

# TEST REPORT

**Report Number.:** 14507330-E1V3

**Applicant :** SRAM LLC  
1000 W Fulton Market 4<sup>th</sup> Floor  
Chicago, IL 60607, United States

**Models :** 12930

**FCC ID :** C9O-RDMB2

**ISED :** 10161A-RDMB2

**EUT Description :** Rear Derailleur with BLE, AIREA and ANT+ Radios

**Test Standard(s) :** FCC 47 CFR PART 15 SUBPART C  
ISED RSS-247 ISSUE 2  
ISED RSS-GEN ISSUE 5 + A1 + A2

**Date of Issue:**  
2022-11-18

**Prepared by:**  
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## REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2022-11-02	Initial Issue	---
V2	2022-11-10	Updated Section 8	Kiya Kedida
V3	2022-11-18	Updated Section 2 and Section 5.3	Dan Coronia

## TABLE OF CONTENTS

<b>REPORT REVISION HISTORY .....</b>	<b>2</b>
<b>TABLE OF CONTENTS .....</b>	<b>3</b>
<b>1. ATTESTATION OF TEST RESULTS .....</b>	<b>5</b>
<b>2. TEST RESULTS SUMMARY .....</b>	<b>7</b>
<b>3. TEST METHODOLOGY .....</b>	<b>8</b>
<b>4. FACILITIES AND ACCREDITATION .....</b>	<b>8</b>
<b>5. DECISION RULES AND MEASUREMENT UNCERTAINTY .....</b>	<b>9</b>
5.1. METROLOGICAL TRACEABILITY .....	9
5.2. DECISION RULES.....	9
5.3. MEASUREMENT UNCERTAINTY.....	9
5.4. SAMPLE CALCULATION .....	10
<b>6. EQUIPMENT UNDER TEST .....</b>	<b>11</b>
6.1. EUT DESCRIPTION .....	11
6.2. MAXIMUM OUTPUT POWER.....	11
6.3. DESCRIPTION OF AVAILABLE ANTENNAS .....	11
6.4. SOFTWARE AND FIRMWARE.....	11
6.5. WORST-CASE CONFIGURATION AND MODE.....	11
6.6. DESCRIPTION OF TEST SETUP.....	12
<b>7. MEASUREMENT METHOD.....</b>	<b>14</b>
<b>8. TEST AND MEASUREMENT EQUIPMENT .....</b>	<b>15</b>
<b>9. ANTENNA PORT TEST RESULTS .....</b>	<b>16</b>
9.1. ON TIME AND DUTY CYCLE.....	16
9.2. 99% BANDWIDTH.....	17
9.3. 6 dB BANDWIDTH.....	18
9.4. OUTPUT POWER.....	19
9.5. AVERAGE POWER.....	20
9.6. POWER SPECTRAL DENSITY.....	21
9.7. CONDUCTED SPURIOUS EMISSIONS.....	22
<b>10. RADIATED TEST RESULTS .....</b>	<b>24</b>
10.1. LIMITS AND PROCEDURE.....	24

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10.2.	TRANSMITTER ABOVE 1 GHz.....	26
10.3.	WORST CASE BELOW 30 MHz.....	36
10.4.	WORST CASE BELOW 1 GHz.....	37
10.5.	WORST CASE 18-26 GHz.....	39
<b>11.</b>	<b>SETUP PHOTOS.....</b>	<b>41</b>

# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SRAM LLC  
1000 W Fulton Market 4<sup>th</sup> Floor  
Chicago, IL 60607, United States

**EUT DESCRIPTION:** Rear Derailleur with BLE, AIREA and ANT+ Radios

**MODELS:** 12930

**SERIAL NUMBER:** Conducted: 1801631006  
Radiated: 1801631011 and 1801631012

**DATE TESTED:** 2022-10-11 TO 2022-10-24

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5 + A1 + A2	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 A2LA, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For  
UL Verification Services Inc. By:

Prepared By:



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Senior Project Engineer  
Consumer Technology Division  
UL Verification Services Inc.

## 2. TEST RESULTS SUMMARY

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for the validity of results after the integration of the data provided by the customer.

Below is a list of the data provided by the customer:

1. Antenna gain and type (see section 6.3)

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment		Duty Cycle	Reporting purposes only	ANSI C63.10 Section 11.6.
-	RSS-GEN 6.7	99% OBW	Reporting purposes only	ANSI C63.10 Section 6.9.3.
15.247 (a) (2)	RSS-247 5.2 (a)	6dB BW	Compliant	None.
15.247 (b) (3)	RSS-247 5.4 (d)	Output Power	Compliant	None.
See Comment		Average power	Reporting purposes only	Per ANSI C63.10, Section 11.9.2.3.2.
15.247 (e)	RSS-247 5.2 (b)	PSD	Compliant	None.
15.247 (d)	RSS-247 5.5	Conducted Spurious Emissions	Compliant	None.
15.209, 15.205	RSS-GEN 8.9, 8.10	Radiated Emissions	Compliant	None.
15.207	RSS-Gen 8.8	AC Mains Conducted Emissions	NA	A.C. line conducted was not evaluated because the E.U.T. uses the battery

### 3. 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, KDB 414788 D01 Radiated Test Site v01r01, RSS-GEN Issue 5 + A1 + A2, and RSS-247 Issue 2.

### 4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, Certificate Number #0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
<input checked="" type="checkbox"/>	Building 1: 47173 Benicia Street Fremont, CA 94538, U.S.A	US0104	2324A	208313
<input type="checkbox"/>	Building 2: 47266 Benicia Street Fremont, CA 94538, U.S.A	US0104	22541	208313
<input checked="" type="checkbox"/>	Building 4: 47658 Kato Rd Fremont, CA 94538, U.S.A	US0104	2324B	208313



## 5. DECISION RULES AND MEASUREMENT UNCERTAINTY

### 5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

### 5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

### 5.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	U <sub>Lab</sub>
Radio Frequency (Spectrum Analyzer)	141.16 Hz
Occupied Bandwidth	1.22%
Power Spectral Density	2.47 dB
RF Power Measurement Direct Method Using Power Meter	1.3 dB (PK) / 0.45 dB (AV)
Unwanted Emissions, Conducted	1.94 dB
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.78 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.40 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.87 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	6.01 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.73 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.51 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.29 dB
Time Domain Measurements	3.39%
Temperature	0.57°C
Humidity	3.39%
DC Supply Voltages	0.57%

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

## 5.4. 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.

$$36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$$

## 6. EQUIPMENT UNDER TEST

### 6.1. EUT DESCRIPTION

The EUT is a Rear Derailleur with BLE, AIREA and ANT+ Radios.

### 6.2. MAXIMUM OUTPUT POWER

The transmitter has maximum peak and average conducted output powers as follows:

Frequency Range (MHz)	Mode	Peak		Average	
		Output Power (dBm)	Output Power (mW)	Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE	6.87	4.86	6.64	4.61

### 6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The antenna gain and type, as provided by the manufacturer, are as follows:

The radio utilizes a ceramic chip antenna, with a maximum gain of 0 dBi.

### 6.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was version B-1.0.

The test utility software used during testing was nRF Connect version 4.26.0.

### 6.5. WORST-CASE CONFIGURATION AND MODE

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

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low, middle, and high channels.

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 rate as provided by the client was 1Mbps.

## 6.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List			
Description	Manufacturer	Model	Serial Number
Phone	Apple	iPhone 8	F4GVG5FZJC67
DC Power Supply	Kenwood Corporation	PA36-3A	7060074
DC Power Supply	TDK.Lambda	ZUP36-6U	LOC-738A019-0007

### I/O CABLES (CONDUCTED EMISSIONS)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Unshielded	1.5	AC Main to DC Supply, to Analyzer
2	DC	1	DC	Unshielded	0.5	Power Supply to EUT
3	Antenna Port	1	SMA	Unshielded	0.1	EUT to Analyzer

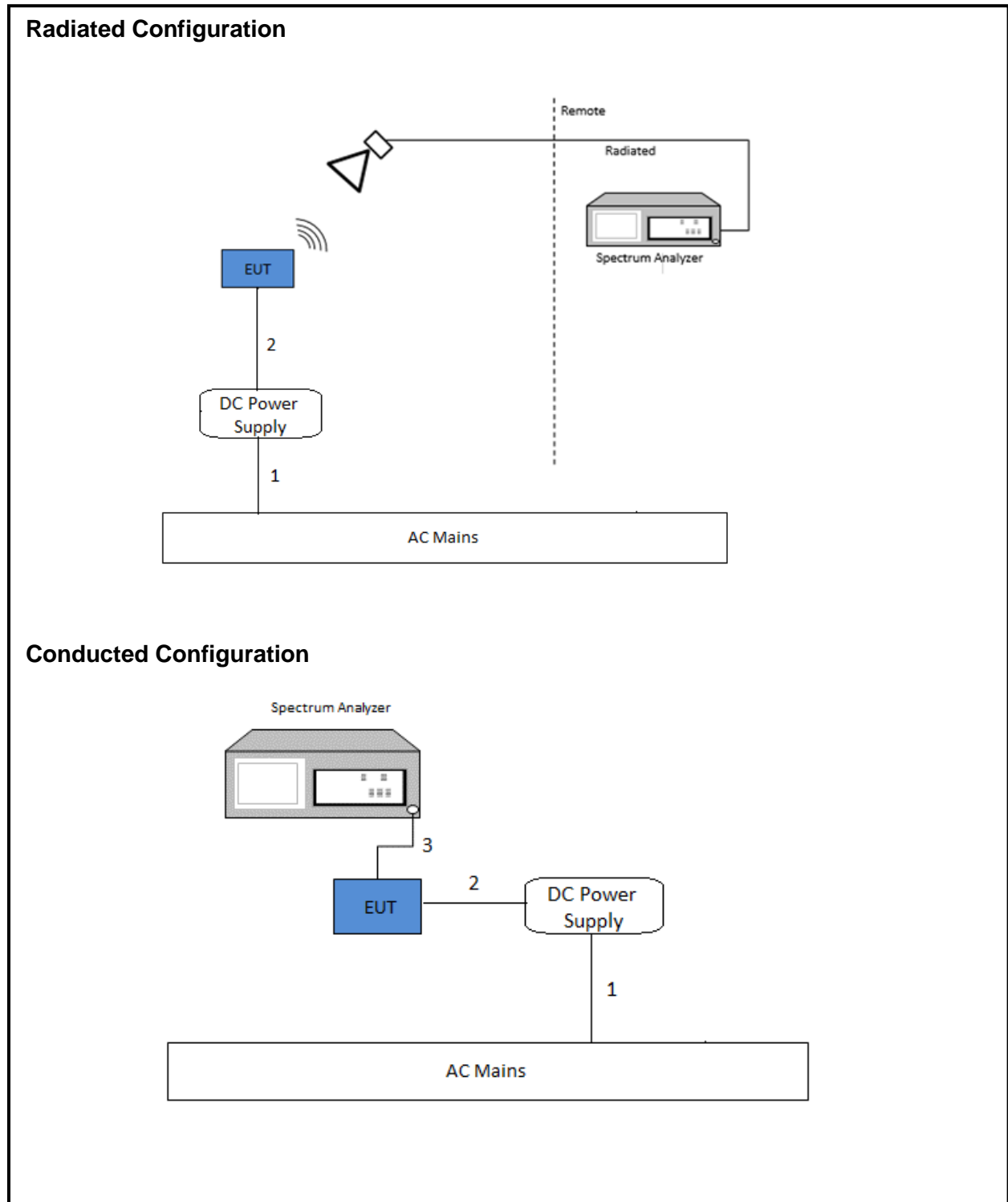
### I/O CABLES (RADIATED EMISSIONS)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Unshielded	1.5	AC Main to DC Supply
2	DC	1	DC	Unshielded	0.5	Power Supply to EUT

### TEST SETUP

For the purposes of testing, the EUT is connected to a 7.4V DC Power supply for radiated emissions above 1GHz. The EUT is normally powered by a custom Li-Ion battery at 7.4V (converted to 3.3 for all microelectronics). The phone is used for setting up purposes and was removed during testing.

