

TEST REPORT

Report Number. : 14507330-E3V4

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

Models : 12930

FCC ID : C9O-RDMB2

ISED : 10161A-RDMB2

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

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

Date of Issue:

2022-11-21

Prepared by:

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Pg. 7)REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2022-11-02	Initial Issue	---
V2	2022-11-11	Updated Section 7 and 9	Kiya Kedida
V3	2022-11-18	Updated Section 4.3, 5.2, 6, 9.1 (pg.20) and 9.2	Dan Coronia
V4	2022-11-21	Added Test Results Summary	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: Rear Derailleur with BLE, AIREA and ANT+ Radios

MODELS: 12930

SERIAL NUMBER: Conducted: 1801631006
Radiated: 1801631011 and 1801631012

DATE TESTED: 2022-10-11 TO 2022-10-27

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 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, 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.
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	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, 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	208313
<input type="checkbox"/>	Building 2: 47266 Benicia Street Fremont, CA 94538, U.S.A	US0104	22541	208313
<input checked="" type="checkbox"/>	Building 4: 47658 Kato Rd Fremont, CA 94538, U.S.A	US0104	2324B	208313

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

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

5.2. DECISION RULES

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

5.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	U _{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)

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

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

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

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

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

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

6.2. MAXIMUM 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+	100.95	86.97	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 X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

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

I/O CABLES (CONDUCTED EMISSIONS)

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

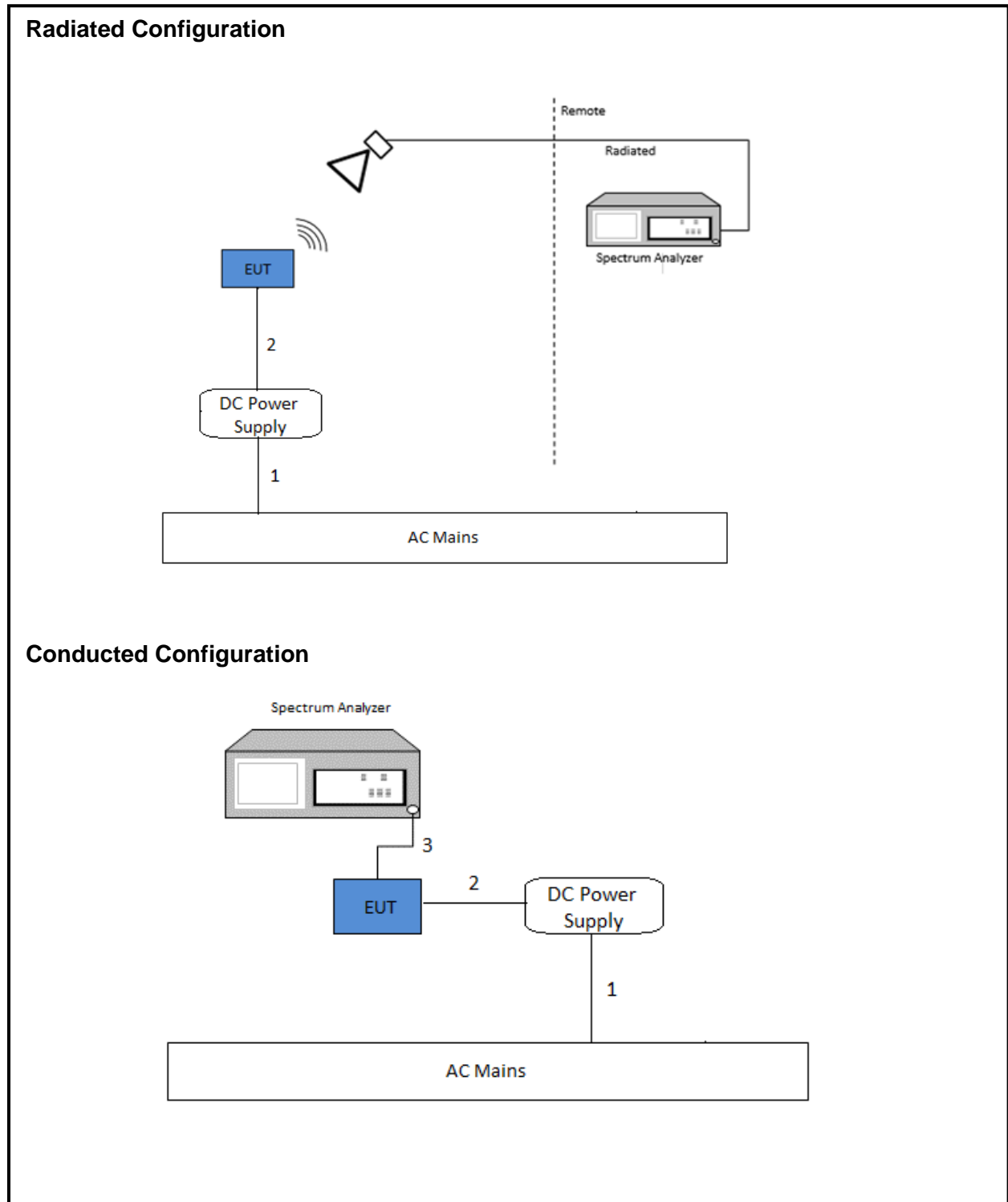
I/O CABLES (RADIATED EMISSIONS)

