TEST REPORT

Report Number: 14775767-E1V3

Applicant	:	SRAM LLC 1000 W Fulton Market 4th 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-247 ISSUE 3 ISED RSS-GEN ISSUE 5 + A1 + A2

Date Of Issue:
2023-12-14

Prepared by:
UL VERIFICATION SERVICES
47173 Benicia Street
Fremont, CA 94538 U.S.A.
TEL: (510) 319-4000
FAX: (510) 661-0888

ACCREDITED
CERT #0751.05

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2023-08-15	Initial Issue	
V2	2023-12-07	Updated to RSS-247 Issue 3 and Section 8	Kiya Kedida
V3	2023-12-14	Updated Section 10.2,10.3 and 10.4	Kiya Kedida

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SRAM LLC
1000 W Fulton Market 4th 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: 2023-06-26 to 2023-07-05

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC 47 CFR Part 15 Subpart C	Complies
ISED RSS-247 Issue 3	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.

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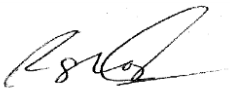
Approved & Released For
UL Verification Services Inc. By:

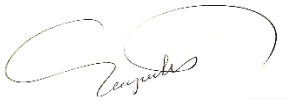
Dan Coronia
Operations Leader
Consumer Technology Division
UL Verification Services Inc.

Prepared By:



Rolly Alegre
Laboratory Engineer
Consumer Technology Division
UL Verification Services Inc.

1st Reviewed By:



Vien Tran
Senior Laboratory Engineer
Consumer Technology Division
UL Verification Services Inc.

2nd Reviewed By:

Kiya Kedida
Senior Project Engineer
Consumer Technology Division
UL Verification Services Inc.

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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

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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 3.

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
☒	Building 1: 47173 Benicia Street Fremont, CA 94538, U.S.A	US0104	2324A	550739
☐	Building 2: 47266 Benicia Street Fremont, CA 94538, U.S.A			
☒	Building 4: 47658 Kato Rd Fremont, CA 94538, U.S.A			

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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_{Lab}
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%.

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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

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6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is an Electronic Rear Derailleur.

6.2. MAXIMUM OUTPUT POWER

The transmitter has a 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	7.31	5.38	7.25	5.31

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.

Worst-case data rate as provided by the client was 1Mbps.

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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.

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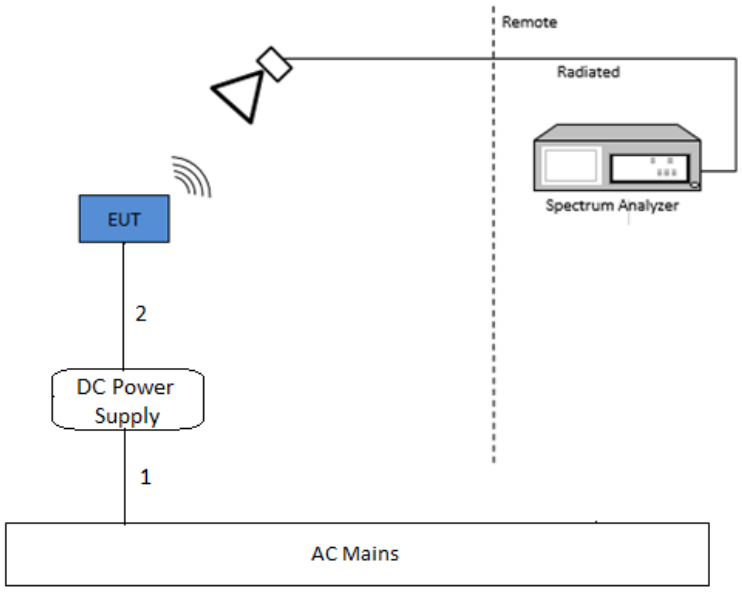
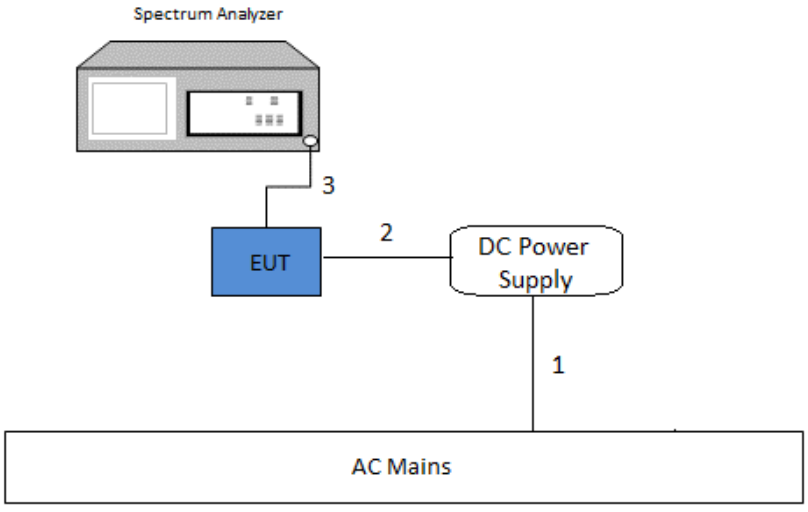
SETUP DIAGRAM

Radiated Configuration



Conducted Configuration



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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 ≥ 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 EUT is powered by a Li-Ion 7.4VDC battery.*

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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, 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
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	90719	2024-01-31	2023-01-25
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.

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9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

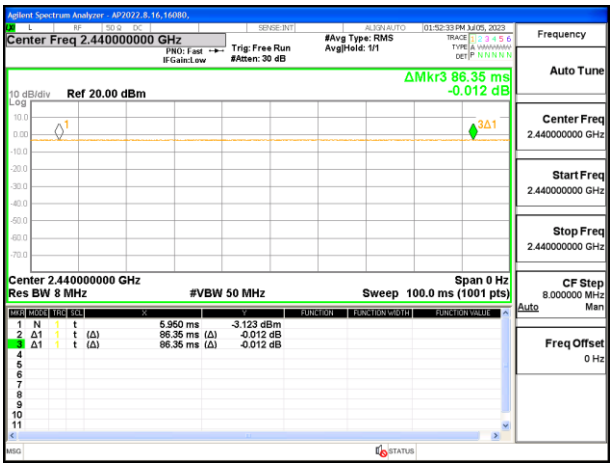
PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
2.4GHz Band						
BLE	86.350	86.350	1.000	100.00	0.00	0.010

DUTY CYCLE PLOTS



DUTY CYCLE BLE

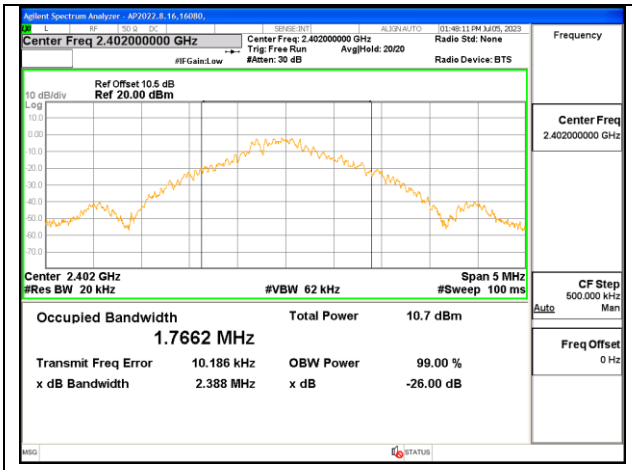
9.2. 99% BANDWIDTH

LIMITS

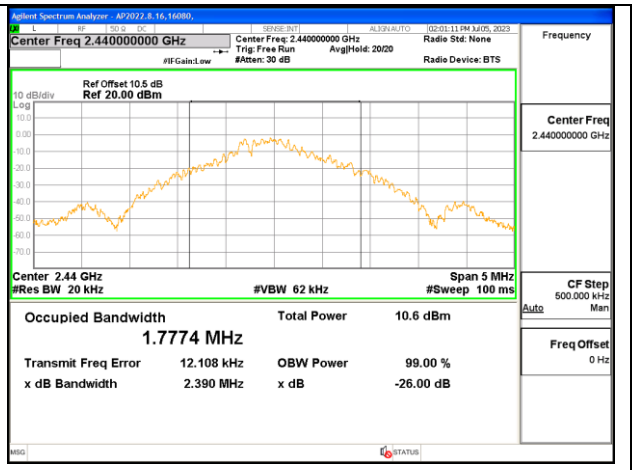
None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.7662
Middle	2440	1.7774
High	2480	1.7934



LOW CHANNEL



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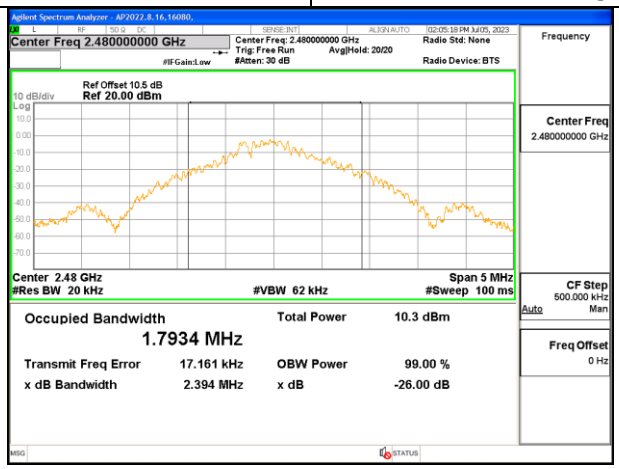

HIGH CHANNEL

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9.3. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

