

# TEST REPORT

**Report Number:** 14775767-E3V3

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

**Model :** 12911

**Brand :** SRAM

**FCC ID :** C9O-RDB2

**IC :** 10161A-RDB2

**EUT Description :** Electronic Rear Derailleur

**Test Standard(s) :** FCC 47 CFR PART 15 SUBPART C  
ISED RSS-210 ISSUE 10  
ISED RSS-GEN ISSUE 5 + A1 + A2

**Date Of Issue:**  
2023-12-14

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

Rev.	Issue Date	Revisions	Revised By
V1	2023-08-15	Initial Issue	---
V2	2023-12-07	Updated Section 2, 5.3, 8, 10.1,10.2, 10.3	Kiya Kedida
V3	2023-12-14	Updated Section 10.3, 10.4 and 10.5	Kiya Kedida

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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 Rear Derailleur

**MODEL:** 12911

**BRAND:** SRAM

**SERIAL NUMBER:** Conducted: 180394310  
Radiated: 180394309

**SAMPLE RECEIPT DATE:** 2023-06-09

**DATE TESTED:** 2023-06-27 to 2023-07-12

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
47 CFR Part 15 Subpart C	Complies
ISED RSS-210 Issue 10	Complies
ISED RSS-GEN Issue 5 + A1 + A2	Complies

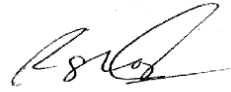
UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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, or any agency of the U.S. government.

Approved & Released For  
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Prepared By:



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Kiya Kedida  
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.
See Comment	RSS-GEN 6.7	20dB BW / 99% OBW	Reporting purposes only	ANSI C63.10 Sections 6.9.2 and 6.9.3.
15.249 (a) (c)	RSS-GEN 8.9, 8.10 and RSS-210 Annex B.10(a)	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 414788 D01 Radiated Test Site v01r01, ISED RSS-GEN Issue 5 + A1 + A2 and ISED RSS-210 Issue 10.

### 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			
<input checked="" type="checkbox"/>	Building 4: 47658 Kato Rd Fremont, CA 94538, U.S.A			



## 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%
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
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%.

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## 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 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

## 6. EQUIPMENT UNDER TEST

### 6.1. EUT DESCRIPTION

The EUT is an Electronic Rear Derailleur.

### 6.2. MAXIMUM FUNDAMENTAL FIELD STRENGTH

The transmitter has maximum fundamental peak and average E-field strength output powers as follows:

Frequency Range (MHz)	Mode	Peak E-field Strength (dBuV/m)	Avg E-field Strength (dBuV/m)	Distance (m)
2405 - 2475	ANT+	99.89	85.91	3.00

### 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 Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

## 6.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List			
Description	Manufacturer	Model	Serial Number
Phone	Apple	iPhone 8	F4GVGFZJC67
Phone	Apple	iPhone 6s	FK1TR0AVGRY1
DC Power Supply	Kenwood Corporation	PA36-3A	7060074
DC Power Supply	TDK.Lambda	ZUP36-6U	PRE0074768

### 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

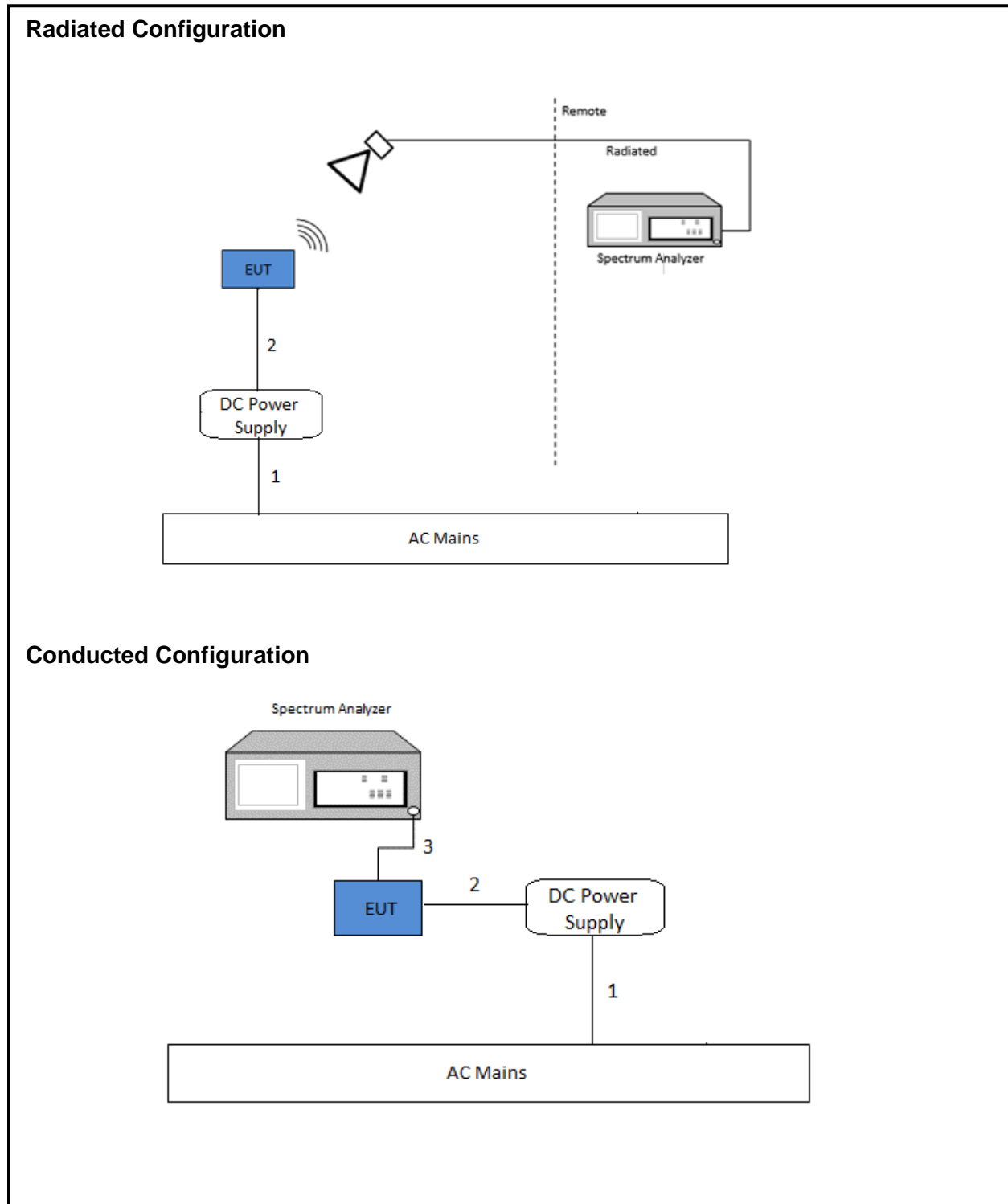
### I/O CABLES (RADIATED EMISSIONS)

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 7.4VDC power supply for radiated emissions above 1GHz. The EUT is normally powered by a 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 C63.10-2013 Section 11.6

Occupied BW (20dB): ANSI C63.10-2013 Section 6.9.2

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

Radiated Spurious Emissions 30-1000MHz: ANSI C63.10-2013 Section 6.3 and 6.5

Radiated Spurious Emissions above 1GHz: ANSI C63.10-2013 Section 6.3 and 6.6

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

Radiated Band-edge: ANSI C63.10-2013 Section 6.10.5

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

*\* A.C line conducted was not evaluated because the EUT is powered by a 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 1GHz	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	2024-04-30	2023-04-17
Link File, @3m, 9KHz-30MHz Passive Loop Path Loss	UL-FR1	Port 0 Factors	211120	2024-04-30	2023-04-17
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	206806	2023-10-07	2022-10-07
RF Filter Box, 1-18GHz	UL-FR1	n/a	171013	2024-05-31	2023-05-04
EMI TEST RECEIVER, with B8 option	Rohde & Schwarz	ESW44	191429	2024-02-29	2023-02-15
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	225688 (chamber k)	2024-02-29	2023-02-14
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	199659	2023-12-06	2022-12-06
Amplifier 18-26.5GHz, +5Vdc, -54dBm P1dB	AMPLICAL	AMP18G26.5-60	234683	2024-03-29	2023-03-18
Antenna, Passive Loop 100KHz - 30MHz	ELECTRO METRICS	EM-6871	219910	2024-05-31	2023-05-31
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent Technologies	N9030A	85201	2024-02-29	2023-02-02
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent Technologies	N9030A	80396	2024-01-31	2023-01-27
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.

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## 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

Note: DCCF based on manufacturer's declared duty cycle of 20%,  $20\log(0.2) = -13.98\text{dB}$ .