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

TEST SETUP

For the purposes of testing, the EUT is connected to a 7.4V DC Power supply for radiated emissions above 1GHz. The EUT is normally powered by a custom Li-Ion battery at 7.4V (converted to 3.3 for all microelectronics). The phone is used for setting up purposes and were 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 E.U.T. uses the 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 2000MHz	Sunol Sciences Corp.	JB1	80293	2023-08-09	2022-08-09
Amplifier, 10KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	175953	2023-02-08	2022-02-08
Amplifier, 10KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310N	29654	2023-04-24	2022-04-24
Antenna, Horn 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	206805	2023-07-05	2022-07-05
Antenna, Horn 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	80402	2023-07-05	2022-07-05
RF Filter Box, 1-18GHz	UL-FR1	n/a	171875	2023-08-12	2022-08-12
RF Filter Box, 8 port, 1-18GHz	UL-FR1 (CTECH)	SAC 8 port rf box 1	197920	2023-04-19	2022-04-19
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	201501	2023-02-19	2022-02-19
EMI TEST RECEIVER, with B8 option	Rohde & Schwarz	ESW44	PRE0179377	2023-02-20	2022-02-20
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	169927	2023-02-13	2022-02-13
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	81138	*2022-10-13	2021-10-13
Amplifier 18-26.5GHz, +5Vdc, 60dB min	AMPLICAL	AMP18G26.5-60	215705	2023-02-26	2022-02-26
Antenna, Passive Loop 30Hz - 1MHz	ELECTRO METRICS	EM-6871	219909	2023-05-10	2022-05-10
Antenna, Passive Loop 100KHz - 30MHz	ELECTRO METRICS	EM-6872	219911	2023-05-10	2022-05-10
Spectrum Analyzer, PSA, 3Hz to 44GHz	Agilent Technologies	N4440A	80386	2023-03-02	2022-03-02
Power Meter, P-series single channel	Keysight Technologies Inc	N1911A	T1268	2023-02-03	2022-02-03
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight Technologies Inc	N1921A	90419	2023-03-02	2022-03-02
10dB Fixed Attenuator	Pasternack Enterprises	PE7087-10	N/A	Verified	Verified
UL TEST SOFTWARE LIST					
Radiated Software	UL	UL EMC	Ver 2022-07-06, 2022-06-01, 2022-05-05, 2022-05-18, 2021-12-07, and 2014-07-15		
Antenna Port Software	UL	UL RF	Ver 2022.5.31		

NOTES:

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

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

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

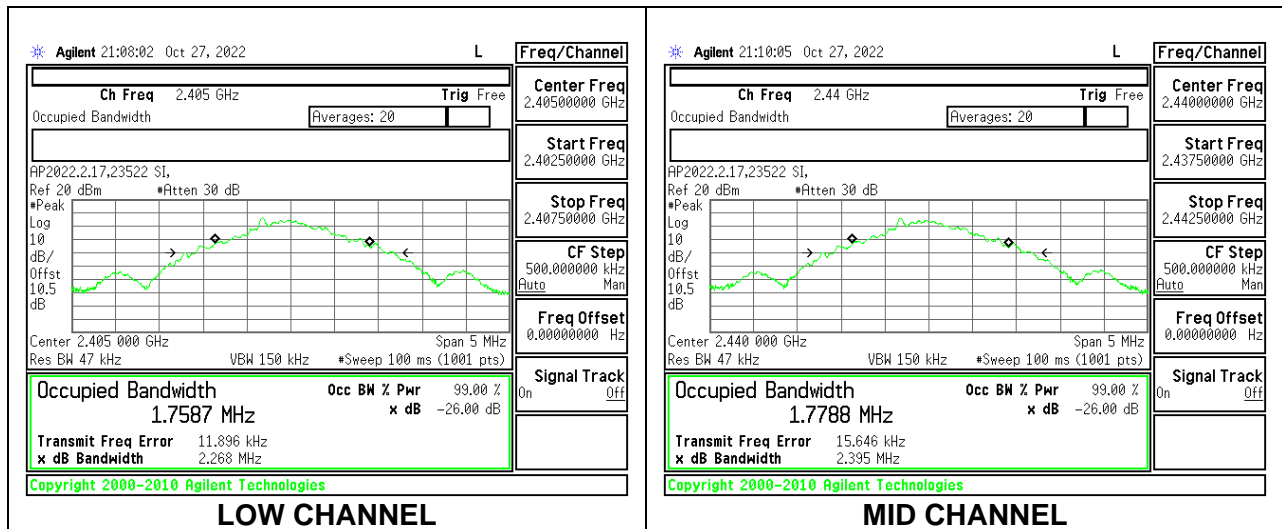
9.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2405	1.7587
Middle	2440	1.7788
High	2475	1.7798



9.3. 20 dB BANDWIDTH

LIMITS

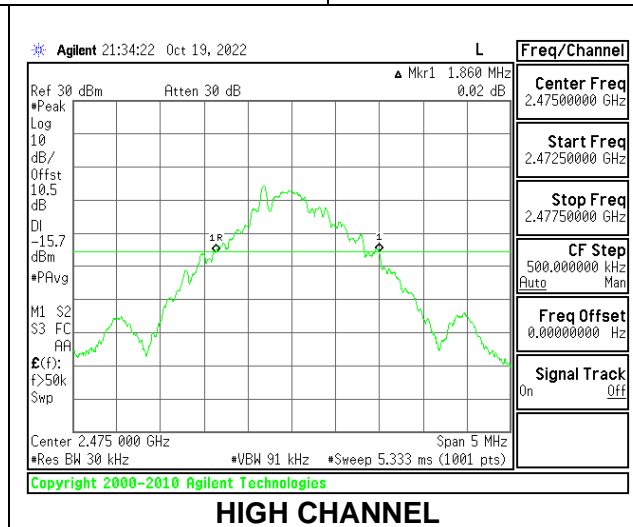
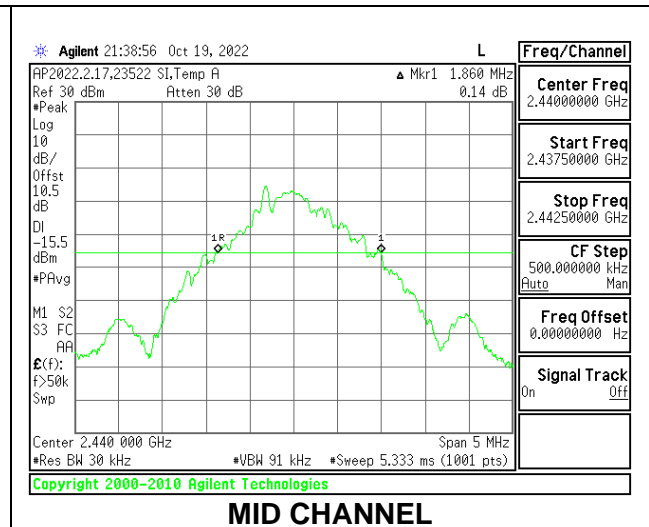
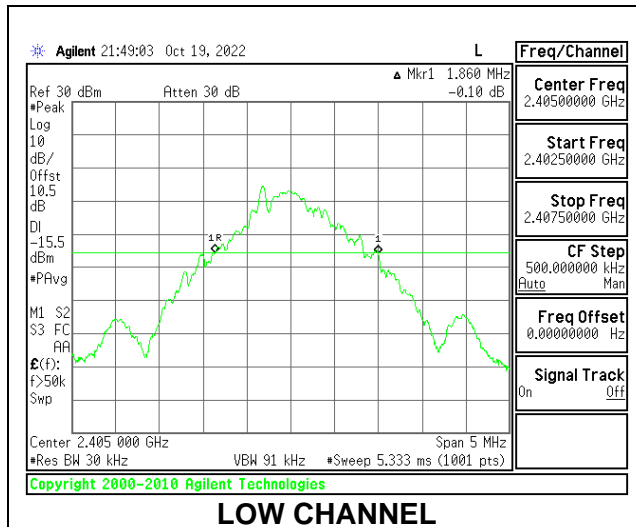
None; for reporting purposes only.

