

# TEST REPORT

**Report Number. :** 14739891-E1V1

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

**Model :** 13110

**Brand :** SRAM

**FCC ID :** C90-RSMB3

**IC :** 10161A-RSMB3

**EUT Description :** Electronic Suspension Rear

**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:**  
2023-05-11

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

Rev.	Issue Date	Revisions	Revised By
V1	2023-05-11	Initial Issue	

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# 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:** Electronic Suspension Rear

**MODEL:** 13110

**BRAND:** SRAM

**SERIAL NUMBER:** Conducted: 1234500001  
Radiated: 1234500020

**SAMPLE RECEIPT DATE:** 2023-04-11

**DATE TESTED:** 2023-04-12 to 2023-05-05

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC 47 CFR 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.

Approved & Released For  
UL Verification Services Inc. By:

Prepared By:



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## 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 47 CFR Part 2, FCC 47 CFR 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	550739
<input type="checkbox"/>	Building 2: 47266 Benicia Street Fremont, CA 94538, U.S.A	US0104	22541	550739
<input checked="" type="checkbox"/>	Building 4: 47658 Kato Rd Fremont, CA 94538, U.S.A	US0104	2324B	550739



## 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

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)

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

## 6. EQUIPMENT UNDER TEST

### 6.1. EUT DESCRIPTION

The EUT is an Electronic Suspension Rear.

### 6.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Peak		Average	
		Output Power (dBm)	Output Power (mW)	Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE	4.74	2.98	4.58	2.87

### 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 1.5 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

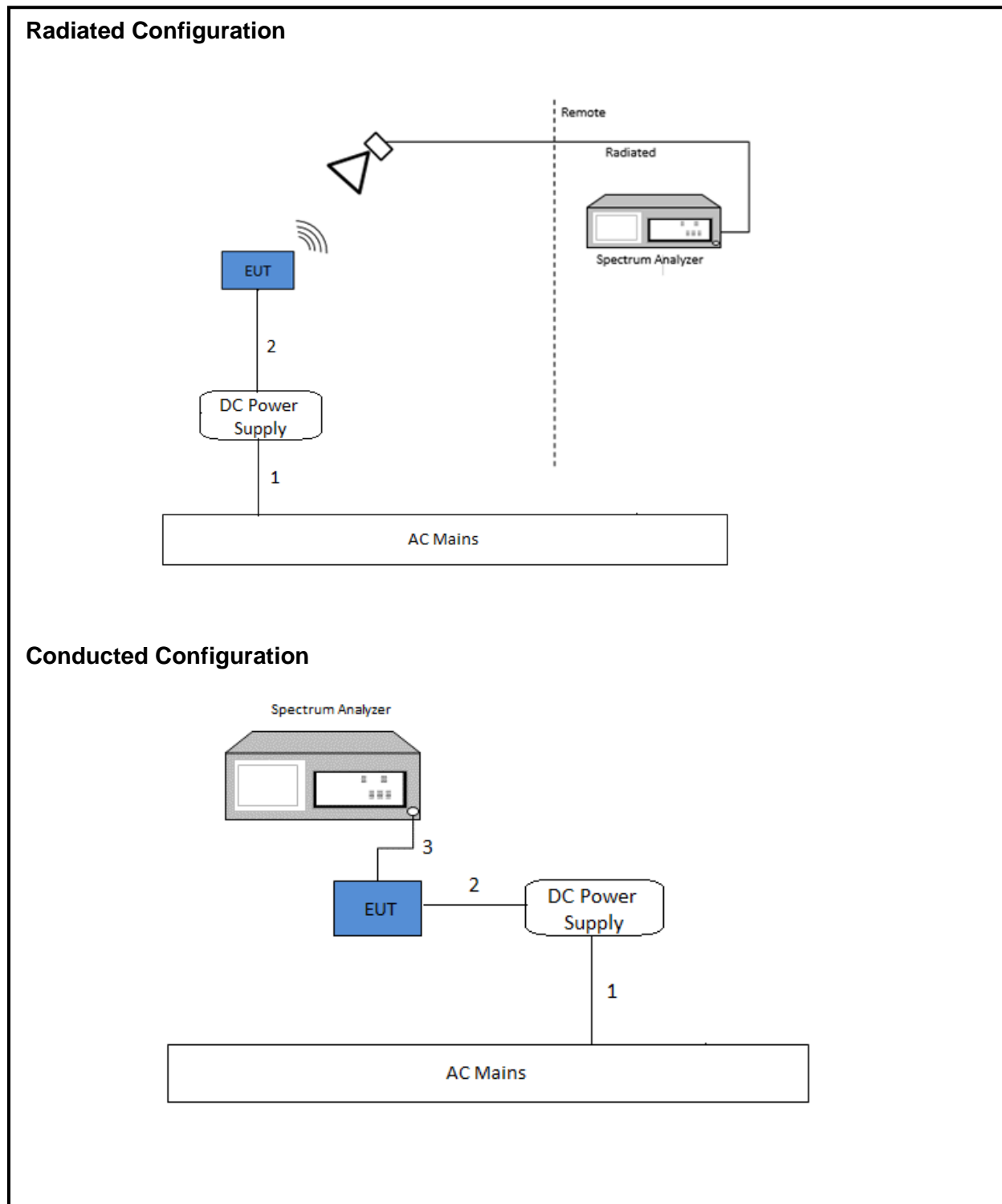
### I/O CABLES (RADIATED EMISSIONS)

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. 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

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

**\* A.C. line conducted was not evaluated because the E.U.T. is powered by a custom Li-Ion 7.4VDC battery.**

## 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 3GHz	Sunol Sciences Corp.	JB3	174374	2024-04-30	2023-04-05
Link File, @3m, 30-1000MHz Hybrid Path Loss	UL-FR1	Port 0 Factors	211121	2023-08-20	2022-08-20
Link File, @3m, 9KHz-30MHz Passive Loop Path Loss	UL-FR1	NA	211120	2023-08-21	2022-08-21
Antenna, Horn 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	223083	2023-10-25	2022-10-25
Antenna, Horn 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	222741	2023-08-31	2022-08-31
RF Filter Box, 1-18GHz	UL-FR1	n/a	171875	2023-11-10	2022-11-10
RF Filter Box, 1-18GHz	UL-FR1	n/a	197920	2023-04-19	2022-04-19
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	230547	2024-02-29	2023-02-15
EMI TEST RECEIVER, with B8 option	Rohde & Schwarz	ESW44	191429	2024-02-29	2023-02-15
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	225688	2024-02-29	2023-02-14
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	199659	2023-06-12	2022-06-12
Amplifier 18-26.5GHz, +5Vdc, -54dBm P1dB	AMPLICAL	AMP18G26.5-60	234683	2024-03-29	2023-03-18
Antenna, Passive Loop 30Hz - 1MHz	ELECTRO METRICS	EM-6871	170014	2023-07-19	2022-07-19
Antenna, Passive Loop 100KHz - 30MHz	ELECTRO METRICS	EM-6872	170016	2023-07-19	2022-07-19
Spectrum Analyzer, PSA, 3Hz to 26.5GHz	Agilent Technologies	N4440A	81311	2024-02-29	2023-02-07
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	90719	2024-01-31	2023-01-26
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	81319	2024-01-31	2023-01-25
10dB Fixed Attenuator	Pasternack Enterprises	PE7087-10	N/A	Verified	Verified
UL TEST SOFTWARE LIST					
Radiated Software	UL	UL EMC	Ver 2023-01-18, 2023-03-03, 2023-05-01		
Antenna Port Software	UL	UL RF	Ver 2022.5.31		

### NOTES:

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

## 9. ANTENNA PORT TEST RESULTS

### 9.1. ON TIME AND DUTY CYCLE

#### LIMITS

None; for reporting purposes only.

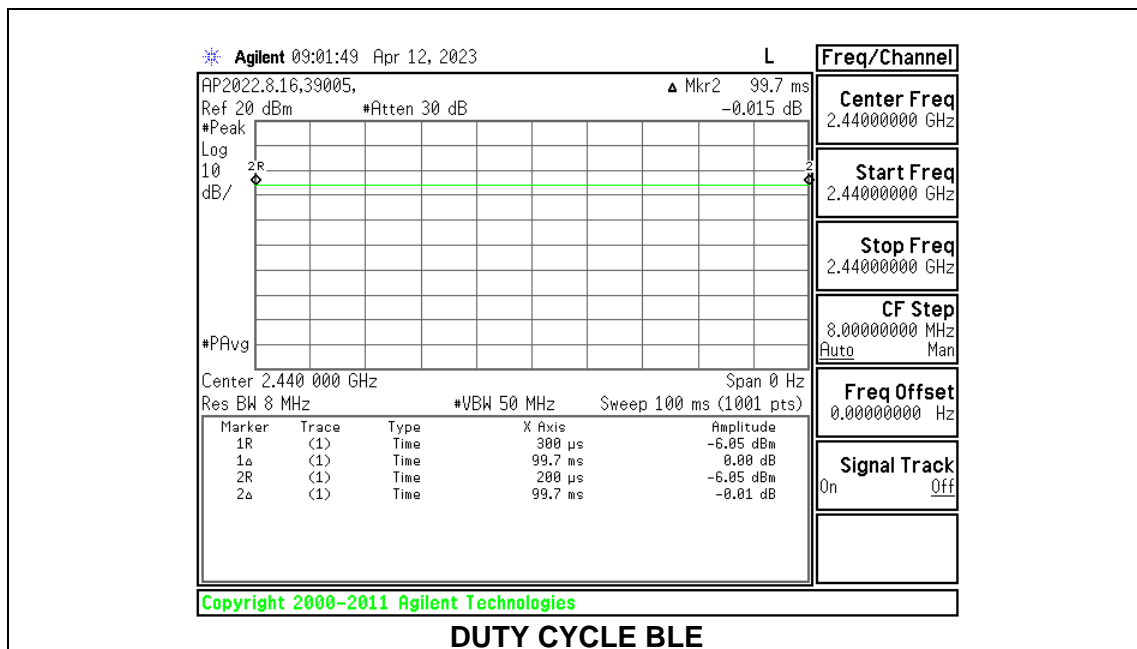
#### PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

#### ON TIME AND DUTY CYCLE RESULTS

	B (msec)	(msec)	x (linear)	Cycle (%)	Correction Factor (dB)	Minimum VBW (kHz)
<b>2.4GHz Band</b>						
BLE	99.700	99.700	1.000	100.00	0.00	0.010