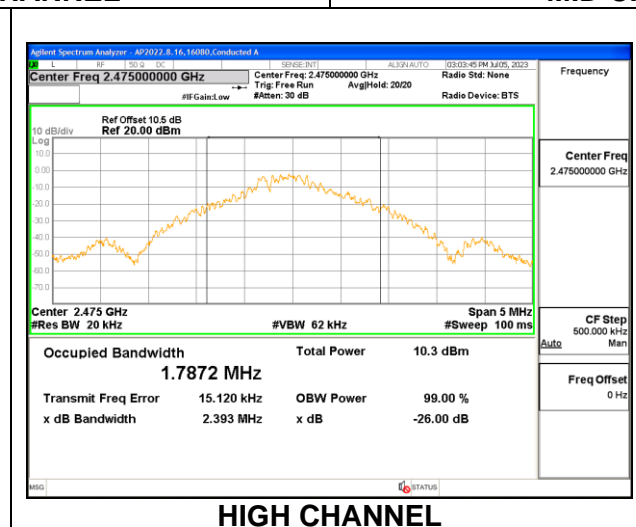
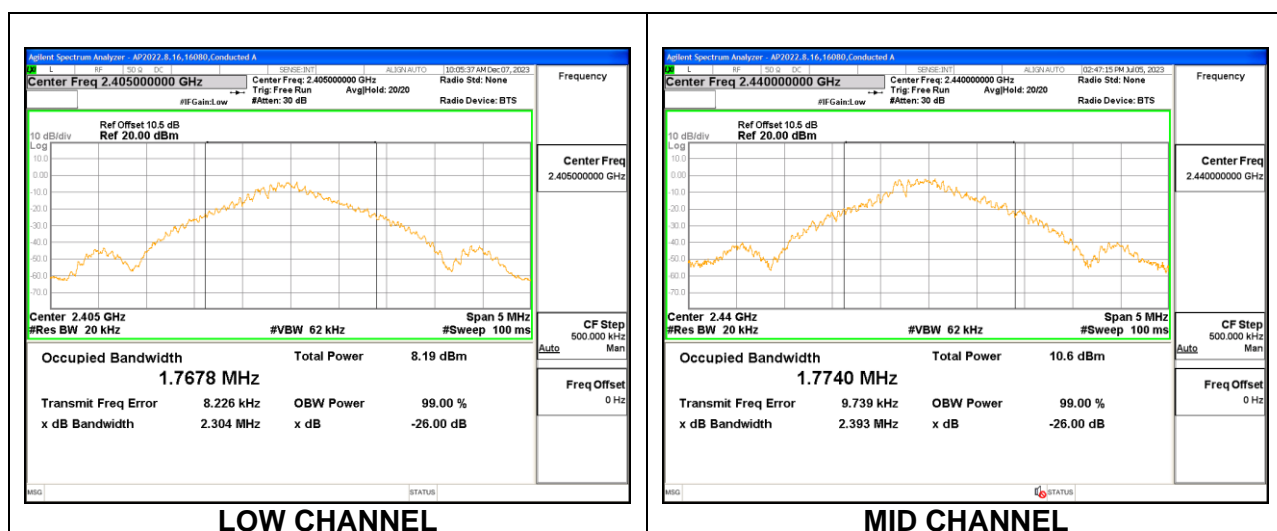
## 9.2. 99% BANDWIDTH

### LIMITS

None; for reporting purposes only.

### RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2405	1.7759
Middle	2440	1.7740
High	2475	1.7872



### 9.3. 20 dB BANDWIDTH

#### LIMITS

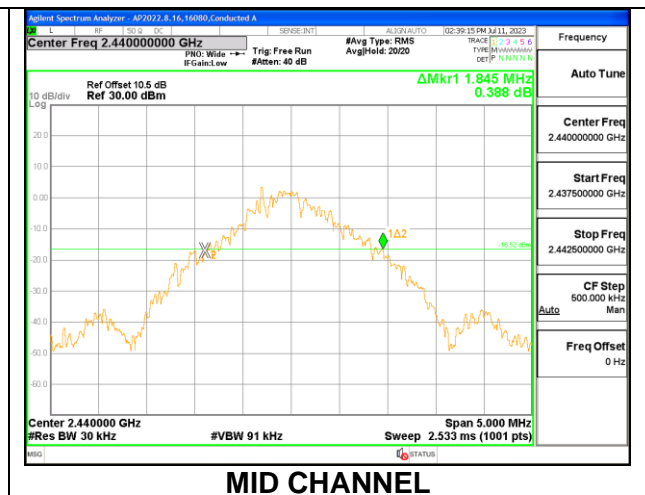
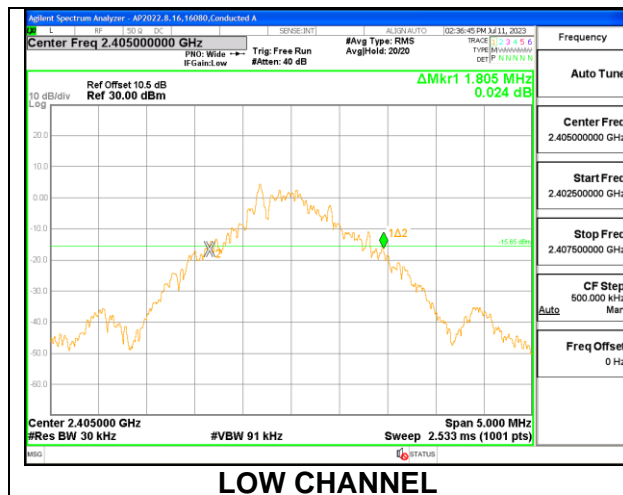
None; for reporting purposes only.

#### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1% to 5% of the 20 dB bandwidth. The VBW is set to approximately three times RBW. The sweep time is coupled

#### RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	Frequency Edge (MHz)	Limit (MHz)	Margin (MHz)
Low	2405	1.805	2404.098	2400	-4.097
Middle	2440	1.845	N/A	N/A	N/A
High	2475	1.815	2475.908	2483.5	-7.593



## 10. RADIATED TEST RESULTS

### 10.1. LIMITS AND PROCEDURE

#### LIMITS

FCC §15.249

FCC §15.205 and §15.209

RSS-210 Annex B.10.

ISED RSS-GEN, Section 8.9 and 8.10

Operation within the bands 902–928 MHz, 2400–2483.5 MHz, 5725–5875 MHz, and 24.0–24.25 GHz.

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/ meter)	Field strength of harmonics (microvolts/ meter)
902–928 MHz .....	50	500
2400–2483.5 MHz .....	50	500
5725–5875 MHz .....	50	500
24.0–24.25 GHz .....	250	2500

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.

(e) As shown in Sec. 15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

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 average measurements was calculated:  
 AVG = Peak Reading + Duty Cycle Correction Factor

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.

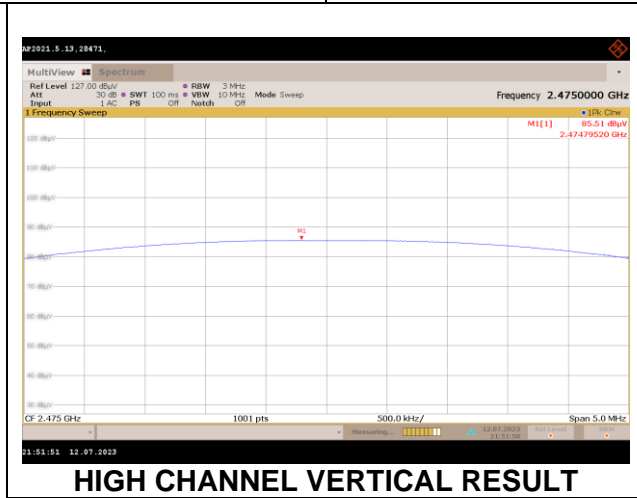
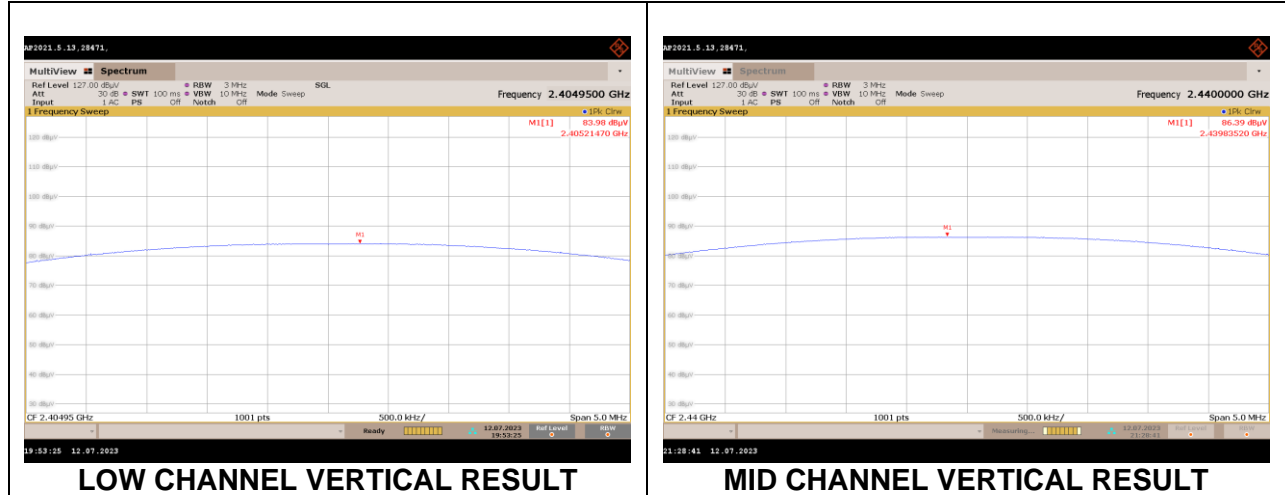
Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

