

TEST REPORT

Report Number.: 14499829-E1V3

Applicant : SRAM LLC
1000 W Fulton Market 4th Floor
Chicago, IL 60607, United States

Models : 00021

FCC ID : C9O-LSBB3

ISED : 10161A-LSBB3

EUT Description : Left Shifter with BLE and AIREA Radios

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

Date of Issue:
2022-11-18

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REPORT REVISION HISTORY

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

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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: Left Shifter with BLE and AIREA Radios

MODELS: 00021

SERIAL NUMBER: Conducted: 1425256666
Radiated: 1425256672

DATE TESTED: 2022-10-04 TO 2022-11-01

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5 + A1 + A2	Complies

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

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by A2LA, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
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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 CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, RSS-GEN Issue 5 + A1 + A2, and RSS-247 Issue 2.

4. FACILITIES AND ACCREDITATION

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

	Address	ISED CABID	ISED Company Number	FCC Registration
☒	Building 1: 47173 Benicia Street Fremont, CA 94538, U.S.A	US0104	2324A	208313
☐	Building 2: 47266 Benicia Street Fremont, CA 94538, U.S.A	US0104	22541	208313
☒	Building 4: 47658 Kato Rd Fremont, CA 94538, U.S.A	US0104	2324B	208313

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

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

5.2. DECISION RULES

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

5.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	U _{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%.

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

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.

36.5 dBuV + 0 dB + 10.1 dB + 0 dB = 46.6 dBuV

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

The EUT is a Left Shifter with BLE and AIREA Radios.

6.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Peak		Average	
		Output Power (dBm)	Output Power (mW)	Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE	4.33	2.71	3.54	2.26

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

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

The radio utilizes a ceramic chip antenna, with a maximum gain of 1.3dBi.

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)

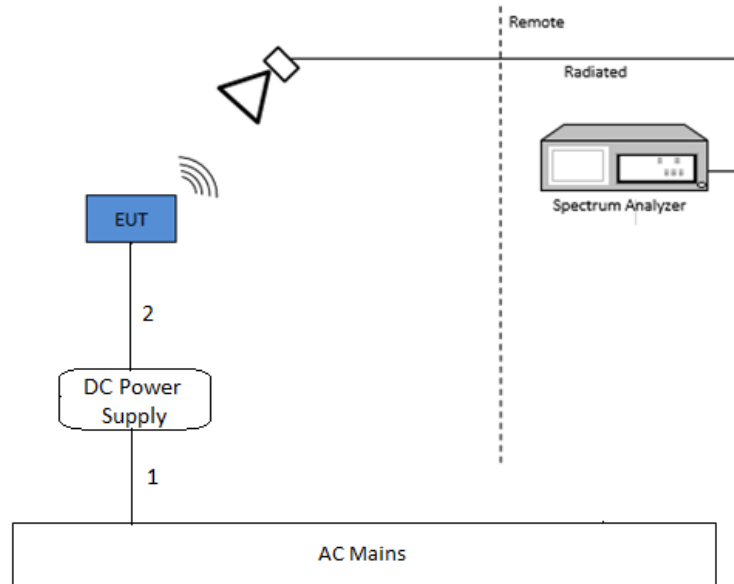
I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Unshielded	1.5	AC Main to DC Supply
2	DC	1	DC	Unshielded	0.5	Power Supply to EUT

TEST SETUP

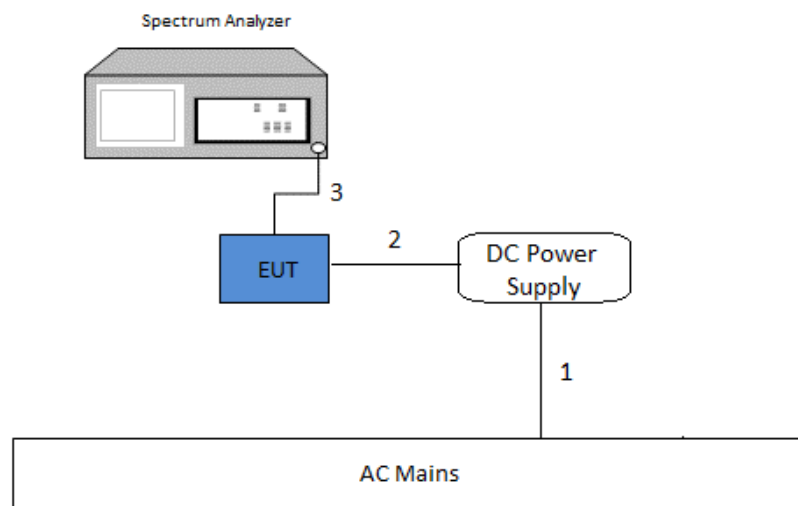
For the purposes of testing, the EUT is connected to a 3V DC Power supply for radiated emissions above 1GHz. The EUT is normally powered by a CR2032 battery at 3V. The phone is used for setting up purposes and were removed during testing.

SETUP DIAGRAM

Radiated Configuration



Conducted Configuration



7. MEASUREMENT METHOD

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

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

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

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

Output Power: ANSI C63.10 Subclause -11.9.2.3.2 Method AVGPM-G (Measurement using a gated RF average-reading power meter)

PSD: ANSI C63.10 Subclause -11.10.2 Method PKPSD (peak PSD)

Radiated emissions non-restricted frequency bands: ANSI C63.10 Subclause -11.11

Radiated emissions restricted frequency bands: ANSI C63.10 Subclause -11.12.1

Conducted emissions in restricted frequency bands: ANSI C63.10 Subclause -11.12.2

Band-edge: ANSI C63.10 Section 6.10

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

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

8. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB1	80293	2023-08-09	2022-08-09
Amplifier, 10KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310N	170647	2023-01-10	2022-01-10
Amplifier, 10KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310N	29654	2023-04-24	2022-04-24
Antenna, Horn 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	206805	2023-07-05	2022-07-05
RF Filter Box, 1-18GHz	UL-FR1	n/a	171875	2023-08-12	2022-08-12
EMI TEST RECEIVER, with B8 option	Rohde & Schwarz	ESW44	PRE0179377	2023-02-20	2022-02-20
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	201501	2023-02-19	2022-02-19
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	169927	2023-02-13	2022-02-13
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	81138	*2022-10-13	2021-10-13
Amplifier 18-26.5GHz, +5Vdc, 60dB min	AMPLICAL	AMP18G26.5-60	215705	2023-02-26	2022-02-26
Antenna, Passive Loop 30Hz - 1MHz	ELECTRO METRICS	EM-6871	219909	2023-05-10	2022-05-10
Antenna, Passive Loop 100KHz - 30MHz	ELECTRO METRICS	EM-6872	219911	2023-05-10	2022-05-10
Spectrum Analyzer, PSA, 3Hz to 44GHz	Agilent Technologies	N4440A	80386	2023-03-02	2022-03-02
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	T1268	2023-02-03	2022-02-03
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	90419	2023-03-02	2022-03-02
10dB Fixed Attenuator	Pasternack Enterprises	PE7087-10	N/A	Verified	Verified
UL TEST SOFTWARE LIST					
Radiated Software	UL	UL EMC	Ver 2022-07-06, 2022-06-01, 2022-05-05, 2022-05-18, 2021-12-07, 2014-07-15,		
Antenna Port Software	UL	UL RF	Ver 2022.5.31		

NOTES:

*- calibration due date extended to 2022-10-31.

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

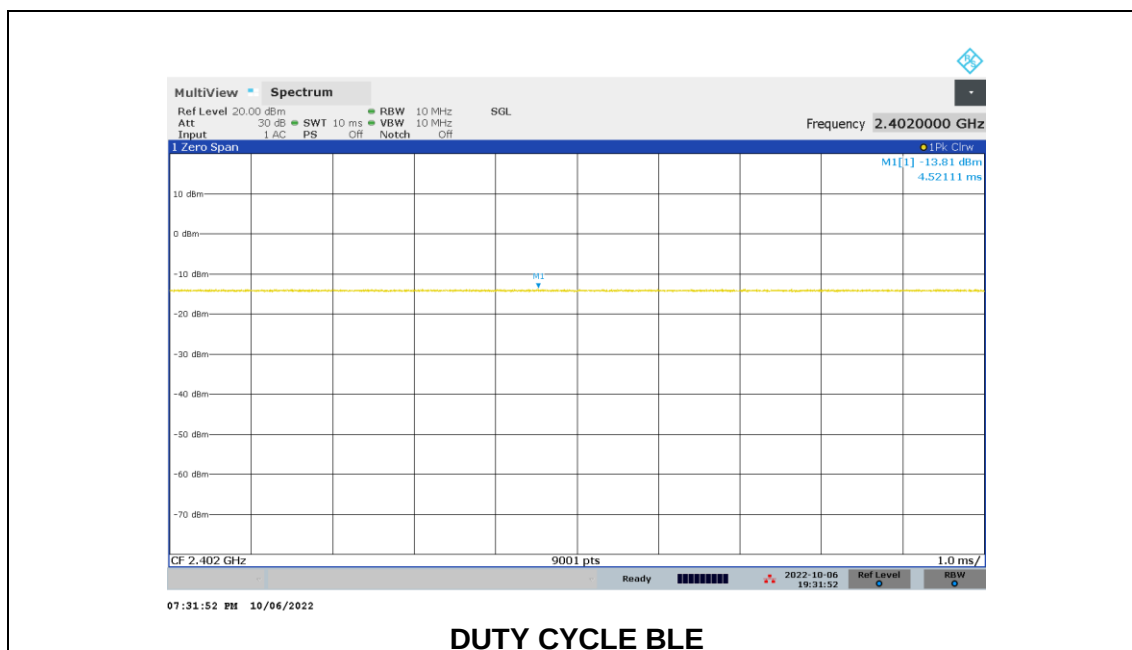
KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Tested By:	SI 23522
Date:	2022-10-06

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
BLE (1Mbps)	4.521	4.521	1.000	100.00	0.00	0.010