**SETUP DIAGRAM**



## 7. MEASUREMENT METHOD

On Time and Duty Cycle: ANSI C63.10 Section 11.6.

6 dB BW: ANSI C63.10 Subclause -11.8.1 RBW  $\geq$  DTS BW

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

Output Power: ANSI C63.10 Subclause -11.9.1.3 Method PKPM1 Peak-reading power meter

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 Section 6.10

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. 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
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB1	80293	2023-08-09	2022-08-09
Amplifier, 10KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	175953	2023-02-08	2022-02-08
Amplifier, 10KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310N	29654	2023-04-24	2022-04-24
Antenna, Horn 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	206805	2023-07-05	2022-07-05
RF Filter Box, 1-18GHz	UL-FR1	n/a	171875	2023-08-12	2022-08-12
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	201501	2023-02-19	2022-02-19
EMI TEST RECEIVER, with B8 option	Rohde & Schwarz	ESW44	PRE0179377	2023-02-20	2022-02-20
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	169927	2023-02-13	2022-02-13
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	81138	*2022-10-13	2021-10-13
Amplifier 18-26.5GHz, +5Vdc, 60dB min	AMPLICAL	AMP18G26.5-60	215705	2023-02-26	2022-02-26
Antenna, Passive Loop 30Hz - 1MHz	ELECTRO METRICS	EM-6871	219909	2023-05-10	2022-05-10
Antenna, Passive Loop 100KHz - 30MHz	ELECTRO METRICS	EM-6872	219911	2023-05-10	2022-05-10
Spectrum Analyzer, PSA, 3Hz to 44GHz	Agilent Technologies	N4440A	80386	2023-03-02	2022-03-02
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	T1268	2023-02-03	2022-02-03
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	90419	2023-03-02	2022-03-02
10dB Fixed Attenuator	Pasternack Enterprises	PE7087-10	N/A	Verified	Verified
UL TEST SOFTWARE LIST					
Radiated Software	UL	UL EMC	Ver 2022-07-06, 2022-06-01, 2022-05-05, 2022-05-18, 2021-12-07, and 2014-07-15		
Antenna Port Software	UL	UL RF	Ver 2022.5.31		

### NOTES:

\*- Calibration due date extended to 2022-10-31.

## 9. ANTENNA PORT TEST RESULTS

### 9.1. ON TIME AND DUTY CYCLE

#### LIMITS

None; for reporting purposes only.

#### PROCEDURE

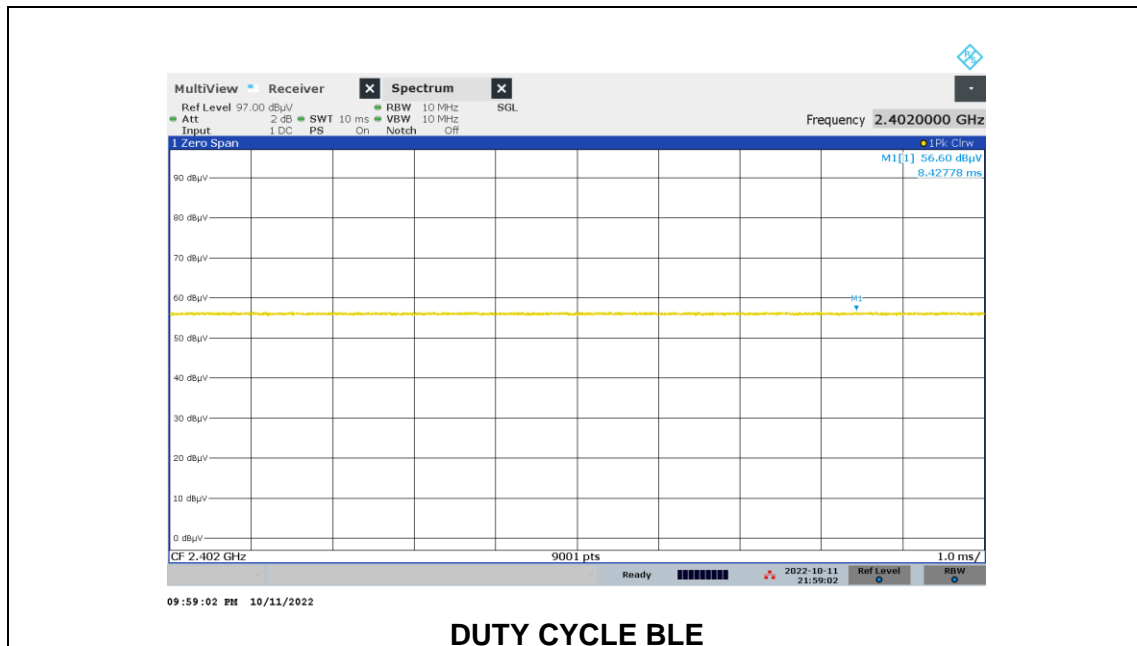
KDB 558074 Zero-Span Spectrum Analyzer Method.

#### ON TIME AND DUTY CYCLE RESULTS

<b>Tested By:</b>	SI 23522
<b>Date:</b>	2022-10-11

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
BLE (1Mbps)	8.428	8.428	1.000	100.00	0.00	0.010

#### DUTY CYCLE PLOTS



DUTY CYCLE BLE



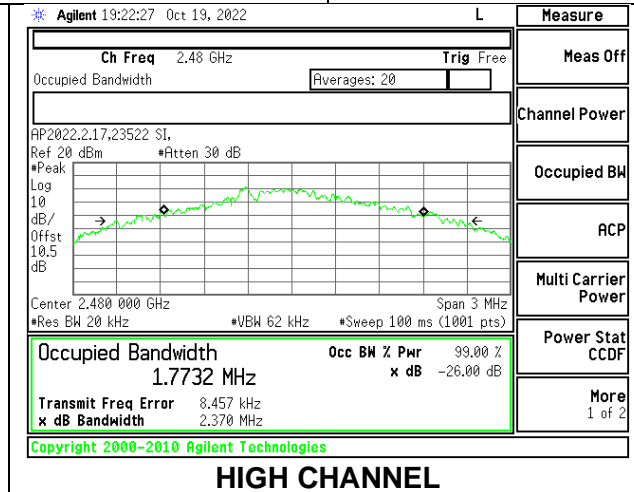
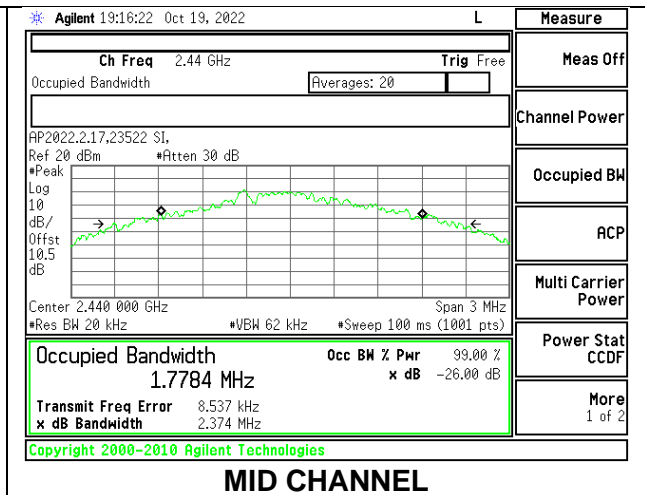
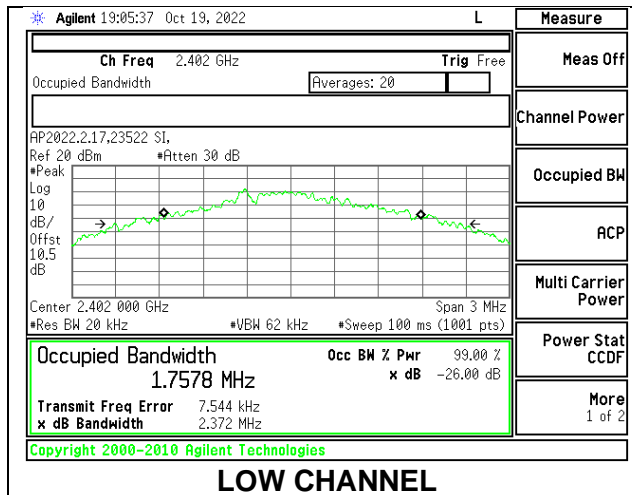
## 9.2. 99% BANDWIDTH

### LIMITS

None; for reporting purposes only.

### RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.7578
Middle	2440	1.7784
High	2480	1.7732



### 9.3. 6 dB BANDWIDTH

#### LIMITS

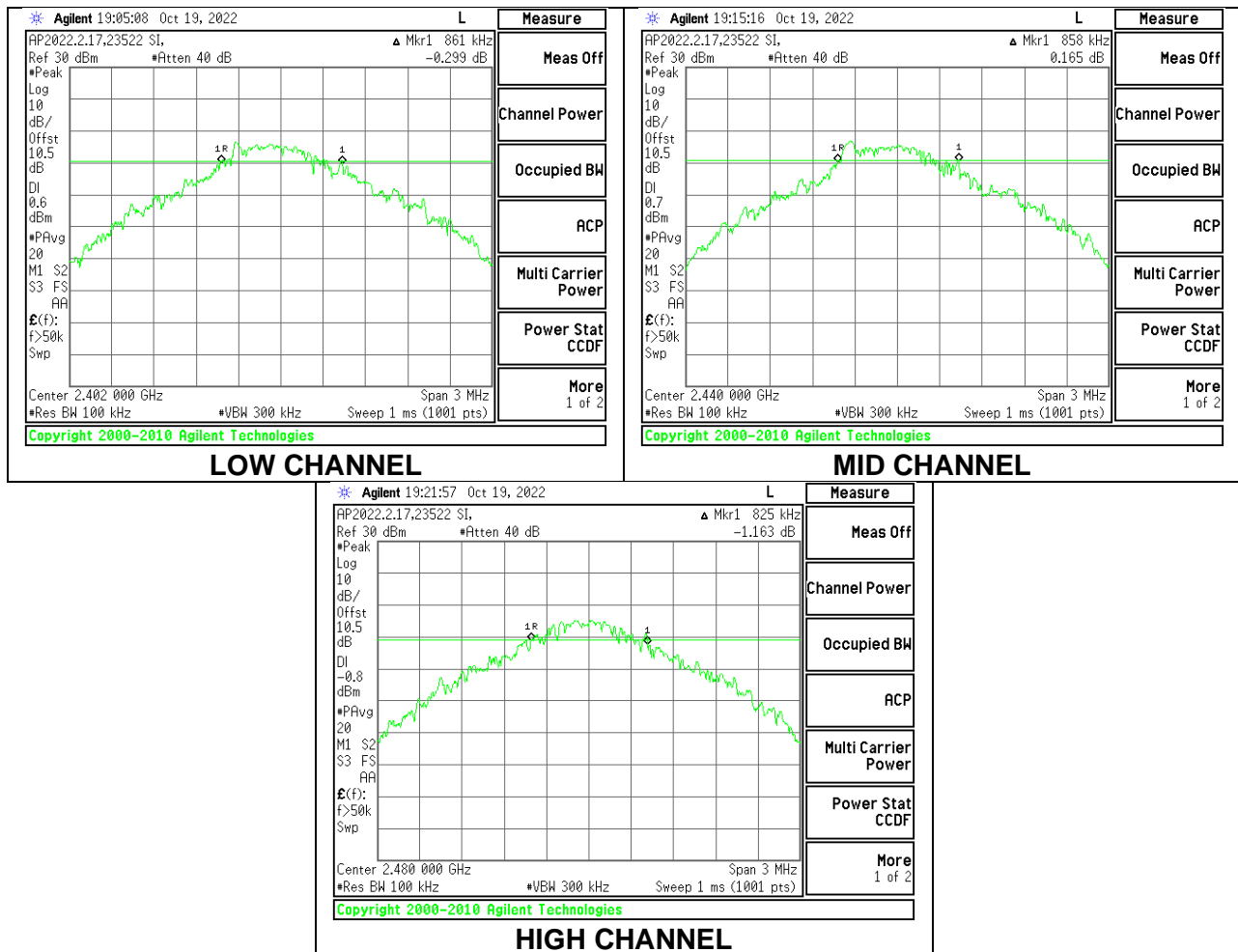
FCC §15.247 (a) (2)