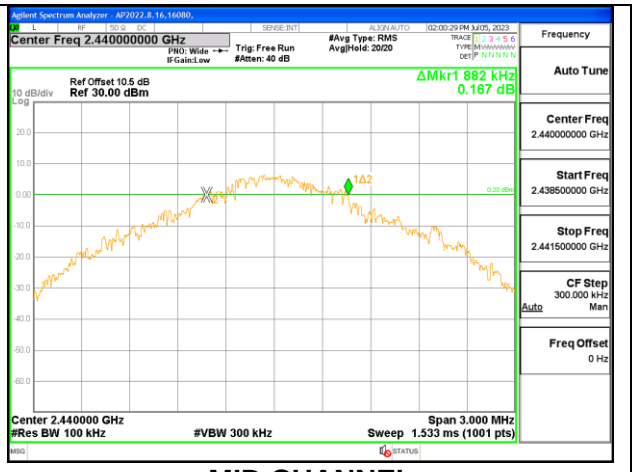
RSS-247 5.2 (a)

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

RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.819	0.5
Middle	2440	0.882	0.5
High	2480	0.771	0.5

LOW CHANNEL



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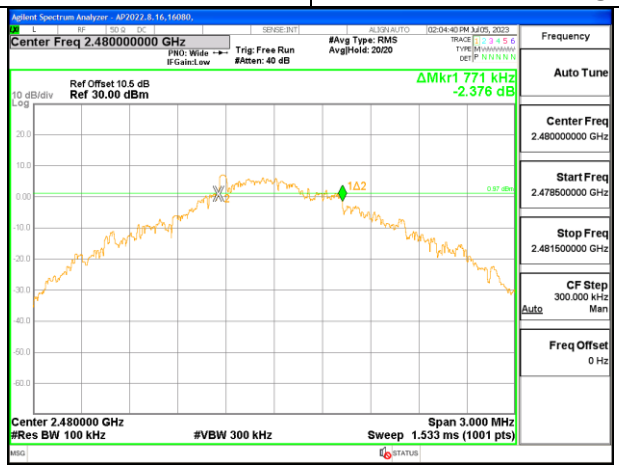

HIGH CHANNEL

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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

Tested By:	ZS 16080
Date:	2023-07-05

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	7.31	30	-22.690
Middle	2440	7.19	30	-22.810
High	2480	6.91	30	-23.090

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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

Tested By:	ZS 16080
Date:	2023-07-05

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	7.25
Middle	2440	7.10
High	2480	6.83

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9.6. POWER SPECTRAL DENSITY

LIMITS

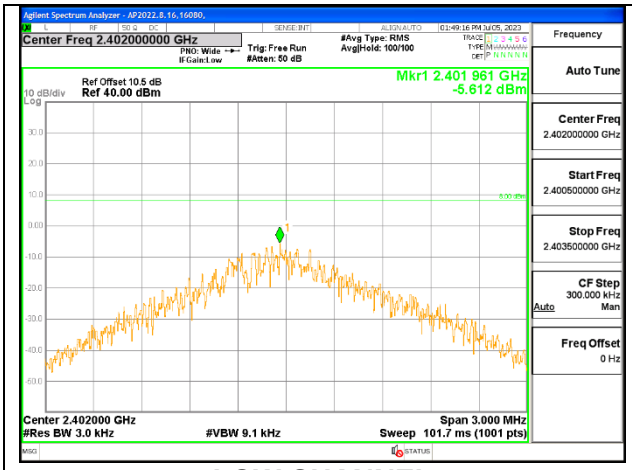
FCC §15.247 (e)

RSS-247 (5.2) (b)

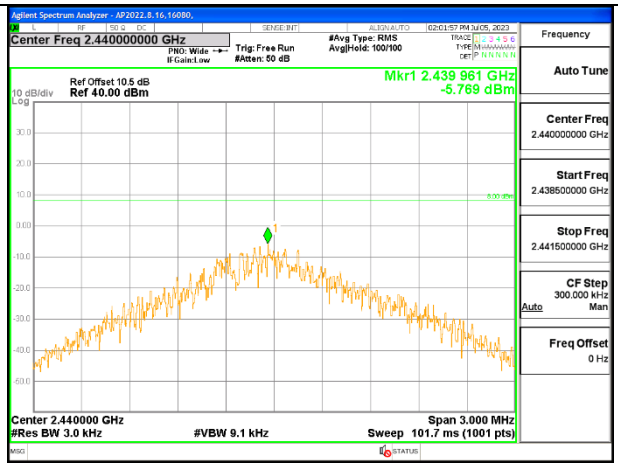
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

RESULTS

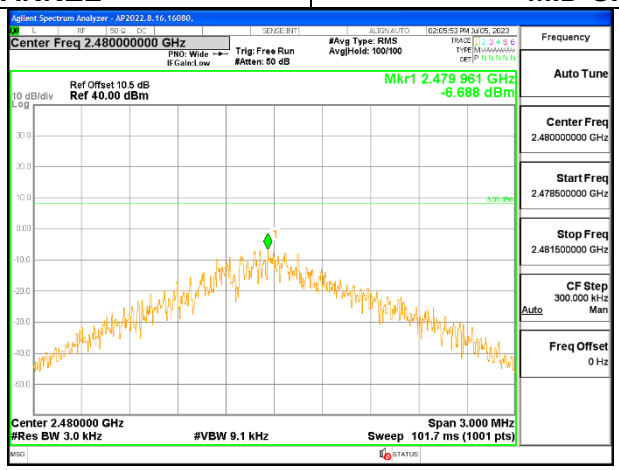
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-5.612	8	-13.61
Middle	2440	-5.769	8	-13.77
High	2480	-6.688	8	-14.69



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

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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

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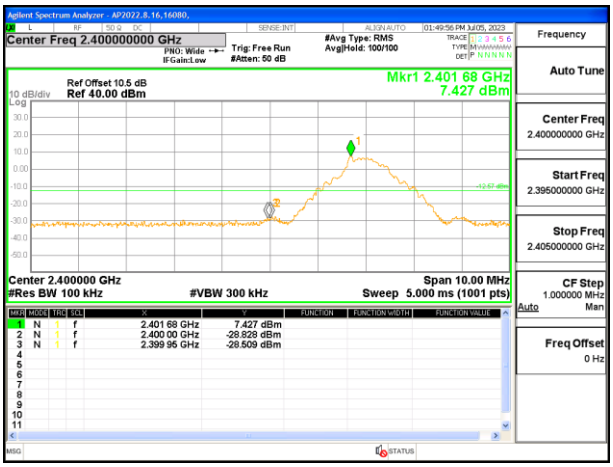
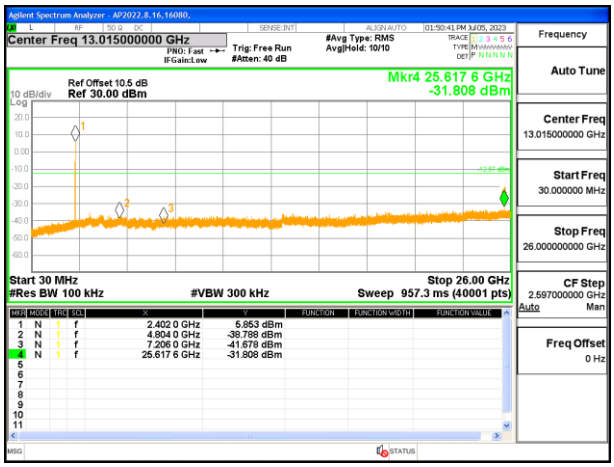
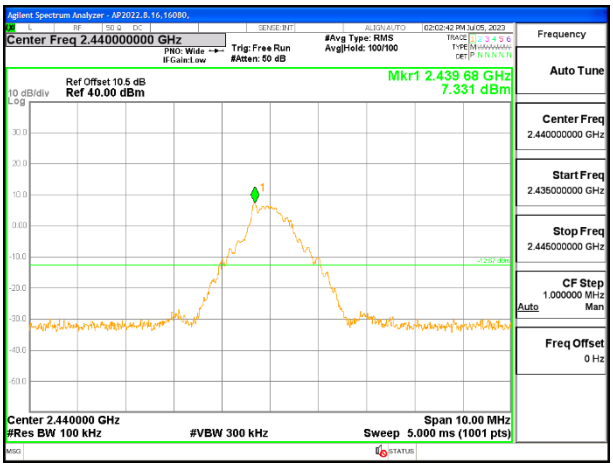