DUTY CYCLE PLOTS



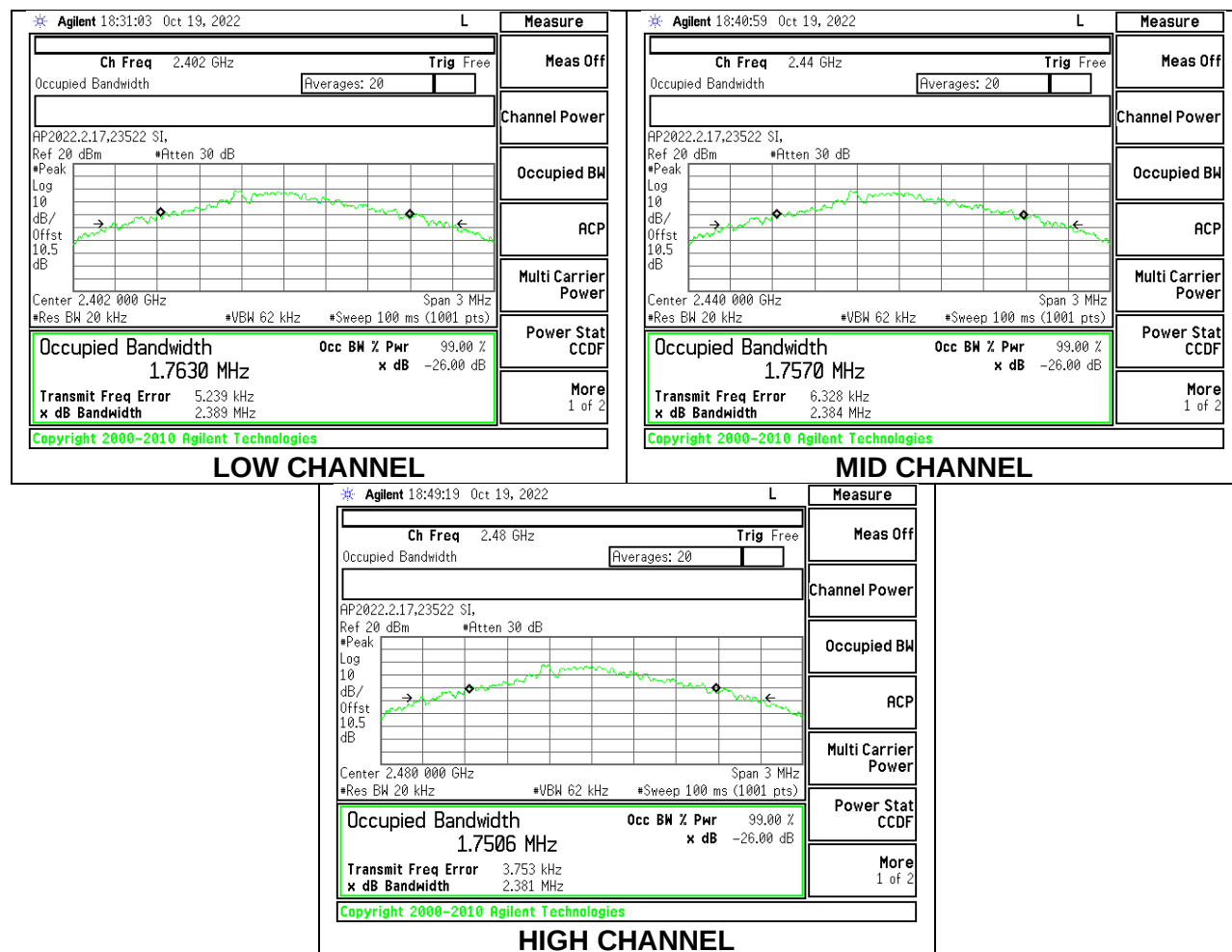
9.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.7630
Middle	2440	1.7570
High	2480	1.7506



9.3. 6 dB BANDWIDTH

LIMITS

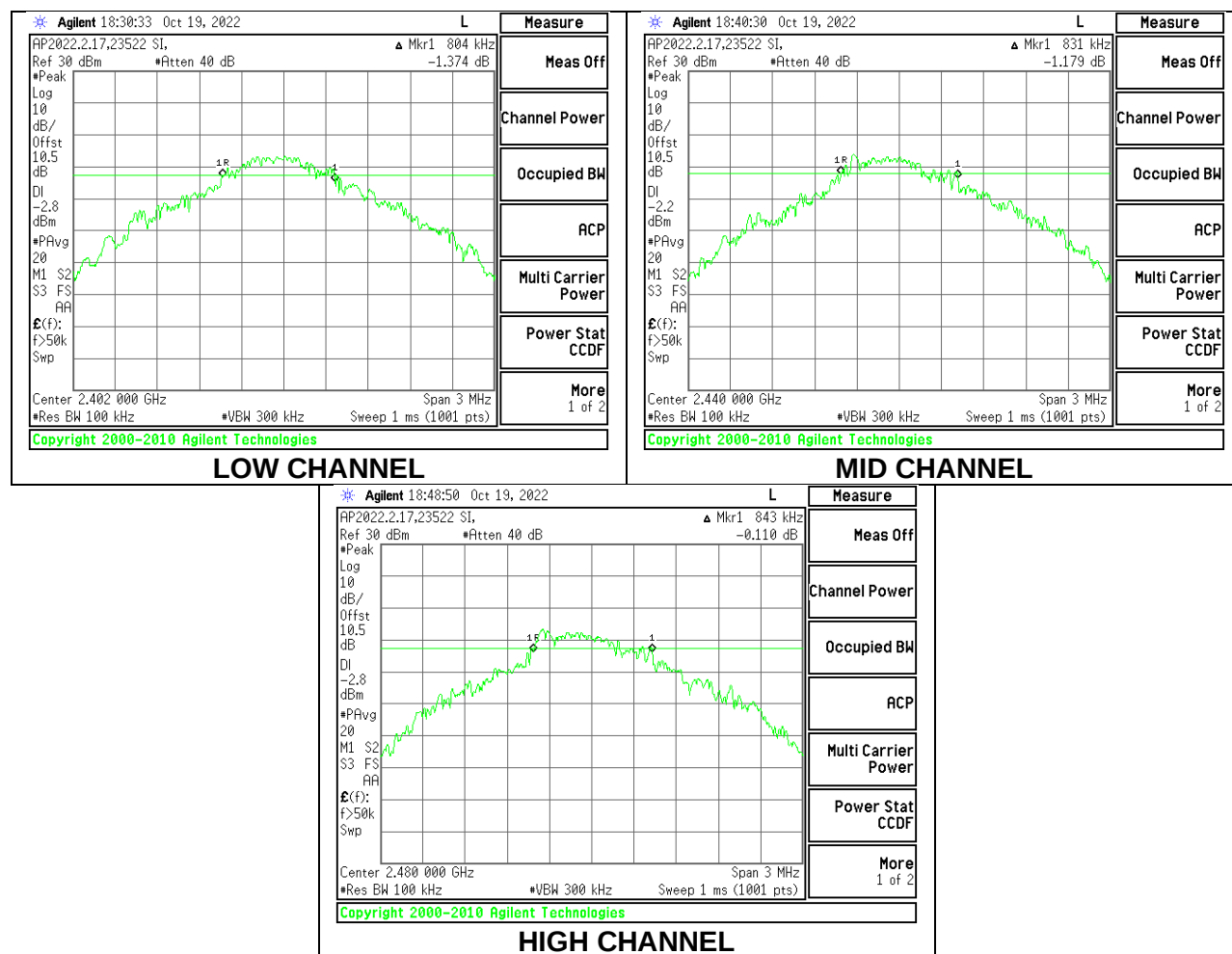
FCC §15.247 (a) (2)

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	0.804	0.5
Middle	2440	0.831	0.5
High	2480	0.843	0.5



9.4. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

RSS-247 5.4 (d)

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

TEST PROCEDURE

The transmitter output is connected to a power meter.

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

RESULTS

Tested By:	SI 23522
Date:	2022-10-19

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	4.33	30	-25.67
Middle	2440	3.80	30	-26.20
High	2480	3.45	30	-26.55

9.5. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

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

RESULTS

Tested By:	SI 23522
Date:	2022-10-19

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	3.52
Middle	2440	3.54
High	2480	3.3

9.6. POWER SPECTRAL DENSITY

LIMITS

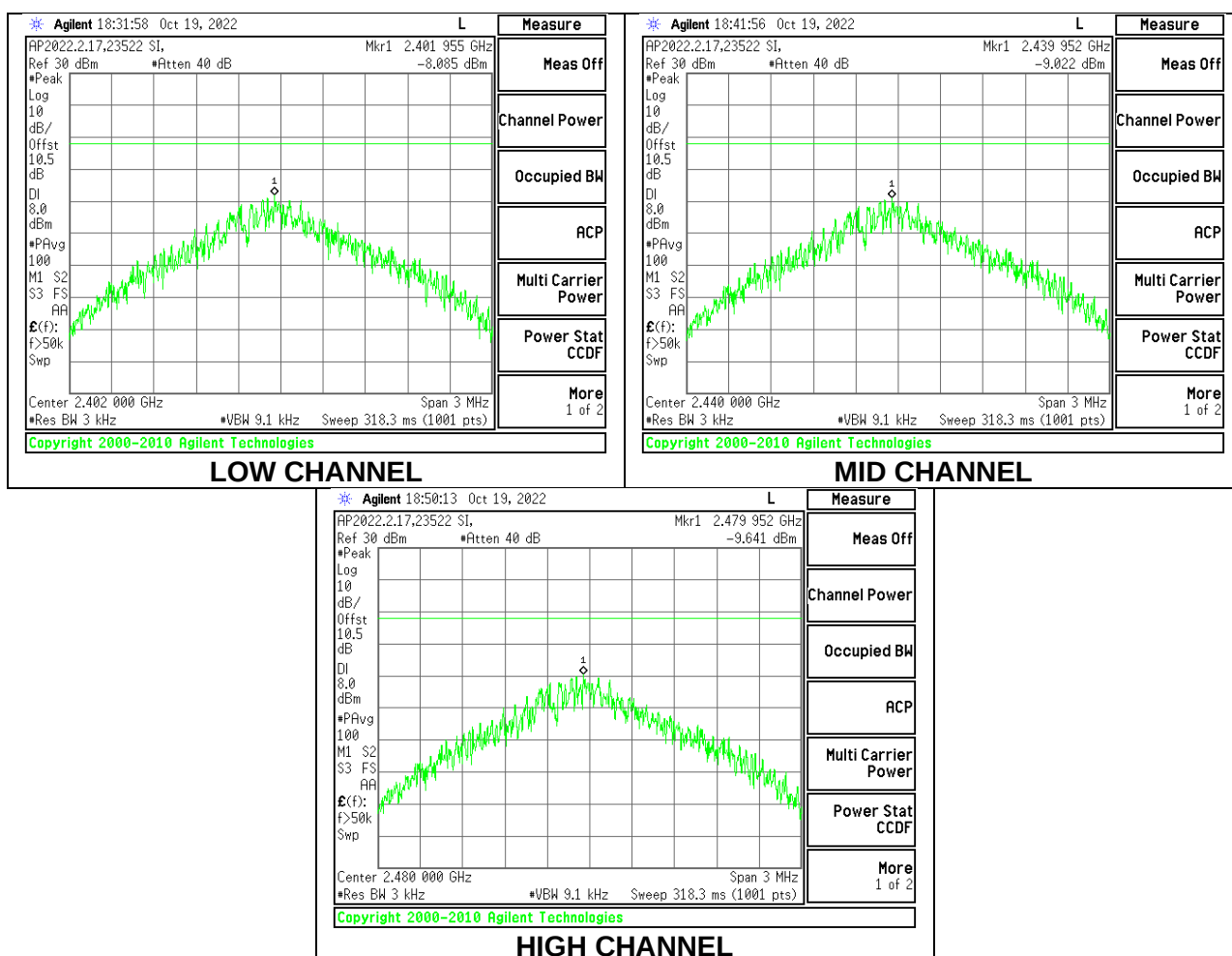
FCC §15.247 (e)