#### DUTY CYCLE PLOTS





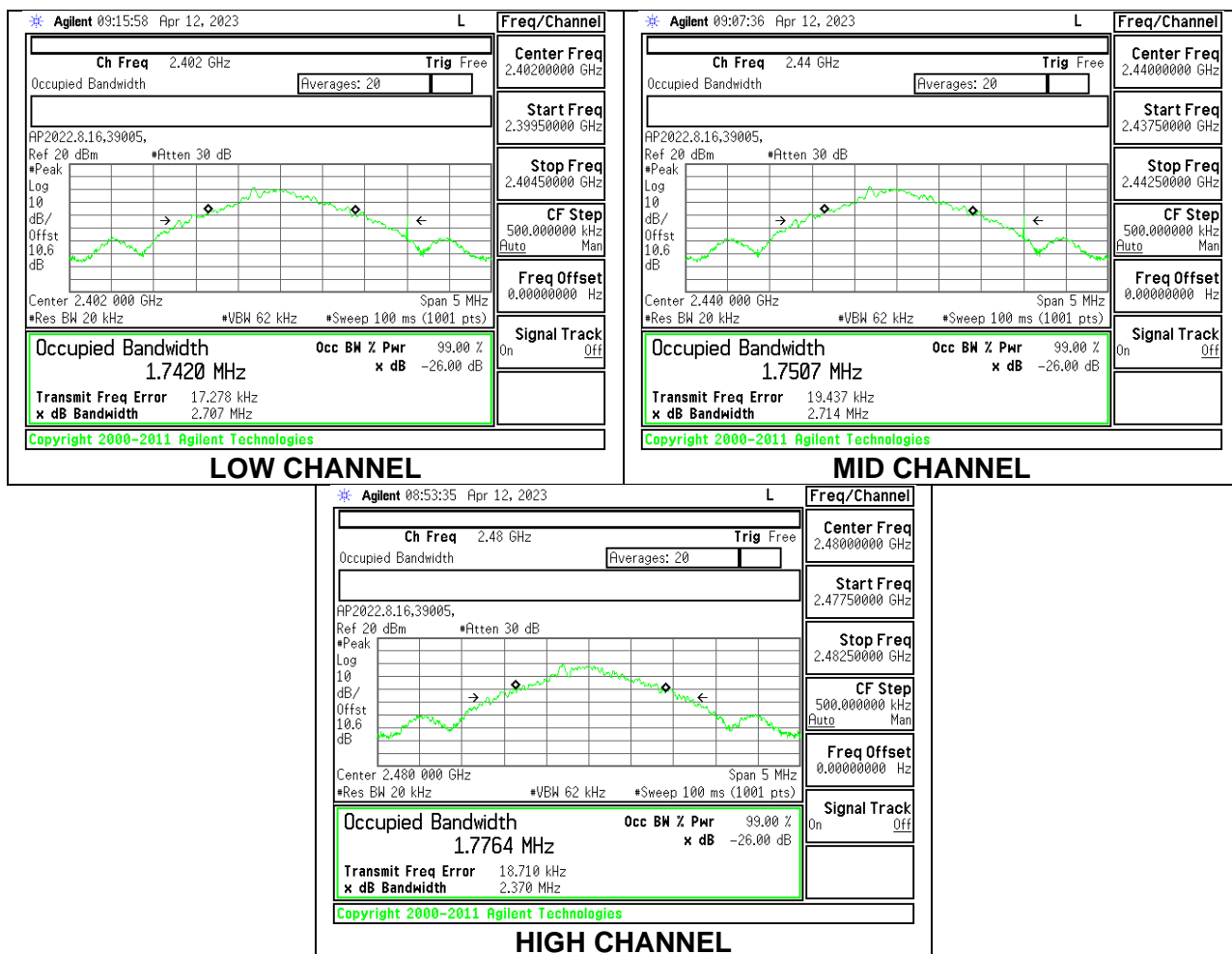
## 9.2. 99% BANDWIDTH

### LIMITS

None; for reporting purposes only.

### RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.7420
Middle	2440	1.7507
High	2480	1.7764



### 9.3. 6 dB BANDWIDTH

#### LIMITS

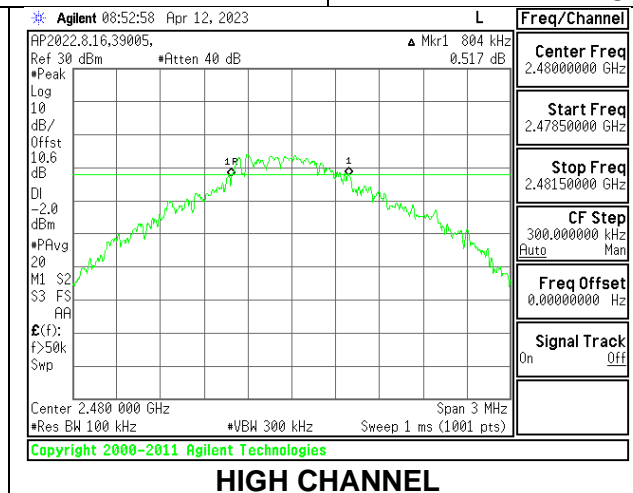
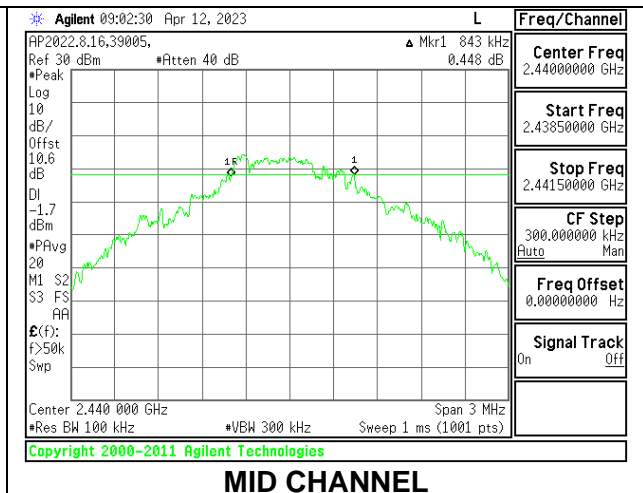
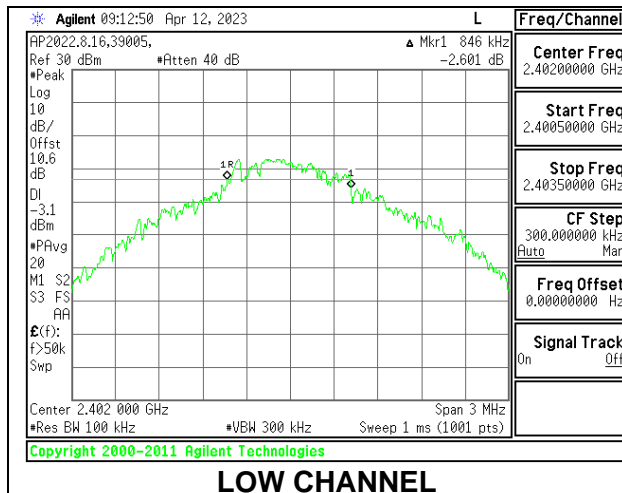
FCC §15.247 (a) (2)

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	0.846	0.5
Middle	2440	0.843	0.5
High	2480	0.804	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 was 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>	RA 39005
<b>Date:</b>	4/12/2023

<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Peak Power Reading (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>
Low	2402	4.57	30	-25.430
Middle	2440	4.29	30	-25.710
High	2480	4.74	30	-25.260

## 9.5. AVERAGE POWER

### LIMITS

None; for reporting purposes only.

### TEST PROCEDURE

The transmitter output is connected to a power meter.

The power output was 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>	RA 39005
<b>Date:</b>	4/12/2023

<b>Channel</b>	<b>Frequency (MHz)</b>	<b>AV power (dBm)</b>
Low	2402	4.38
Middle	2440	4.00
High	2480	4.58

## 9.6. POWER SPECTRAL DENSITY

### LIMITS

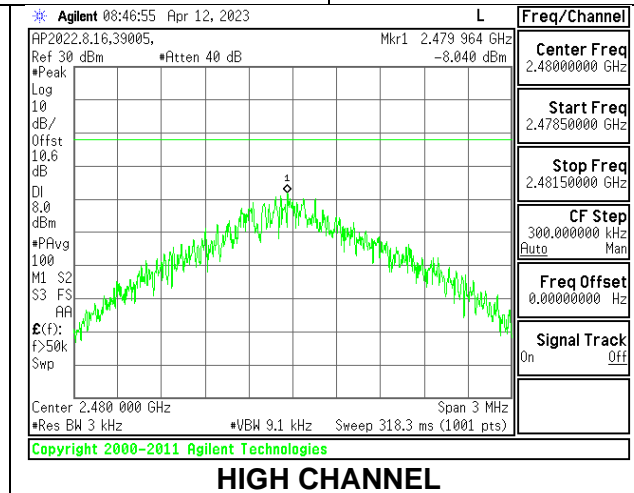
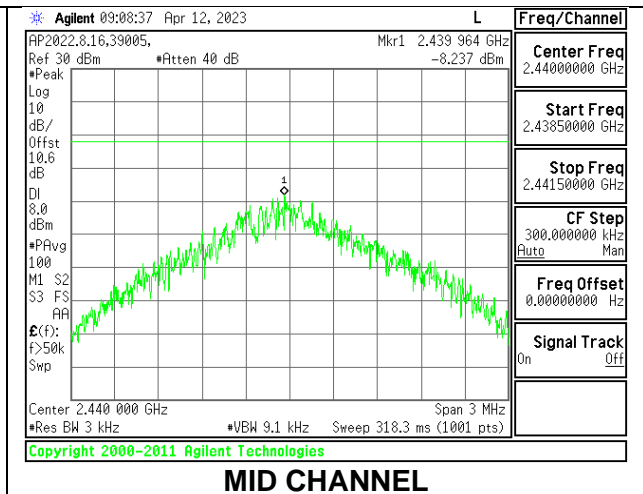
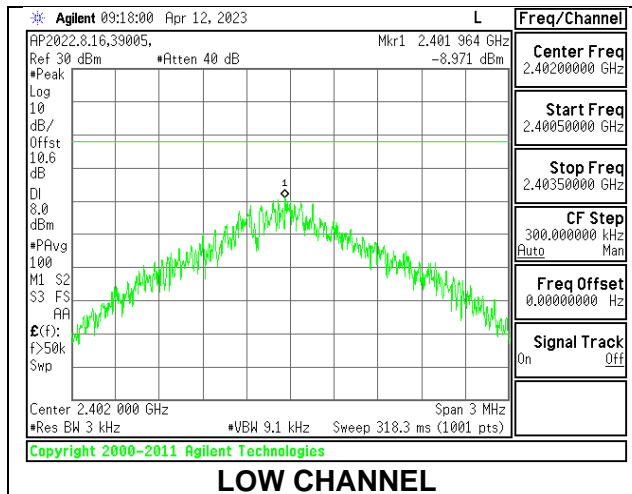
FCC §15.247 (e)