RSS-247 5.2 (a)

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

#### RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.861	0.5
Middle	2440	0.858	0.5
High	2480	0.825	0.5



## 9.4. 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 power output measured on the EUT antenna port using SMA cable with 10dB attenuator connected to a power meter via wideband power sensor. Peak output power was read directly from power meter.

### RESULTS

<b>Tested By:</b>	SI 23522
<b>Date:</b>	2022-10-19

<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Peak Power Reading (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>
Low	2402	6.78	30	-23.22
Middle	2440	6.87	30	-23.13
High	2480	6.48	30	-23.52

## 9.5. AVERAGE POWER

### LIMITS

None; for reporting purposes only.

### TEST PROCEDURE

The transmitter output is connected to a power meter.

The power output measured on the EUT antenna port using SMA cable with 10dB attenuator connected to a power meter via wideband power sensor. Average output power was read directly from power meter.

### RESULTS

<b>Tested By:</b>	SI 23522
<b>Date:</b>	2022-10-19

<b>Channel</b>	<b>Frequency (MHz)</b>	<b>AV power (dBm)</b>
Low	2402	6.64
Middle	2440	6.57
High	2480	6.35

## 9.6. POWER SPECTRAL DENSITY

### LIMITS

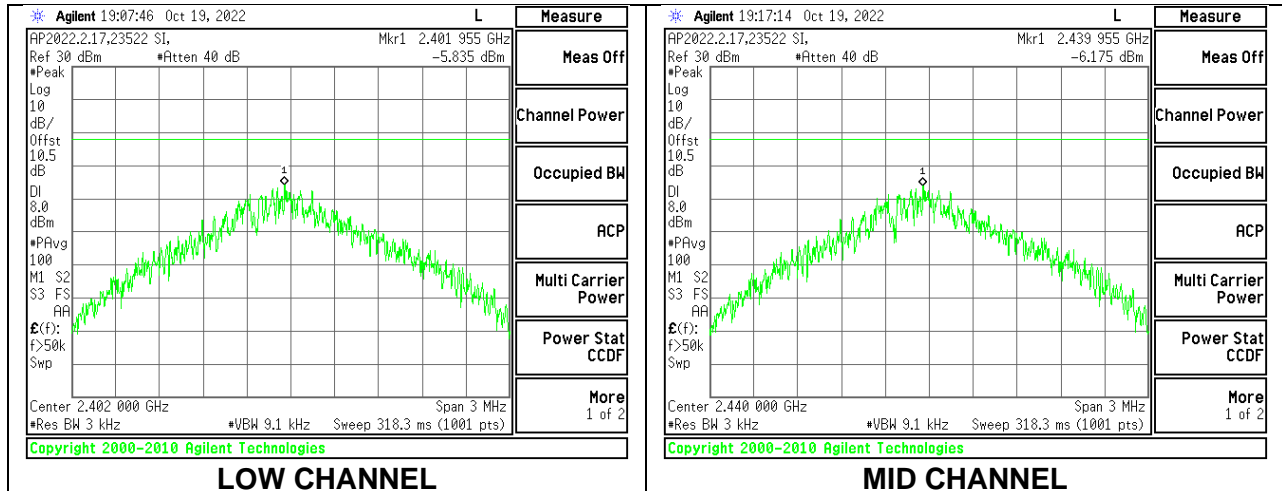
FCC §15.247 (e)

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.

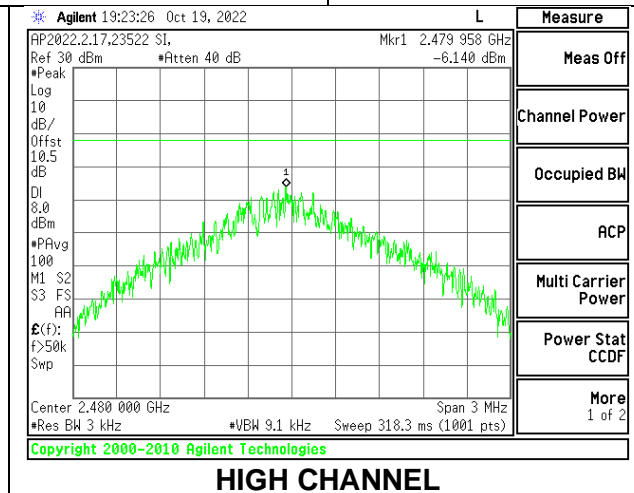
### RESULTS

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-5.835	8	-13.84
Middle	2440	-6.175	8	-14.18
High	2480	-6.140	8	-14.14



**LOW CHANNEL**

**MID CHANNEL**



**HIGH CHANNEL**

## **9.7. CONDUCTED SPURIOUS EMISSIONS**

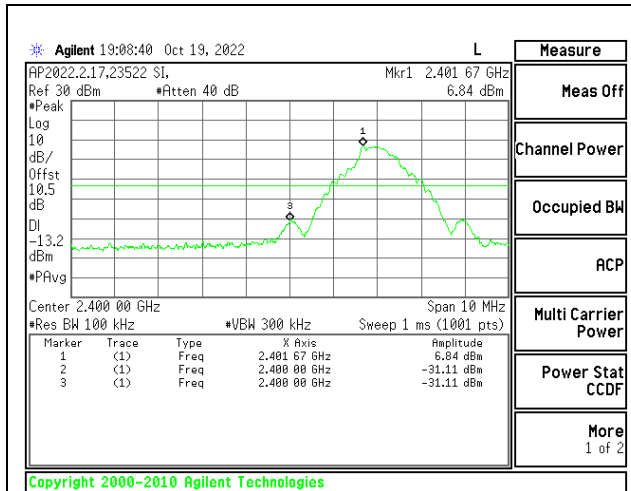
### **LIMITS**

FCC §15.247 (d)

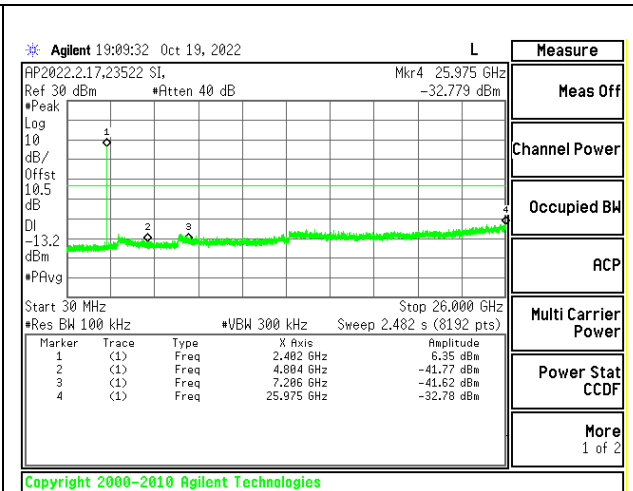
RSS-247 5.5

Output power was measured based on the use of a peak measurement; therefore, spurious emissions are required to be 20 dBc.