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	-8.085	8	-16.09
Middle	2440	-9.022	8	-17.02
High	2480	-9.641	8	-17.64



9.7. CONDUCTED SPURIOUS EMISSIONS

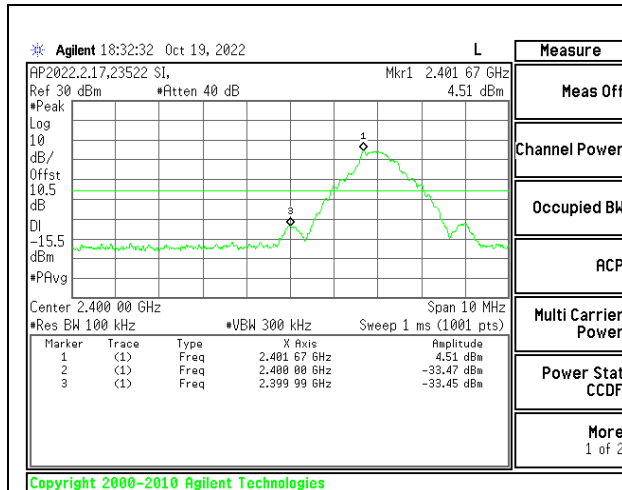
LIMITS

FCC §15.247 (d)

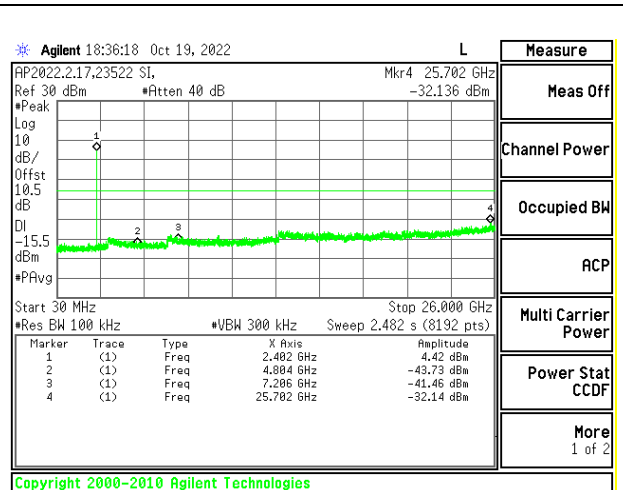
RSS-247 5.5

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

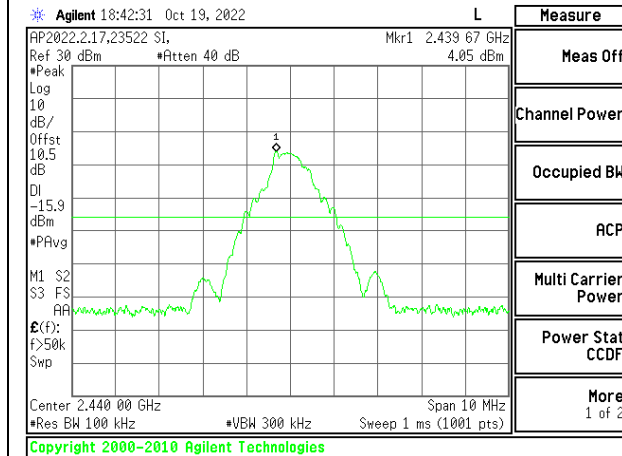
RESULTS



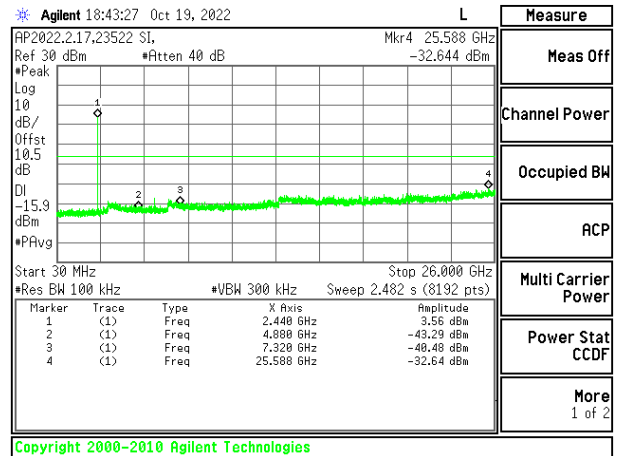
LOW CHANNEL BANDEDGE



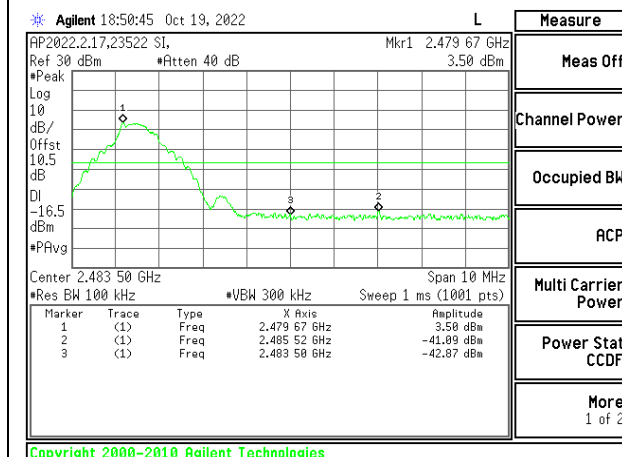
OUT-OF-BAND LOW CHANNEL



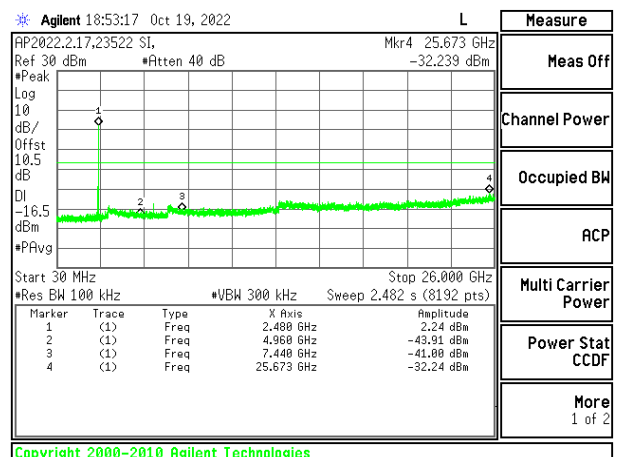
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

RSS-GEN, Section 8.9 and 8.10.

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
0.009-0.490	2400/F(kHz) @ 300 m	-
0.490-1.705	24000/F(kHz) @ 30 m	-
1.705 - 30	30 @ 30m	-
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 kHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements.

The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest output power was tested.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

2D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.

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

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

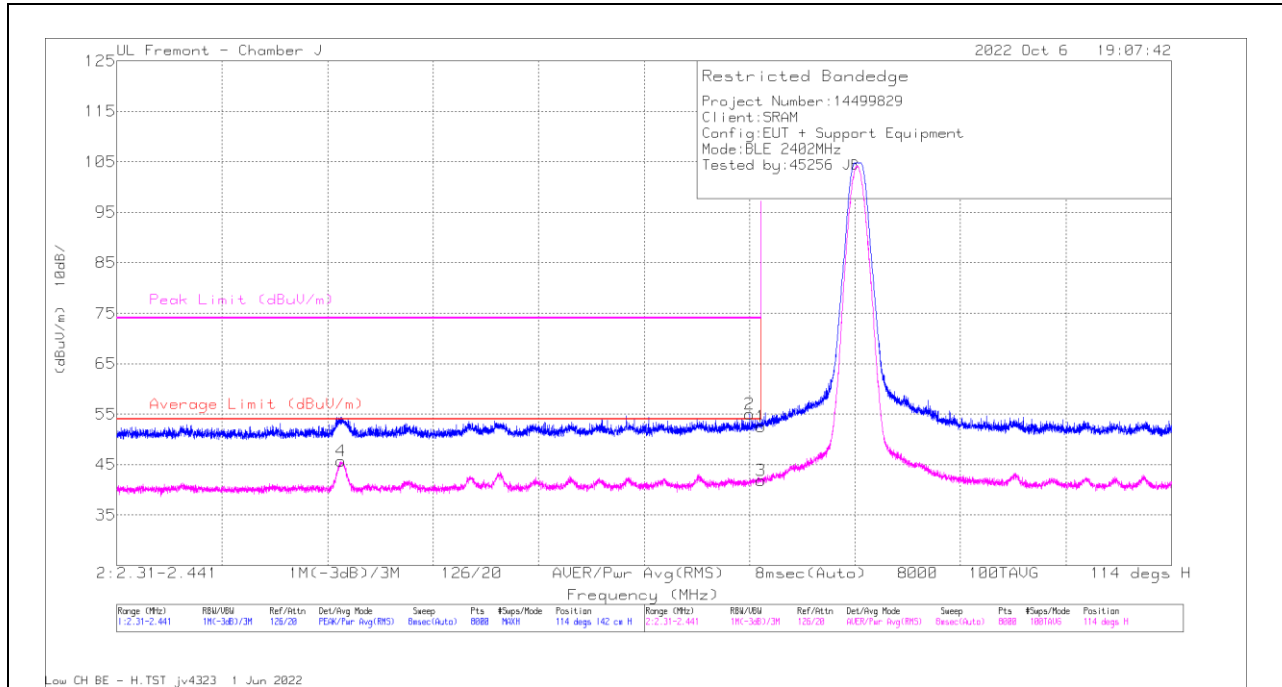
OFS and chamber correlation testing had been performed and chamber measured test result is the worst-case test result.