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	1.860	2404.070	2400	-4.070
Middle	2440	1.860	N/A	N/A	N/A
High	2475	1.860	2475.930	2483.5	-7.570



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. Peak detection is used unless otherwise noted as quasi-peak.

For fundamental test the RBW is set to 3MHz; the video bandwidth is set to 10MHz.

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 radiated spurious emission measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor for average measurement. Please refer to section 8.1 for duty cycle factor information.

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.

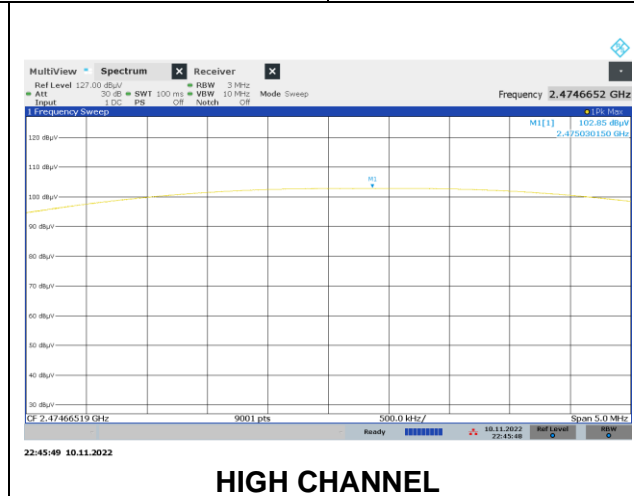
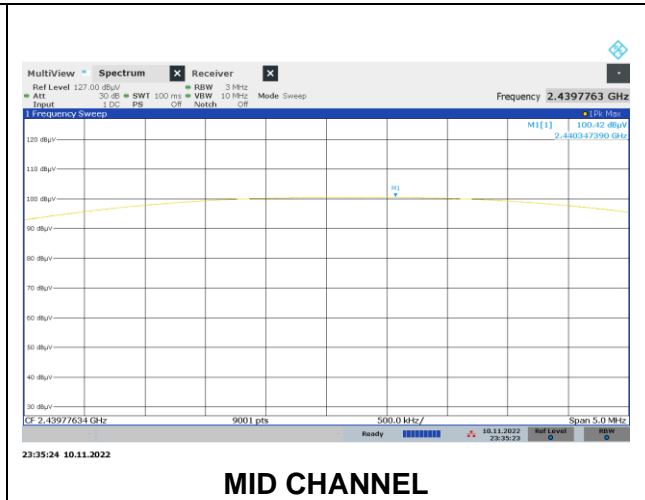
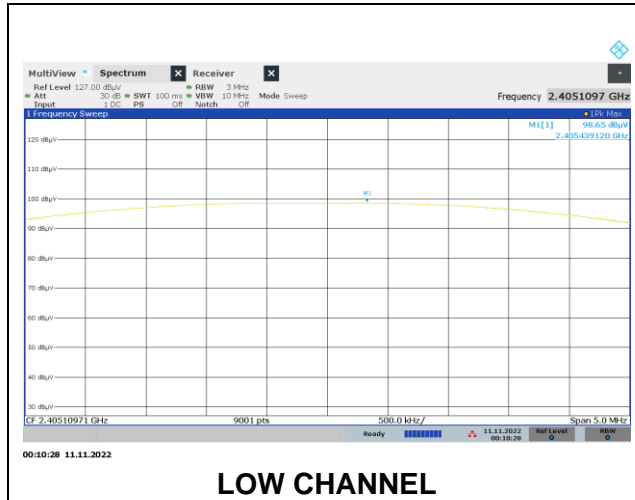
2D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.