**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. FUNDAMENTAL FREQUENCY RADIATED EMISSION



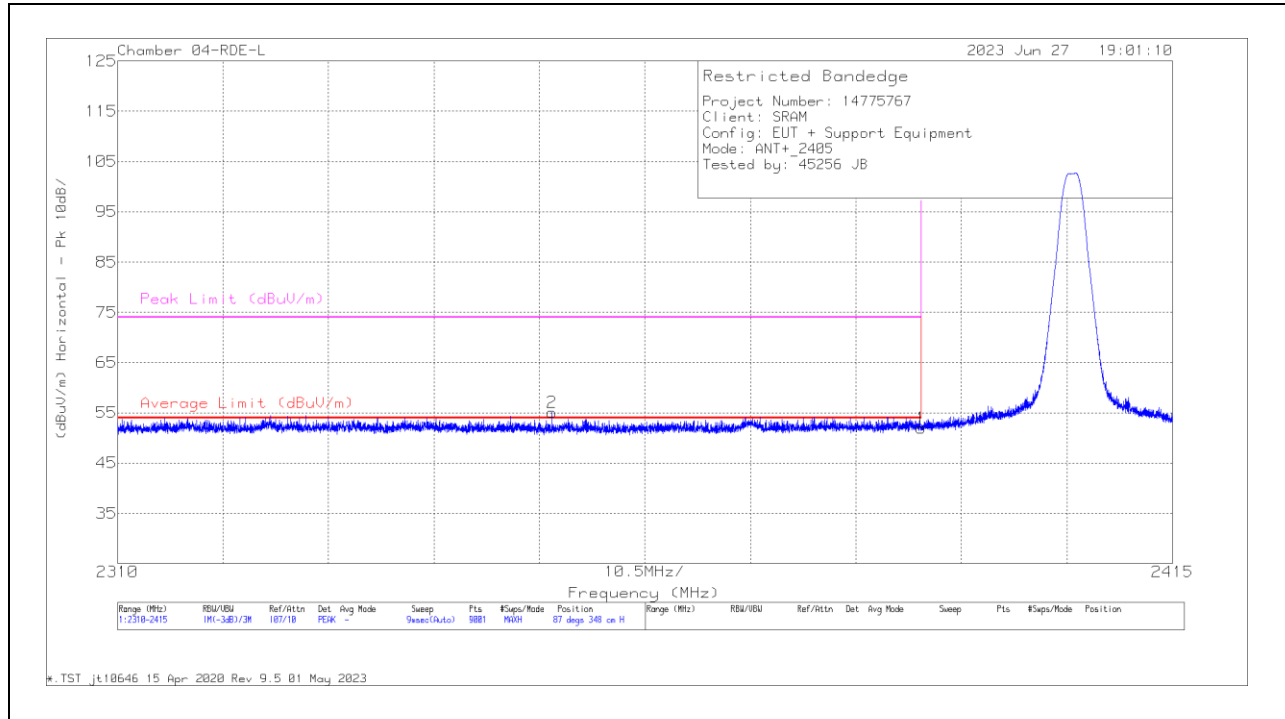
Frequency (GHz)	Measured Meter Reading (dBuV)	Det	22308 3 ACF (dB/m)	Amp/Cbl/Fit r/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2.405	74.53	PK	32.1	-18.8	-13.98	87.83	-	-20.15	114	-26.17	340	232	H
	74.53	AVG	32.1	-18.8	-13.98	73.85	94	-20.15	-	-	340	232	H
	83.98	PK	32.1	-18.8	-13.98	97.28	-	-10.7	114	-16.72	344	128	V
	83.98	AVG	32.1	-18.8	-13.98	83.3	94	-10.7	-	-	344	128	V
2.440	79.02	PK	32.1	-18.6	-13.98	92.52	-	-	114	-21.48	305	230	H
	79.02	AVG	32.1	-18.6	-13.98	78.54	94	-15.46	-	-	305	230	H
	86.39	PK	32.1	-18.6	-13.98	99.89	-	-	114	-14.11	347	118	V
	86.39	AVG	32.1	-18.6	-13.98	85.91	94	-8.09	-	-	347	118	V
2.475	78.85	PK	32	-18.6	-13.98	92.25	-	-	114	-21.75	244	217	H
	78.85	AVG	32	-18.6	-13.98	78.27	94	-15.73	-	-	244	217	H
	85.51	PK	32	-18.6	-13.98	98.91	-	-	114	-15.09	211	111	V
	85.51	AVG	32	-18.6	-13.98	84.93	94	-9.07	-	-	211	111	V

PK - Peak detector  
 AVG = Measured Peak Reading + Duty Cycle Correction Factor  
 Duty Cycle Correction Factor = -13.98 dB

### 10.3. TRANSMITTER ABOVE 1 GHz

#### BANDEDGE (LOW CHANNEL)

#### HORIZONTAL RESULT

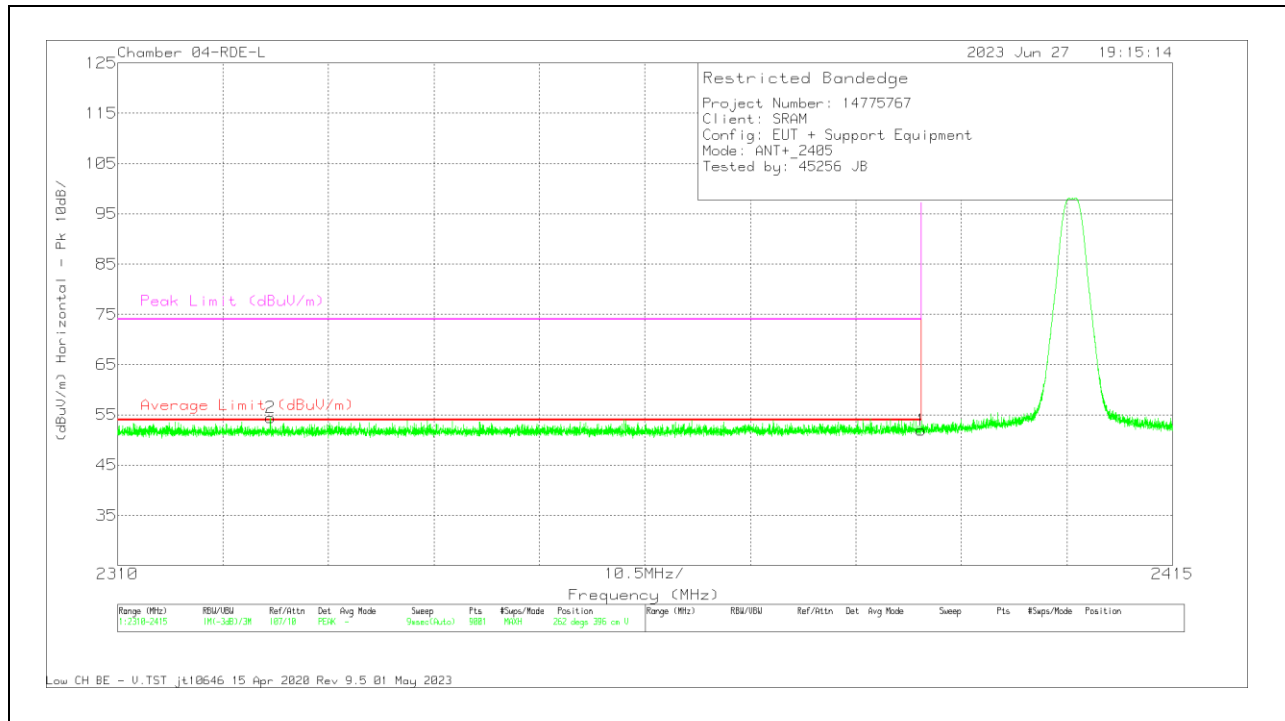


#### Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206806 ACF (dB/m)	AMP/CBL(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	* 2390	38.72	PK	32	-18.8	-	51.92	-	-	74	-22.08	87	348	H
	* 2390	38.72	AVG	32	-18.8	-13.98	37.94	54	-16.06	-	-	87	348	H
2	* 2353.261	42.03	PK	32	-18.9	-	55.13	-	-	74	-18.87	87	348	H
	* 2353.261	42.03	AVG	32	-18.9	-13.98	41.15	54	-12.85	-	-	87	348	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK - RB=1MHz VB=3 x RB, Peak  
 AVG = Peak Reading + Duty Cycle Correction Factor  
 Duty Cycle Correction Factor = -13.98 dB

### VERTICAL RESULT



### Trace Markers

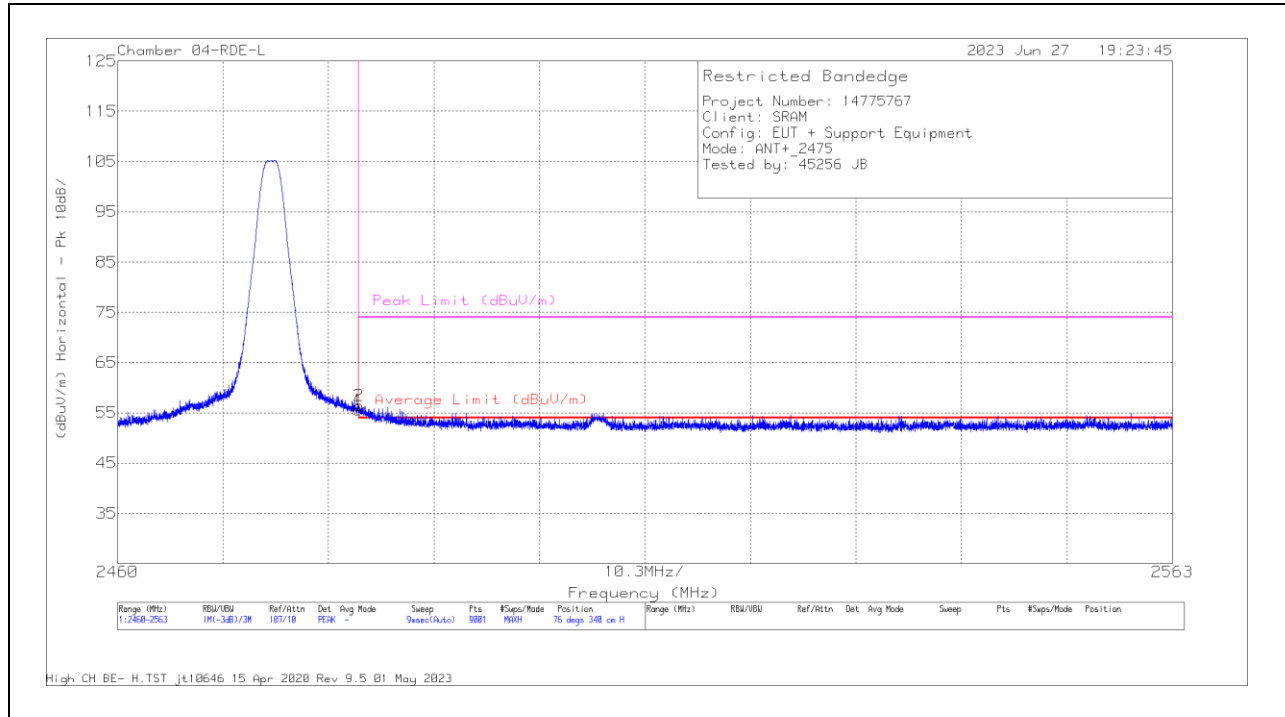
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206806 ACF (dB/m)	AMP/CBL(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2390	38.76	Pk	32	-18.8	-	51.96	-	-	74	-22.04	262	396	V
	* 2390	38.76	AVG	32	-18.8	-13.98	37.98	54	-16.02	-	-	262	396	V
2	* 2325.214	41.52	Pk	32	-19	-	54.52	-	-	74	-19.48	262	396	V
	* 2325.214	41.52	AVG	32	-19	-13.98	40.54	54	-13.46	-	-	262	396	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK - RB=1MHz VB=3 x RB, Peak  
 AVG = Peak Reading + Duty Cycle Correction Factor  
 Duty Cycle Correction Factor = -13.98 dB