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	-8.971	8	-16.97
Middle	2440	-8.237	8	-16.24
High	2480	-8.040	8	-16.04



## **9.7. CONDUCTED SPURIOUS EMISSIONS**

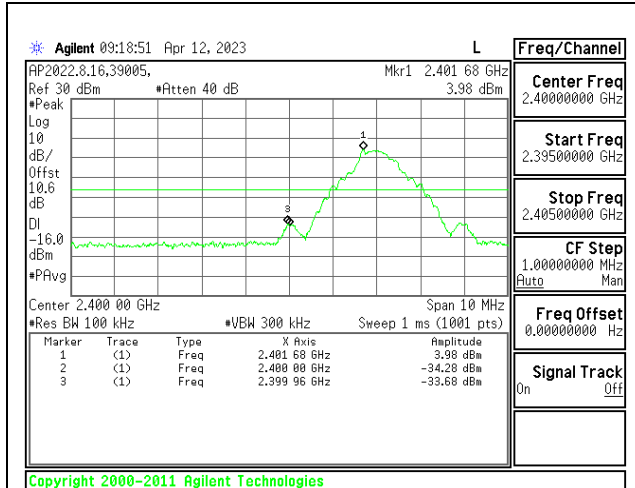
### **LIMITS**

FCC §15.247 (d)

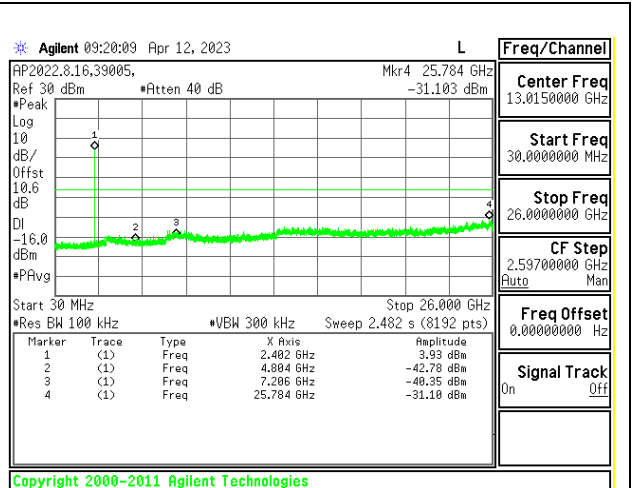
RSS-247 5.5

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

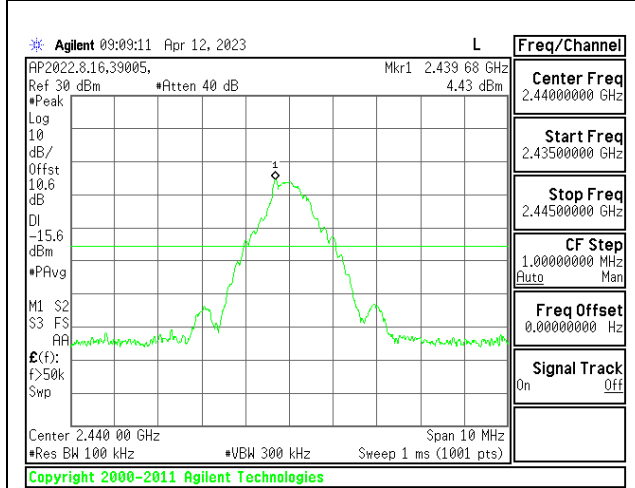
### **RESULTS**



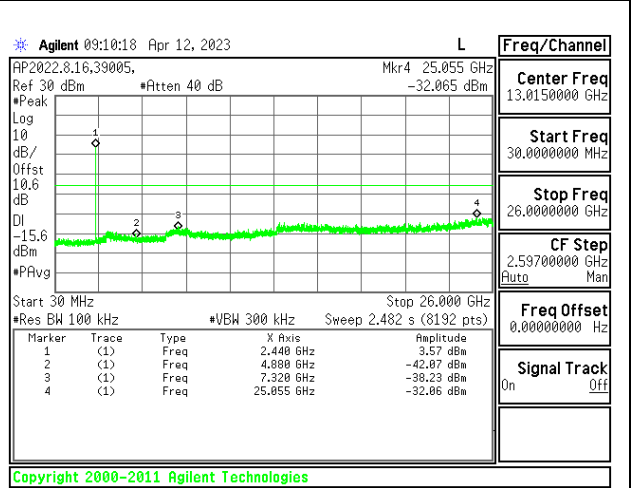
LOW CHANNEL BANDEDGE



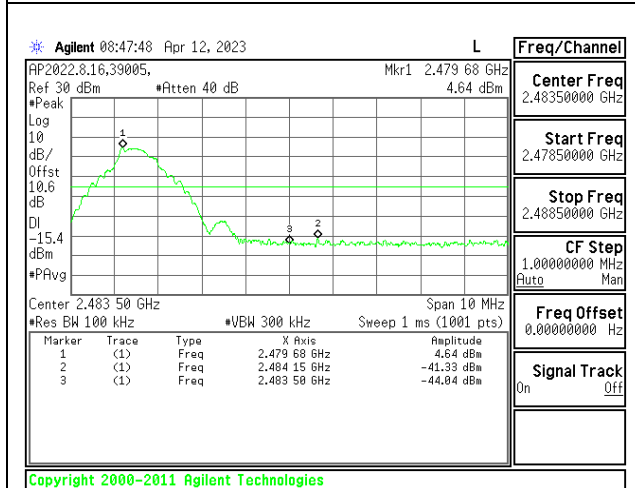
OUT-OF-BAND LOW CHANNEL



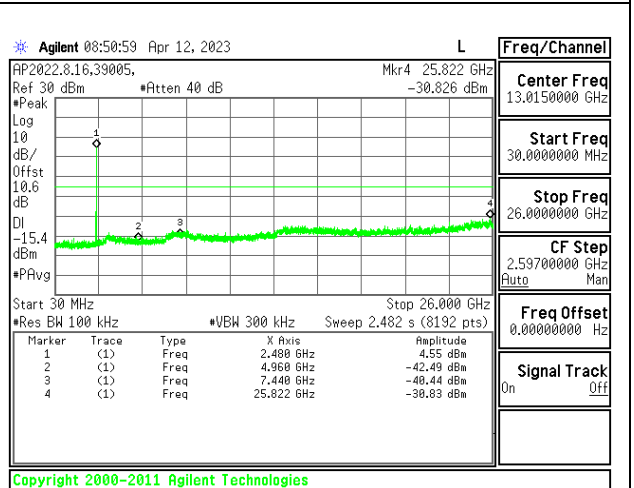
IN-BAND REFERENCE LEVEL



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 in the 30-1000MHz range, 9kHz for peak and/or quasi-peak detection measurements in the 0.15-30MHz range and 200Hz for peak and/or quasi-peak detection measurements in the 9 to 150kHz range. Peak detection is used unless otherwise noted as quasi-peak or average (9-90kHz and 110-490kHz).

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.

#### **KDB 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.

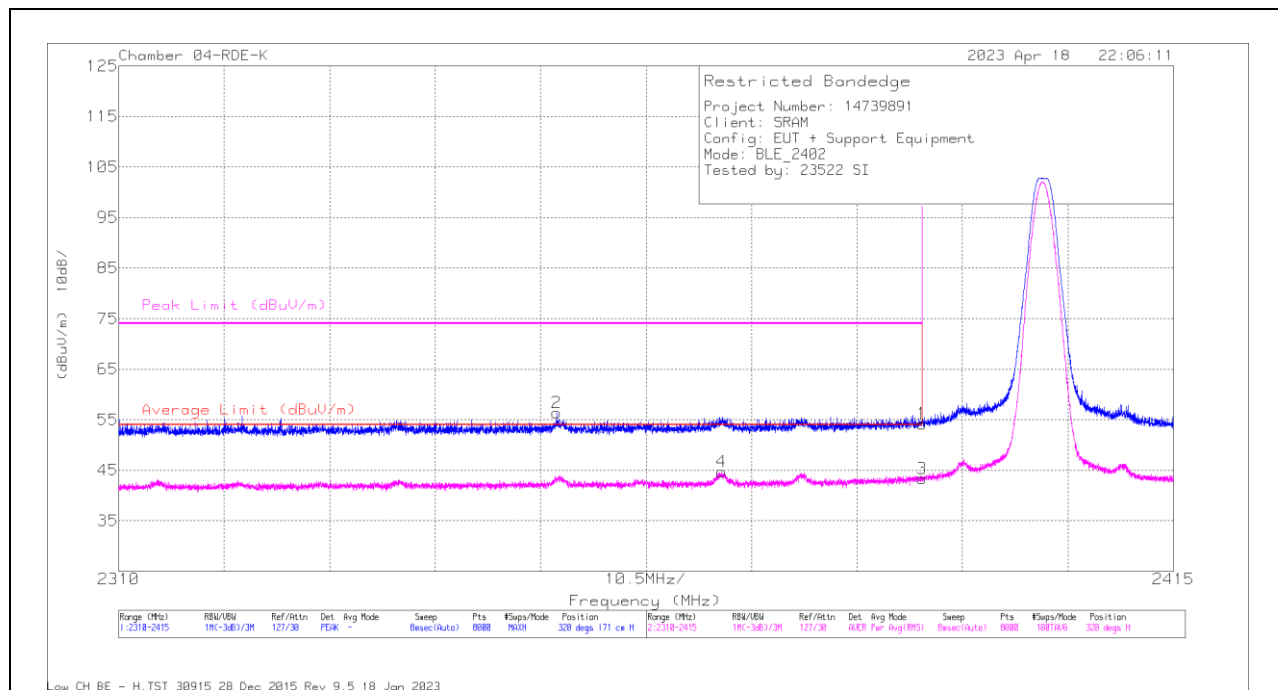
NOTE: The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table), using the free space impedance 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