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

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.

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

10.2. FUNDAMENTAL FREQUENCY RADIATED EMISSION



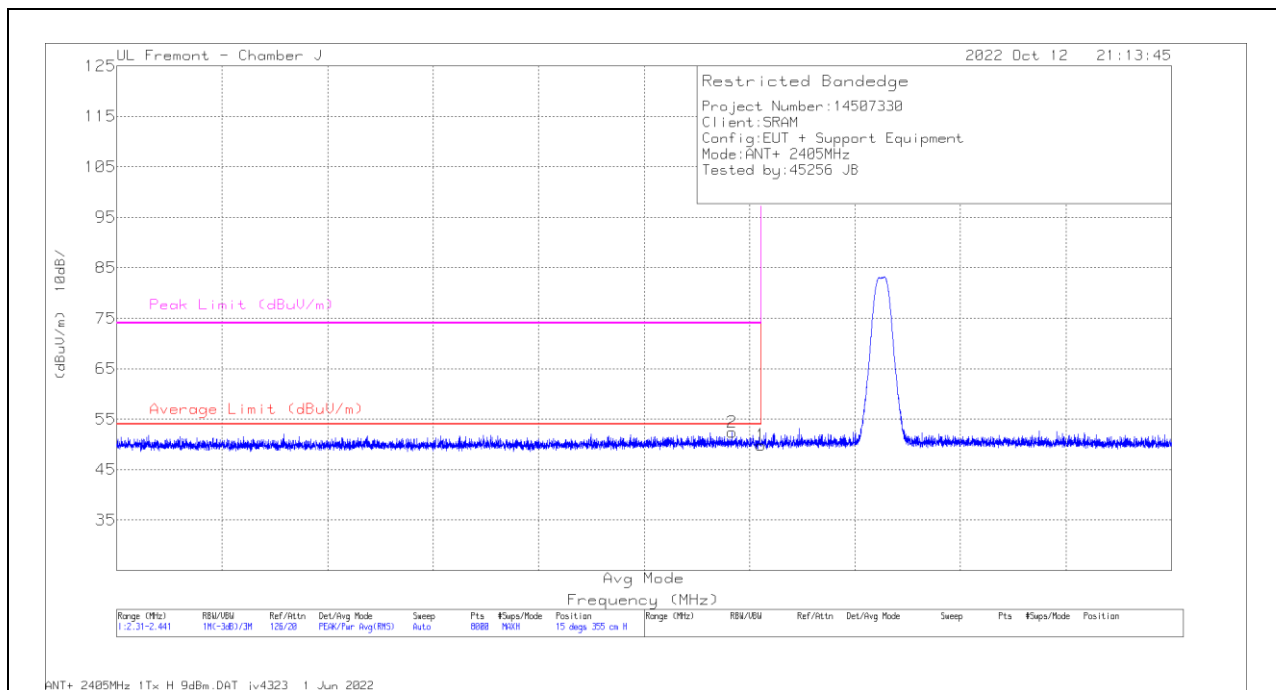
Frequency (GHz)	Meter Reading (dBuV)	Det	80402 ACF (dB) - 3mH	Amp/Cbl/Filtr/ Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2.405	98.65	PK	32.5	-34.8	0	96.35	-	-	114	-17.65	284	195	H
	98.65	AVG	32.5	-34.8	-13.98	82.37	94	-11.63	-	-	284	195	H
	96.26	PK	32.5	-34.8	0	94.21	-	-	114	-19.79	64	193	V
	96.26	AVG	32.5	-34.8	-13.98	80.23	94	-13.77	-	-	64	193	V
2.440	100.42	PK	32.4	-34.7	0	98.12	-	-	114	-15.88	273	124	H
	100.42	AVG	32.4	-34.7	-13.98	84.14	94	-9.86	-	-	273	124	H
	99.51	PK	32.4	-34.7	0	97.21	-	-	114	-16.79	236	256	V
	99.51	AVG	32.4	-34.7	-13.98	83.23	94	-10.77	-	-	236	256	V
2.475	102.85	PK	32.5	-34.4	0	100.95	-	-	114	-13.05	265	234	H
	102.85	AVG	32.5	-34.4	-13.98	86.97	94	-7.03	-	-	265	234	H
	101.5	PK	32.5	-34.4	0	99.6	-	-	114	-14.4	69	134	V
	101.5	AVG	32.5	-34.4	-13.98	85.62	94	-8.38	-	-	69	134	V