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

10.2. TRANSMITTER ABOVE 1 GHz

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT

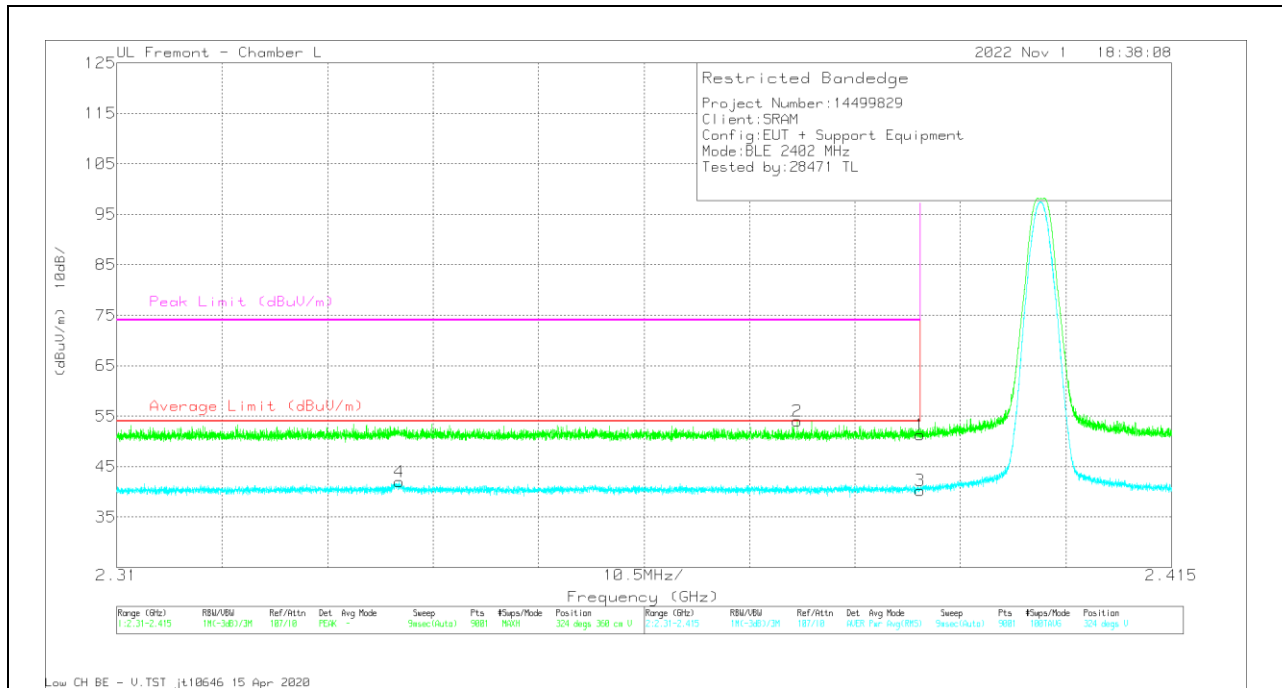


Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2390	59.48	Pk	32.5	-39.4	52.58	-	-	74	-21.42	114	142	H
2	* 2388.593	61.92	Pk	32.5	-39.4	55.02	-	-	74	-18.98	114	142	H
3	* 2390	48.79	RMS	32.5	-39.4	41.89	54	-12.11	-	-	114	142	H
4	* 2337.841	52.97	RMS	32.2	-39.5	45.67	54	-8.33	-	-	114	142	H

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

VERTICAL RESULT



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	Amp/Cb/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	39.44	Pk	31.9	-20.1	51.24	-	-	74	-22.76	324	360	V
2	* 2.377739	42.22	Pk	31.9	-20.1	54.02	-	-	74	-19.98	324	360	V
3	* 2.39	28.45	RMS	31.9	-20.1	40.25	54	-13.75	-	-	324	360	V
4	* 2.338106	30.17	RMS	32	-20.2	41.97	54	-12.03	-	-	324	360	V

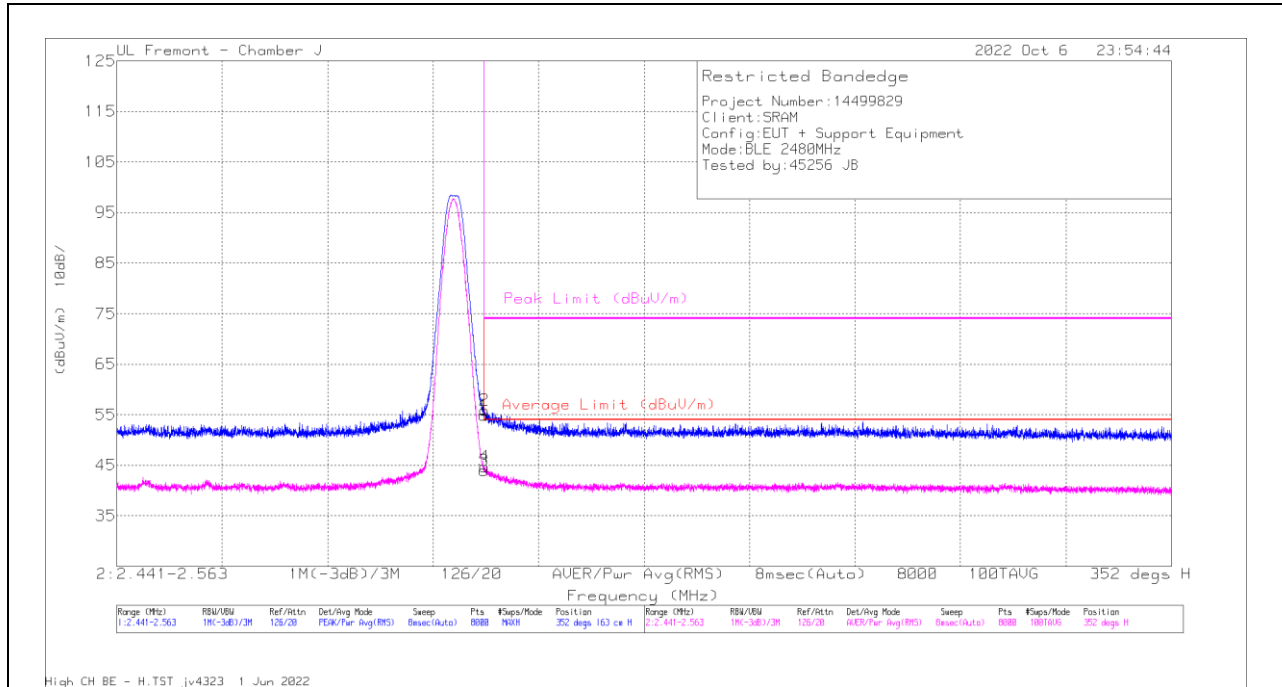
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT

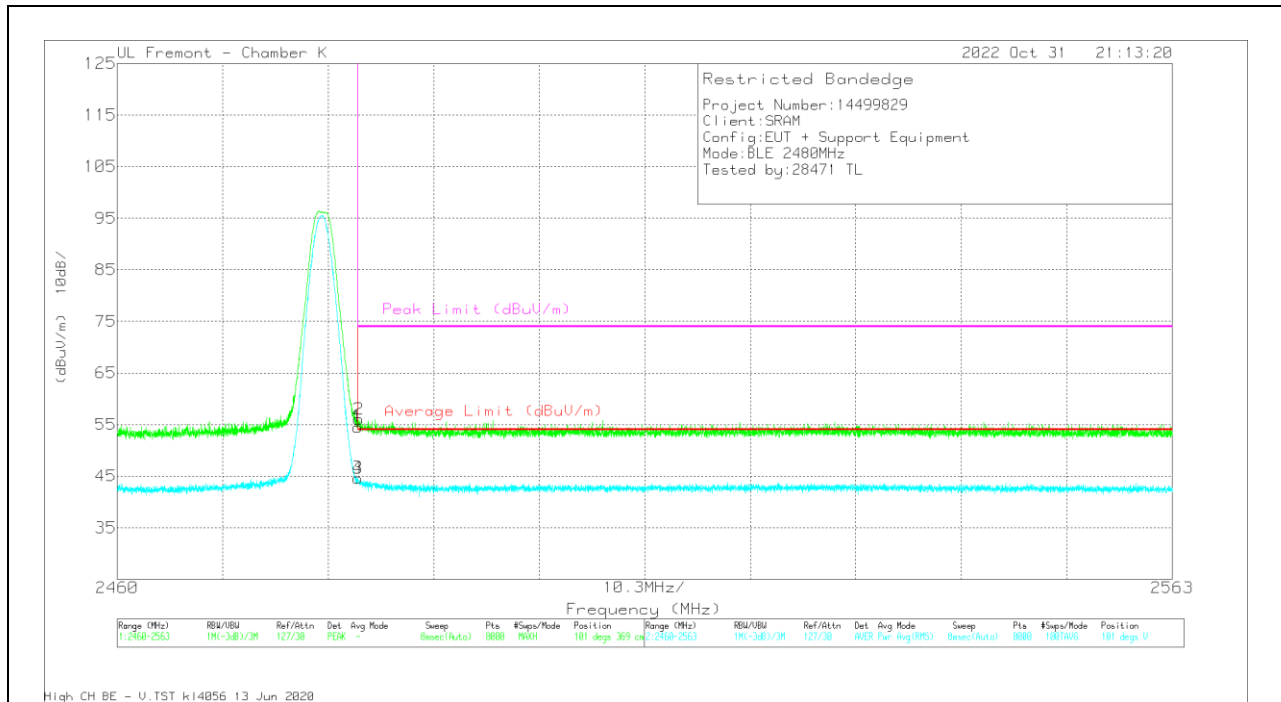


Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2483.5	61.49	Pk	32.5	-39.1	54.89	-	-	74	-19.11	352	163	H
2	* 2483.553	62.45	Pk	32.5	-39.1	55.85	-	-	74	-18.15	352	163	H
3	* 2483.5	50.59	RMS	32.5	-39.1	43.99	54	-10.01	-	-	352	163	H
4	* 2483.538	51.28	RMS	32.5	-39.1	44.68	54	-9.32	-	-	352	163	H