### Antenna 1

### BANDEDGE (LOW CHANNEL)

### HORIZONTAL RESULT



### Trace Markers

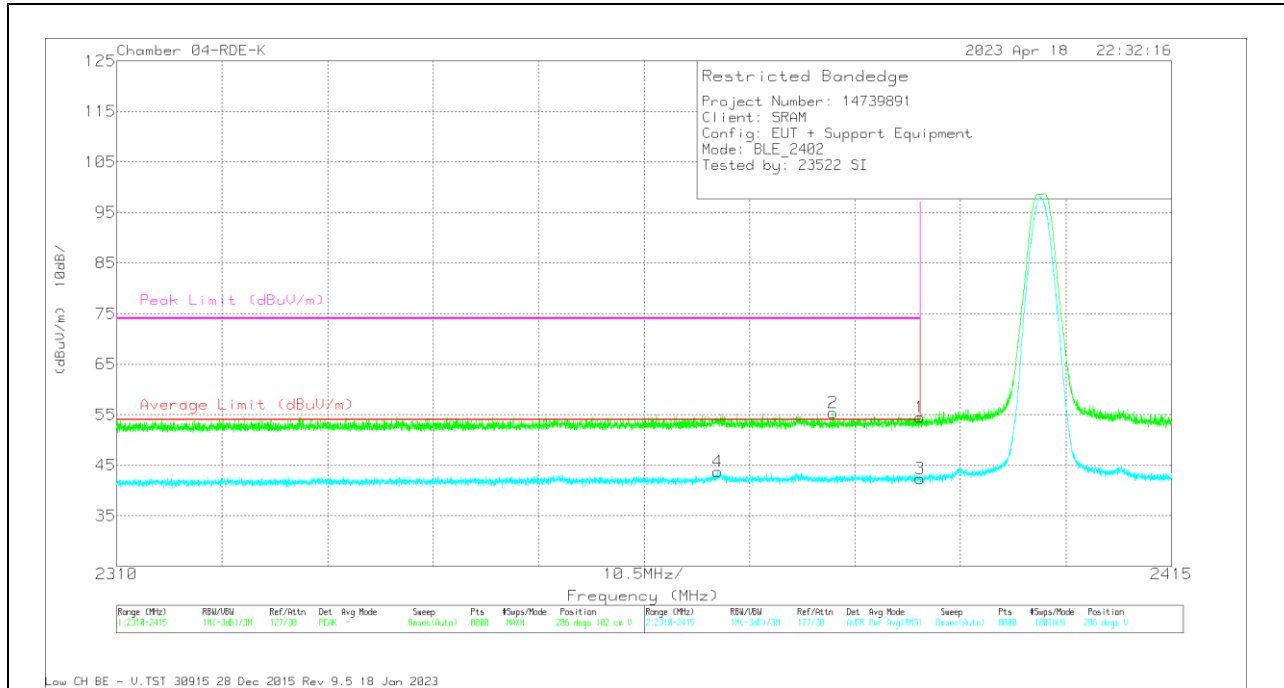
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	223083 ACF (dB) 3mH	Amp/Cbl/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2390	57.3	Pk	31.8	-34.9	54.2	-	-	74	-19.8	320	171	H
2	* 2353.608	59.74	Pk	31.6	-35	56.34	-	-	74	-17.66	320	171	H
3	* 2390	46.44	RMS	31.8	-34.9	43.34	54	-10.66	-	-	320	171	H
4	* 2370.043	47.91	RMS	31.7	-34.9	44.71	54	-9.29	-	-	320	171	H

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

Pk - Peak detector

RMS - RMS detection

### VERTICAL RESULT



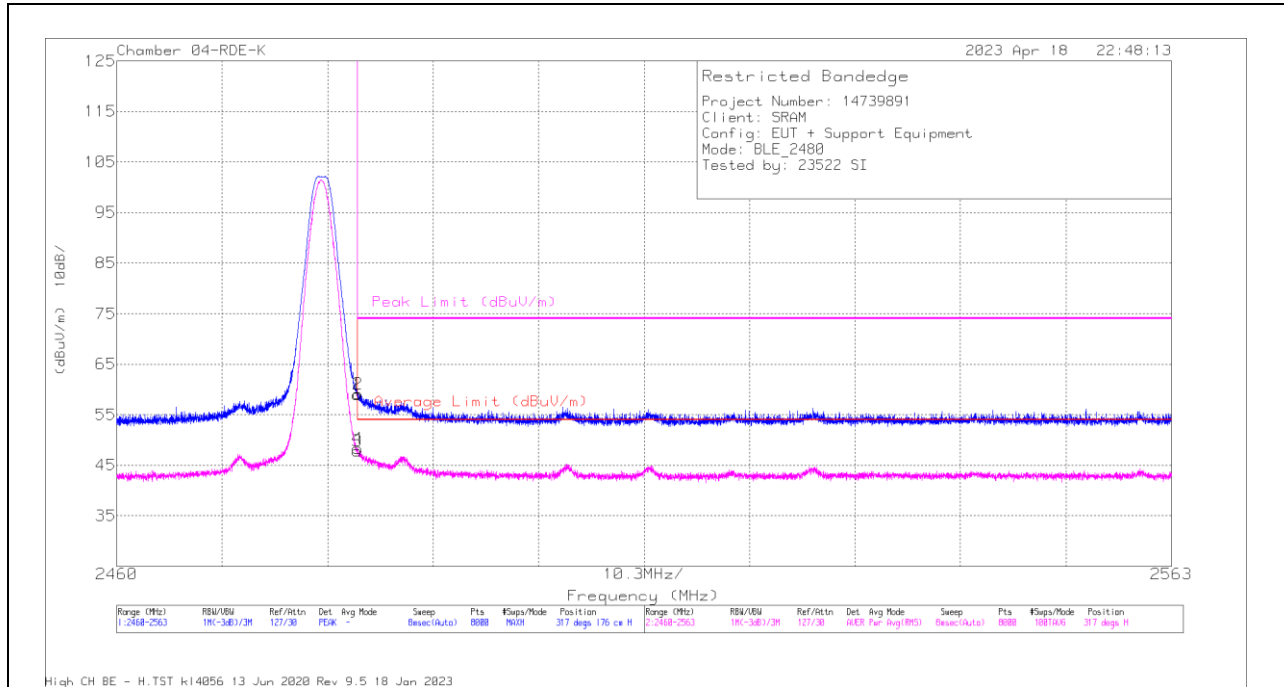
### Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	223083 ACF (dB) 3mH	Amp/Cb/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	57.63	Pk	31.8	-34.9	54.53	-	-	74	-19.47	286	102	V
2	* 2381.319	58.47	Pk	31.8	-34.9	55.37	-	-	74	-18.63	286	102	V
3	* 2390	45.39	RMS	31.8	-34.9	42.29	54	-11.71	-	-	286	102	V
4	* 2369.846	46.9	RMS	31.7	-34.9	43.7	54	-10.3	-	-	286	102	V

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

**BANEDGE (HIGH CHANNEL)**

**HORIZONTAL RESULT**

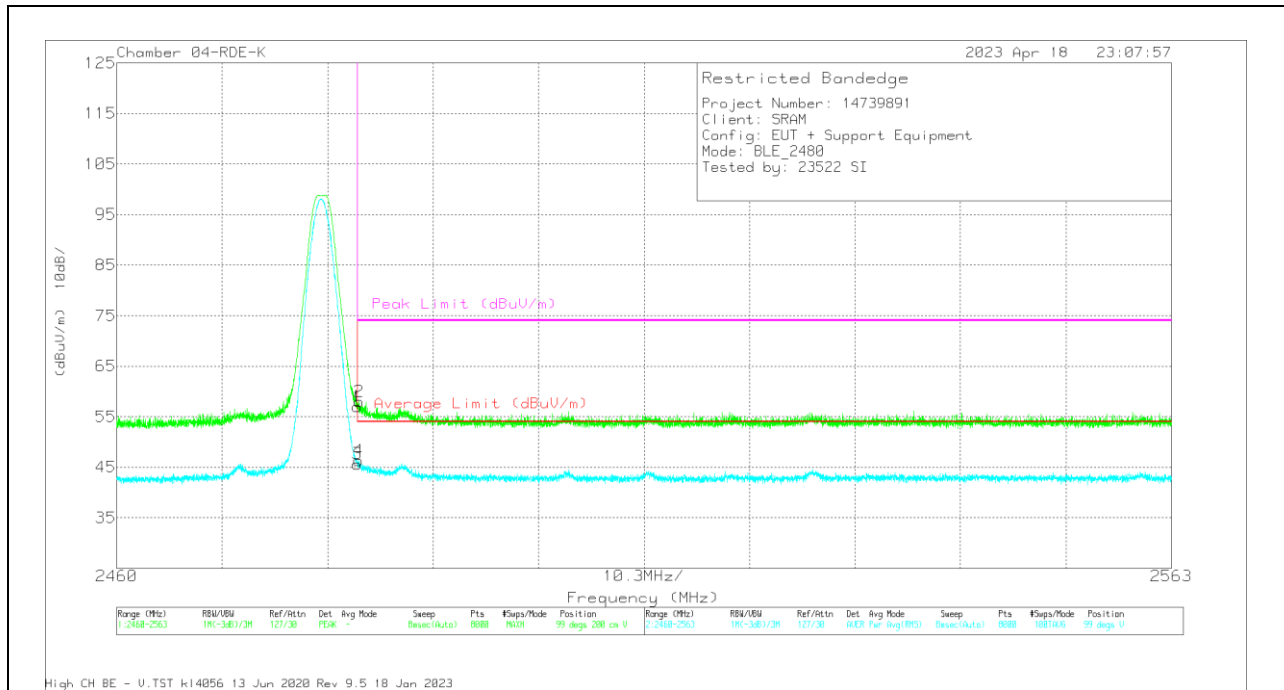


**Trace Markers**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	223083 ACF (dB) 3mH	Amp/Cb/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	61.31	Pk	32.2	-34.5	59.01	-	-	74	-14.99	317	176	H
2	* 2483.578	61.45	Pk	32.2	-34.5	59.15	-	-	74	-14.85	317	176	H
3	* 2483.5	50.08	RMS	32.2	-34.5	47.78	54	-6.22	-	-	317	176	H
4	* 2483.526	50.58	RMS	32.2	-34.5	48.28	54	-5.72	-	-	317	176	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	223083 ACF (dB) 3mH	Amp/Cb/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	59.24	Pk	32.2	-34.5	56.94	-	-	74	-17.06	99	200	V
2	* 2483.655	60.33	Pk	32.2	-34.5	58.03	-	-	74	-15.97	99	200	V
3	* 2483.5	47.94	RMS	32.2	-34.5	45.64	54	-8.36	-	-	99	200	V
4	* 2483.591	48.61	RMS	32.2	-34.5	46.31	54	-7.69	-	-	99	200	V