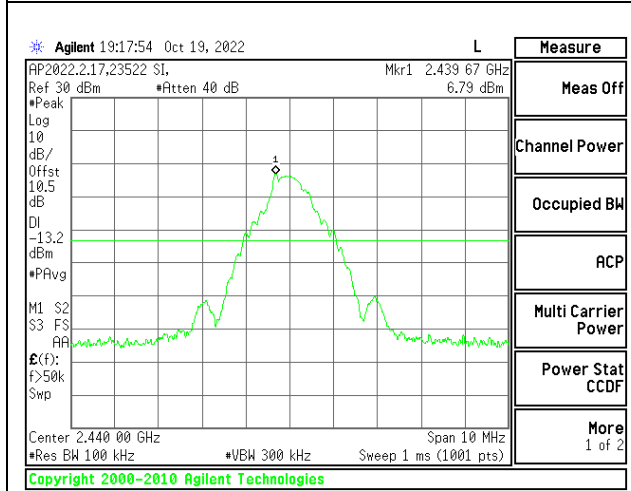
### **RESULTS**



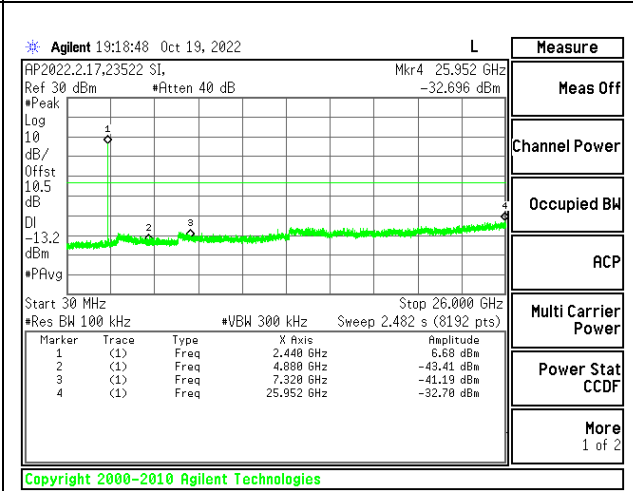
**LOW CHANNEL BANDEDGE**



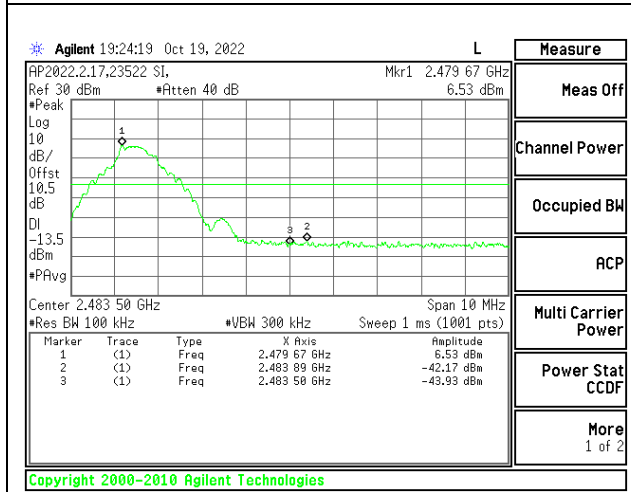
**OUT-OF-BAND LOW CHANNEL**



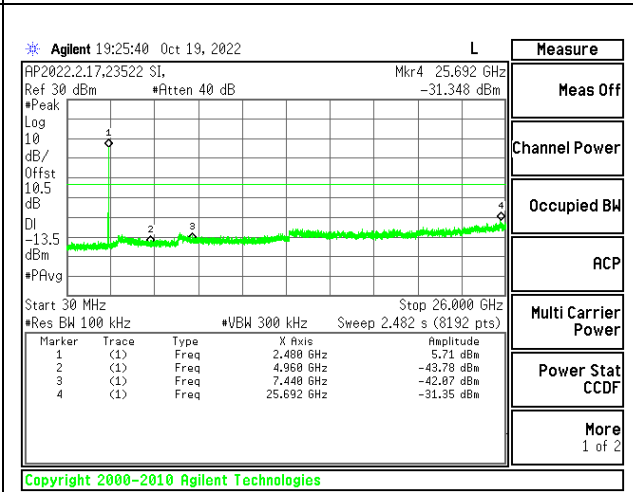
**IN-BAND REFERENCE LEVEL**



**OUT-OF-BAND MID CHANNEL**



**HIGH CHANNEL BANDEDGE**



**OUT-OF-BAND HIGH CHANNEL**

## 10. RADIATED TEST RESULTS

### 10.1. 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.



2D antenna use - 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.

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.

**KB 414788 Open Field Site (OFS) and Chamber Correlation Justification**

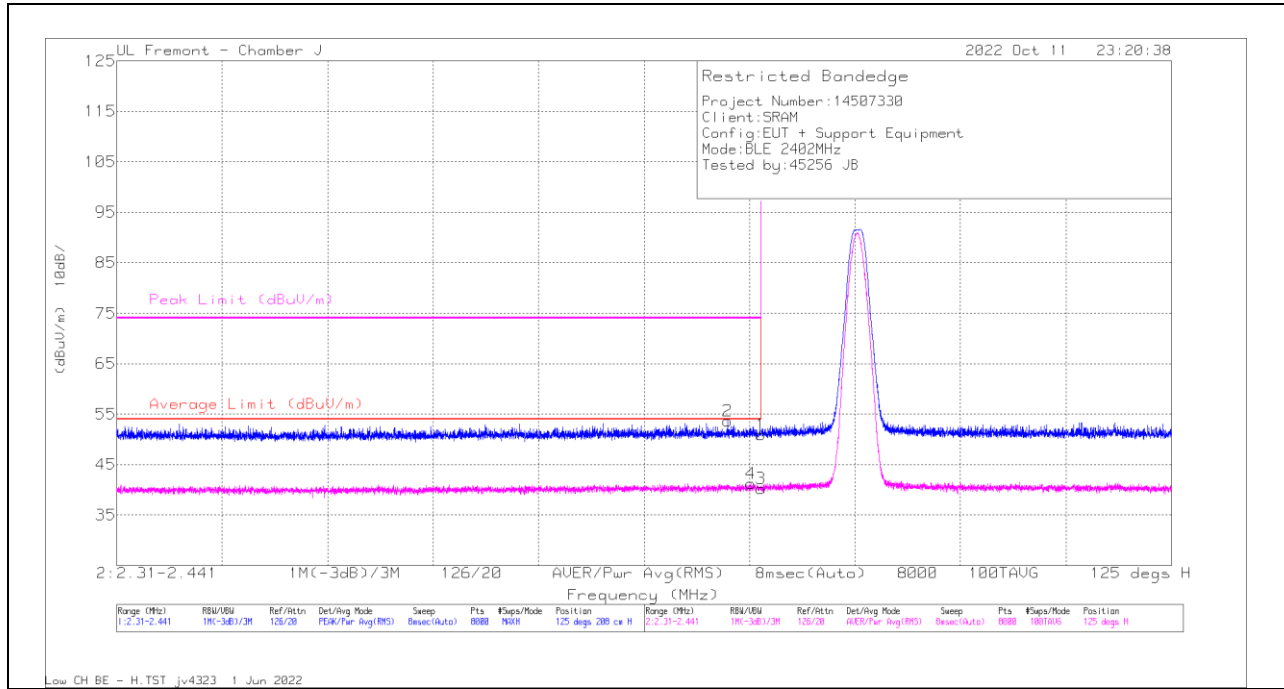
OFS and chamber correlation testing had been performed and chamber measured test result is the worst-case test result.

**Note:** The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table), using the free space impedance of 377 Ohms. For example, the measurement at frequency X kHz resulted in a level of Y dBuV/m, which is equivalent to  $Y - 51.5 = Z$  dBuA/m, which has the same margin, W dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

## 10.2. TRANSMITTER ABOVE 1 GHz

### BANDEDGE (LOW CHANNEL)

#### HORIZONTAL RESULT

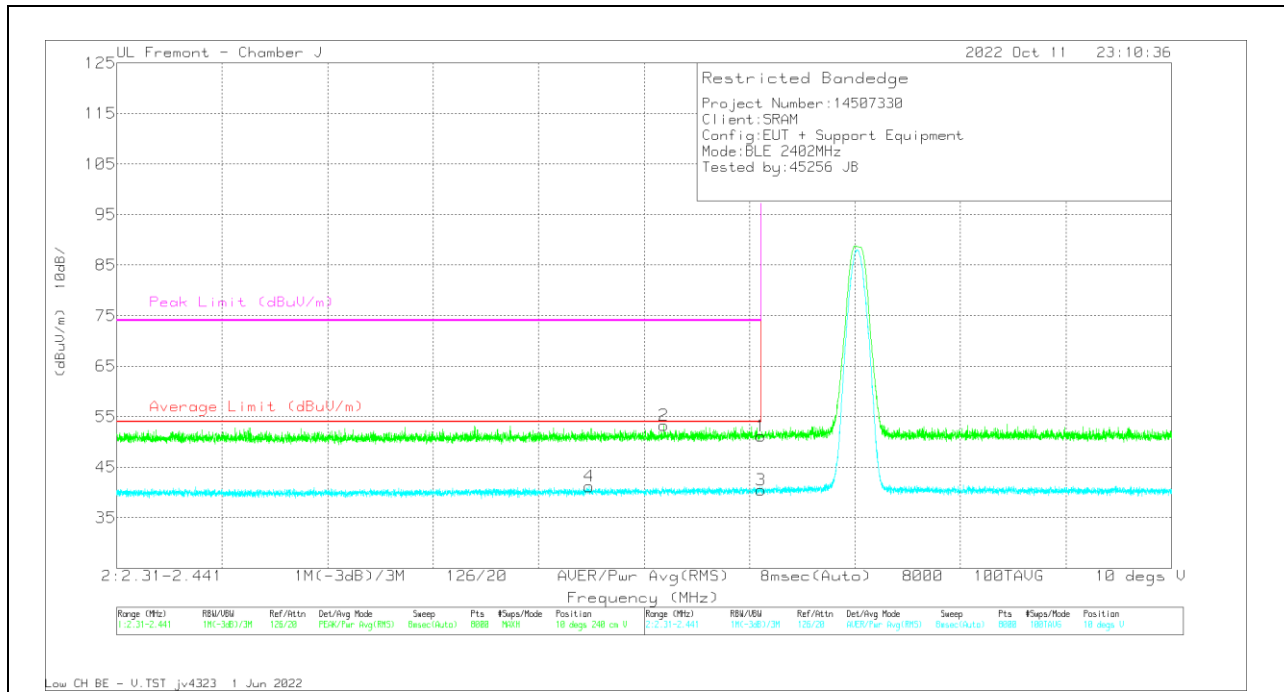


#### Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	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	* 2390	57.87	Pk	32.5	-39.4	50.97	-	-	74	-23.03	125	208	H
2	* 2385.891	60.49	Pk	32.5	-39.4	53.59	-	-	74	-20.41	125	208	H
3	* 2390	47.15	RMS	32.5	-39.4	40.25	54	-13.75	-	-	125	208	H
4	* 2388.757	48.13	RMS	32.5	-39.4	41.23	54	-12.77	-	-	125	208	H

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

### VERTICAL RESULT



### Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	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	* 2390	58.05	Pk	32.5	-39.4	51.15	-	-	74	-22.85	10	240	V
2	* 2377.948	60.24	Pk	32.4	-39.4	53.24	-	-	74	-20.76	10	240	V
3	* 2390	47.44	RMS	32.5	-39.4	40.54	54	-13.46	-	-	10	240	V
4	* 2368.679	48.27	RMS	32.3	-39.4	41.17	54	-12.83	-	-	10	240	V

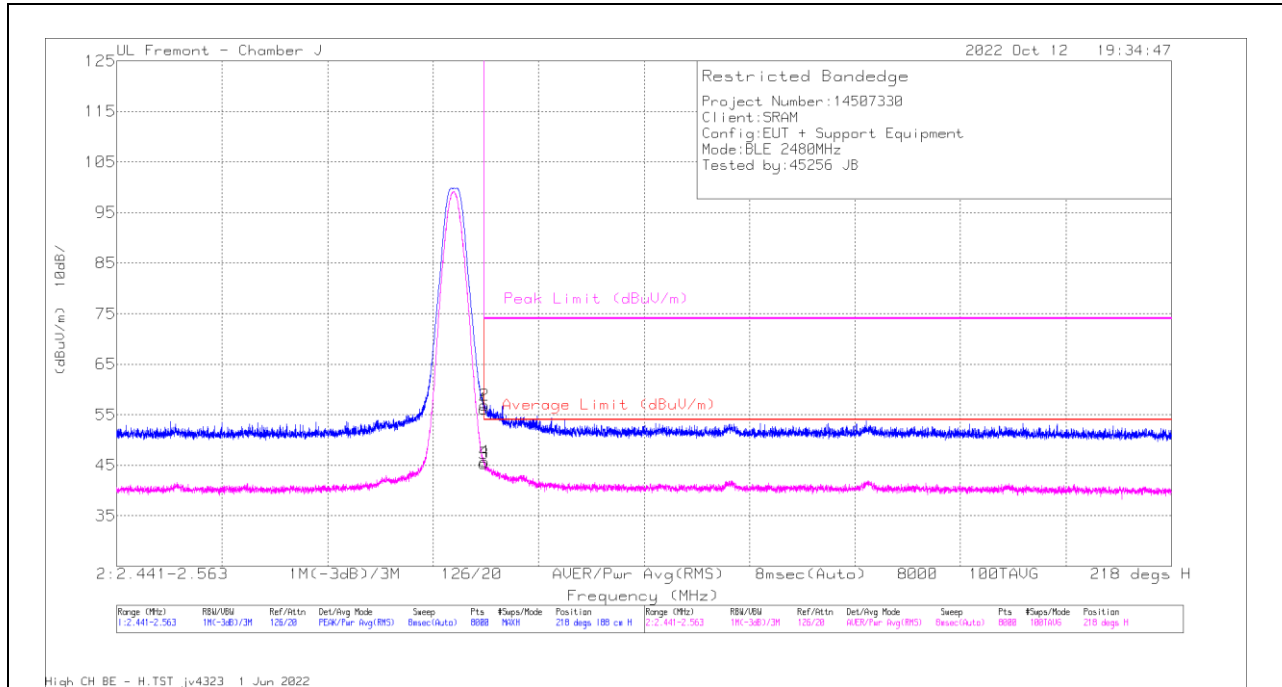
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