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

VERTICAL RESULT



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2483.5	56.51	Pk	32.5	-34.5	54.51	-	-	74	-19.49	101	369	V
2	* 2483.578	58.02	Pk	32.5	-34.5	56.02	-	-	74	-17.98	101	369	V
3	* 2483.5	46.61	RMS	32.5	-34.5	44.61	54	-9.39	-	-	101	369	V
4	* 2483.501	46.62	RMS	32.5	-34.5	44.62	54	-9.38	-	-	101	369	V

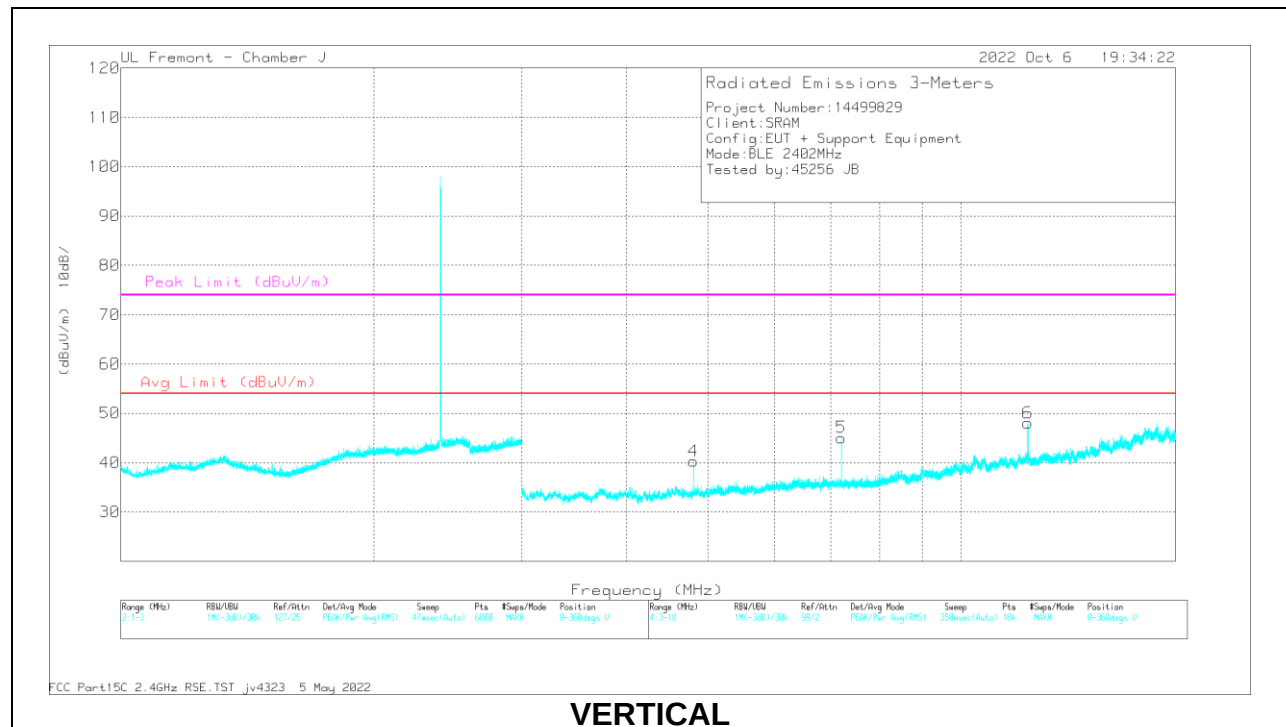
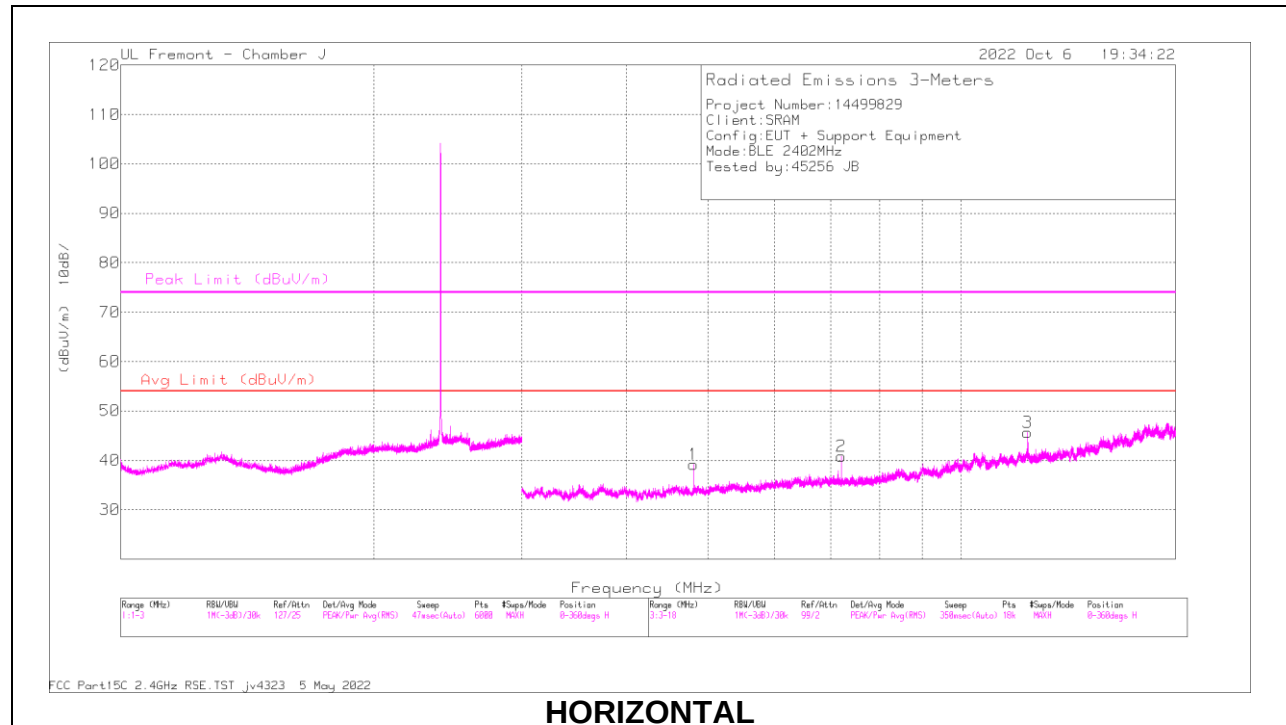
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

RMS - RMS detection

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



RADIATED EMISSIONS

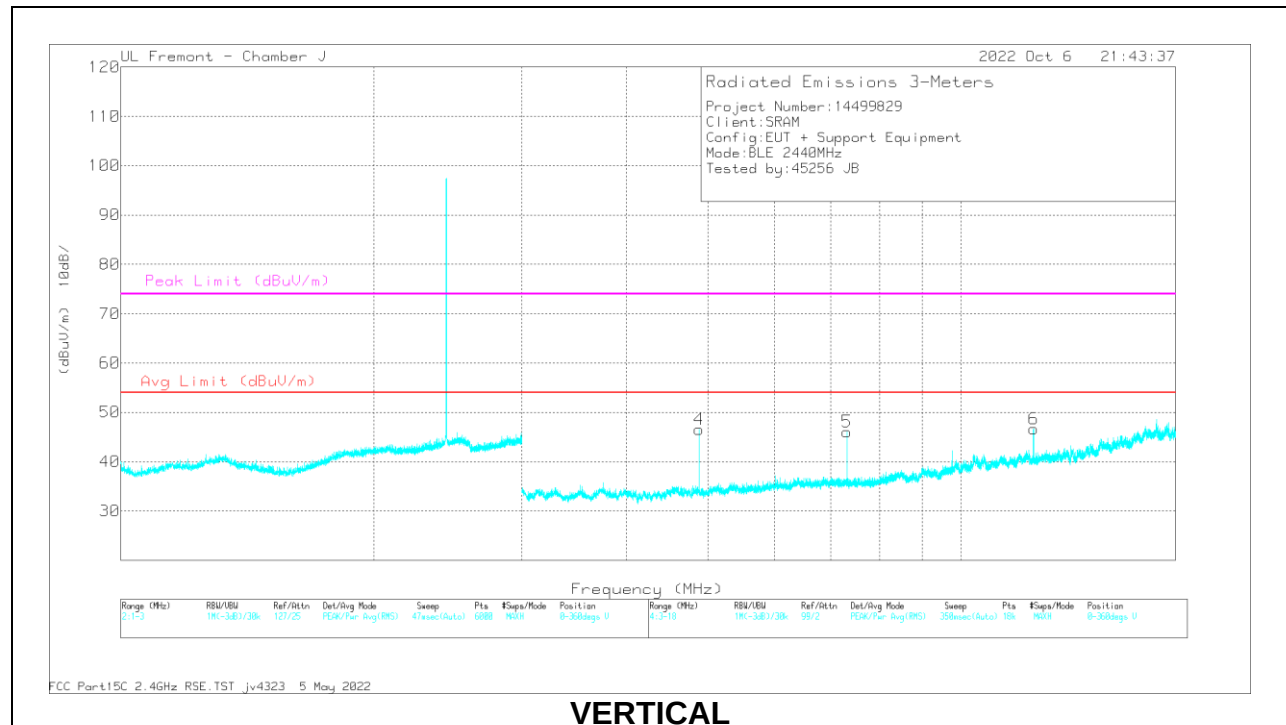
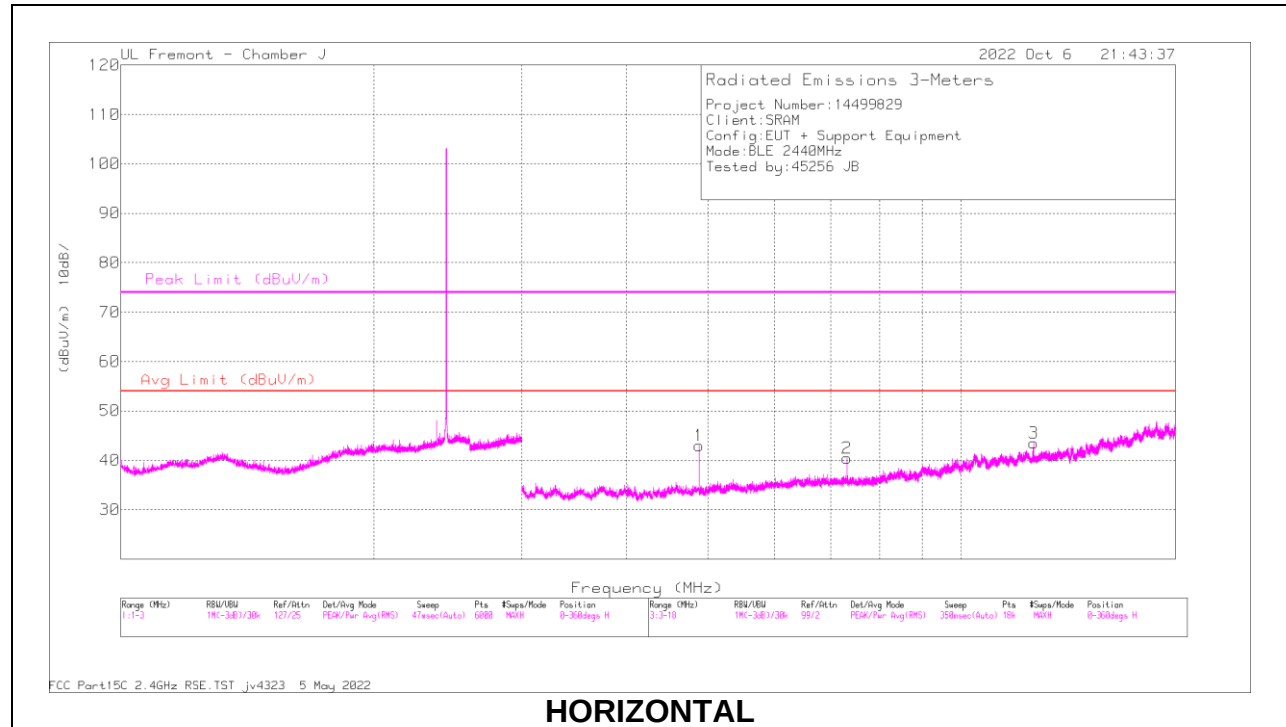
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	Amp/Cbl/Fitr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4804.496	61.62	PK2	34	-47.6	48.02	-	-	74	-25.98	177	142	H
	* 4803.872	53.02	MAv1	34	-47.6	39.42	54	-14.58	-	-	177	142	H
2	7204.908	57.82	PK2	35.9	-45.7	48.02	-	-	-	-	40	150	H
3	* 12008.582	57.25	PK2	38.8	-43.2	52.85	-	-	74	-21.15	216	268	H
	* 12008.67	47.48	MAv1	38.8	-43.2	43.08	54	-10.92	-	-	216	268	H
4	* 4803.766	61.83	PK2	34	-47.6	48.23	-	-	74	-25.77	41	106	V
	* 4803.758	53.5	MAv1	34	-47.6	39.9	54	-14.1	-	-	41	106	V
5	7204.84	61.28	PK2	35.9	-45.7	51.48	-	-	-	-	209	104	V
6	* 12011.302	59.49	PK2	38.8	-43.1	55.19	-	-	74	-18.81	215	106	V
	* 12011.302	50.22	MAv1	38.8	-43.1	45.92	54	-8.08	-	-	215	106	V