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

10.3. TRANSMITTER ABOVE 1 GHz

BANDEGE (LOW CHANNEL)

HORIZONTAL RESULT



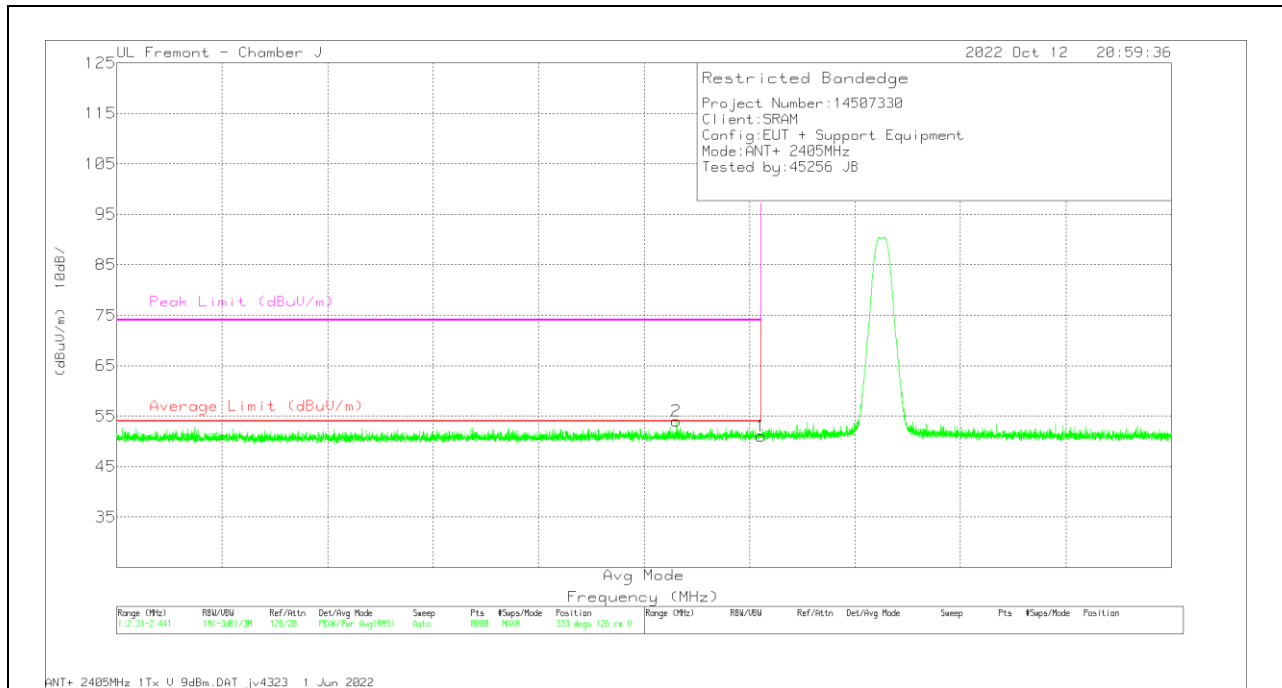
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	Amp/Cbl/Filtr/Pad (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	56.75	Pk	32.5	-39.4	0	49.85	-	-	74	-24.15	15	355	H
	* 2390	56.75	AVG	32.5	-39.4	-13.98	35.87	54	-18.13	-	-	15	355	H
2	* 2386.415	59.27	Pk	32.5	-39.4	0	52.37	-	-	74	-21.63	15	355	H
	* 2386.415	59.27	AVG	32.5	-39.4	-13.98	38.39	54	-15.61	-	-	15	355	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