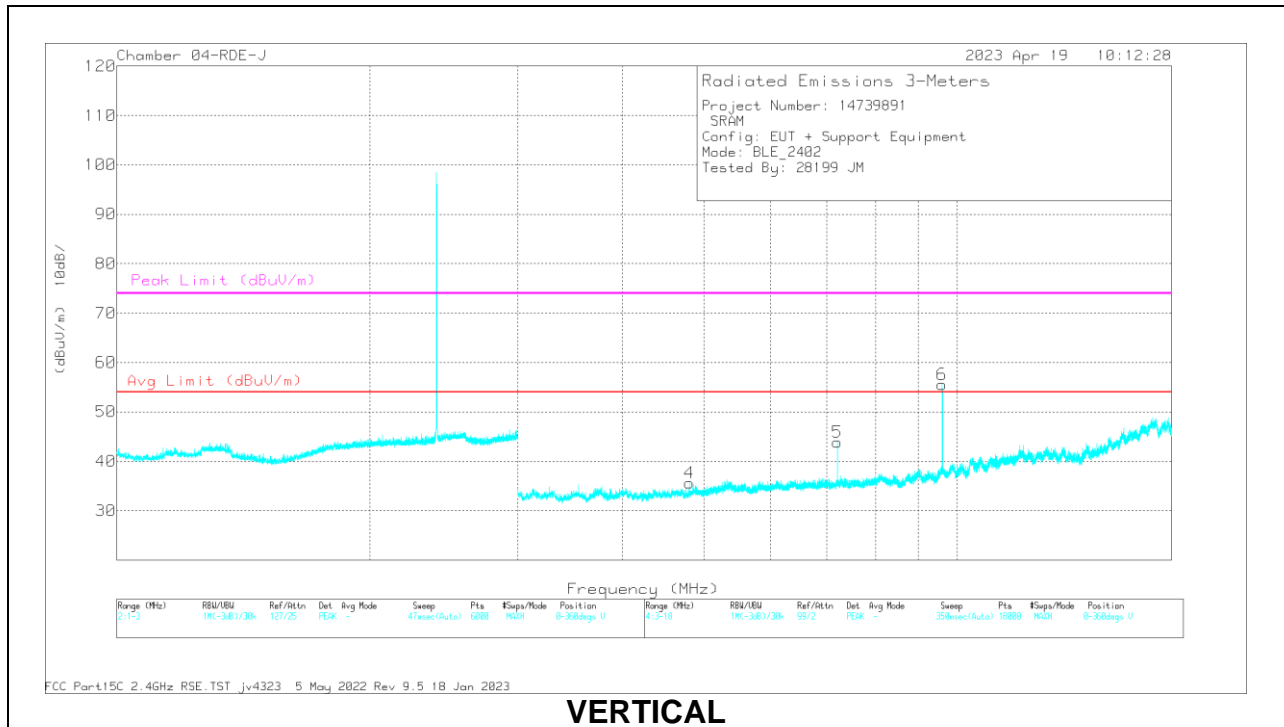
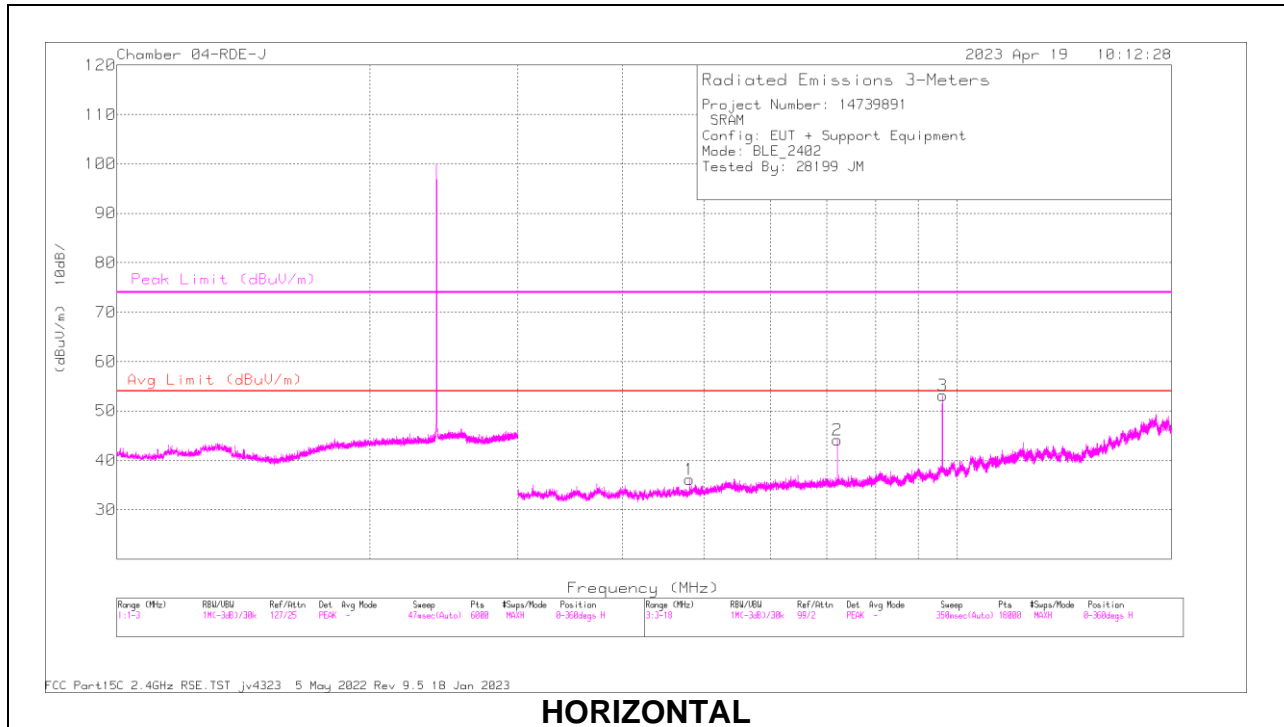
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

# HARMONICS AND SPURIOUS EMISSIONS

## LOW CHANNEL RESULTS

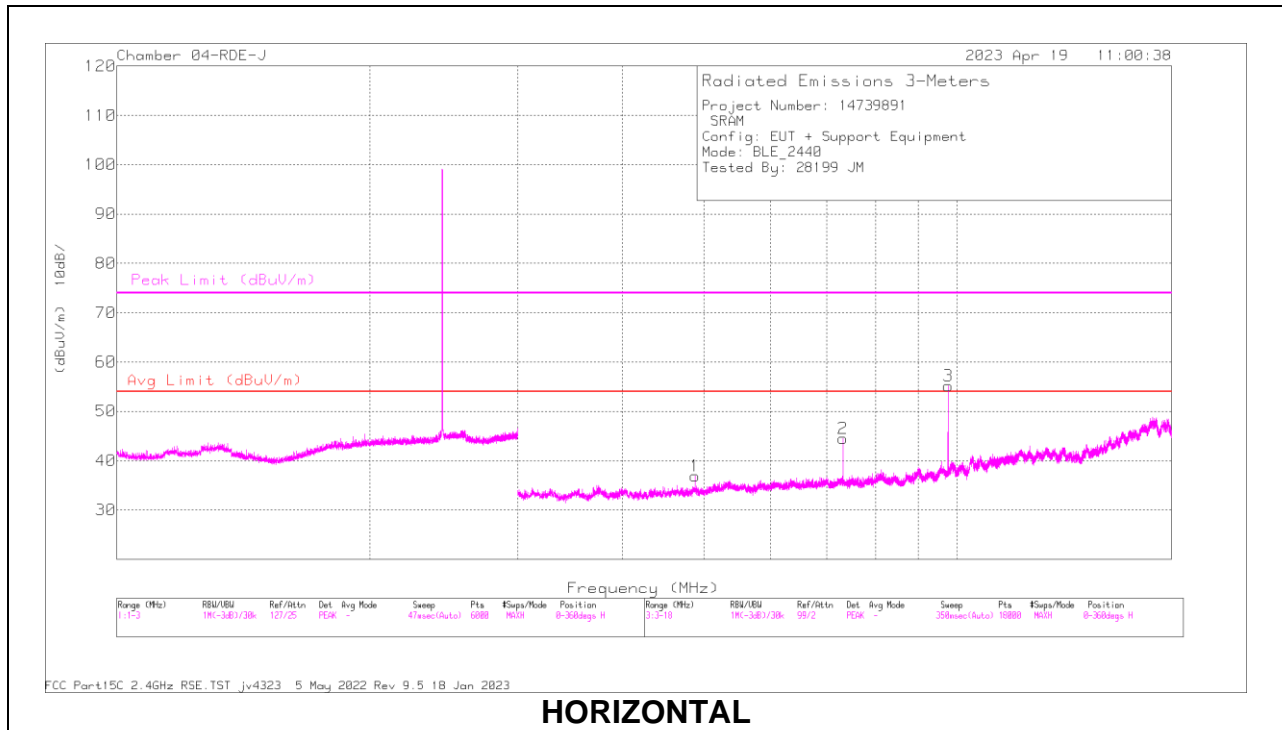


**RADIATED EMISSIONS**

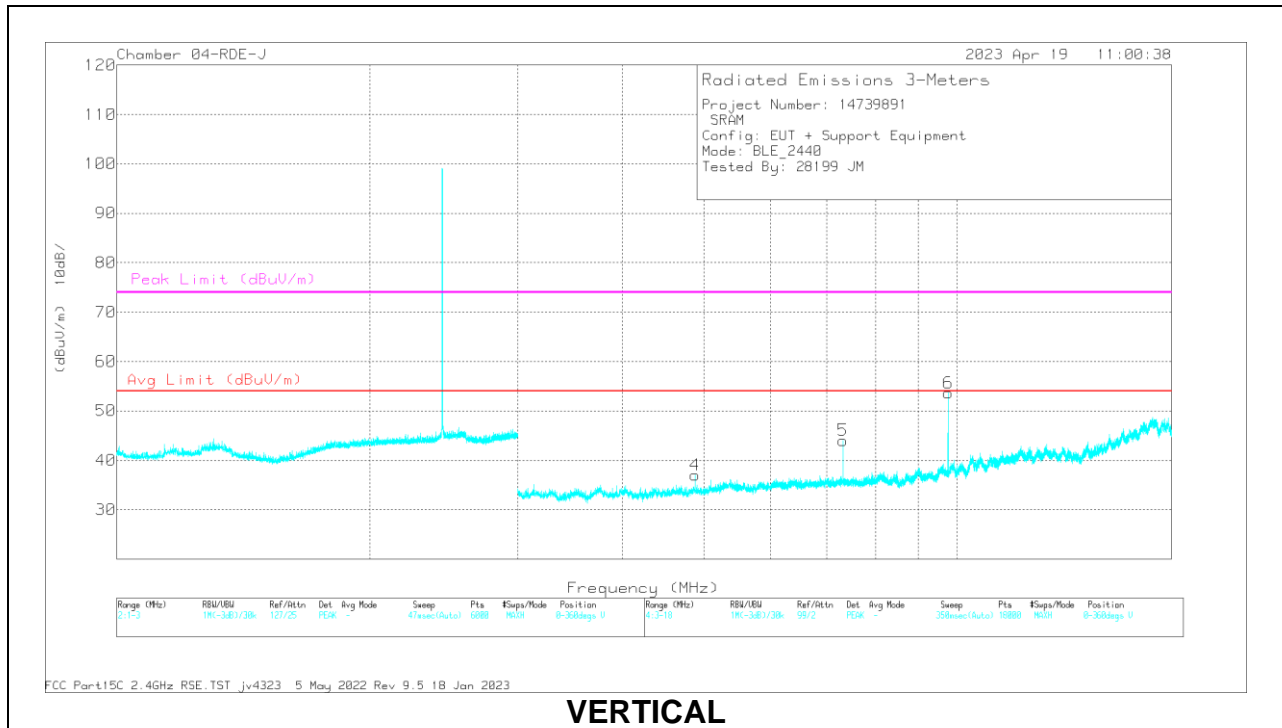
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	222741 ACF(dB) - 3mH	Amp/Cb/Fitr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4803.823	56.24	PK2	34	-44.5	45.74	-	-	74	-28.26	360	190	H
	* 4804.195	45.65	MAv1	34	-44.5	35.15	54	-18.85	-	-	360	190	H
2	7204.976	56	PK2	35.8	-40.3	51.5	-	-	-	-	249	231	H
3	9606.788	58.04	PK2	36.7	-35.9	58.84	-	-	-	-	234	195	H
4	* 4803.721	56.14	PK2	34	-44.5	45.64	-	-	74	-28.36	275	205	V
	* 4803.641	45.51	MAv1	34	-44.5	35.01	54	-18.99	-	-	275	205	V
5	7207	55.45	PK2	35.8	-40.4	50.85	-	-	-	-	231	137	V
6	9606.669	60.56	PK2	36.7	-35.9	61.36	-	-	-	-	79	216	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**