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

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

MID CHANNEL RESULTS



RADIATED EMISSIONS

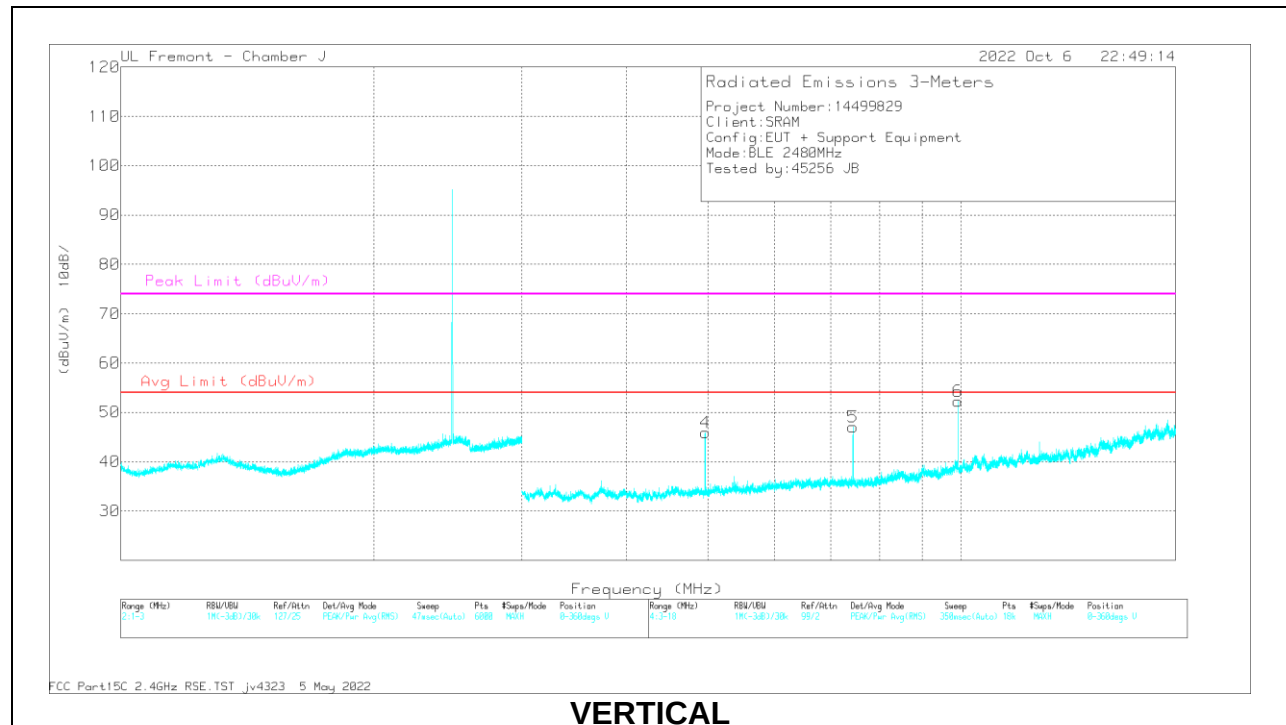
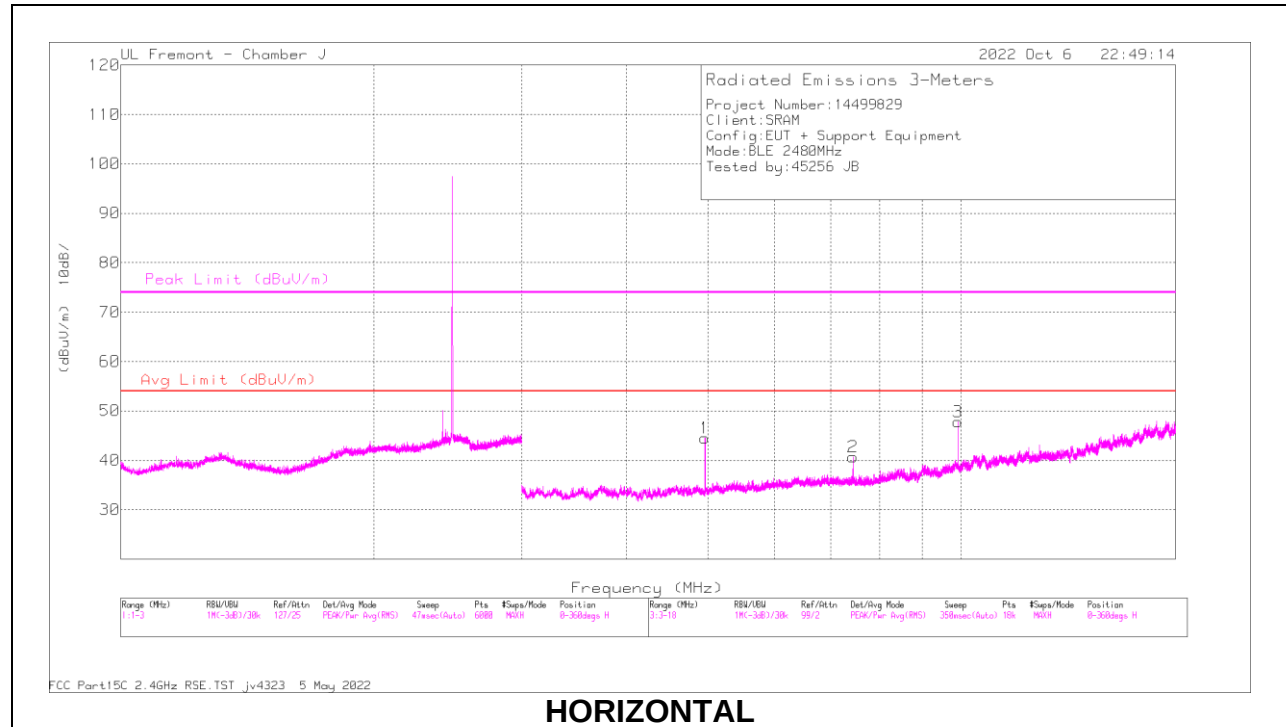
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4879.214	63.01	PK2	34.1	-47.1	50.01	-	-	74	-23.99	239	139	H
	* 4879.738	56.44	MAv1	34.1	-47	43.54	54	-10.46	-	-	239	139	H
2	* 7319.015	59.75	PK2	35.9	-45.9	49.75	-	-	74	-24.25	187	106	H
	* 7318.991	50.96	MAv1	35.9	-45.9	40.96	54	-13.04	-	-	187	106	H
3	* 12198.597	57.24	PK2	39.1	-43.3	53.04	-	-	74	-20.96	234	106	H
	* 12198.389	46.66	MAv1	39.1	-43.3	42.46	54	-11.54	-	-	234	106	H
4	* 4879.24	64.82	PK2	34.1	-47.1	51.82	-	-	74	-22.18	203	163	V
	* 4879.644	59.06	MAv1	34.1	-47	46.16	54	-7.84	-	-	203	163	V
5	* 7318.999	62.93	PK2	35.9	-45.9	52.93	-	-	74	-21.07	207	299	V
	* 7319.291	56.45	MAv1	35.9	-45.9	46.45	54	-7.55	-	-	207	299	V
6	* 12198.405	58.91	PK2	39.1	-43.3	54.71	-	-	74	-19.29	158	120	V
	* 12198.529	50.1	MAv1	39.1	-43.3	45.9	54	-8.1	-	-	158	120	V