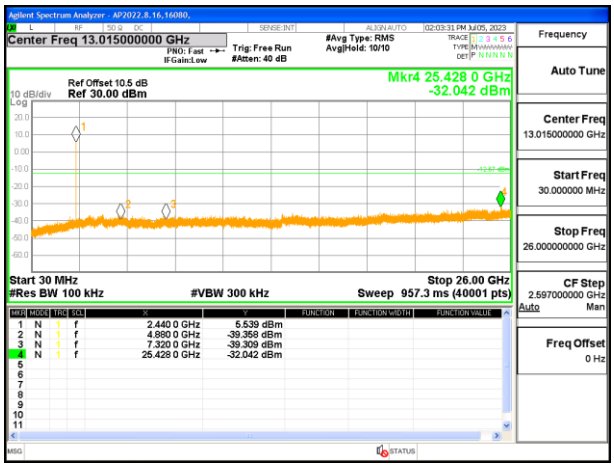
LOW CHANNEL BANDEDGE



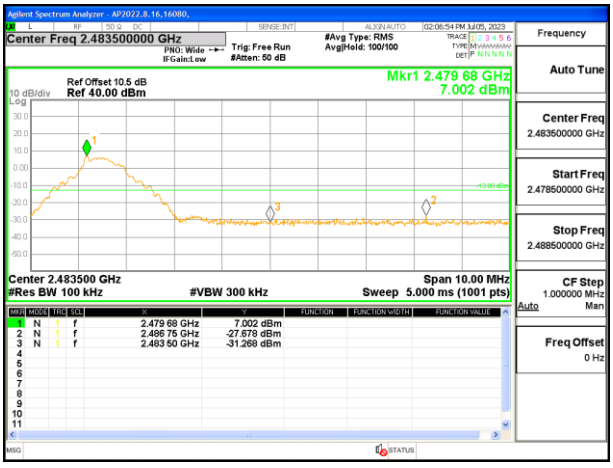
OUT-OF-BAND LOW CHANNEL



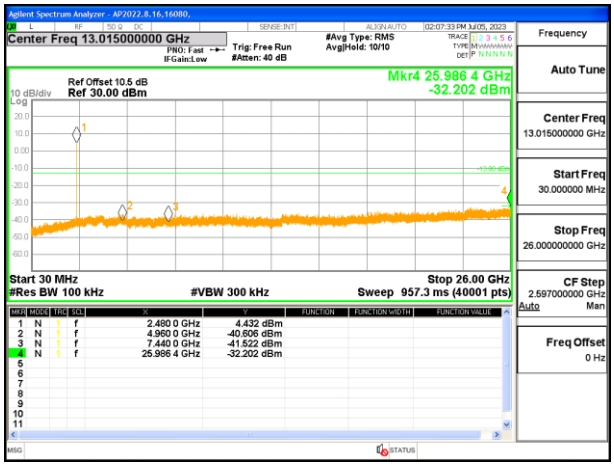
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

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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.

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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 FCC 47 CFR, 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.

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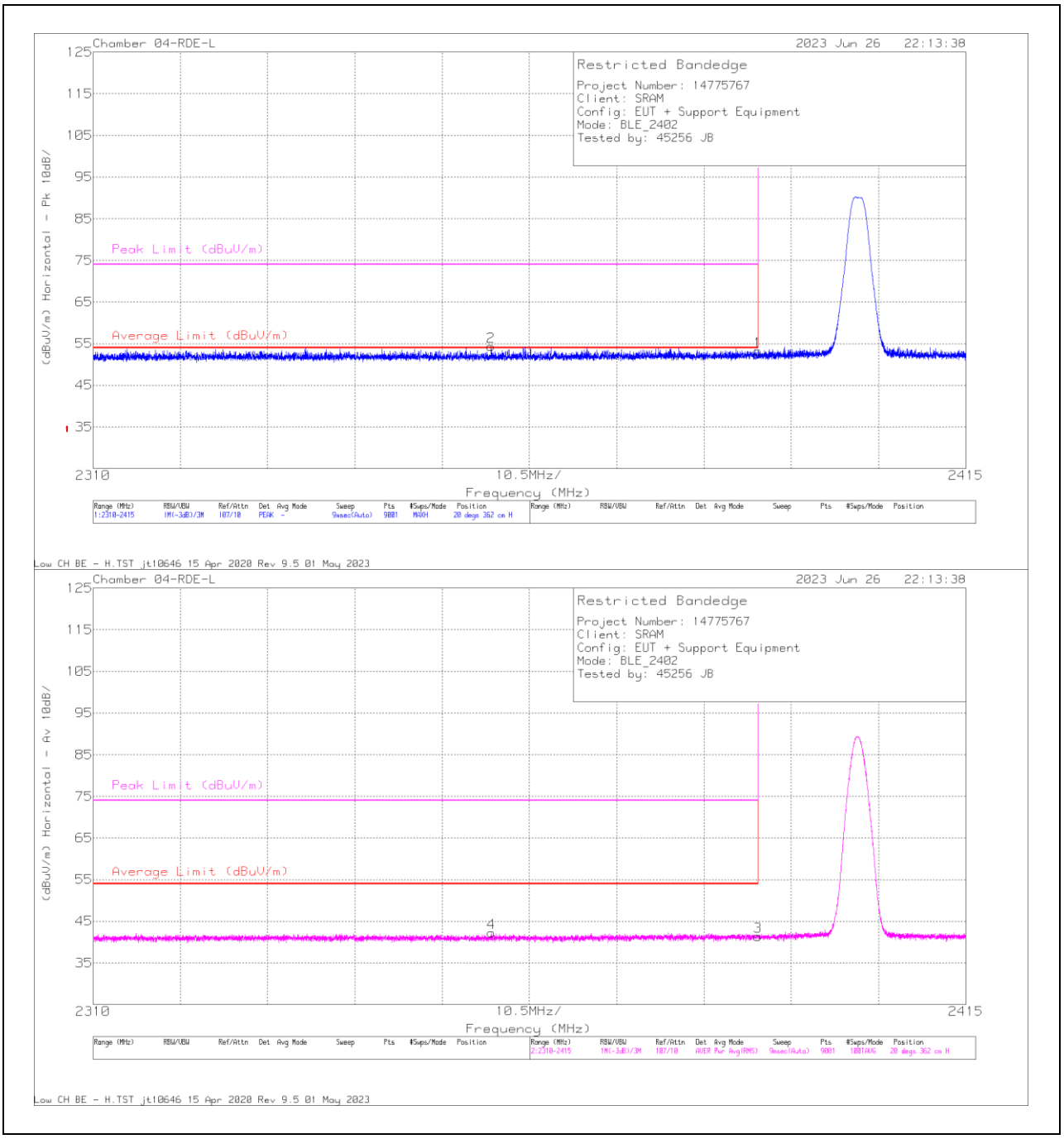
10.2. TRANSMITTER ABOVE 1 GHz

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206806 ACF (dB/m)	AMP/CBL (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2390	40.05	Pk	32	-18.8	53.25	-	-	74	-20.75	20	362	H
2	* 2357.881	41.28	Pk	32	-18.9	54.38	-	-	74	-19.62	20	362	H
3	* 2390	28.12	RMS	32	-18.8	41.32	54	-12.68	-	-	20	362	H
4	* 2357.893	29.12	RMS	32	-18.9	42.22	54	-11.78	-	-	20	362	H

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

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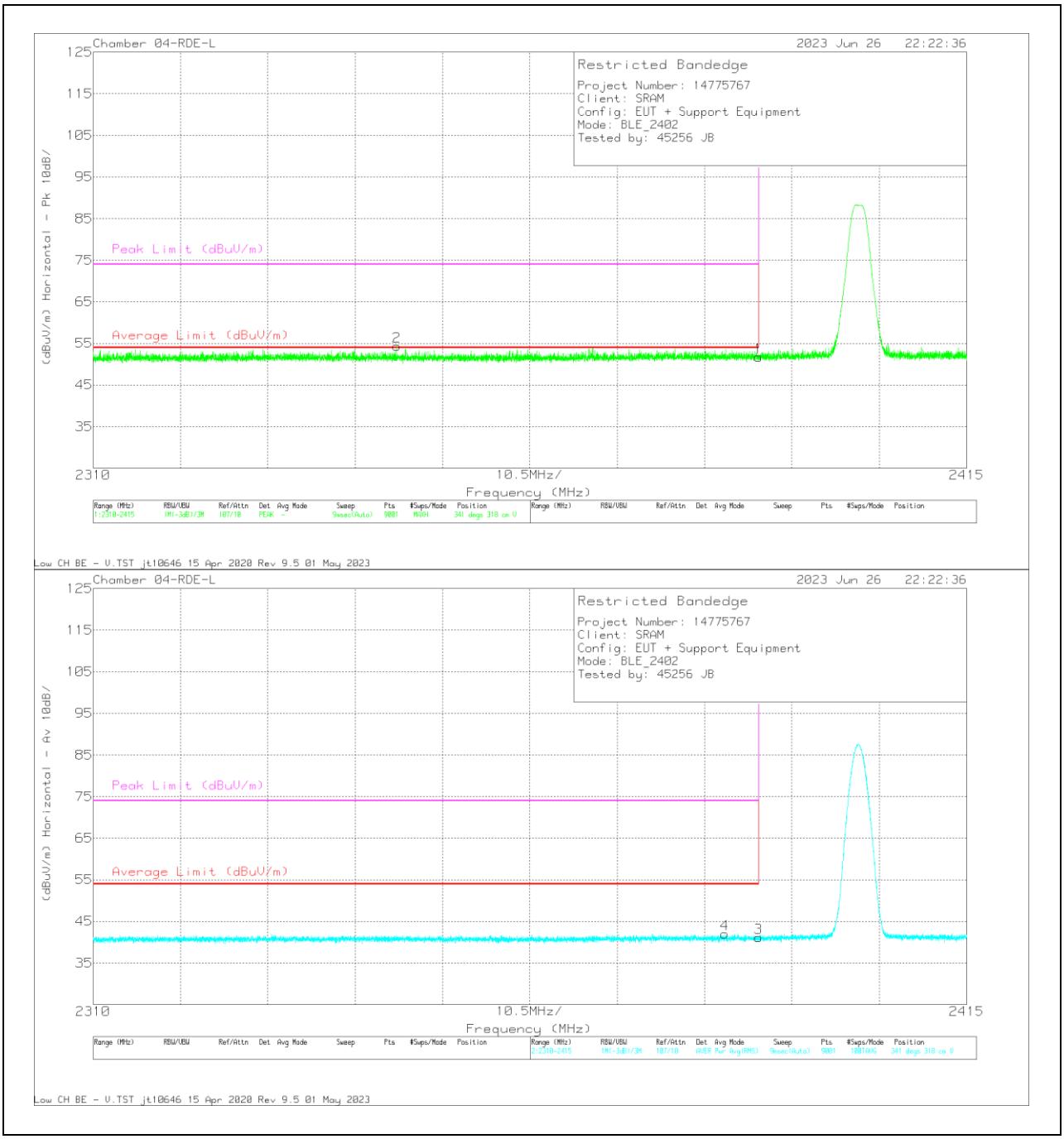
VERTICAL RESULT