**BANDEDGE (HIGH CHANNEL)**

**HORIZONTAL RESULT**

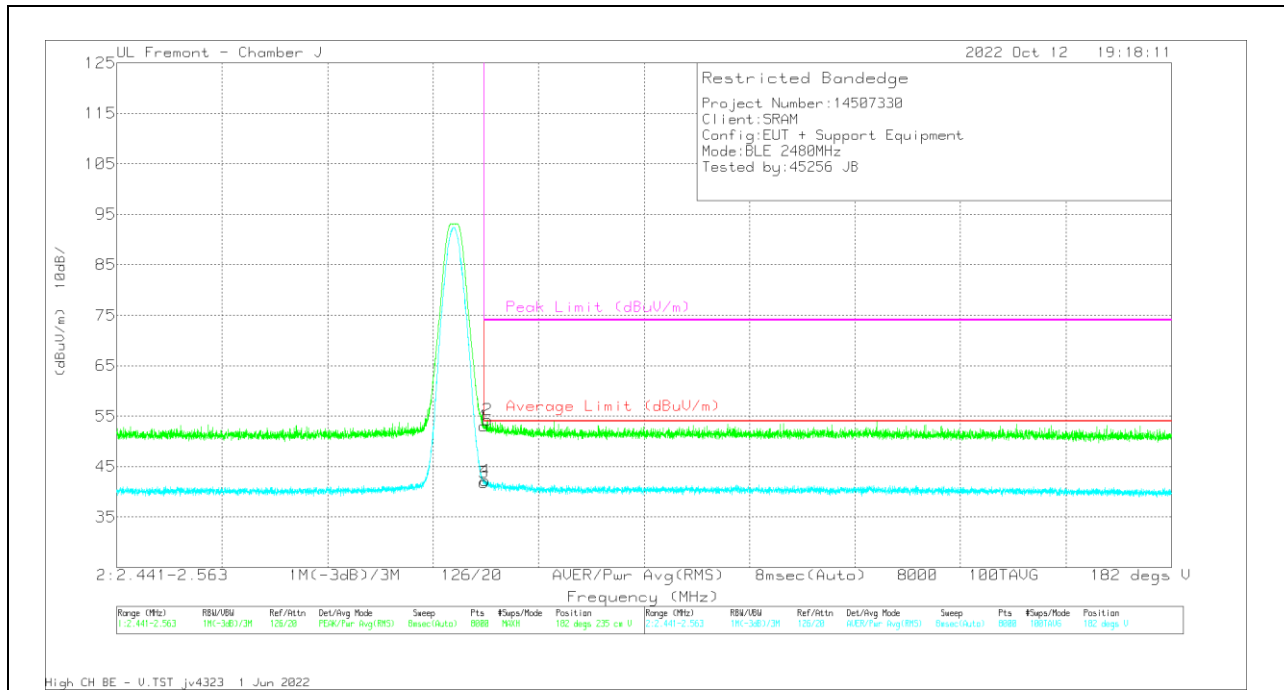


**Trace Markers**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	Amp/Cb/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2483.5	62.7	Pk	32.5	-39.1	56.1	-	-	74	-17.9	218	188	H
2	* 2483.568	63.45	Pk	32.5	-39.1	56.85	-	-	74	-17.15	218	188	H
3	* 2483.5	51.93	RMS	32.5	-39.1	45.33	54	-8.67	-	-	218	188	H
4	* 2483.538	52.27	RMS	32.5	-39.1	45.67	54	-8.33	-	-	218	188	H

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

### VERTICAL RESULT



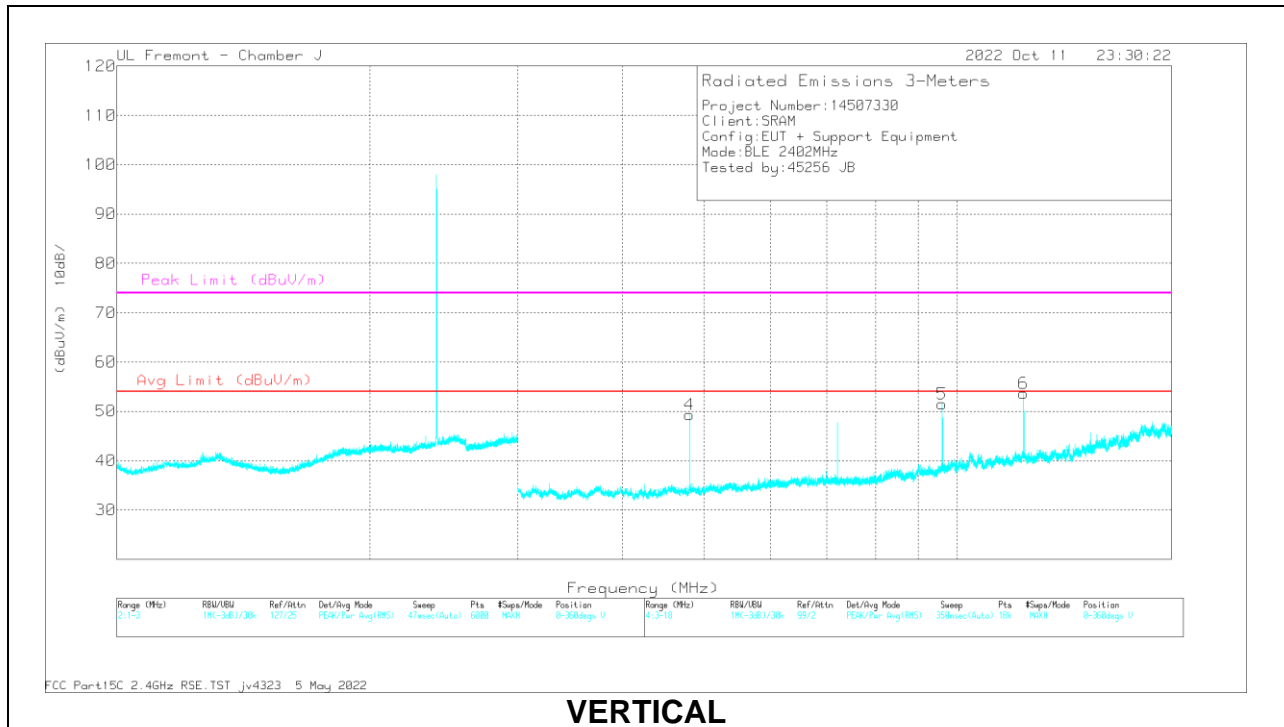
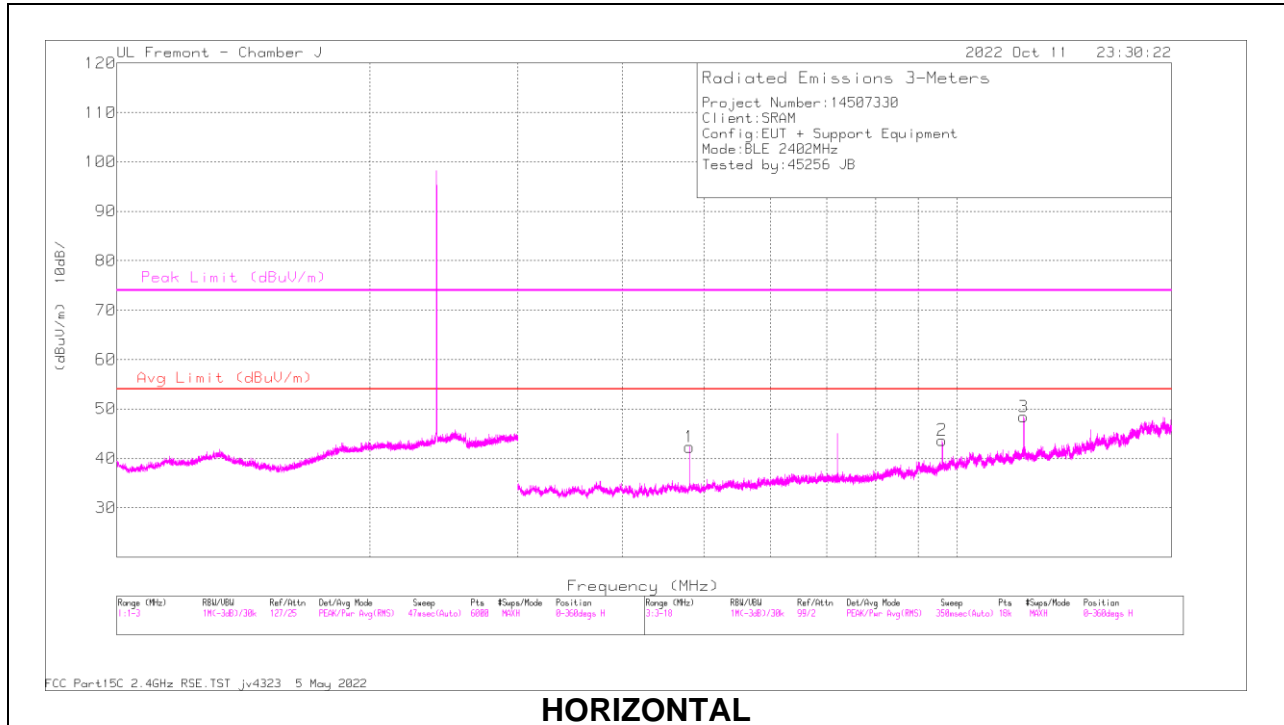
### Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	Amp/Cb/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2483.5	59.63	Pk	32.5	-39.1	53.03	-	-	74	-20.97	182	235	V
2	* 2483.919	60.91	Pk	32.5	-39.1	54.31	-	-	74	-19.69	182	235	V
3	* 2483.5	48.46	RMS	32.5	-39.1	41.86	54	-12.14	-	-	182	235	V
4	* 2483.614	48.84	RMS	32.5	-39.1	42.24	54	-11.76	-	-	182	235	V