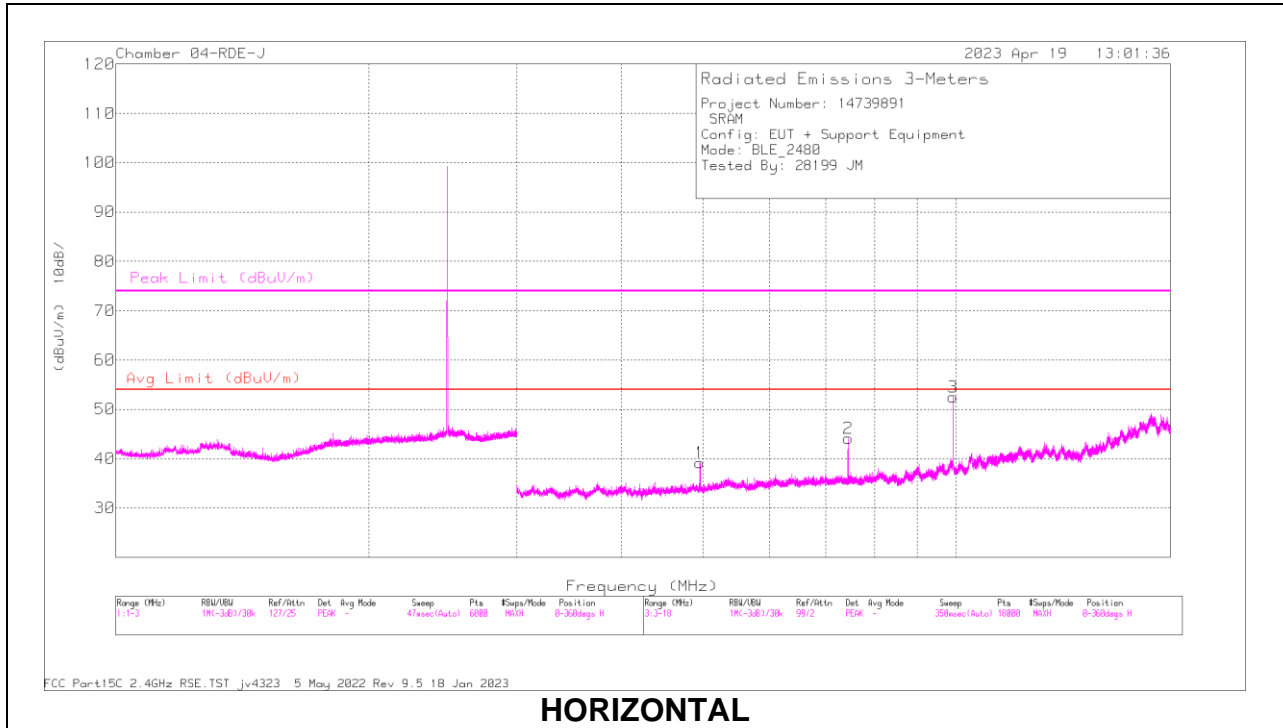
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	222741 ACF(dB) - 3mH	Amp/Cb/Fitr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4880.106	56.28	PK2	34	-43.7	46.58	-	-	74	-27.42	8	147	H
	* 4879.935	46.16	MAv1	34	-43.7	36.46	54	-17.54	-	-	8	147	H
2	* 7321.165	55.56	PK2	35.8	-40.4	50.96	-	-	74	-23.04	240	201	H
	* 7319.213	48.07	MAv1	35.8	-40.4	43.47	54	-10.53	-	-	240	201	H
3	9758.656	57.63	PK2	36.8	-36.1	58.33	-	-	-	-	25	121	H
4	* 4879.134	55.9	PK2	34	-43.7	46.2	-	-	74	-27.8	57	115	V
	* 4879.752	45.92	MAv1	34	-43.7	36.22	54	-17.78	-	-	57	115	V
5	* 7319.083	56.86	PK2	35.8	-40.4	52.26	-	-	74	-21.74	224	148	V
	* 7319.258	49.1	MAv1	35.8	-40.4	44.5	54	-9.5	-	-	224	148	V
6	9758.618	59.95	PK2	36.8	-36.1	60.65	-	-	-	-	77	208	V

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

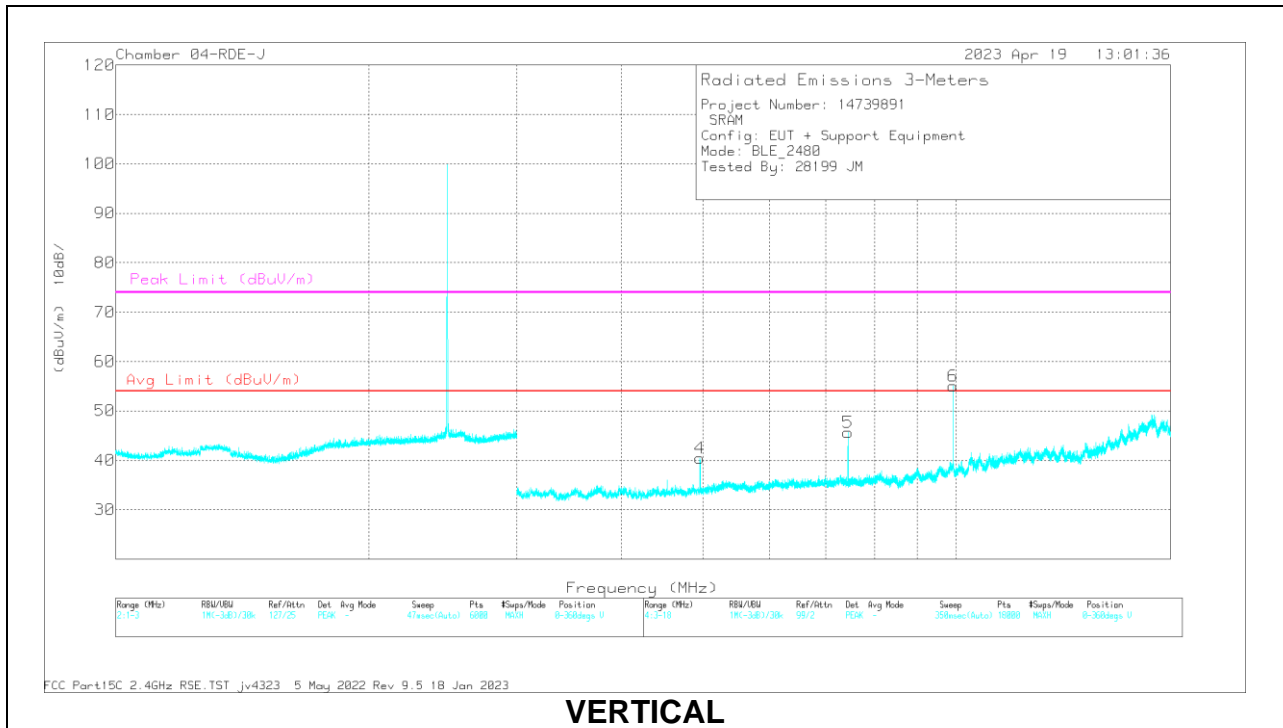
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