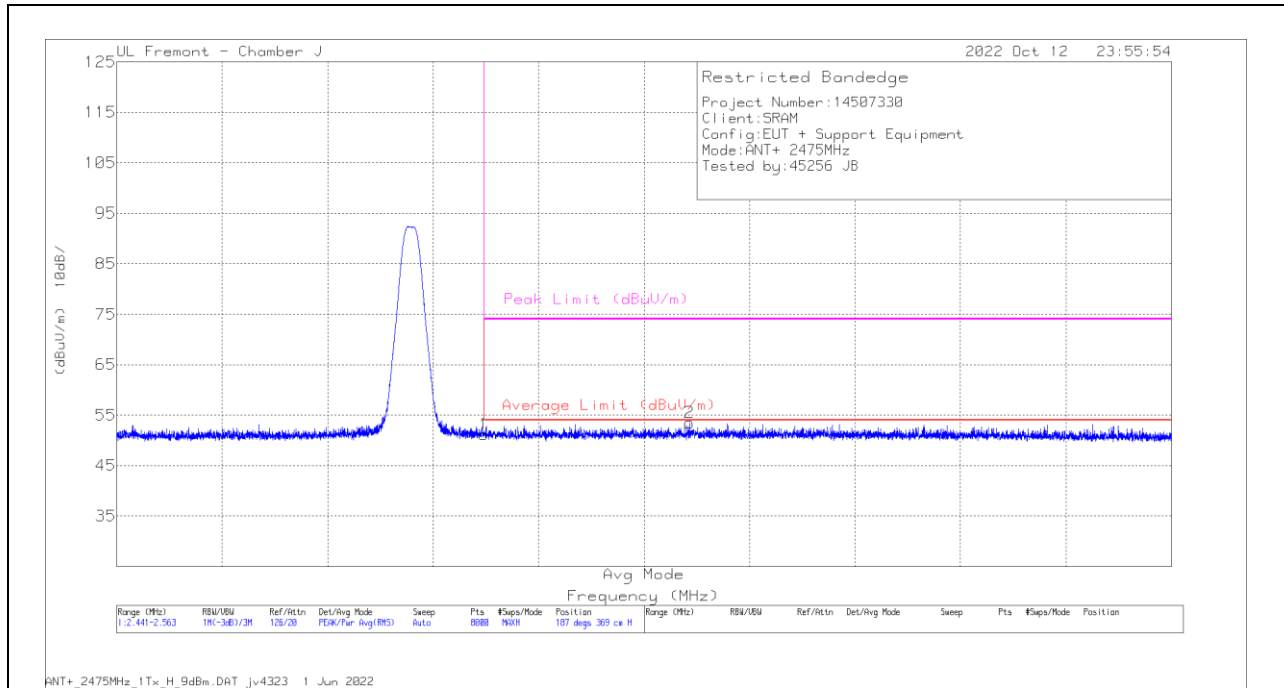
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2390	57.94	Pk	32.5	-39.4	0	51.04	-	-	74	-22.96	333	126	V
	* 2390	57.945	AVG	32.5	-39.4	-13.98	37.06	54	-16.94	-	-	333	126	V
2	* 2379.537	60.99	Pk	32.4	-39.4	0	53.99	-	-	74	-20.01	333	126	V
	* 2379.537	60.99	AVG	32.4	-39.4	-13.98	40.01	54	-13.99	-	-	333	126	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