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Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206806 ACF (dB/m)	AMP/CBL (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	38.46	Pk	32	-18.8	51.66	-	-	74	-22.34	341	318	V
2	* 2346.506	41.29	Pk	32	-18.9	54.39	-	-	74	-19.61	341	318	V
3	* 2390	27.96	RMS	32	-18.8	41.16	54	-12.84	-	-	341	318	V
4	* 2385.917	28.82	RMS	32	-18.8	42.02	54	-11.98	-	-	341	318	V

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

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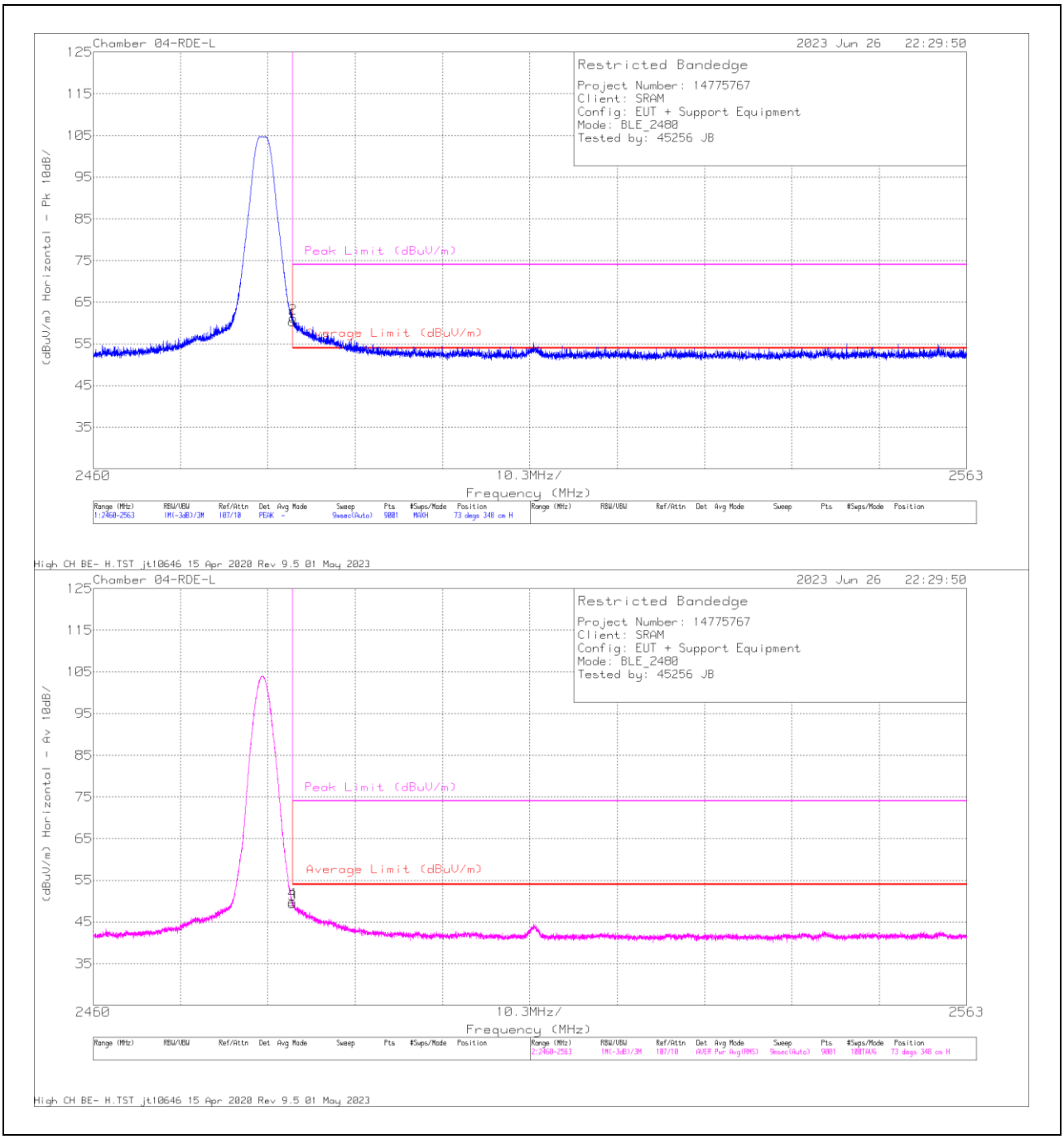
BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT



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Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206806 ACF (dB/m)	AMP/CBL (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	46.94	Pk	32	-18.6	60.34	-	-	74	-13.66	73	348	H
2	* 2483.586	47.72	Pk	32	-18.5	61.22	-	-	74	-12.78	73	348	H
3	* 2483.5	35.96	RMS	32	-18.6	49.36	54	-4.64	-	-	73	348	H
4	* 2483.517	36.33	RMS	32	-18.5	49.83	54	-4.17	-	-	73	348	H

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

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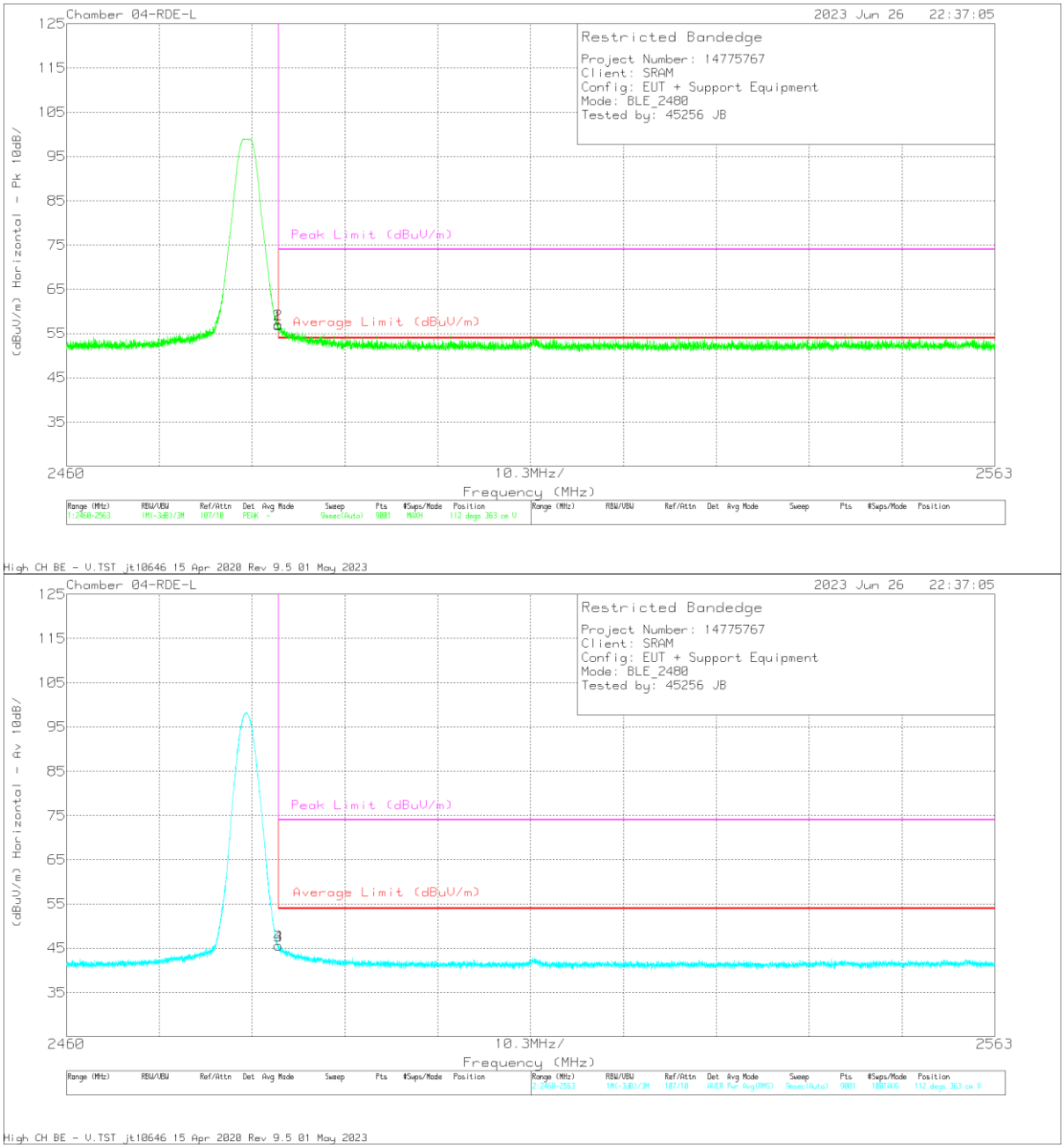
VERTICAL RESULT



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Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206806 ACF (dB/m)	AMP/CBL (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	43.38	Pk	32	-18.6	56.78	-	-	74	-17.22	112	363	V
2	* 2483.506	43.55	Pk	32	-18.5	57.05	-	-	74	-16.95	112	363	V
3	* 2483.5	32.25	RMS	32	-18.6	45.65	54	-8.35	-	-	112	363	V
4	* 2483.506	32.11	RMS	32	-18.5	45.61	54	-8.39	-	-	112	363	V