**BANDEDGE (HIGH CHANNEL)**

**HORIZONTAL RESULT**

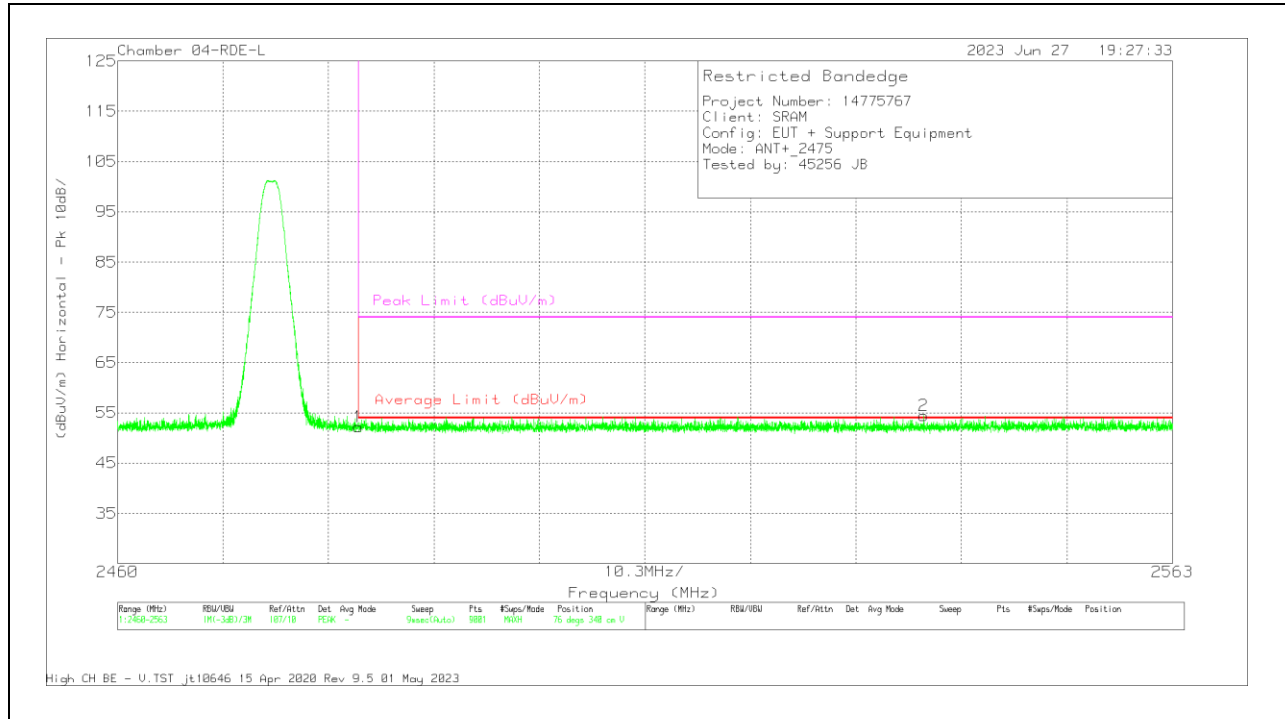


**Trace Markers**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206806 ACF (dB/m)	AMP/CBL(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	* 2483.5	42.2	PK	32	-18.6		55.6	-	-	74	-18.4	76	340	H
	* 2483.5	42.2	AVG	32	-18.6	-13.98	41.62	54	-12.38	-	-	76	340	H
2	* 2483.552	42.95	PK	32	-18.5		56.45	-	-	74	-17.55	76	340	H
	* 2483.552	42.95	AVG	32	-18.5	-13.98	42.47	54	-11.53	-	-	76	340	H

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK - RB=1MHz VB=3 x RB, Peak  
 AVG = Peak Reading + Duty Cycle Correction Factor  
 Duty Cycle Correction Factor = -13.98 dB

### VERTICAL RESULT



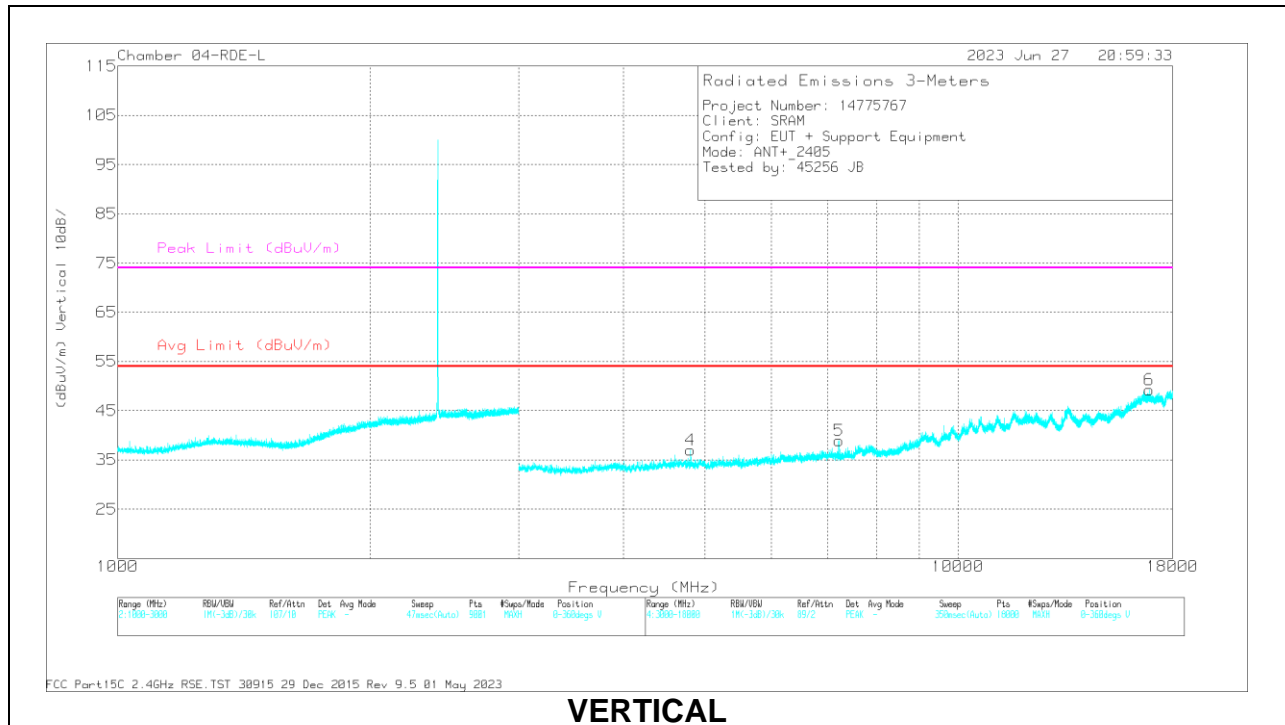
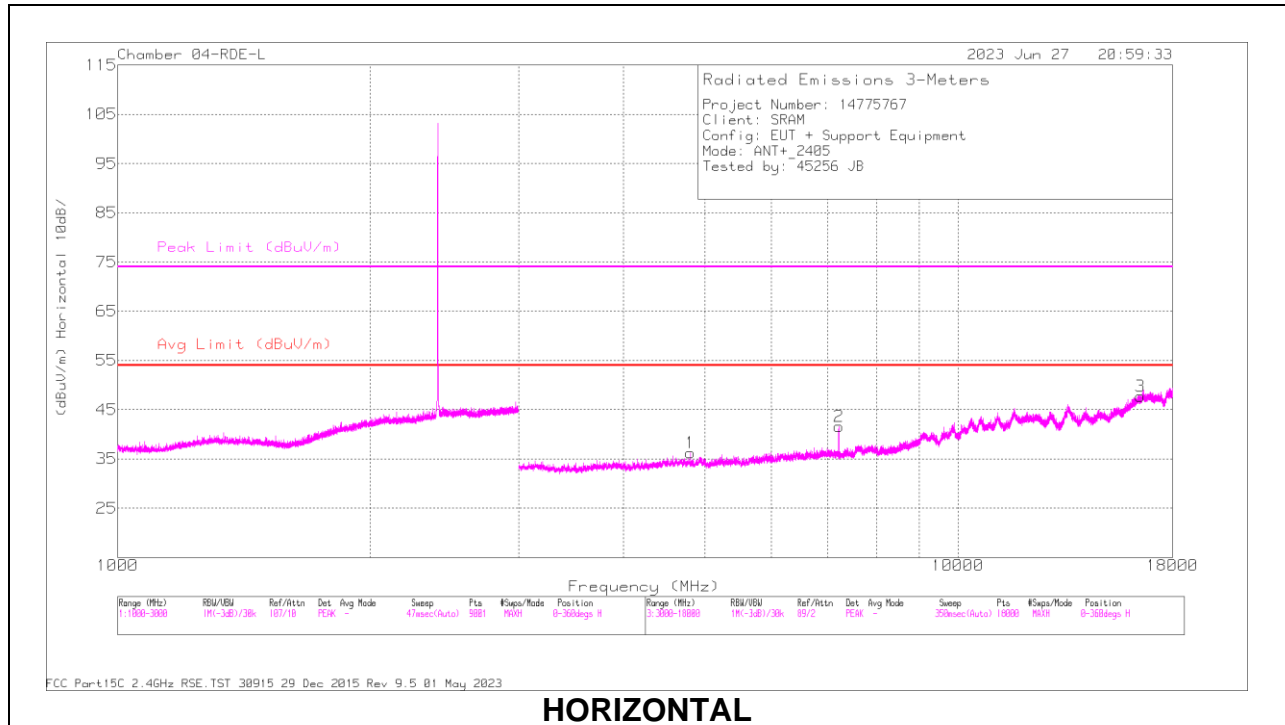
### Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206806 ACF (dB/m)	AMP/CBL(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	* 2483.5	38.78	PK	32	-18.6		52.18	-	-	74	-21.82	76	340	V
	* 2483.5	38.78	AVG	32	-18.6	-13.98	38.2	54	-15.8	-	-	76	340	V
2	2538.735	40.94	PK	32	-18.5		54.44	-	-	74	-19.56	76	340	V
	2538.735	40.94	AVG	32	-18.5	-13.98	40.46	54	-13.54	-	-	76	340	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 PK - RB=1MHz VB=3 x RB, Peak  
 AVG = Peak Reading + Duty Cycle Correction Factor  
 Duty Cycle Correction Factor = -13.98 dB