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

PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

HIGH CHANNEL RESULTS



RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	Amp/Cbl/Filtr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4959.284	62.7	PK2	34.2	-47.1	49.8	-	-	74	-24.2	130	157	H
	* 4959.712	56.23	MAV1	34.2	-47.1	43.33	54	-10.67	-	-	130	157	H
2	* 7439.269	59.72	PK2	35.9	-45.7	49.92	-	-	74	-24.08	184	386	H
	* 7438.878	49.77	MAV1	35.9	-45.8	39.87	54	-14.13	-	-	184	386	H
3	9918.649	59.98	PK2	37.2	-44.2	52.98	-	-	-	-	149	102	H
4	* 4959.386	64.22	PK2	34.2	-47.1	51.32	-	-	74	-22.68	193	161	V
	* 4959.53	58.37	MAV1	34.2	-47.1	45.47	54	-8.53	-	-	193	161	V
5	* 7439.053	62.92	PK2	35.9	-45.8	53.02	-	-	74	-20.98	193	128	V
	* 7439.313	56.39	MAV1	35.9	-45.7	46.59	54	-7.41	-	-	193	128	V
6	9918.741	64.41	PK2	37.2	-44.2	57.41	-	-	-	-	178	105	V

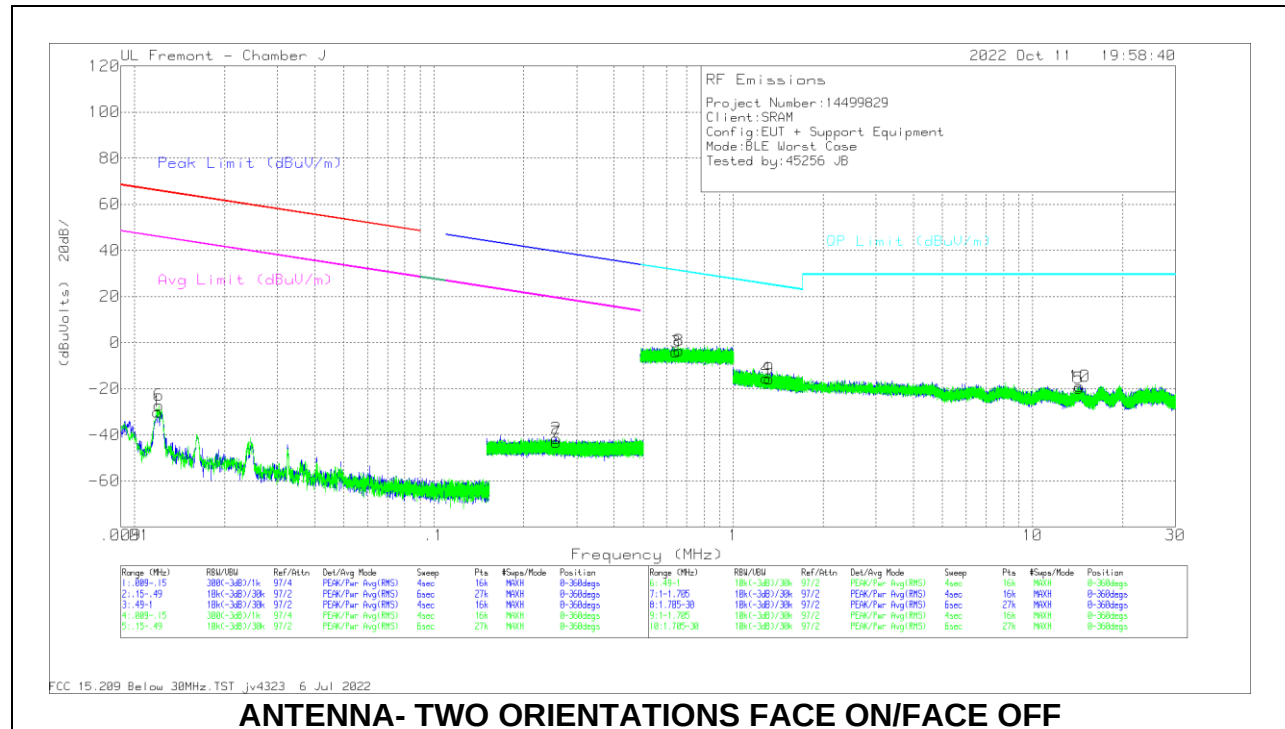
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak

MAV1 - KDB558074 Option 1 Maximum RMS Average

10.3. WORST CASE BELOW 30 MHz

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



Below 30MHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Antenna Polarity (Degs)
1	.012	21.19	Pk	60	-31.2	-80	-30.01	66.02	-96.03	46.02	-76.03	0-360	0 deg
2	.2564	14.51	Pk	56.2	-32.3	-80	-41.59	39.44	-81.03	19.44	-61.03	0-360	0 deg
6	.0121	24.06	Pk	60	-31.2	-80	-27.14	65.95	-93.09	45.95	-73.09	0-360	90 deg
7	.2566	12.98	Pk	56.2	-32.3	-80	-43.12	39.43	-82.55	19.43	-62.55	0-360	90 deg

Pk - Peak detector

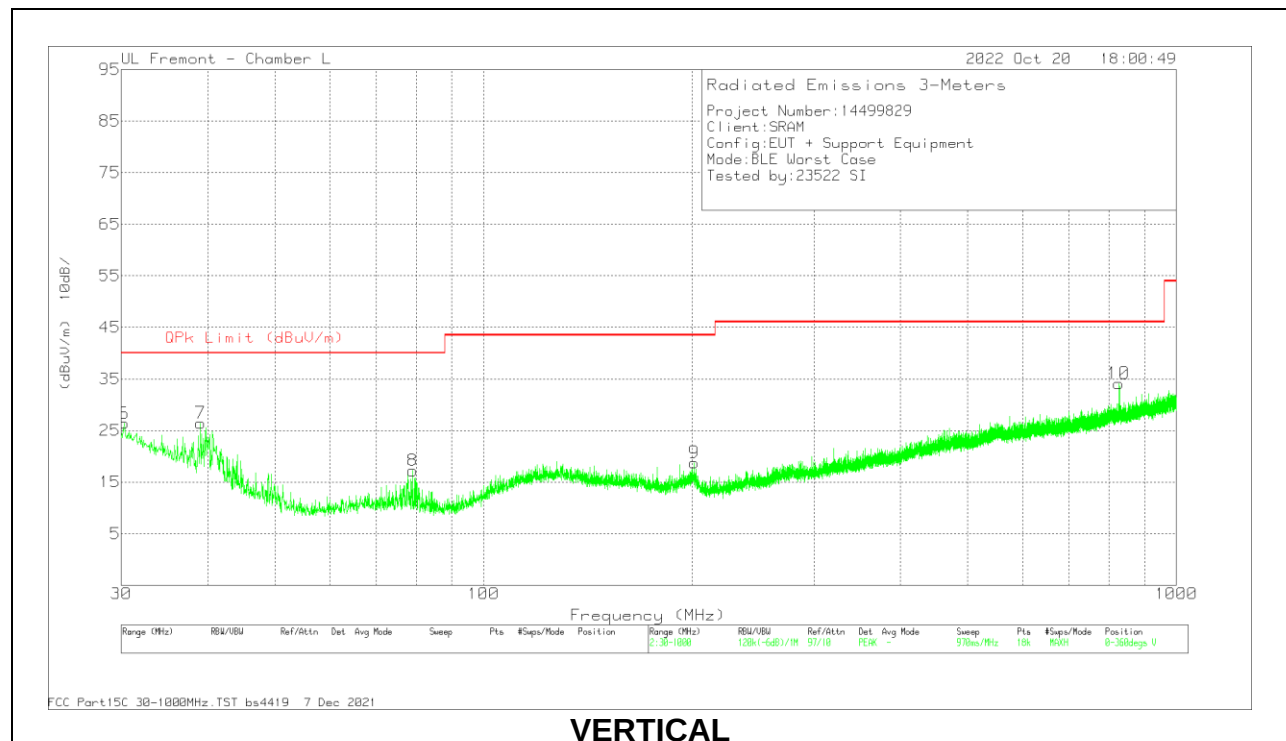
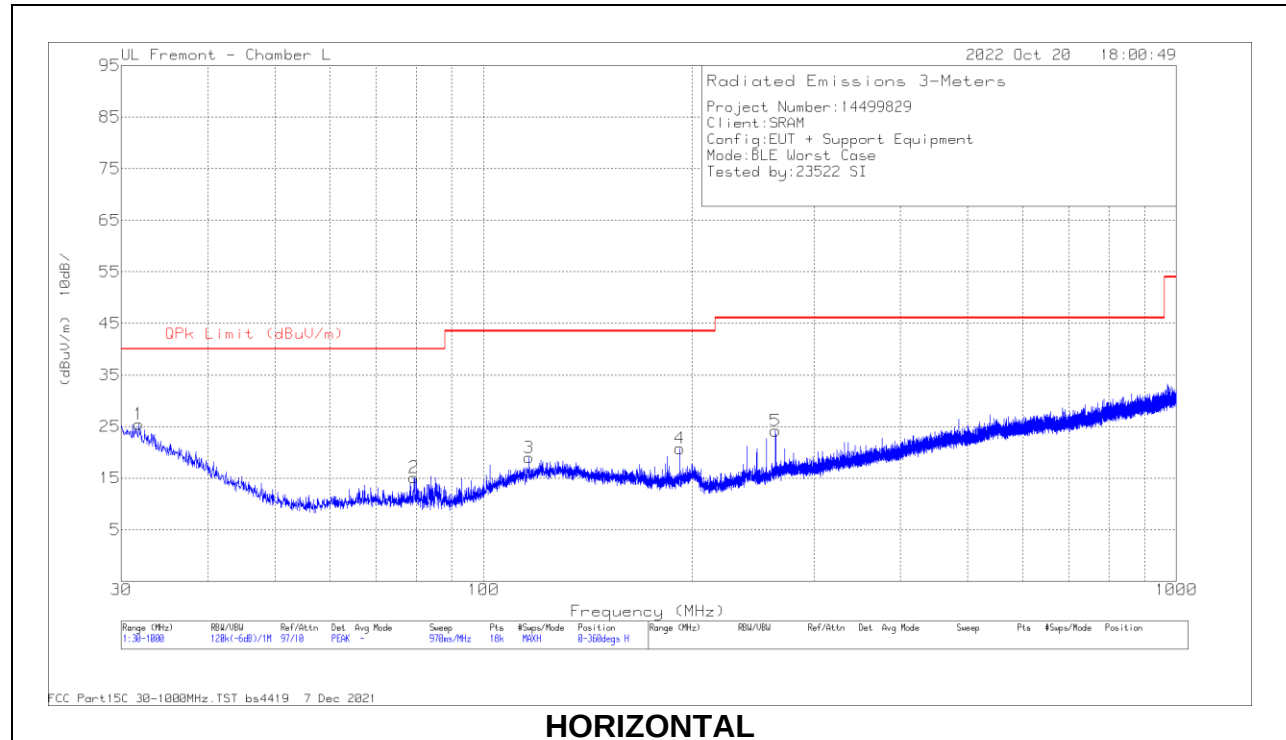
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF)	Amp/Cbl (dB)	Dist Corr 30m 40Log	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Antenna Polarity (Degs)
3	.6436	11.96	Pk	56.1	-32.2	-40	-4.14	31.44	-35.58	0-360	0 deg
8	.6597	12.49	Pk	56.2	-32.2	-40	-3.51	31.22	-34.73	0-360	90 deg
4	1.2882	11.39	Pk	45.4	-32.2	-40	-15.41	25.43	-40.84	0-360	0 deg
5	14.2527	18.21	Pk	34	-31.9	-40	-19.69	29.5	-49.19	0-360	0 deg
9	1.3199	11.4	Pk	45.2	-32.2	-40	-15.6	25.22	-40.82	0-360	90 deg
10	14.3481	19.02	Pk	34	-31.9	-40	-18.88	29.5	-48.38	0-360	90 deg