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

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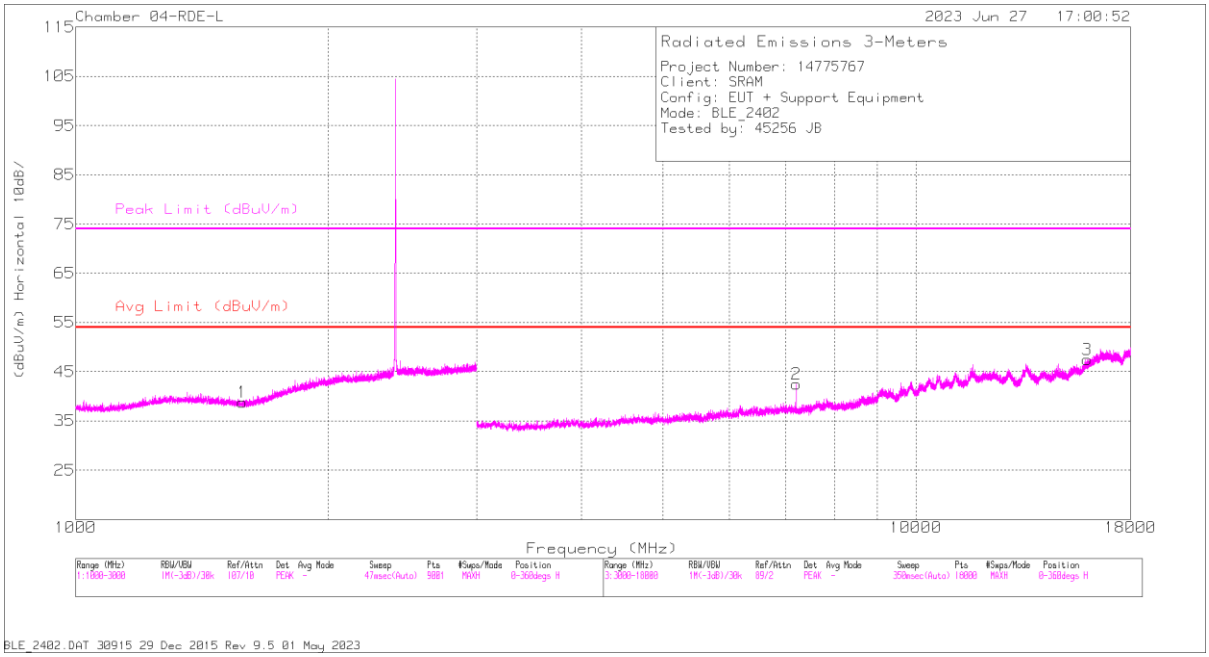
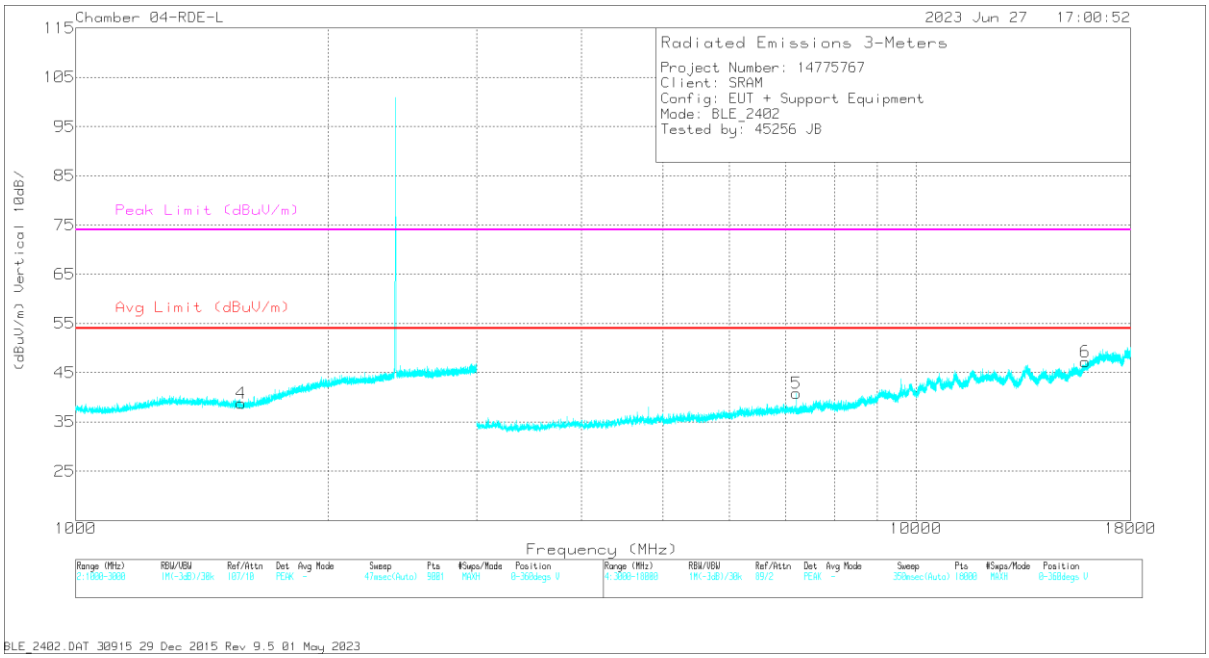
HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZONTAL



VERTICAL

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RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206806 ACF (dB/m)	AMP/CBL (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1579.462	42.34	PK2	27.8	-21	49.14	-	-	74	-24.86	327	259	H
	* 1578.912	30.12	MAv1	27.8	-21	36.92	54	-17.08	-	-	327	259	H
2	* 1574.256	41.92	PK2	27.8	-21.1	48.62	-	-	74	-25.38	41	332	V
	* 1577.918	30.35	MAv1	27.8	-21	37.15	54	-16.85	-	-	41	332	V
3	7205.193	37.57	PK2	35.6	-21.6	51.57	-	-	74	-22.43	62	221	H
	7205.278	29.25	MAv1	35.6	-21.6	43.25	54	-10.75	-	-	62	221	H
4	* 15991.946	31.18	PK2	40.6	-15.3	56.48	-	-	74	-17.52	356	180	H
	* 15993.837	19.53	MAv1	40.6	-15.3	44.83	54	-9.17	-	-	356	180	H
5	7207.017	33.85	PK2	35.6	-21.6	47.85	-	-	74	-26.15	76	113	V
	7205.377	23.86	MAv1	35.6	-21.6	37.86	54	-16.14	-	-	76	113	V
6	* 15896.511	31.29	PK2	40.4	-15.7	55.99	-	-	74	-18.01	266	131	V
	* 15895.59	20.08	MAv1	40.4	-15.6	44.88	54	-9.12	-	-	266	131	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

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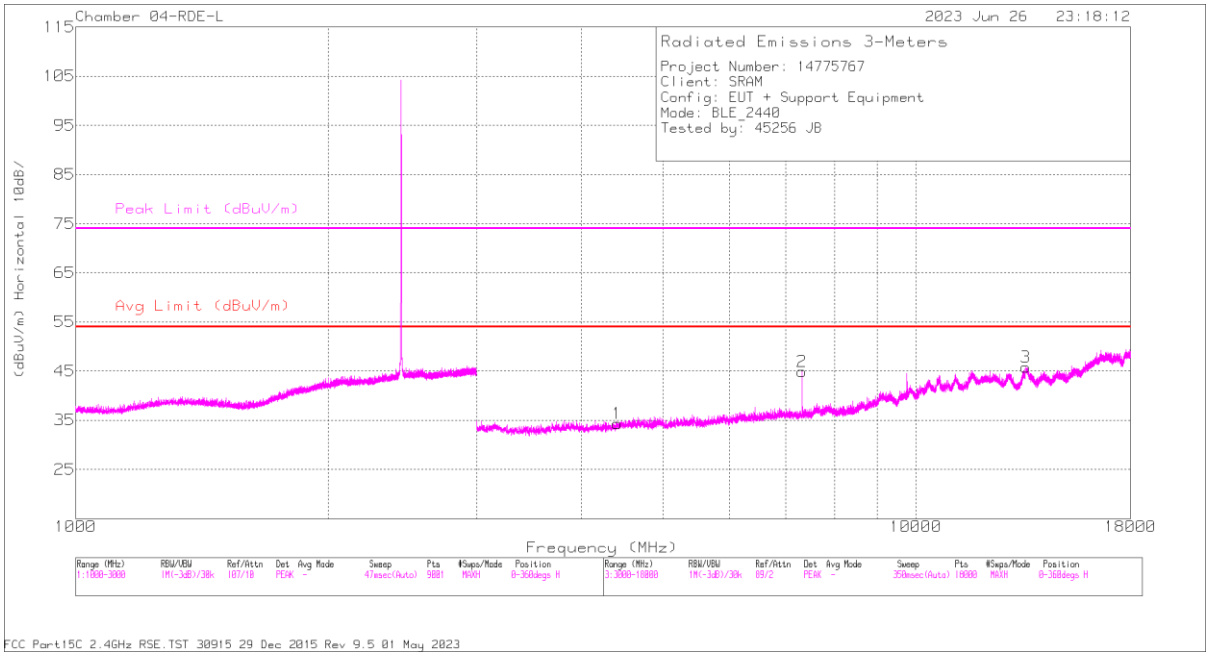
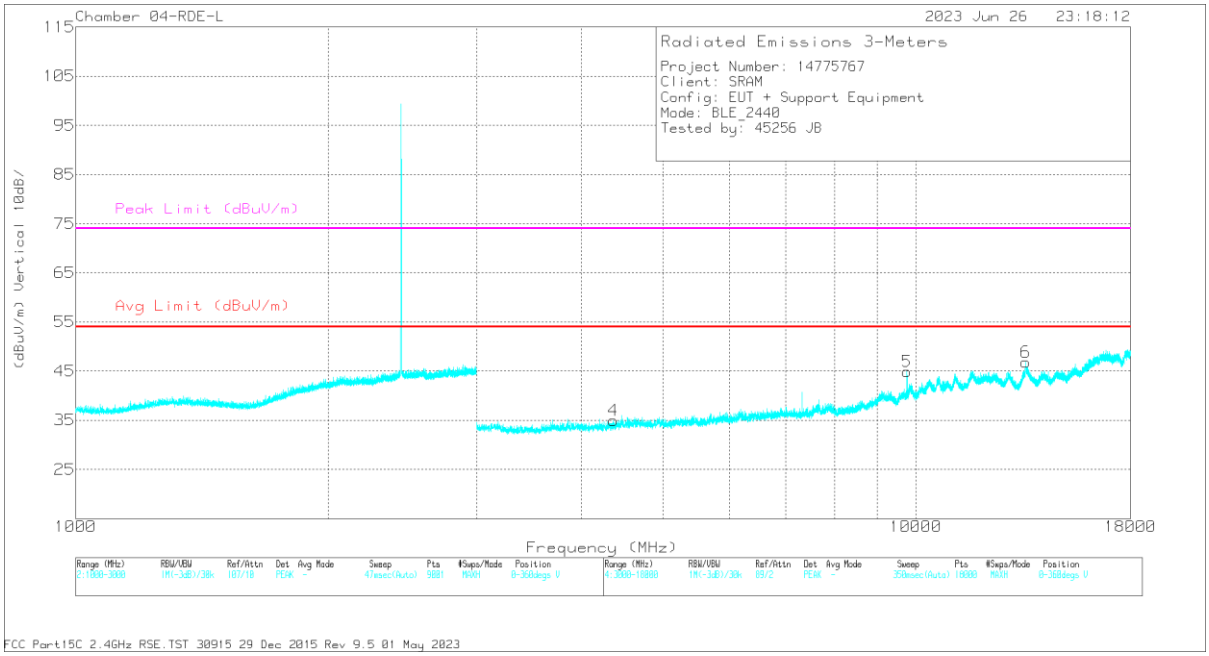
MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