# HARMONICS AND SPURIOUS EMISSIONS

## LOW CHANNEL RESULTS

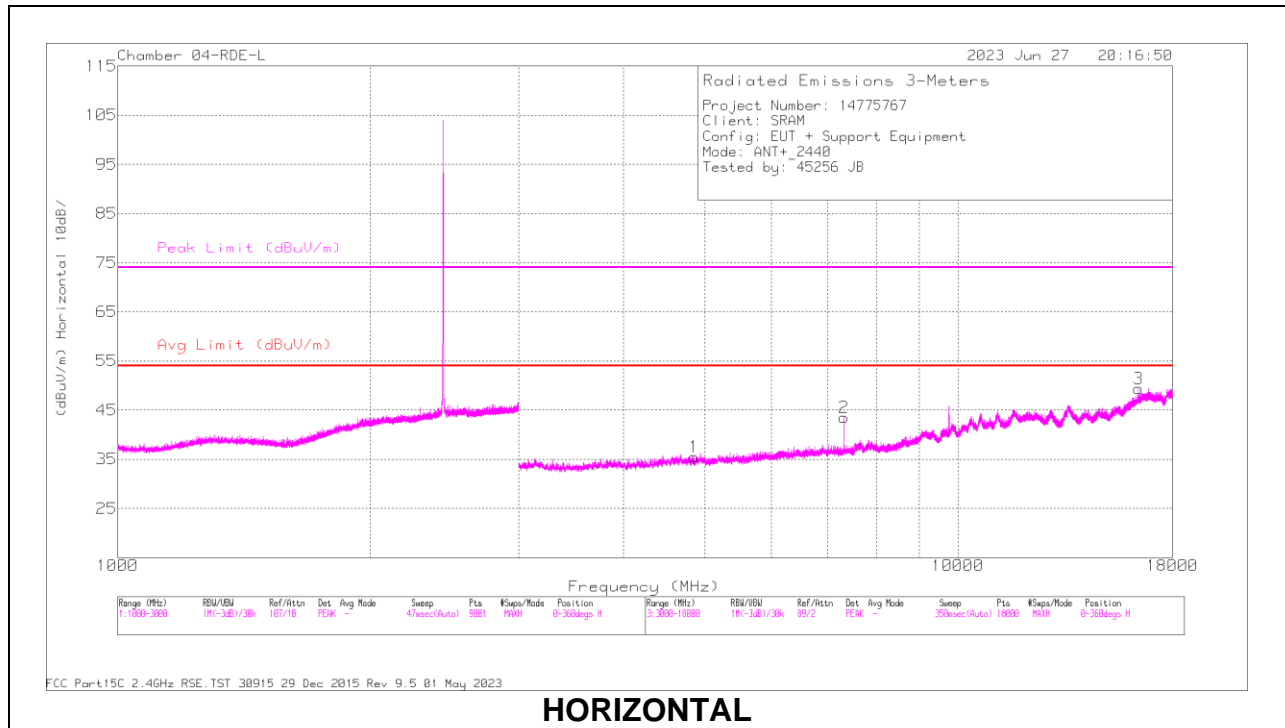


**RADIATED EMISSIONS**

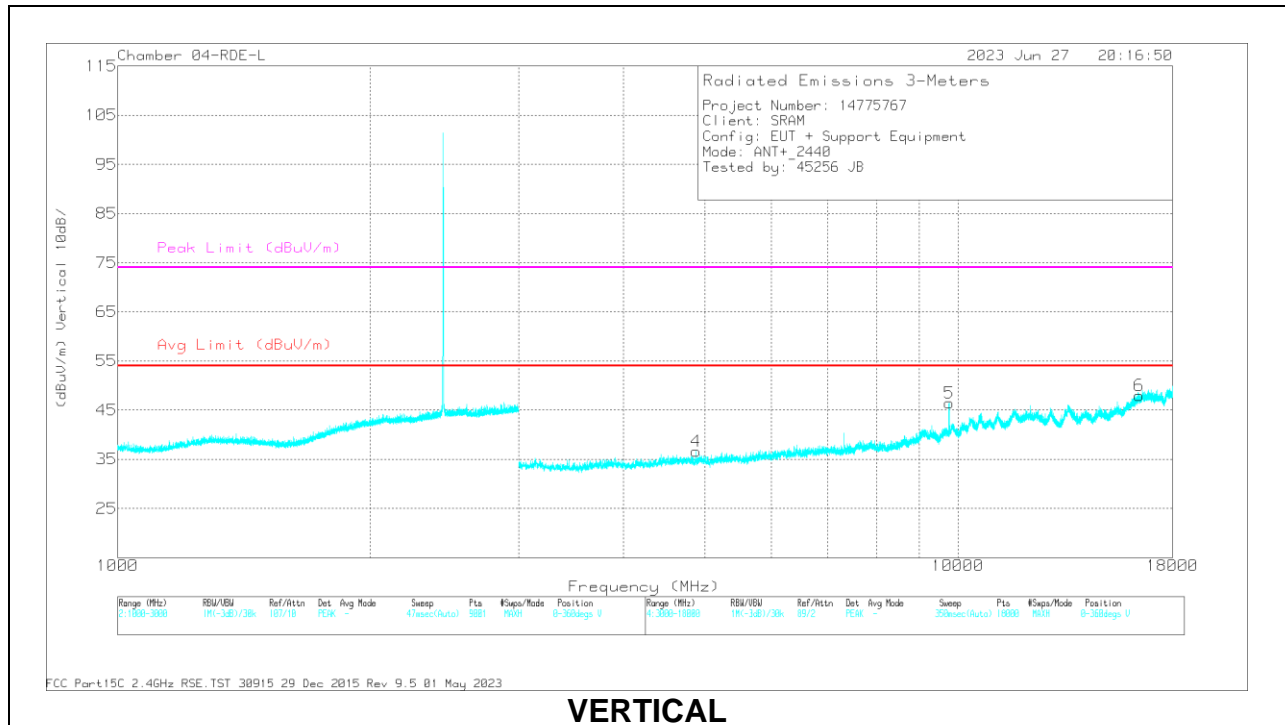
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206806 ACF (dB/m)	AMP/CBL(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4810.509	36.91	PK	33.9	-25.2		45.61	-	-	74	-28.39	36	125	H
	* 4810.509	36.91	AVG	33.9	-25.2	-13.98	31.63	54	-22.37	-	-	36	125	H
2	7216.086	36.49	PK	35.6	-21.7		50.39	-	-	74	-23.61	149	101	H
	7216.086	36.49	AVG	35.6	-21.7	-13.98	36.41	54	-17.59	-	-	149	101	H
3	16494.562	31.29	PK	41.2	-15.2		57.29	-	-	74	-16.71	342	296	H
	16494.562	31.29	AVG	41.2	-15.2	-13.98	43.31	54	-10.69	-	-	342	296	H
4	* 4809.421	37.79	PK	33.9	-25.2		46.49	-	-	74	-27.51	124	107	V
	* 4809.421	37.79	AVG	33.9	-25.2	-13.98	32.51	54	-21.49	-	-	124	107	V
5	7213.891	34.88	PK	35.6	-21.7		48.78	-	-	74	-25.22	167	110	V
	7213.891	34.88	AVG	35.6	-21.7	-13.98	34.8	54	-19.2	-	-	167	110	V
6	16877.302	31.7	PK	41.6	-14.6		58.7	-	-	74	-15.3	123	127	V
	16877.302	31.7	AVG	41.6	-14.6	-13.98	44.72	54	-9.28	-	-	123	127	V

PK - RB=1MHz VB=3 x RB, Peak  
 AVG = Peak Reading + Duty Cycle Correction Factor  
 Duty Cycle Correction Factor = -13.98 dB