Pk - Peak detector

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

10.4. WORST CASE BELOW 1 GHz

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



Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80293 ACF (dB)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	31.7783	29.94	Pk	26.8	-31.3	25.44	40	-14.56	0-360	100	H
2	79.4162	31.89	Pk	14	-30.8	15.09	40	-24.91	0-360	200	H
3	116.384	29.98	Pk	19.6	-30.6	18.98	43.52	-24.54	0-360	100	H
4	191.99	32.45	Pk	18.3	-30	20.75	43.52	-22.77	0-360	200	H
5	263.986	34.48	Pk	19.3	-29.6	24.18	46.02	-21.84	0-360	100	H
6	30.3233	29.88	Pk	27.9	-31.4	26.38	40	-13.62	0-360	100	V
7	39.0534	36.45	Pk	21.2	-31.2	26.45	40	-13.55	0-360	100	V
8	78.9851	34.03	Pk	14	-30.8	17.23	40	-22.77	0-360	100	V
9	201.475	29.55	Pk	19.2	-30	18.75	43.52	-24.77	0-360	100	V
10	825.863	32.57	Qp	28.1	-27.9	32.77	46.02	-13.25	360	227	V
	825.863	24.92	Pk	28.1	-27.9	25.12	46.02	-20.9	360	227	V

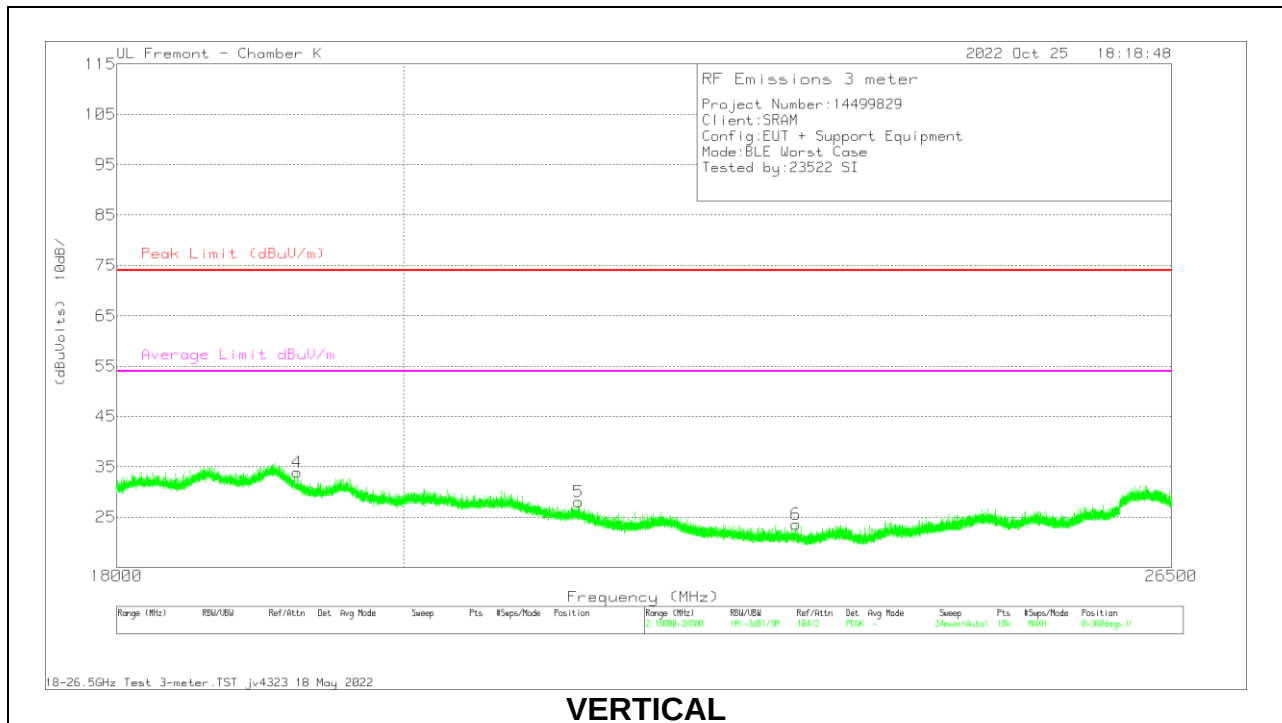
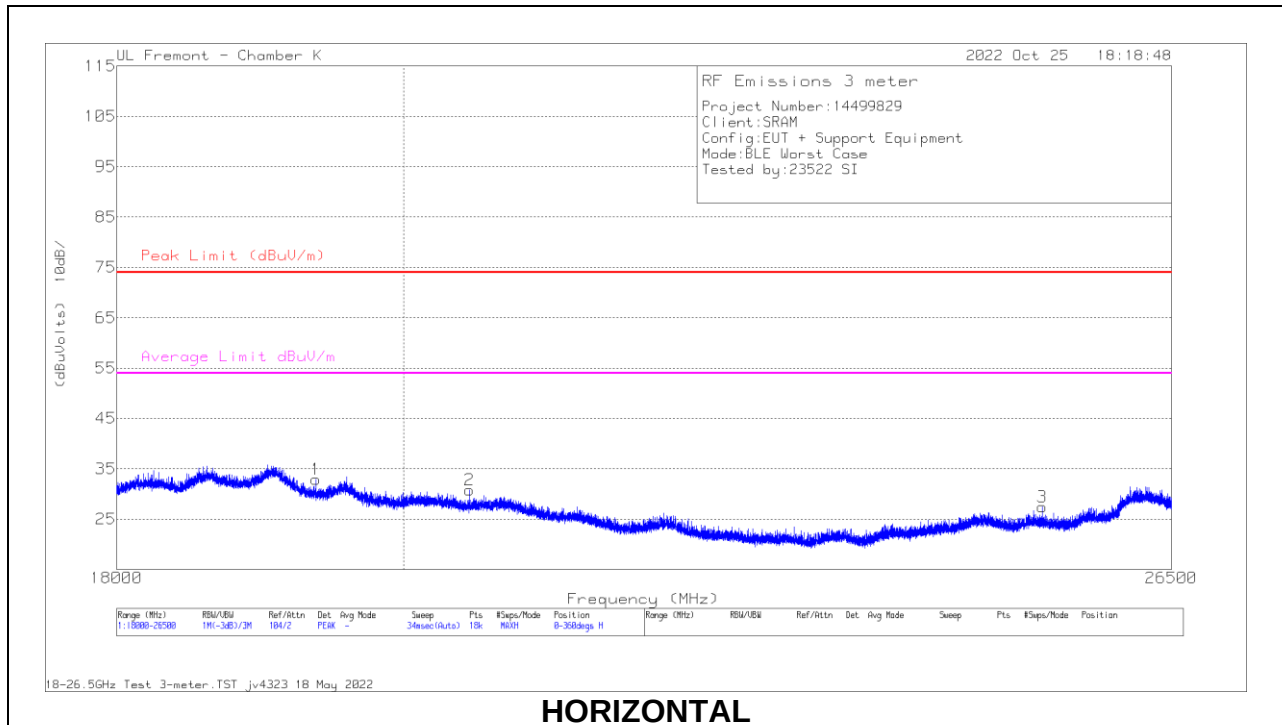
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Qp - Quasi-Peak detector

10.5. WORST CASE 18-26 GHz

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



18 – 26GHz DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	81138 AF (dB/m)	215705 amp/cbl (dB)	Cables (dB)	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	PK Margin (dB)	Average Limit dBuV/m	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 19366.138	42.87	Pk	32.8	-61	18.2	32.87	74	-41.13	54	-21.13	0-360	100	H
2	* 20487.193	38.85	Pk	33	-59.8	18.7	30.75	74	-43.25	54	-23.25	0-360	200	H
3	25272.691	33.39	Pk	34.4	-61.2	20.8	27.39	74	-46.61	54	-26.61	0-360	100	H
4	* 19232.027	44.03	Pk	32.7	-60.9	18.1	33.93	74	-40.07	54	-20.07	0-360	199	V
5	* 21320.193	35.81	Pk	33.1	-59.9	19.1	28.11	74	-45.89	54	-25.89	0-360	100	V
6	* 23091.498	31.29	Pk	33.5	-61	19.8	23.59	74	-50.41	54	-30.41	0-360	100	V

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

Pk - Peak detector