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RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206806 ACF (dB/m)	AMP/CBL (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	4410.41	36.53	PK2	33.7	-25.5	44.73	-	-	74	-29.27	307	374	H
	4409.788	24.98	MAv1	33.7	-25.5	33.18	54	-20.82	-	-	307	374	H
2	* 7319.011	34.91	PK2	35.6	-21.3	49.21	-	-	74	-24.79	67	105	H
	* 7319.103	26.51	MAv1	35.6	-21.3	40.81	54	-13.19	-	-	67	105	H
3	13509.892	33.22	PK2	38.6	-15.9	55.92	-	-	74	-18.08	257	178	H
	13513.014	21.41	MAv1	38.6	-15.9	44.11	54	-9.89	-	-	257	178	H
4	* 4364.742	35.98	PK2	33.5	-25.7	43.78	-	-	74	-30.22	55	257	V
	* 4366.048	24.44	MAv1	33.5	-25.8	32.14	54	-21.86	-	-	55	257	V
5	9759.042	33.23	PK2	36.9	-18	52.13	-	-	74	-21.87	192	185	V
	9758.879	23.81	MAv1	36.9	-18	42.71	54	-11.29	-	-	192	185	V
6	13504.973	32.6	PK2	38.6	-15.9	55.3	-	-	74	-18.7	6	250	V
	13505.08	21.39	MAv1	38.6	-15.9	44.09	54	-9.91	-	-	6	250	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

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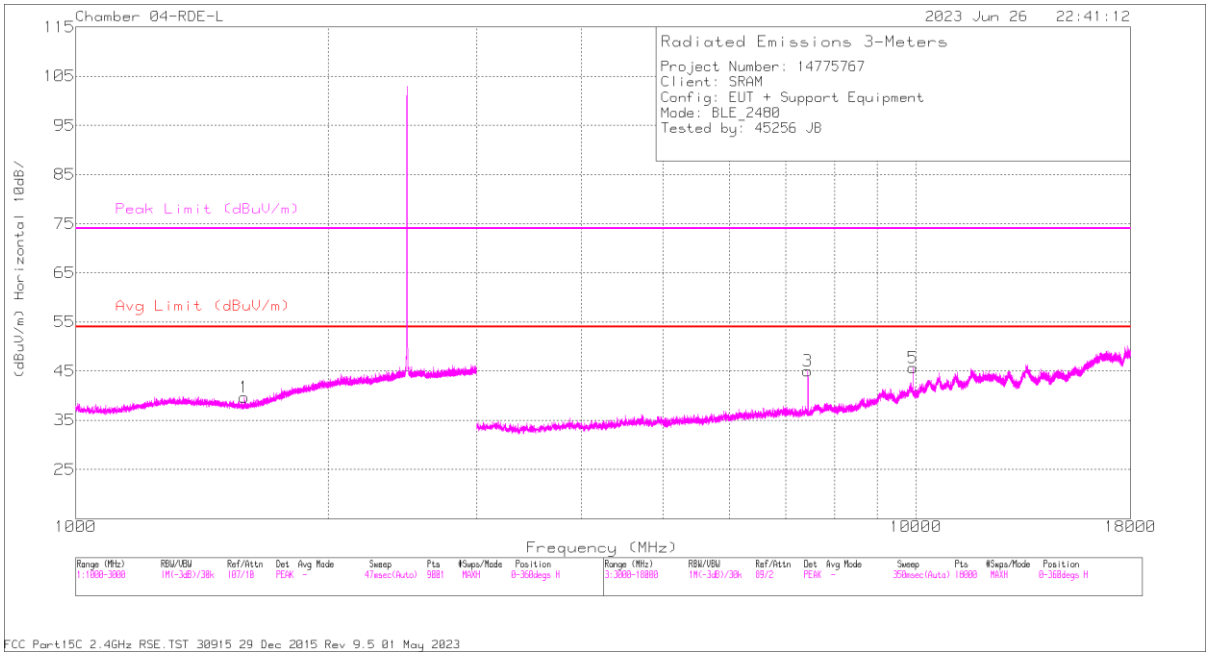
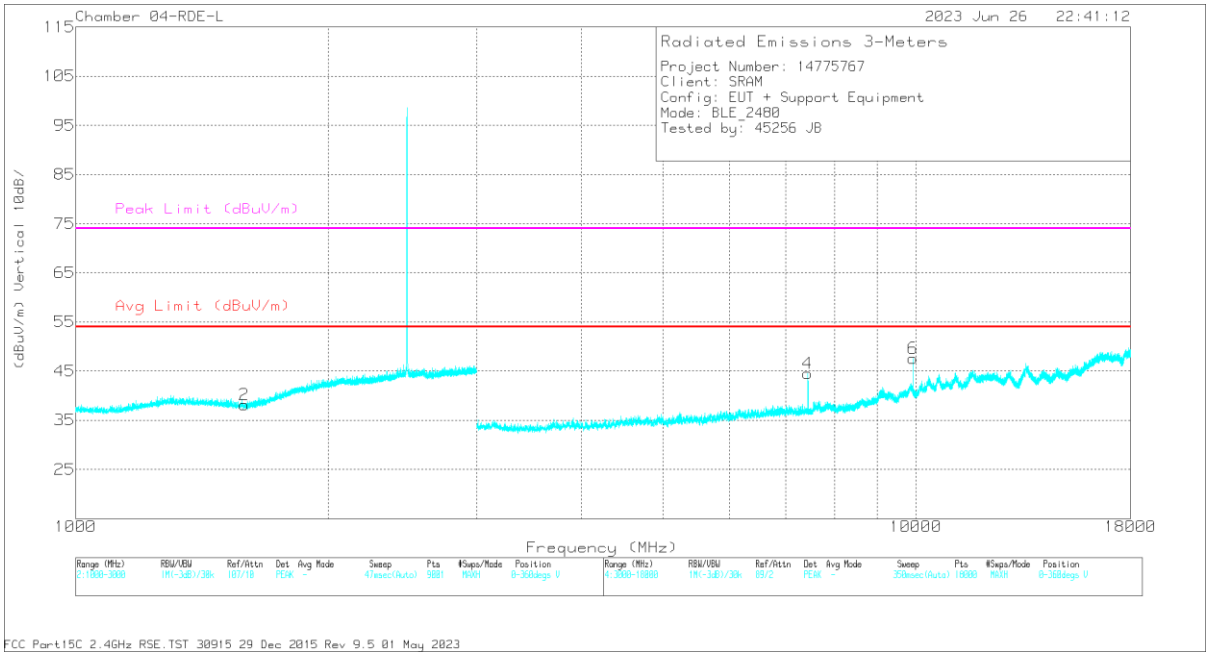
HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

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RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206806 ACF (dB/m)	AMP/CBL (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1590.776	41.71	PK2	27.7	-21	48.41	-	-	74	-25.59	101	360	H
	* 1589.522	30.16	MAv1	27.7	-21.1	36.76	54	-17.24	-	-	101	360	H
2	* 1589.409	41.57	PK2	27.7	-21	48.27	-	-	74	-25.73	172	178	V
	* 1588.588	30.14	MAv1	27.7	-21	36.84	54	-17.16	-	-	172	178	V
3	* 7439.319	36.27	PK2	35.6	-21	50.87	-	-	74	-23.13	63	210	H
	* 7439.243	27.61	MAv1	35.6	-21	42.21	54	-11.79	-	-	63	210	H
4	9918.708	34.65	PK2	37	-17.5	54.15	-	-	74	-19.85	255	218	H
	9918.8	25.42	MAv1	37	-17.5	44.92	54	-9.08	-	-	255	218	H
5	* 7440.86	34.97	PK2	35.6	-21	49.57	-	-	74	-24.43	166	138	V
	* 7439.142	25.24	MAv1	35.6	-21	39.84	54	-14.16	-	-	166	138	V
6	9918.713	34.85	PK2	37	-17.5	54.35	-	-	74	-19.65	195	189	V
	9918.969	26.79	MAv1	37	-17.5	46.29	54	-7.71	-	-	195	189	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PK2 - KDB558074 Method: Maximum Peak
MAv1 - KDB558074 Option 1 Maximum RMS Average