### MID CHANNEL RESULTS



**HORIZONTAL**



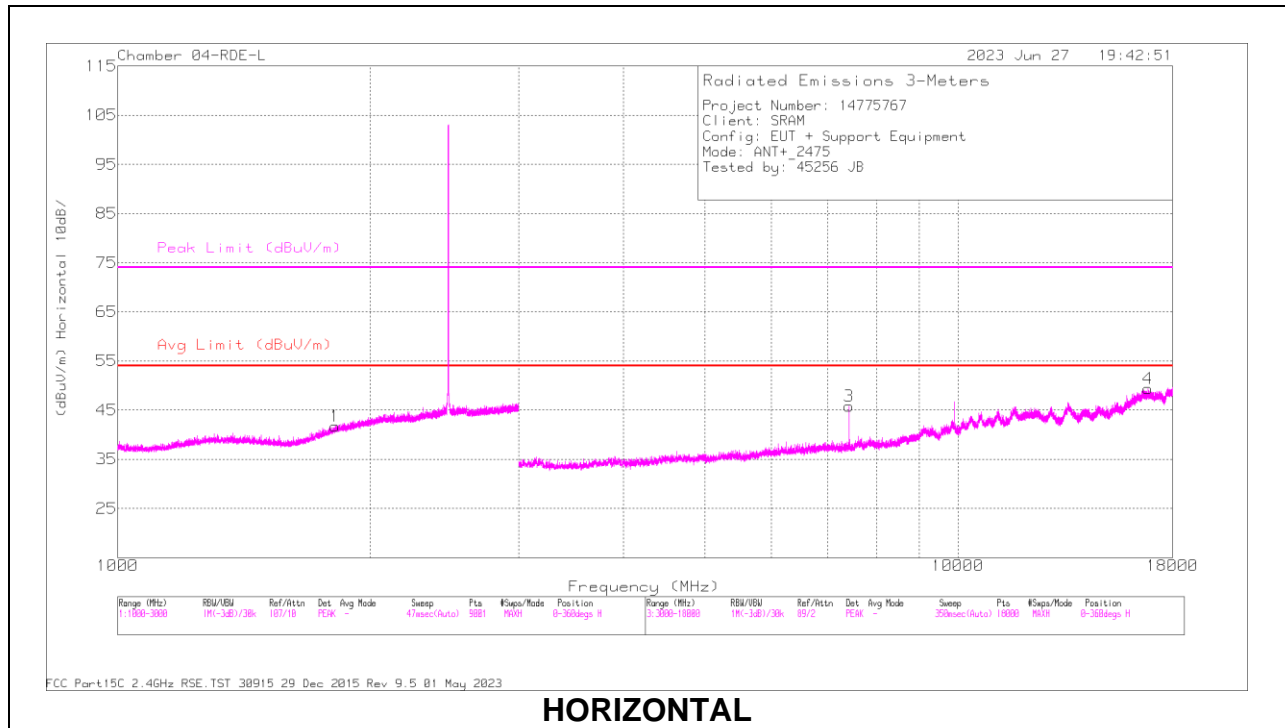
**VERTICAL**

**RADIATED EMISSIONS**

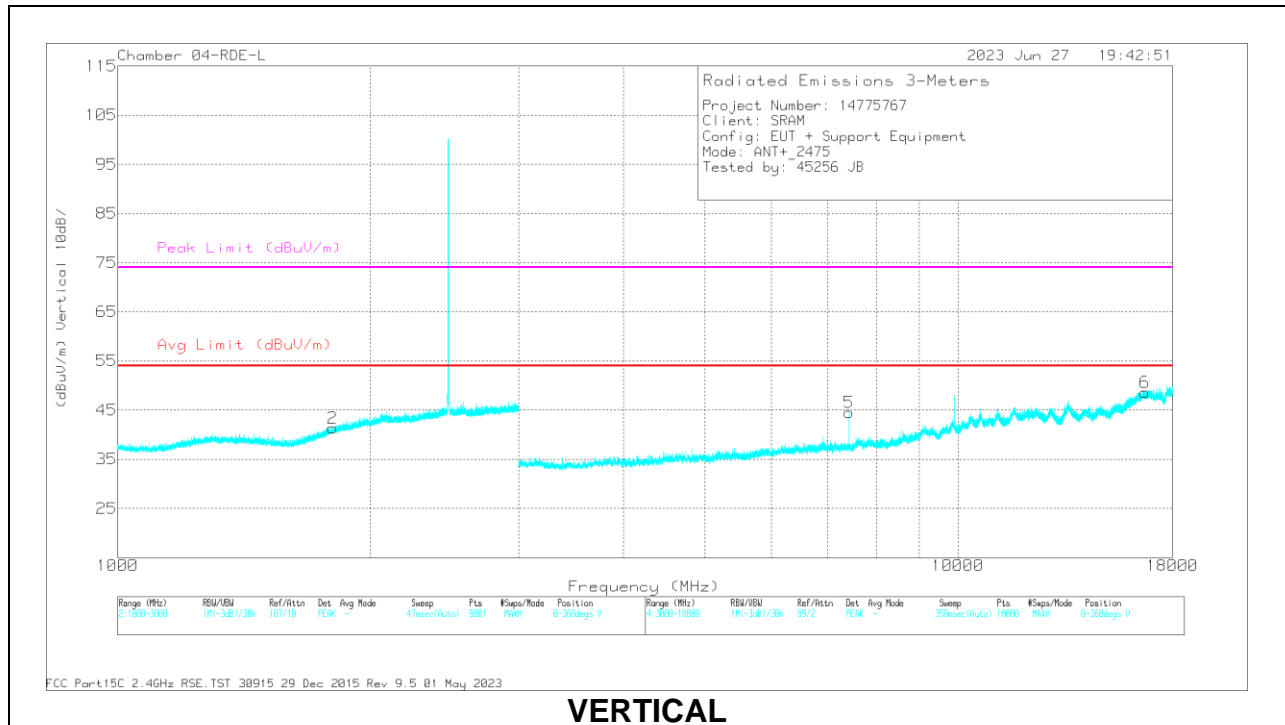
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206806 ACF (dB/m)	AMP/CBL(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4860.204	36.46	PK	33.9	-25.4		44.96	-	-	74	-29.04	10	360	H
	* 4860.204	36.46	AVG	33.9	-25.4	-13.98	30.98	54	-23.02	-	-	10	360	H
2	* 7319.235	37.05	PK	35.6	-21.3		51.35	-	-	74	-22.65	66	109	H
	* 7319.235	37.05	AVG	35.6	-21.3	-13.98	37.37	54	-16.63	-	-	66	109	H
3	16394.853	32.22	PK	41.1	-15.4		57.92	-	-	74	-16.08	57	287	H
	16394.853	32.22	AVG	41.1	-15.4	-13.98	43.94	54	-10.06	-	-	57	287	H
4	* 4879.237	36.49	PK	33.9	-25		45.39	-	-	74	-28.61	113	119	V
	* 4879.237	36.49	AVG	33.9	-25	-13.98	31.41	54	-22.59	-	-	113	119	V
5	9758.981	34.3	PK	36.9	-18		53.2	-	-	74	-20.8	207	201	V
	9758.981	34.3	AVG	36.9	-18	-13.98	39.22	54	-14.78	-	-	207	201	V
6	16429.352	31.41	PK	41.1	-15.3		57.21	-	-	74	-16.79	59	164	V
	16429.352	31.41	AVG	41.1	-15.3	-13.98	43.23	54	-10.77	-	-	59	164	V

PK - RB=1MHz VB=3 x RB, Peak  
 AVG = Peak Reading + Duty Cycle Correction Factor  
 Duty Cycle Correction Factor = -13.98 dB