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

# HARMONICS AND SPURIOUS EMISSIONS

## LOW CHANNEL RESULTS

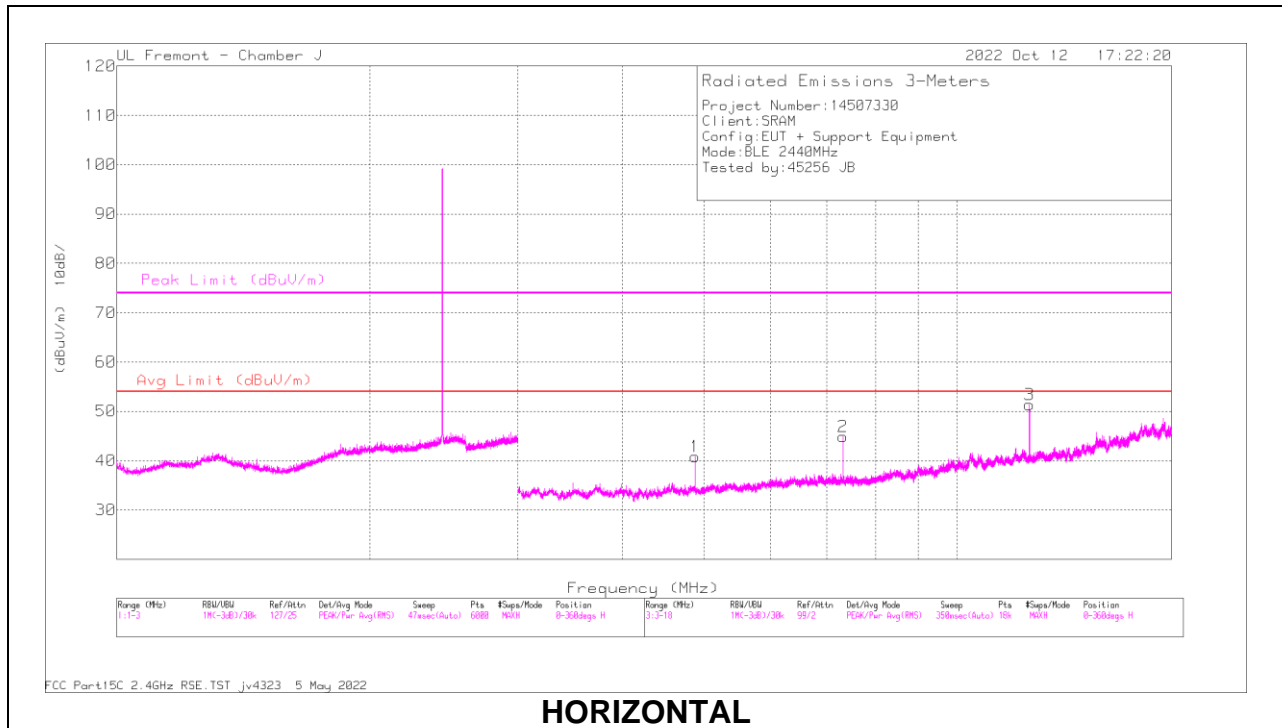


**RADIATED EMISSIONS**

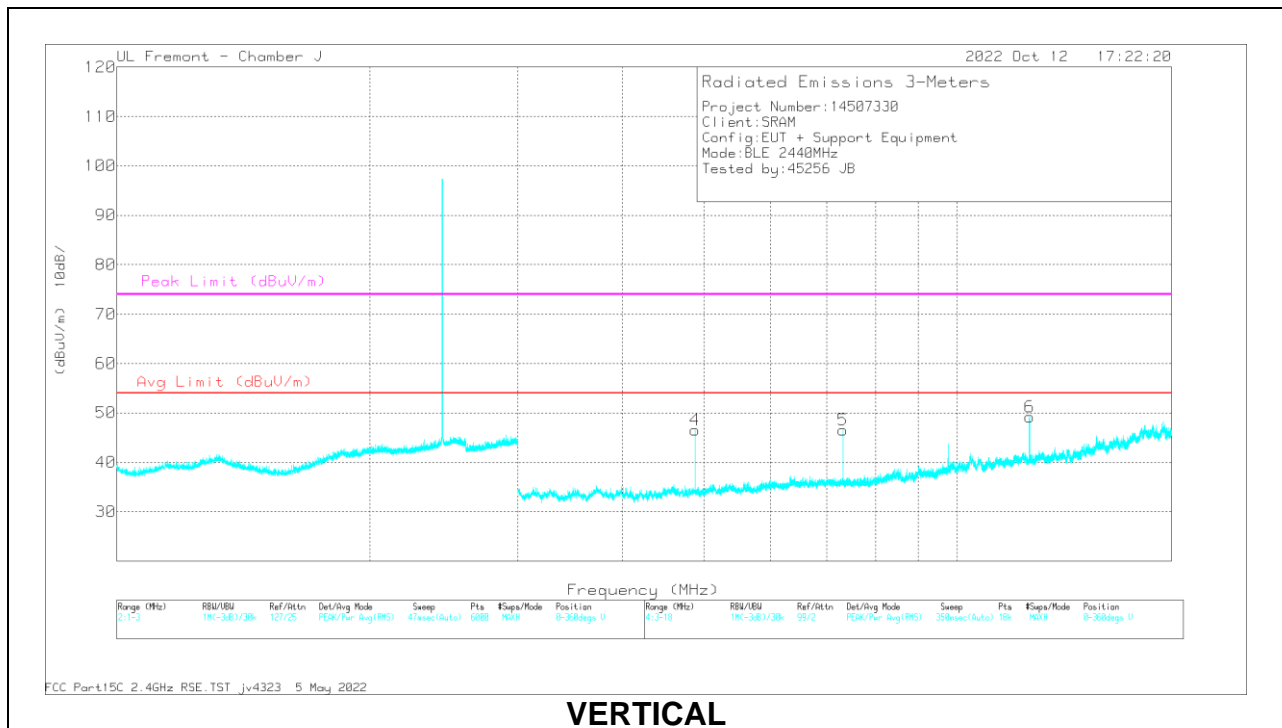
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4803.425	64.68	PK2	34	-47.6	51.08	-	-	74	-22.92	165	398	H
	* 4803.676	58	MAv1	34	-47.6	44.4	54	-9.6	-	-	165	398	H
2	9606.561	62.37	PK2	36.7	-44.9	54.17	-	-	-	-	356	234	H
	* 12008.57	60.85	PK2	38.8	-43.2	56.45	-	-	74	-17.55	51	221	H
3	* 12008.618	53.37	MAv1	38.8	-43.2	48.97	54	-5.03	-	-	51	221	H
	* 4803.31	66.72	PK2	34	-47.6	53.12	-	-	74	-20.88	37	172	V
4	* 4803.722	61.59	MAv1	34	-47.6	47.99	54	-6.01	-	-	37	172	V
	9606.785	63.96	PK2	36.7	-44.9	55.76	-	-	-	-	243	217	V
6	* 12008.434	59.89	PK2	38.8	-43.2	55.49	-	-	74	-18.51	45	110	V
	* 12008.614	51.82	MAv1	38.8	-43.2	47.42	54	-6.58	-	-	45	110	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



**HORIZONTAL**



**VERTICAL**



**RADIATED EMISSIONS**

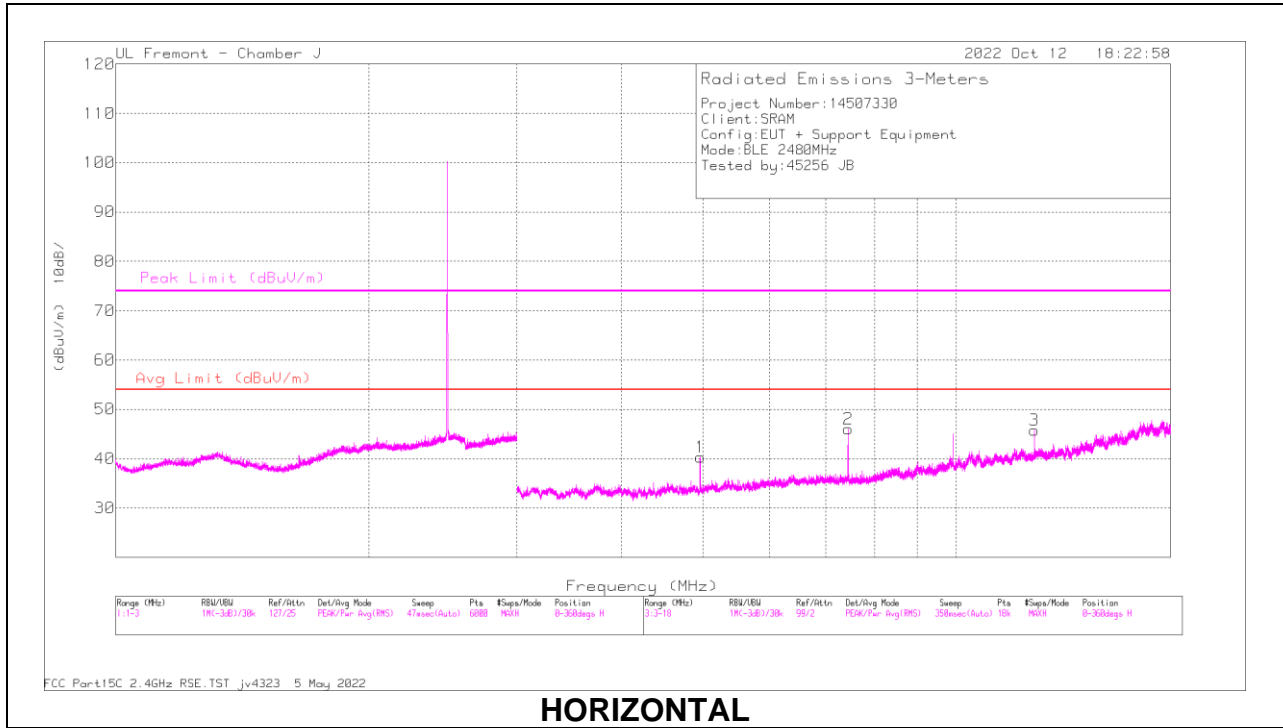
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4880.101	56.67	PK2	34.1	-47	43.77	-	-	74	-30.23	77	303	H
	* 4880.041	48.02	MAv1	34.1	-47	35.12	54	-18.88	-	-	77	303	H
2	* 7318.921	63.1	PK2	35.9	-45.9	53.1	-	-	74	-20.9	43	200	H
	* 7319.129	56.54	MAv1	35.9	-45.9	46.54	54	-7.46	-	-	43	200	H
3	* 12198.343	61.38	PK2	39.1	-43.3	57.18	-	-	74	-16.82	33	255	H
	* 12198.57	54.35	MAv1	39.1	-43.3	50.15	54	-3.85	-	-	33	255	H
4	* 4880.551	63.97	PK2	34.1	-47	51.07	-	-	74	-22.93	346	102	V
	* 4879.72	58.21	MAv1	34.1	-47	45.31	54	-8.69	-	-	346	102	V
5	* 7318.987	63.63	PK2	35.9	-45.9	53.63	-	-	74	-20.37	19	230	V
	* 7319.107	57.53	MAv1	35.9	-45.9	47.53	54	-6.47	-	-	19	230	V
6	* 12198.525	60.51	PK2	39.1	-43.3	56.31	-	-	74	-17.69	238	113	V
	* 12198.425	53.37	MAv1	39.1	-43.3	49.17	54	-4.83	-	-	238	113	V