### HIGH CHANNEL RESULTS



**HORIZONTAL**



**VERTICAL**

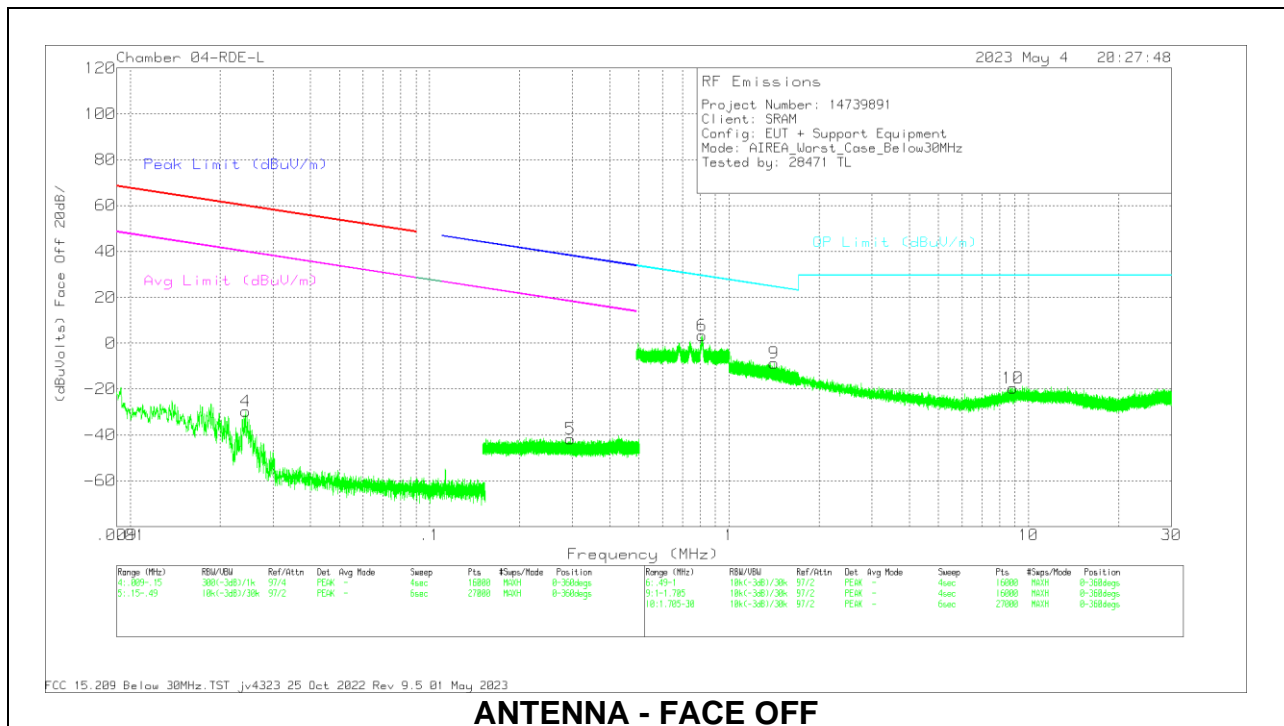
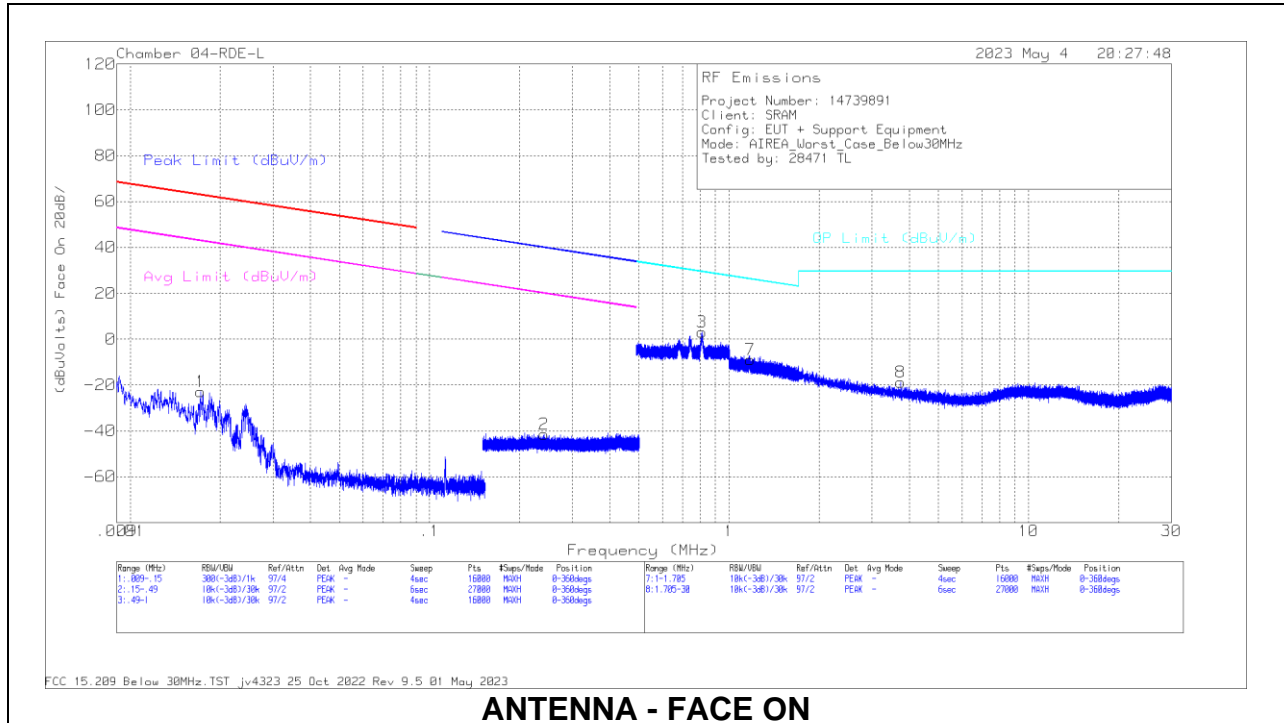
**RADIATED EMISSIONS**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	222741 ACF(dB) - 3mH	Amp/Cb/Fitr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4959.301	57.36	PK2	34.1	-44.2	47.26	-	-	74	-26.74	47	272	H
	* 4959.863	49.14	MAv1	34.1	-44.3	38.94	54	-15.06	-	-	47	272	H
2	* 7439.21	56.4	PK2	35.8	-40	52.2	-	-	74	-21.8	239	227	H
	* 7439.117	49.61	MAv1	35.8	-40	45.41	54	-8.59	-	-	239	227	H
3	9918.806	55.56	PK2	37	-34	58.56	-	-	-	-	145	239	H
4	* 4959.721	57.48	PK2	34.1	-44.3	47.28	-	-	74	-26.72	78	334	V
	* 4959.878	48.95	MAv1	34.1	-44.3	38.75	54	-15.25	-	-	78	334	V
5	* 7438.941	56.46	PK2	35.8	-40	52.26	-	-	74	-21.74	227	150	V
	* 7439.188	49.82	MAv1	35.8	-40	45.62	54	-8.38	-	-	227	150	V
6	9918.724	55.89	PK2	37	-34	58.89	-	-	-	-	221	240	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 30MHz

#### SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)



**Below 30MHz Data**

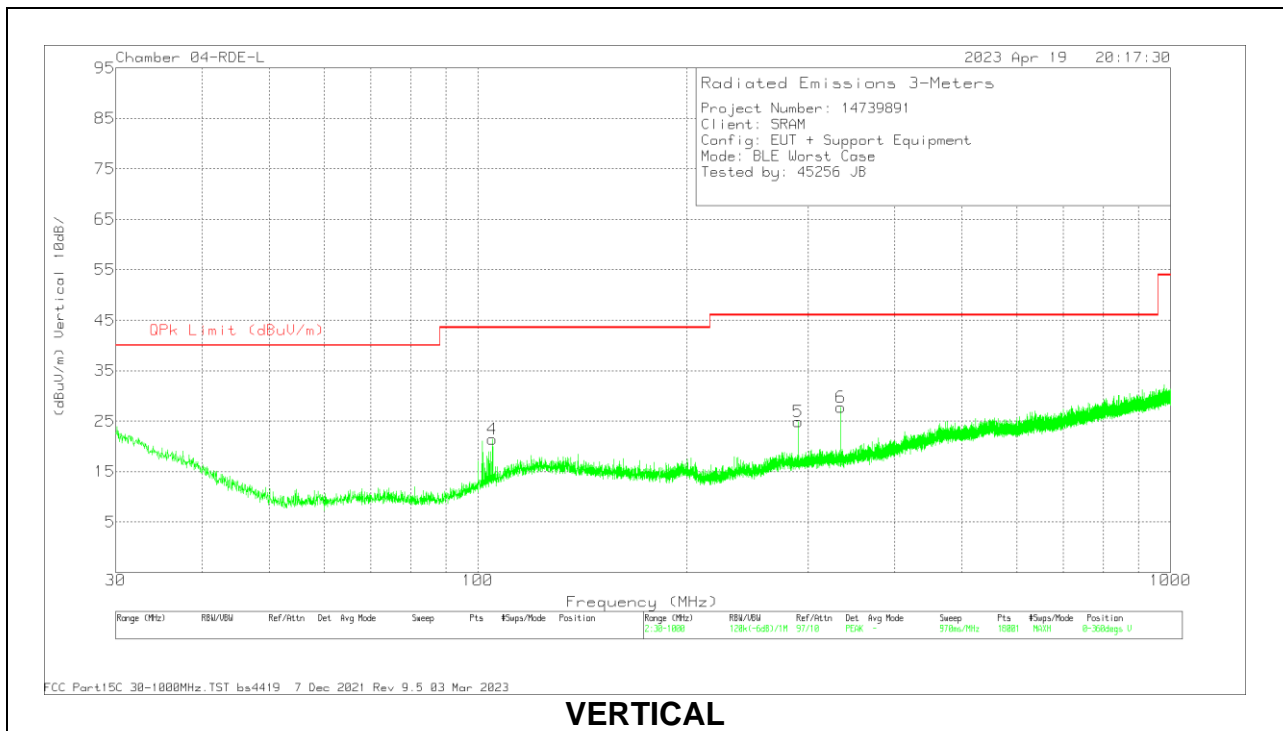
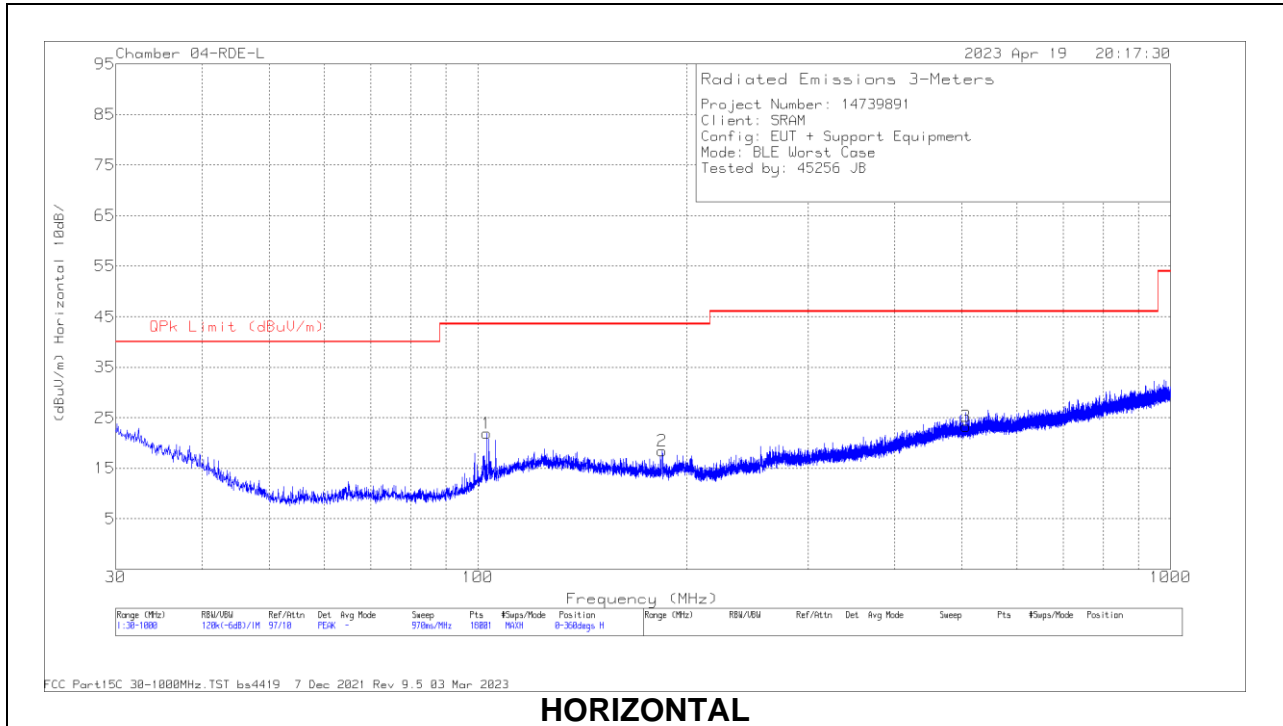
Range 1: Face On .009 - .15MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E (ACF)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)
1	.0172	28.23	Pk	59.2	-30.4	-80	-22.97	62.88	-85.85	42.88	-65.85	0-360	0-deg
Range 2: Face On .15 - .49MHz													
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)	Azimuth (Degs)	Polarity (degs)
2	.2406	14.52	Pk	56	-32	-80	-41.48	39.99	-81.47	19.99	-61.47	0-360	0-deg
Range 3: Face On .49 - 1MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E (ACF)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)		
3	.812	18.98	Pk	56.1	-31.9	-40	3.18	29.42	-26.24	0-360	0-deg		
Range 4: Face Off .009 - .15MHz													
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)	Azimuth (Degs)	Polarity (degs)
4	.0243	23.24	Pk	58.4	-31.3	-80	-29.66	59.88	-89.54	39.88	-69.54	0-360	90-degs
Range 5: Face Off .15 - .49MHz													
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)	Azimuth (Degs)	Polarity (degs)
5	.2954	14.22	Pk	56	-31.9	-80	-41.68	38.2	-79.88	18.2	-59.88	0-360	90-degs
Range 6: Face Off .49 - 1MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E (ACF)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)		
6	.8107	19.19	Pk	56.1	-31.9	-40	3.39	29.44	-26.05	0-360	90-degs		
Range 7: Face On 1 - 1.705MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E (ACF)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)		
7	1.1742	16.95	Pk	45.9	-31.8	-40	-8.95	26.23	-35.18	0-360	0-deg		
Range 8: Face On 1.705 - 30MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)		
8	3.7476	15.43	Pk	37.5	-31.7	-40	-18.77	29.5	-48.27	0-360	0-deg		
Range 9: Face Off 1 - 1.705MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)		
9	1.4135	18.6	Pk	44.6	-31.8	-40	-8.6	24.62	-33.22	0-360	90-degs		
Range 10: Face Off 1.705 - 30MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)		
10	8.8576	17.43	Pk	34.6	-31.5	-40	-19.47	29.5	-48.97	0-360	90-degs		