### HIGH CHANNEL RESULTS



**HORIZONTAL**



**VERTICAL**

**RADIATED EMISSIONS**

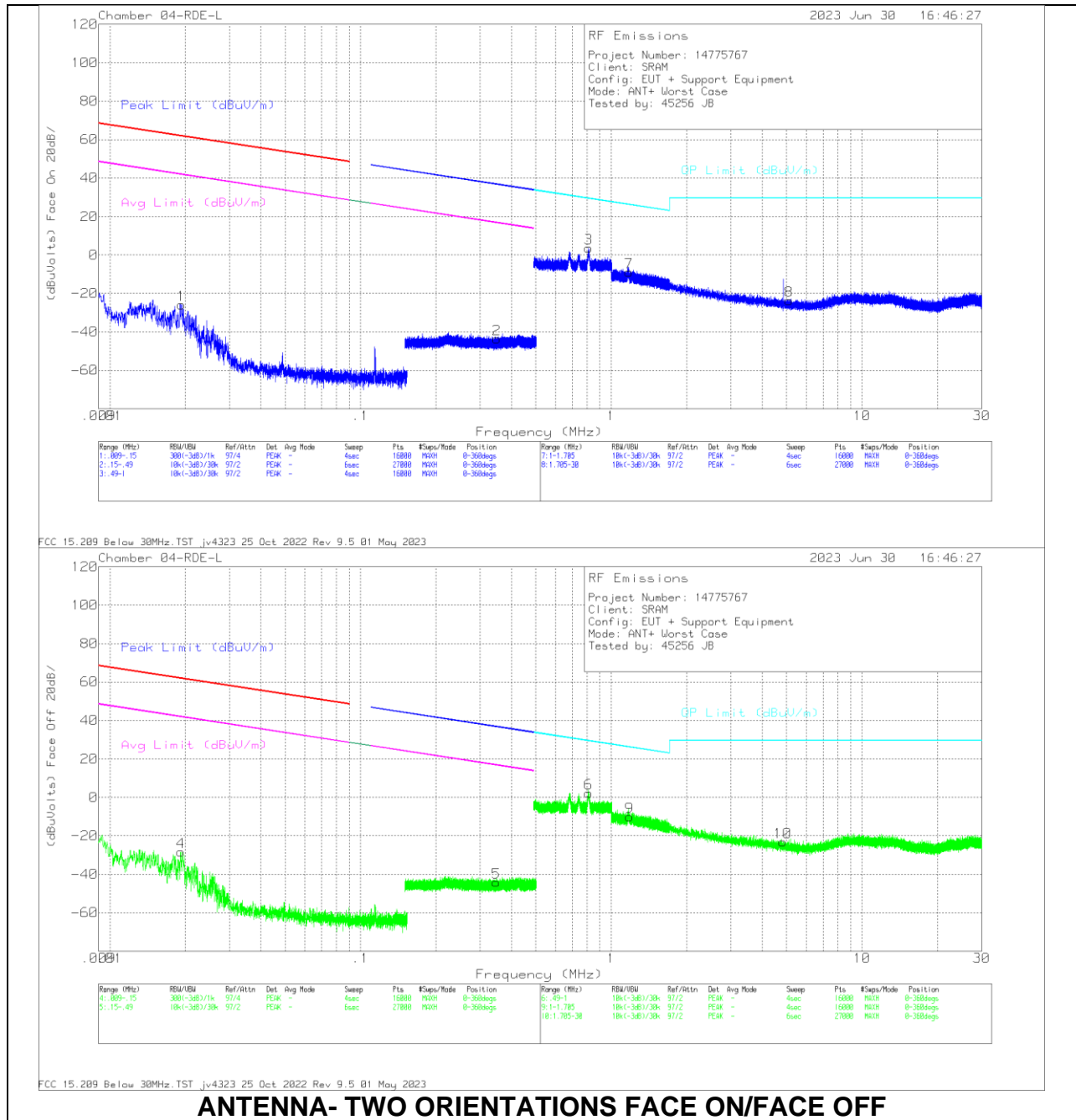
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206806 ACF (dB/m)	AMP/CBL(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1816.073	41.46	PK	30.2	-20.3		51.36	-	-	74	-22.64	162	287	H
	1816.073	41.46	AVG	30.2	-20.3	-13.98	37.38	54	-16.62	-	-	162	287	H
2	1799.122	41.61	AVG	30	-20.3	-13.98	37.33	54	-16.67	-	-	206	386	V
	1799.122	41.61	PK	30	-20.3		51.31	-	-	74	-22.69	206	386	V
3	* 7426.111	38.11	PK	35.6	-21.1		52.61	-	-	74	-21.39	69	108	H
	* 7426.111	38.11	AVG	35.6	-21.1	-13.98	38.63	54	-15.37	-	-	69	108	H
4	16835.55	31.49	PK	41.7	-14.5		58.69	-	-	74	-15.31	232	228	H
	16835.55	31.49	AVG	41.7	-14.5	-13.98	44.71	54	-9.29	-	-	232	228	H
5	* 7424.229	36.3	PK	35.6	-21.1		50.8	-	-	74	-23.2	152	230	V
	* 7424.229	36.3	AVG	35.6	-21.1	-13.98	36.82	54	-17.18	-	-	152	230	V
6	16689.849	31.17	PK	41.6	-14.5		58.27	-	-	74	-15.73	27	159	V
	16689.849	31.17	AVG	41.6	-14.5	-13.98	44.29	54	-9.71	-	-	27	159	V

PK - RB=1MHz VB=3 x RB, Peak  
 AVG = Peak Reading + Duty Cycle Correction Factor  
 Duty Cycle Correction Factor = -13.98 dB



# 10.4. WORST CASE BELOW 30 MHz

## 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 (dB/m)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)
1	.0193	25.88	Pk	59.2	-30.9	-80	-25.82	61.87	-87.69	41.87	-67.69	0-360	0-deg

Range 2: Face On .15 - .49MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E ACF (dB/m)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)
2	.3497	12.11	Pk	56.2	-31.9	-80	-43.59	36.74	-80.33	16.74	-60.33	0-360	0-deg

Range 3: Face On .49 - 1MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E ACF (dB/m)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)		
3	.8107	19.06	Pk	56.4	-31.9	-40	3.56	29.44	-25.88	0-360	0-deg		

Range 4: Face Off .009 - .15MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E ACF (dB/m)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)
4	.0192	23.35	Pk	59.2	-30.8	-80	-28.25	61.93	-90.18	41.93	-70.18	0-360	90-degs

Range 5: Face Off .15 - .49MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E ACF (dB/m)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)
5	.3481	11.65	Pk	56.2	-31.9	-80	-44.05	36.78	-80.83	16.78	-60.83	0-360	90-degs

Range 6: Face Off .49 - 1MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E ACF (dB/m)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)		
6	.8127	17.82	Pk	56.4	-31.9	-40	2.32	29.42	-27.1	0-360	90-degs		

Range 7: Face On 1 - 1.705MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E ACF (dB/m)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)		
7	1.1771	17.08	Pk	45.9	-31.8	-40	-8.82	26.21	-35.03	0-360	0-deg		

Range 8: Face On 1.705 - 30MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E ACF (dB/m)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)		
8	5.11	12.06	Pk	35.9	-31.6	-40	-23.64	29.5	-53.14	0-360	0-deg		

Range 9: Face Off 1 - 1.705MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E ACF (dB/m)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)		
9	1.1815	15.99	Pk	45.8	-31.8	-40	-10.01	26.18	-36.19	0-360	90-degs		

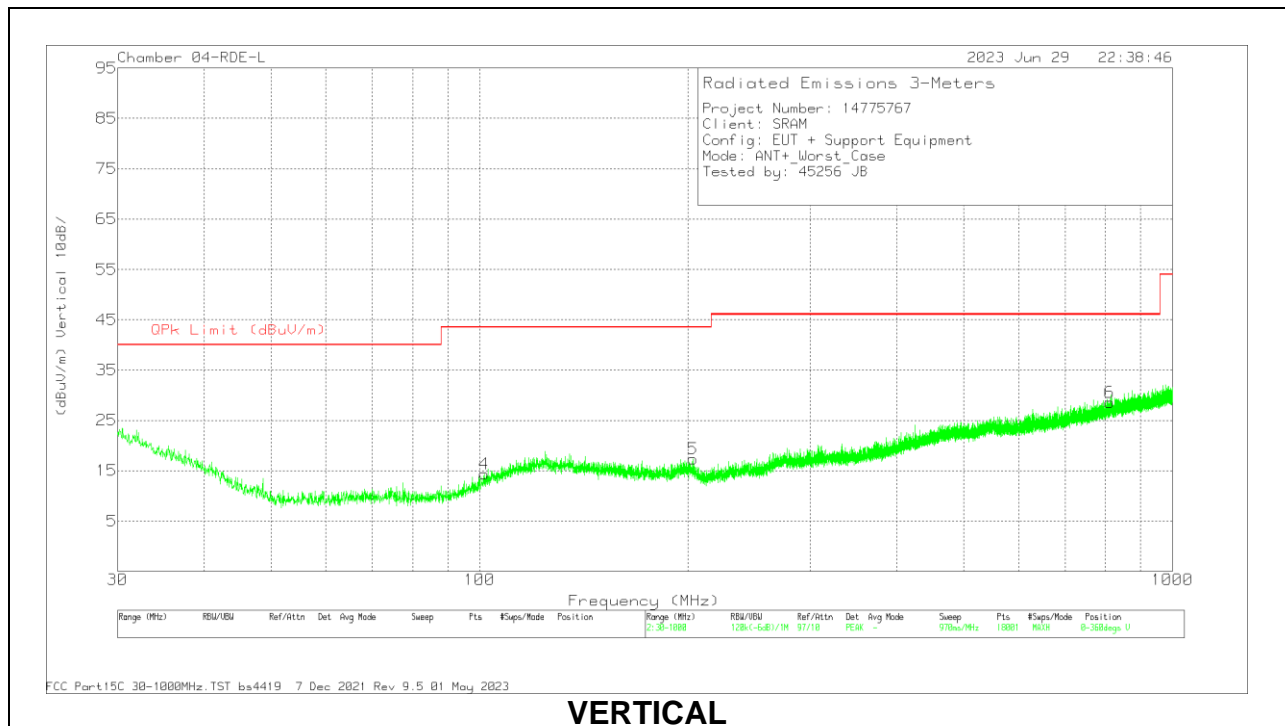
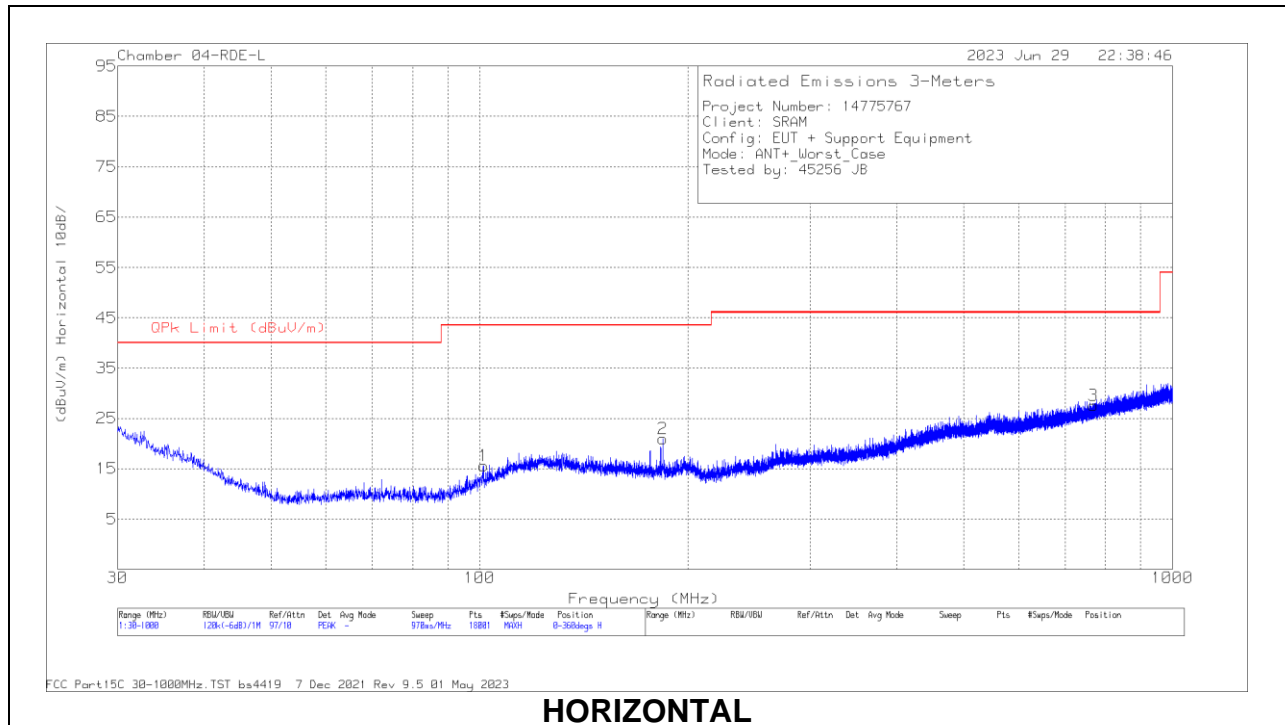
Range 10: Face Off 1.705 - 30MHz													
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E ACF (dB/m)	Amp/Cbl (dB)	Dist Corr 30m (dB) 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Polarity (degs)		
10	4.8228	12.34	Pk	36.2	-31.6	-40	-23.06	29.5	-52.56	0-360	90-degs		