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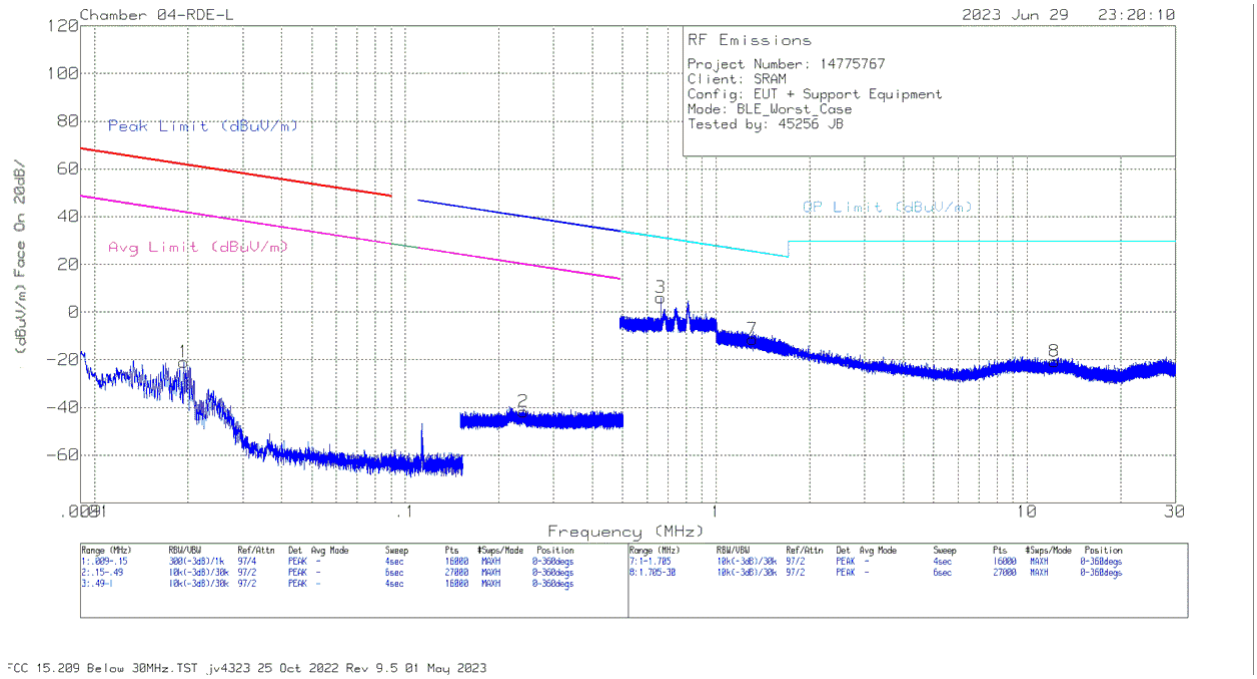
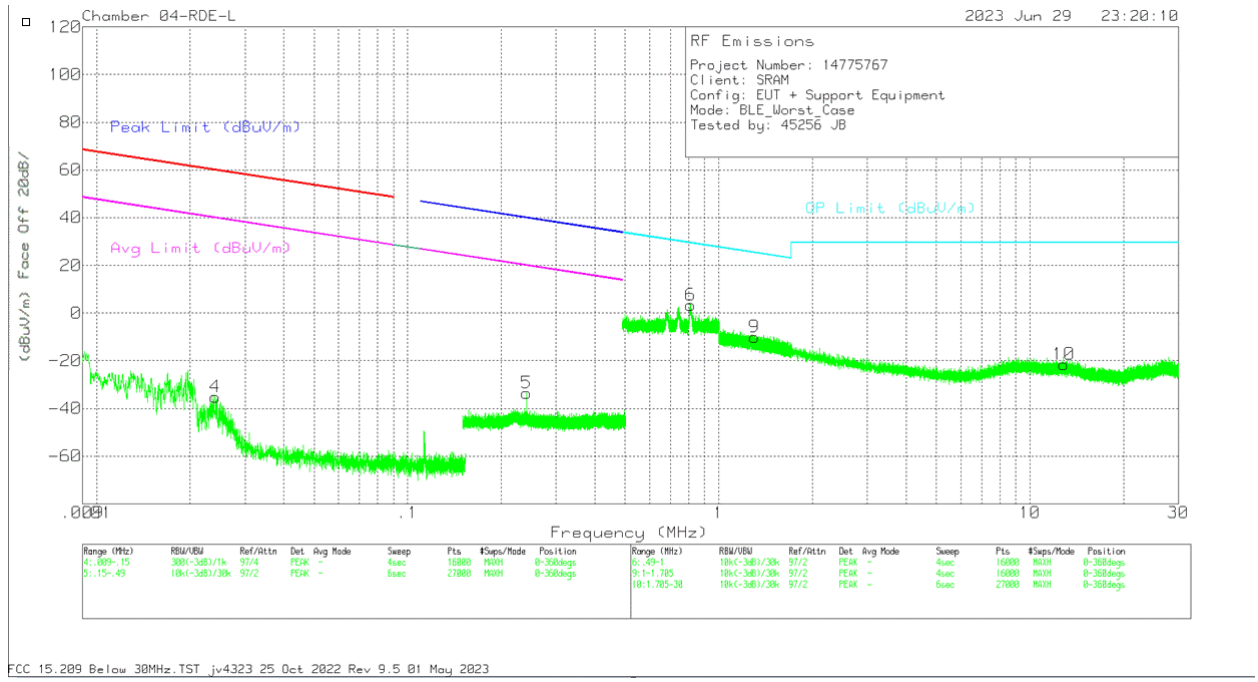
10.3. WORST CASE BELOW 30MHz

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)



ANTENNA - FACE ON



ANTENNA - FACE OFF

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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	.0194	30.71	Pk	59.2	-30.9	-80	-20.99	61.84	-82.83	41.84	-62.83	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	.2405	14.18	Pk	56.2	-32	-80	-41.62	39.99	-81.61	19.99	-61.61	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	.6633	21.52	Pk	56.4	-31.9	-40	6.02	31.18	-25.16	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	.0241	17.55	Pk	58.6	-31.2	-80	-35.05	59.93	-94.98	39.93	-74.98	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	.2413	22.18	Pk	56.2	-32	-80	-33.62	39.96	-73.58	19.96	-53.58	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	.8108	18.96	Pk	56.4	-31.9	-40	3.46	29.44	-25.98	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	1.3068	15.24	Pk	45.2	-31.8	-40	-11.36	25.3	-36.66	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	12.2667	16.34	Pk	34.5	-31.5	-40	-20.66	29.5	-50.16	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	1.3015	16.67	Pk	45.2	-31.8	-40	-9.93	25.34	-35.27	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	12.8463	15.61	Pk	34.4	-31.4	-40	-21.39	29.5	-50.89	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.