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

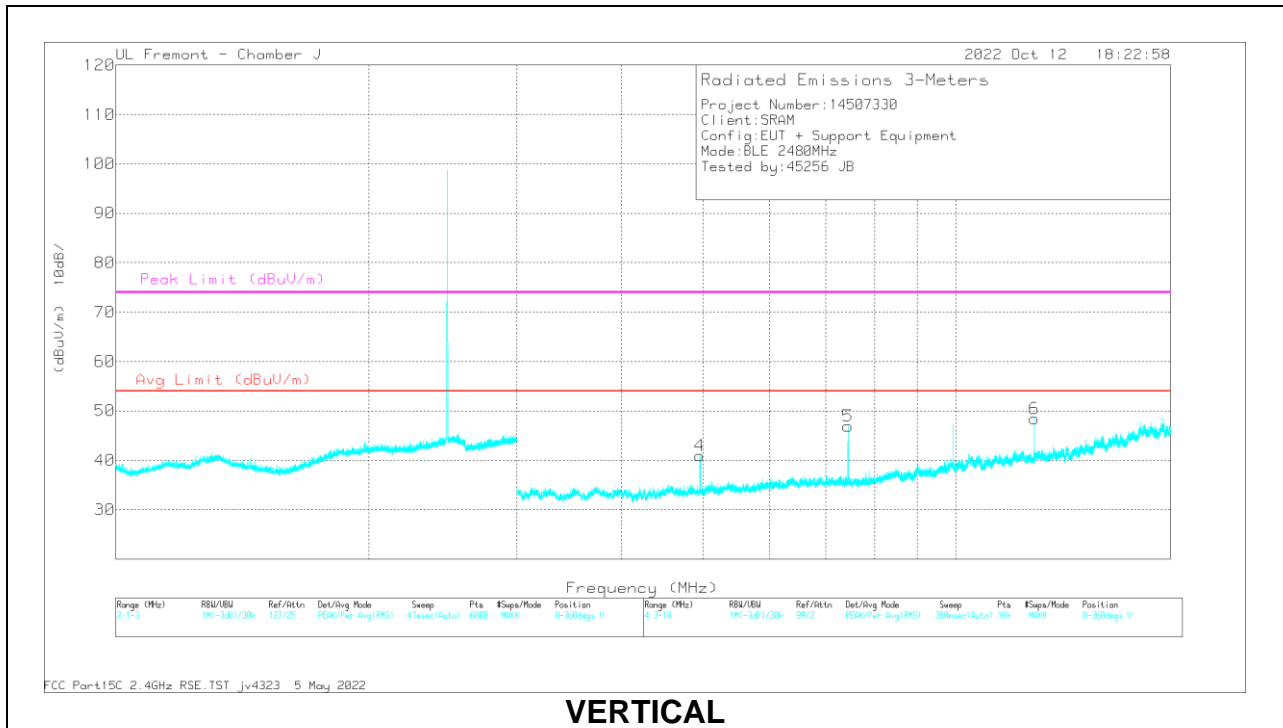
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

### HIGH CHANNEL RESULTS



**HORIZONTAL**



**VERTICAL**

**RADIATED EMISSIONS**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	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	* 4960.27	60.84	PK2	34.2	-47.1	47.94	-	-	74	-26.06	229	140	H
	* 4960.066	52.26	MAv1	34.2	-47.1	39.36	54	-14.64	-	-	229	140	H
2	* 7438.998	63.47	PK2	35.9	-45.8	53.57	-	-	74	-20.43	44	220	H
	* 7439.262	56.83	MAv1	35.9	-45.7	47.03	54	-6.97	-	-	44	220	H
3	* 12398.48	56.8	PK2	39	-43.2	52.6	-	-	74	-21.4	154	108	H
	* 12398.408	48.04	MAv1	39	-43.2	43.84	54	-10.16	-	-	154	108	H
4	* 4959.419	59.73	PK2	34.2	-47.1	46.83	-	-	74	-27.17	32	323	V
	* 4959.783	50.62	MAv1	34.2	-47.1	37.72	54	-16.28	-	-	32	323	V
5	* 7438.926	63.02	PK2	35.9	-45.8	53.12	-	-	74	-20.88	10	163	V
	* 7439.129	56.8	MAv1	35.9	-45.8	46.9	54	-7.1	-	-	10	163	V
6	* 12398.316	59.01	PK2	39	-43.2	54.81	-	-	74	-19.19	240	126	V
	* 12398.484	51.36	MAv1	39	-43.2	47.16	54	-6.84	-	-	240	126	V

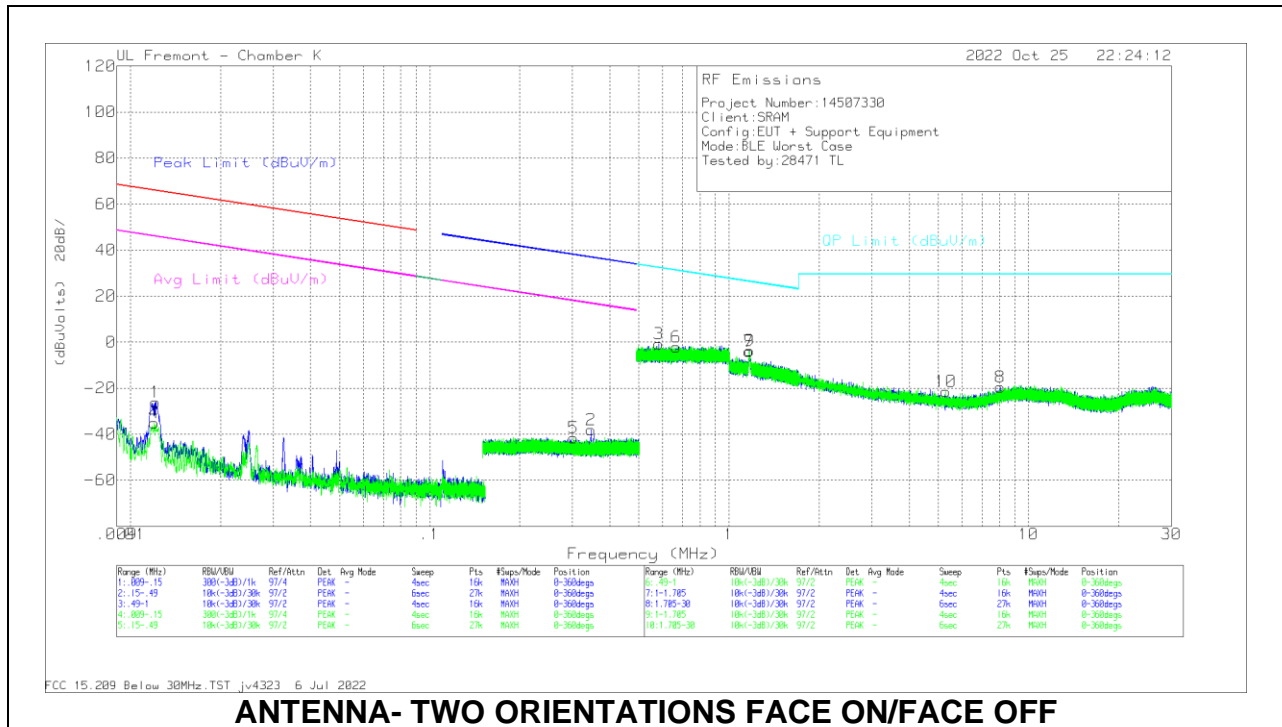
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

### 10.3. WORST CASE BELOW 30 MHz

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



#### ANTENNA- TWO ORIENTATIONS FACE ON/FACE OFF

#### Below 30MHz Data

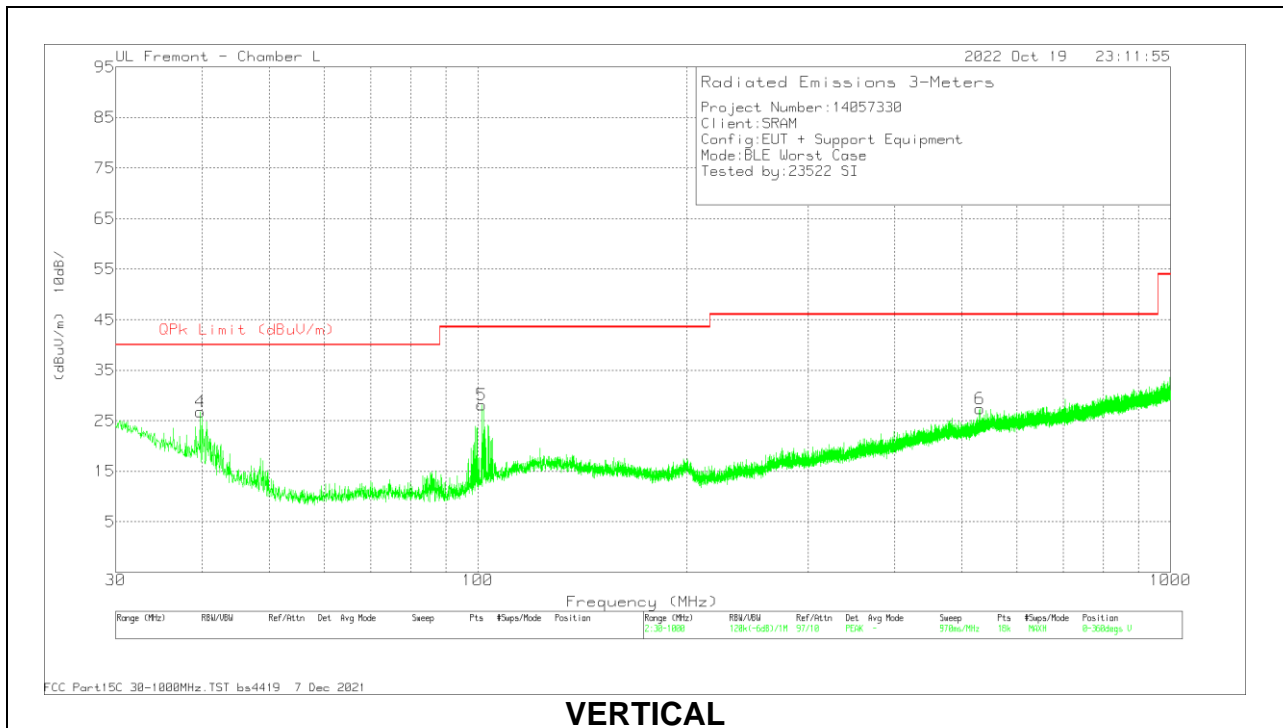
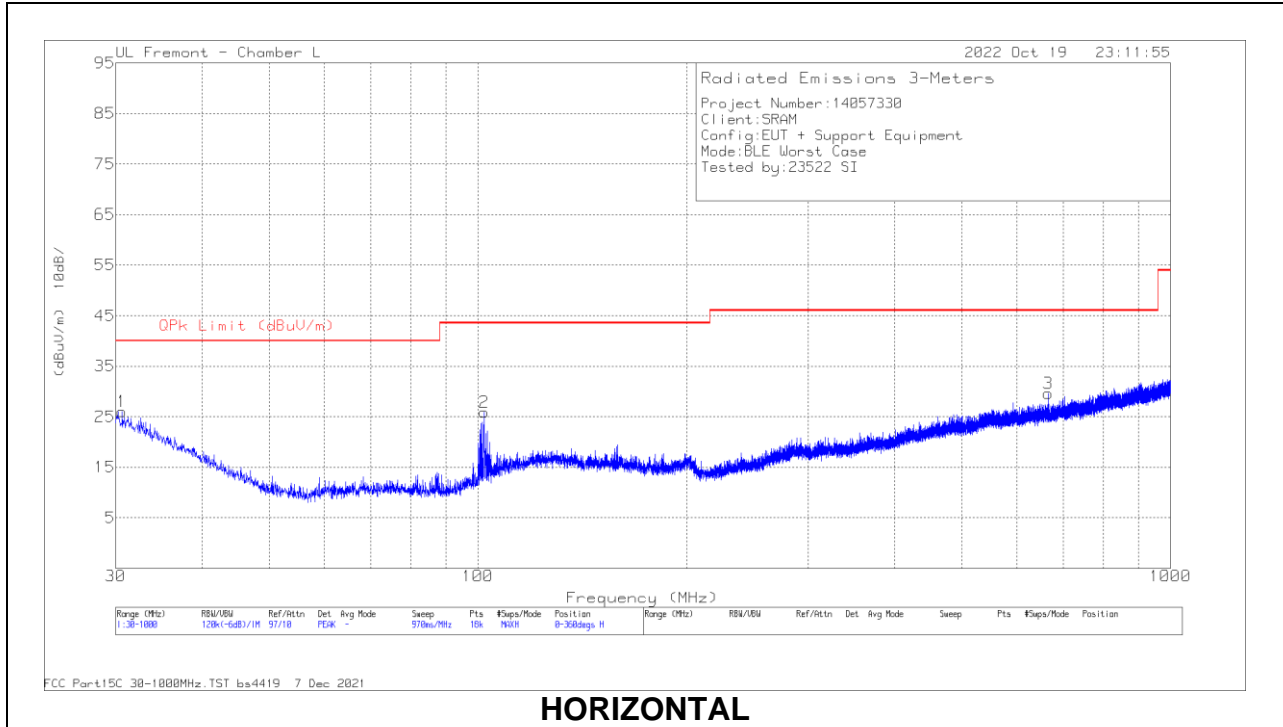
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Antenna Polarity (Degs)
1	.0122	24.83	Pk	60	-31	-80	-26.17	65.88	-92.05	45.88	-72.05	-	-	0-360	0-deg
2	.3466	17.95	Pk	56.2	-32.2	-80	-38.05	36.81	-74.86	16.81	-54.86	-	-	0-360	0-deg
4	.012	16.02	Pk	60	-31	-80	-34.98	65.99	-100.97	45.99	-80.97	-	-	0-360	90-deg
5	.3023	14.45	Pk	56.2	-32.2	-80	-41.55	38	-79.55	18	-59.55	-	-	0-360	90-deg
3	.581	15.18	Pk	56.1	-32.1	-40	-.82	-	-	-	-	32.32	-33.14	0-360	0-deg
6	.6651	13.82	Pk	56.2	-32.1	-40	-2.08	-	-	-	-	31.15	-33.23	0-360	0-deg
7	1.1672	22.17	Pk	46	-32.1	-40	-3.93	-	-	-	-	26.28	-30.21	0-360	0-deg
8	8.0622	17.42	Pk	34.7	-31.8	-40	-19.68	-	-	-	-	29.5	-49.18	0-360	0-deg
9	1.1694	22.35	Pk	46	-32.1	-40	-3.75	-	-	-	-	26.27	-30.02	0-360	90-deg
10	5.2965	14.56	Pk	35.8	-31.9	-40	-21.54	-	-	-	-	29.5	-51.04	0-360	90-deg