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.

## 10.5. 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 (dB/m)	AMP/CBL(dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	101.295	29.74	Pk	16.4	-30.5	15.64	43.52	-27.88	0-360	299	H
2	183.853	33.46	Pk	17.1	-29.6	20.96	43.52	-22.56	0-360	299	H
3	768.71	28.45	Pk	26.8	-27.7	27.55	46.02	-18.47	0-360	199	H
4	101.511	28.32	Pk	16.5	-30.5	14.32	43.52	-29.2	0-360	299	V
5	202.984	29.28	Pk	17.6	-29.5	17.38	43.52	-26.14	0-360	100	V
6	811.606	28.72	Pk	27.3	-27.5	28.52	46.02	-17.5	0-360	299	V
	810.628	20.38	Qp	27.2	-27.5	20.08	46.02	-25.94	48	106	V

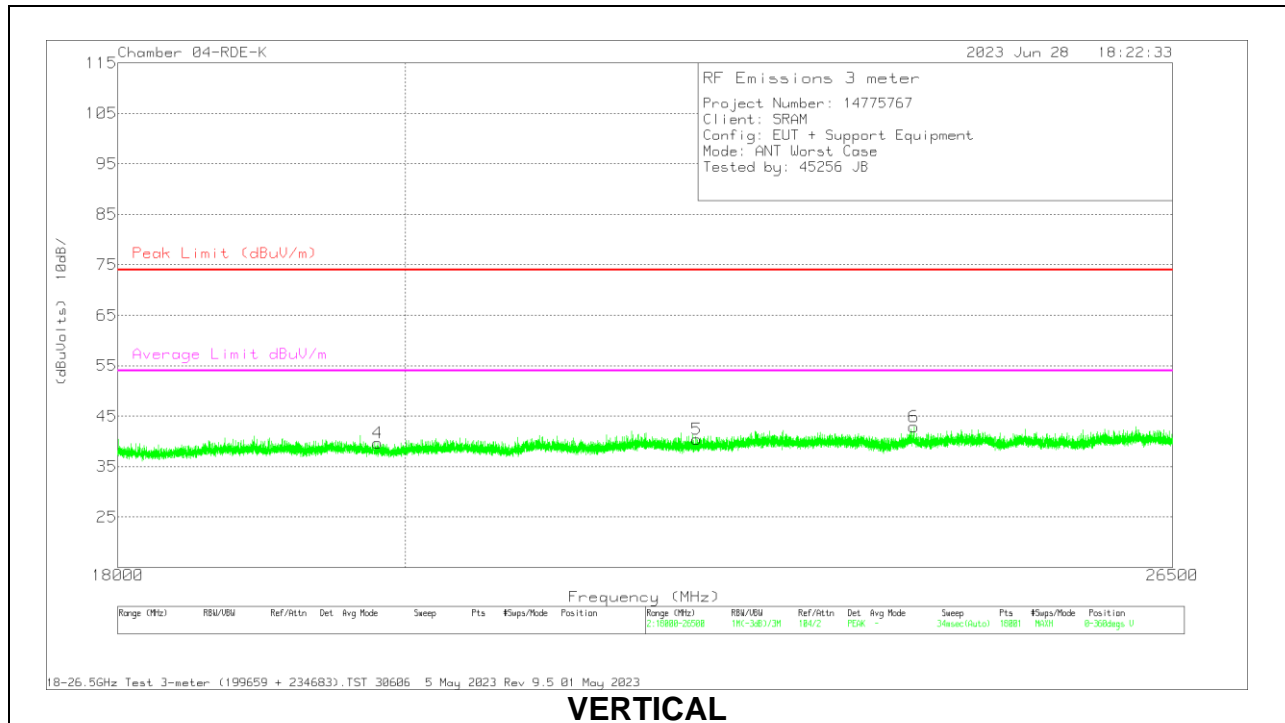
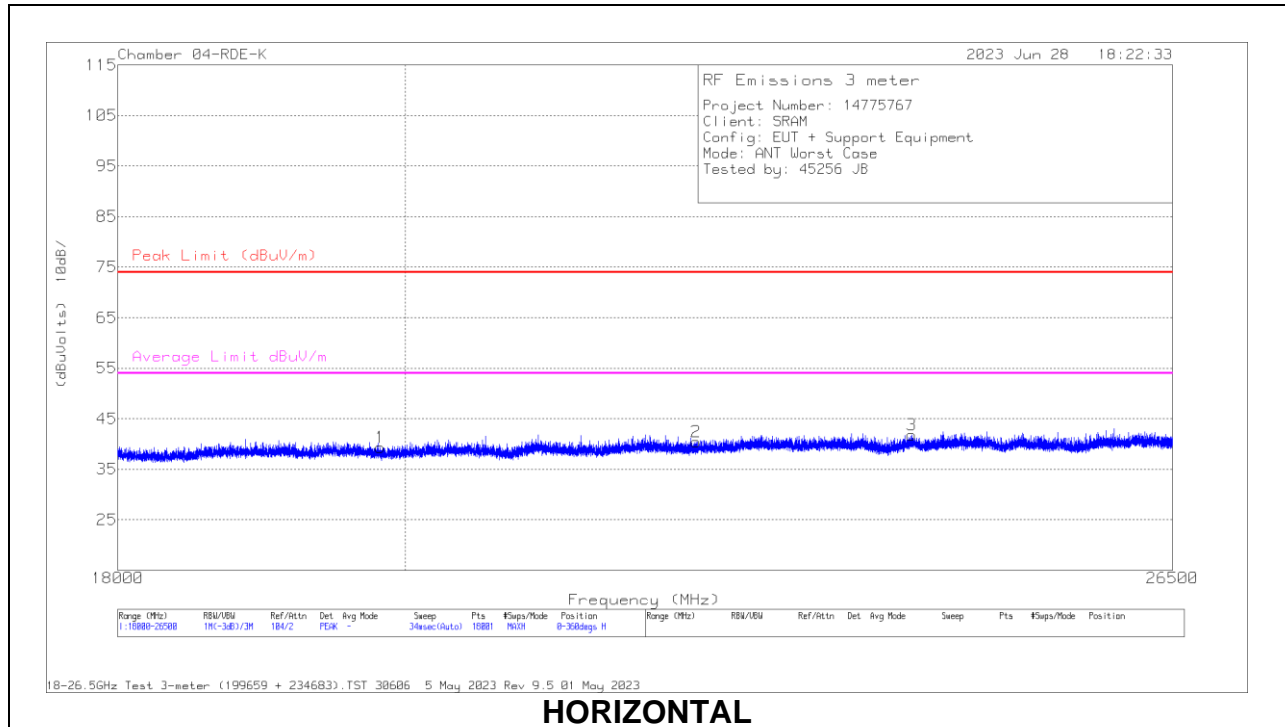
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Qp - Quasi-Peak detector

## 10.6. WORST CASE 18-26 GHz

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



## 18 – 26GHz DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Horn ACF (dB/m)	23483 Amp/Cbl (dB)	Cables (dB)	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	PK Margin (dB)	Average Limit dBuV/m	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 19820.888	50.62	Pk	32.7	-62.6	18.6	39.32	74	-34.68	54	-14.68	0-360	100	H
2	* 22251.887	49.97	Pk	33.3	-62.6	19.7	40.37	74	-33.63	54	-13.63	0-360	200	H
3	24084.108	50.03	Pk	33.7	-62.4	20.5	41.83	74	-32.17	54	-12.17	0-360	200	H
4	* 19798.694	50.97	Pk	32.7	-62.6	18.6	39.67	74	-34.33	54	-14.33	0-360	100	V
5	* 22259.442	50	Pk	33.3	-62.6	19.7	40.4	74	-33.6	54	-13.6	0-360	200	V
6	24102.997	51.13	Pk	33.7	-62.4	20.5	42.93	74	-31.07	54	-11.07	0-360	200	V

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