Pk - Peak detector

**Note:** The Limits in FCC 47 CRF, 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)



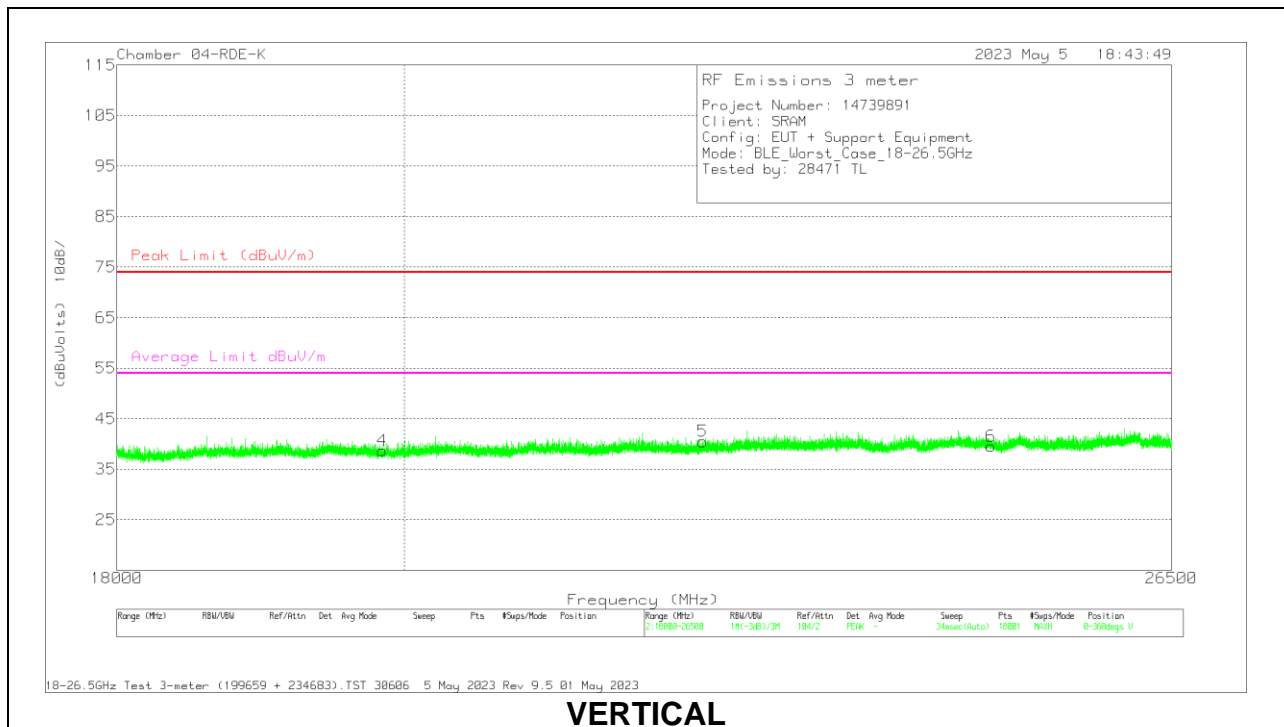
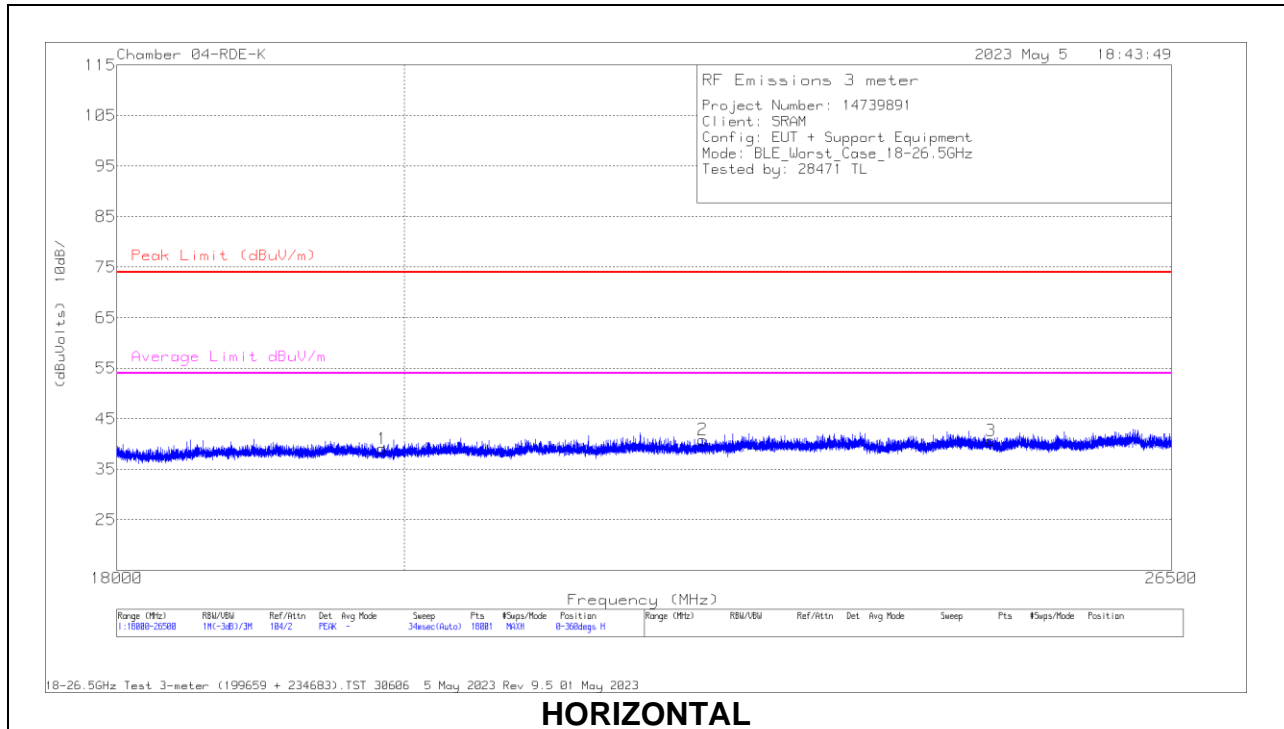
**Below 1GHz Data**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	174374 ANSI ACF 10 m H UL	CBL/AMP	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	102.966	35.46	Pk	16.9	-30.4	21.96	43.52	-21.56	0-360	299	H
2	184.715	30.93	Pk	17.1	-29.6	18.43	43.52	-25.09	0-360	299	H
3	506.81	27.87	Pk	23.6	-28.2	23.27	46.02	-22.75	0-360	299	H
4	104.852	34.37	Pk	17.4	-30.4	21.37	43.52	-22.15	0-360	99	V
5	289.961	34.86	Pk	19.3	-29.3	24.86	46.02	-21.16	0-360	99	V
6	331.55	29.79	Pk	19.9	-29	20.69	46.02	-25.33	154	339	V
	331.55	20.44	Qp	19.9	-29	11.34	46.02	-34.68	154	339	V

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	199659 CISPR 3m ACF (dB/m)	234683 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	* 19839.777	50.28	Pk	32.7	-62.6	18.7	39.08	74	-34.92	54	-14.92	0-360	200	H
2	* 22313.748	50.45	Pk	33.3	-62.6	19.7	40.85	74	-33.15	54	-13.15	0-360	200	H
3	24800.941	48.11	Pk	33.9	-62.2	20.8	40.61	74	-33.39	54	-13.39	0-360	200	H
4	* 19840.249	49.89	Pk	32.7	-62.6	18.7	38.69	74	-35.31	54	-15.31	0-360	101	V
5	* 22315.165	50.08	Pk	33.3	-62.6	19.7	40.48	74	-33.52	54	-13.52	0-360	101	V
6	24801.886	47.1	Pk	33.9	-62.2	20.8	39.6	74	-34.4	54	-14.4	0-360	101	V

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

Pk - Peak detector