Pk - Peak detector

**Note:** The Limits in CRF 47, Part 15, Subpart C, Paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ohms. For example, the measurement at frequency X kHz resulted in a level of Y dBuV/m, which is equivalent to  $Y - 51.5 = Z$  dBuA/m, which has the same margin, W dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

### 10.4. WORST CASE BELOW 1 GHz

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



**Below 1GHz Data**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80293 ACF (dB)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.6467	29.75	Pk	27.6	-31.3	26.05	40	-13.95	0-360	100	H
2	102.05	39.83	Pk	16.7	-30.7	25.83	43.52	-17.69	0-360	299	H
3	665.782	31.78	Pk	26.2	-28.4	29.58	46.02	-16.44	0-360	299	H
4	39.7	37.22	Pk	20.7	-31.2	26.72	40	-13.28	324	100	V
	39.5298	26.21	Qp	20.8	-31.2	15.81	40	-24.19	324	100	V
5	101.295	42.35	Pk	16.5	-30.7	28.15	43.52	-15.37	0-360	100	V
6	530.737	31.42	Pk	24.3	-28.3	27.42	46.02	-18.6	0-360	100	V

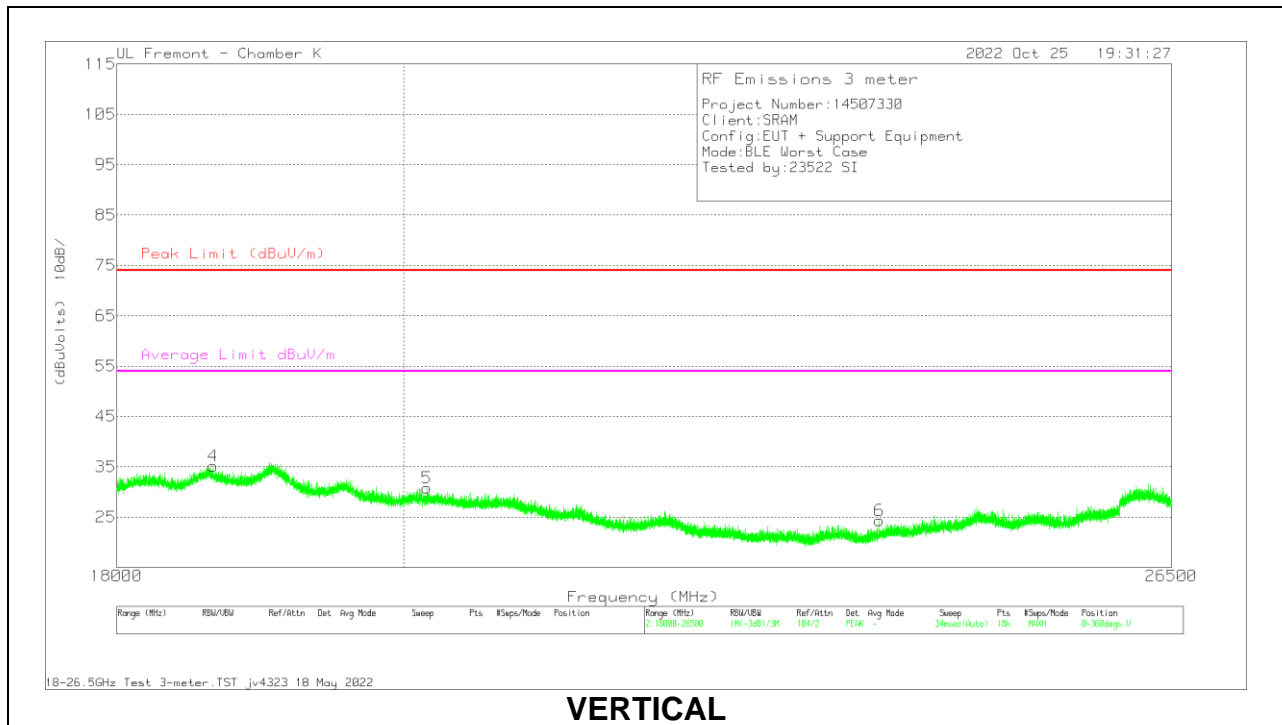
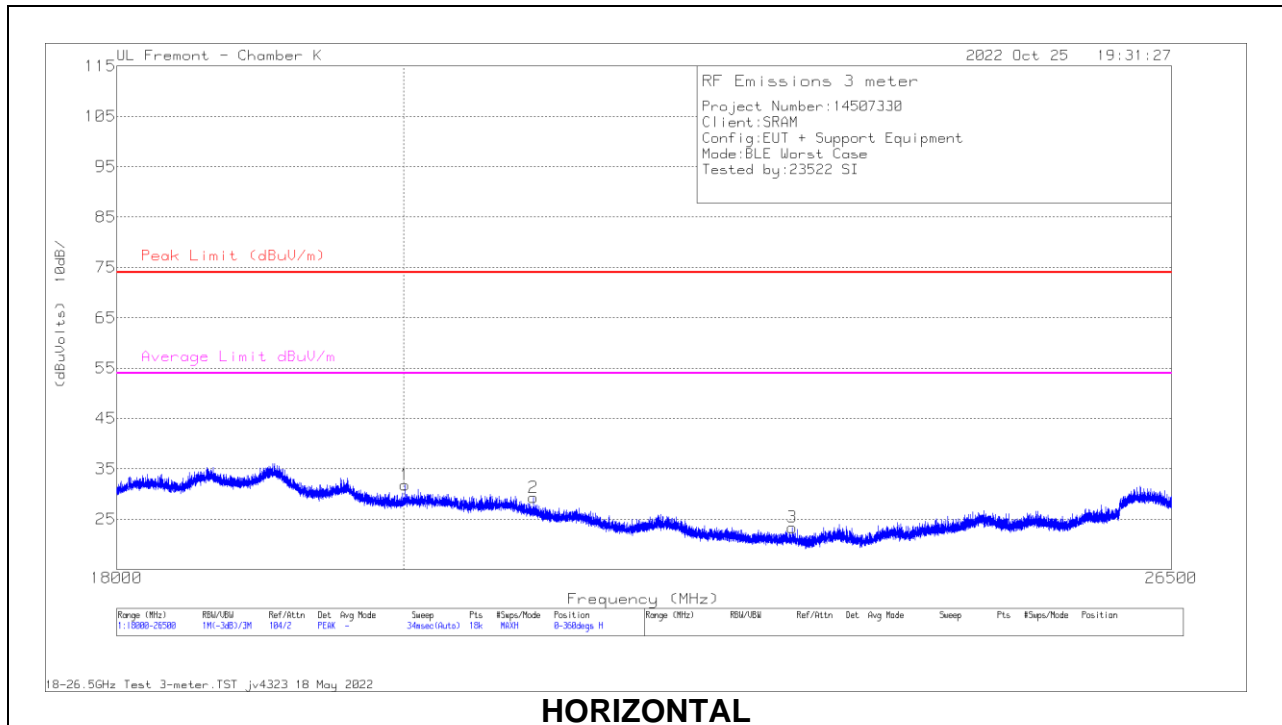
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Qp - Quasi-Peak detector

## 10.5. WORST CASE 18-26 GHz

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



## 18 – 26GHz DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	81138 AF (dB/m)	215705 amp/cbl (dB)	Cables (dB)	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	PK Margin (dB)	Average Limit dBuV/m	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 20006.471	41.13	Pk	32.8	-60.5	18.4	31.83	74	-42.17	54	-22.17	0-360	100	H
2	* 20972.165	36.7	Pk	33.2	-59.6	19	29.3	74	-44.7	54	-24.7	0-360	199	H
3	* 23058.442	31.1	Pk	33.5	-61	19.8	23.4	74	-50.6	54	-30.6	0-360	199	H
4	* 18649.777	45.43	Pk	32.5	-60.7	17.9	35.13	74	-38.87	54	-18.87	0-360	100	V
5	* 20169.388	39.69	Pk	32.8	-60.2	18.5	30.79	74	-43.21	54	-23.21	0-360	100	V
6	* 23808.803	31.41	Pk	33.9	-61.2	20.2	24.31	74	-49.69	54	-29.69	0-360	100	V

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

Pk - Peak detector