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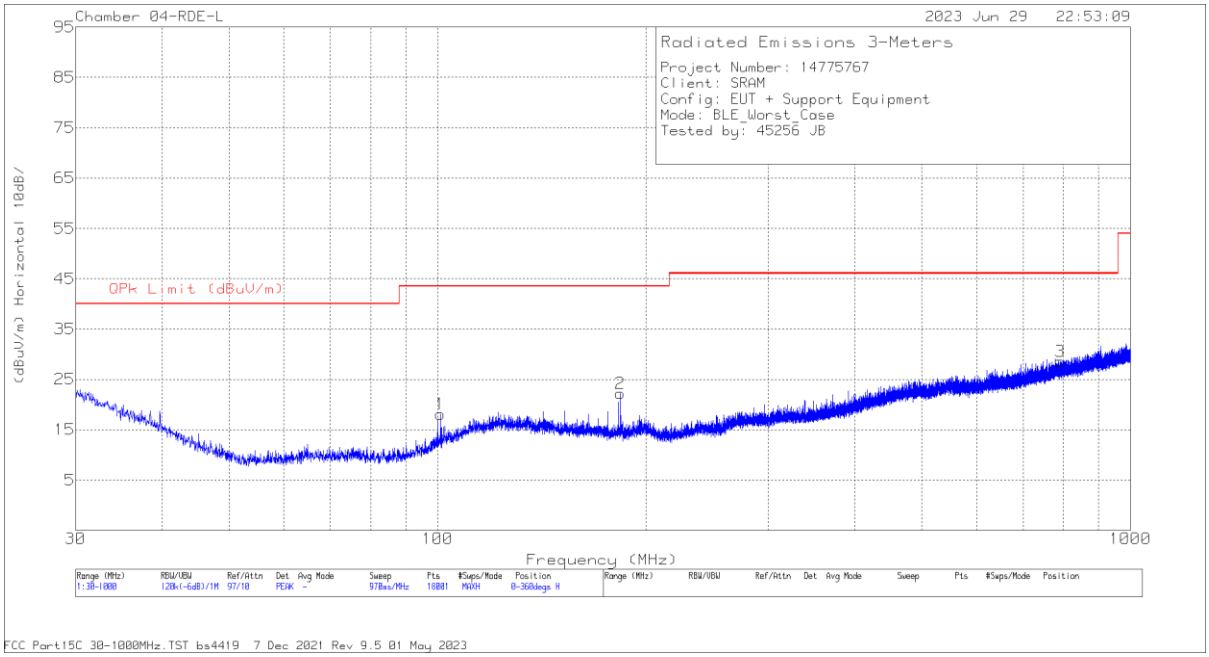
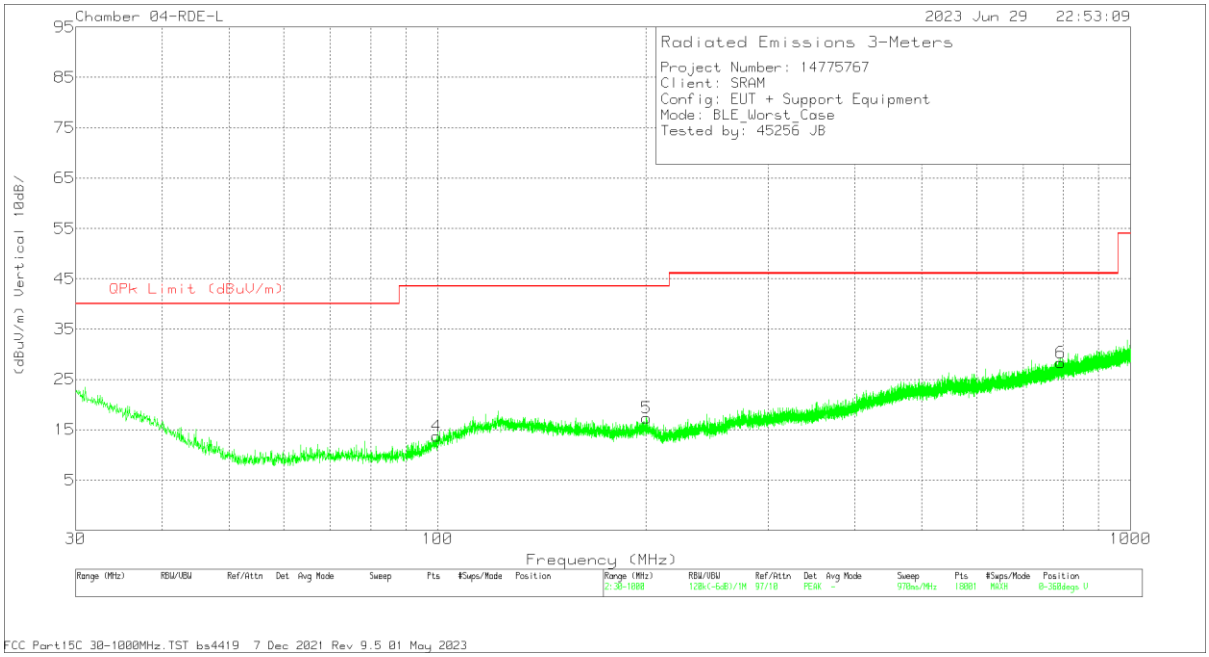
10.4. WORST CASE BELOW 1 GHz

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



HORIZONTAL



VERTICAL

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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	100.972	32.35	Pk	16.3	-30.5	18.15	43.52	-25.37	0-360	199	H
2	183.584	34.66	Pk	17.1	-29.6	22.16	43.52	-21.36	0-360	299	H
3	791.29	29.03	Pk	26.9	-27.3	28.63	46.02	-17.39	0-360	99	H
	792.698	19.89	Qp	26.9	-27.3	19.49	46.02	-26.53	0-344	378	H
4	99.6785	28.29	Pk	16	-30.5	13.79	43.52	-29.73	0-360	199	V
5	200.128	28.86	Pk	18.1	-29.6	17.36	43.52	-26.16	0-360	100	V
6	793.607	28.57	Pk	27	-27.3	28.27	46.02	-17.75	0-360	299	V

Pk - Peak detector
Qp - Quasi-Peak detector

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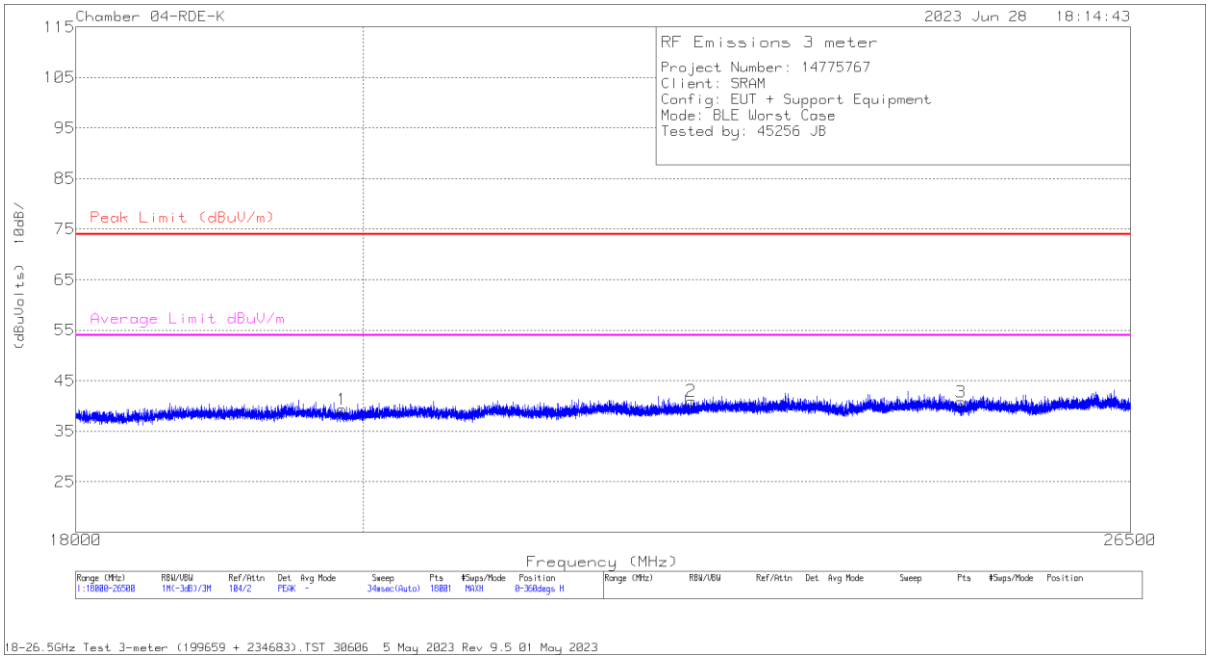
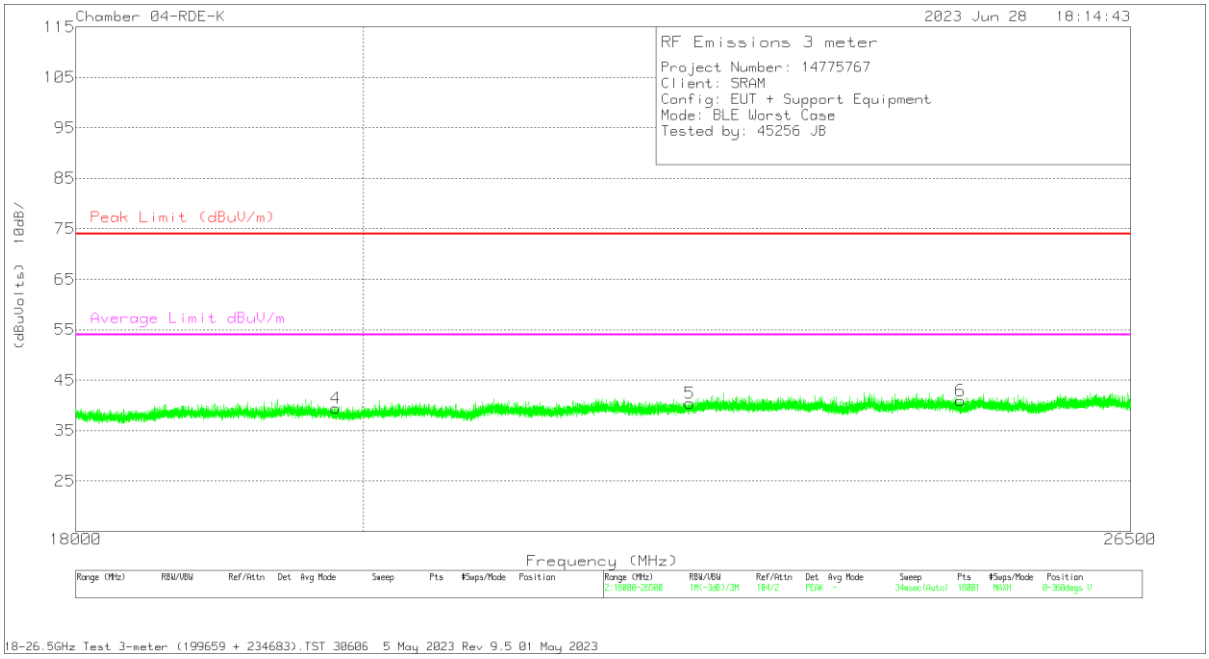
10.5. WORST CASE 18-26 GHz

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



HORIZONTAL



VERTICAL

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18 – 26GHz DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Horn ACF (dB/m)	234683 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	*19845.444	50.52	Pk	32.7	-62.6	18.7	39.32	74	-34.68	54	-14.68	0-360	200	H
2	*22558.831	50.47	Pk	33.3	-62.6	19.8	40.97	74	-33.03	54	-13.03	0-360	200	H
3	24902.469	48.11	Pk	34	-62.1	20.8	40.81	74	-33.19	54	-13.19	0-360	200	H
4	*19802.944	50.76	Pk	32.7	-62.6	18.6	39.46	74	-34.54	54	-14.54	0-360	100	V
5	*22545.609	49.93	Pk	33.3	-62.6	19.8	40.43	74	-33.57	54	-13.57	0-360	100	V
6	24897.747	48.22	Pk	34	-62.1	20.8	40.92	74	-33.08	54	-13.08	0-360	100	V

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

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