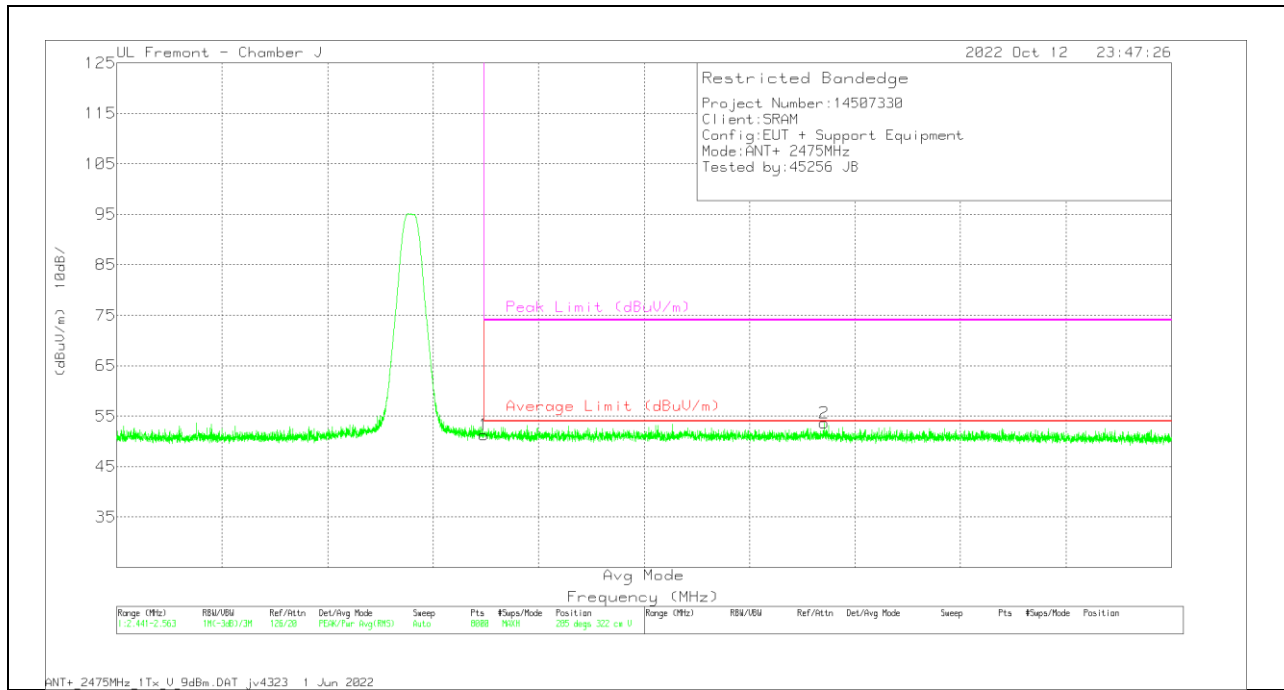
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	Amp/Cbl/Filtr/Pad (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	57.78	Pk	32.5	-39.1	0	51.18	-	-	74	-22.82	187	369	H
	* 2483.5	57.78	AVG	32.5	-39.1	-13.98	37.2	54	-16.8	-	-	187	369	H
2	2507.255	59.76	Pk	32.7	-39	0	53.46	-	-	74	-20.54	187	369	H
	2507.255	59.76	AVG	32.7	-39	-13.98	39.48	54	-14.52	-	-	187	369	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

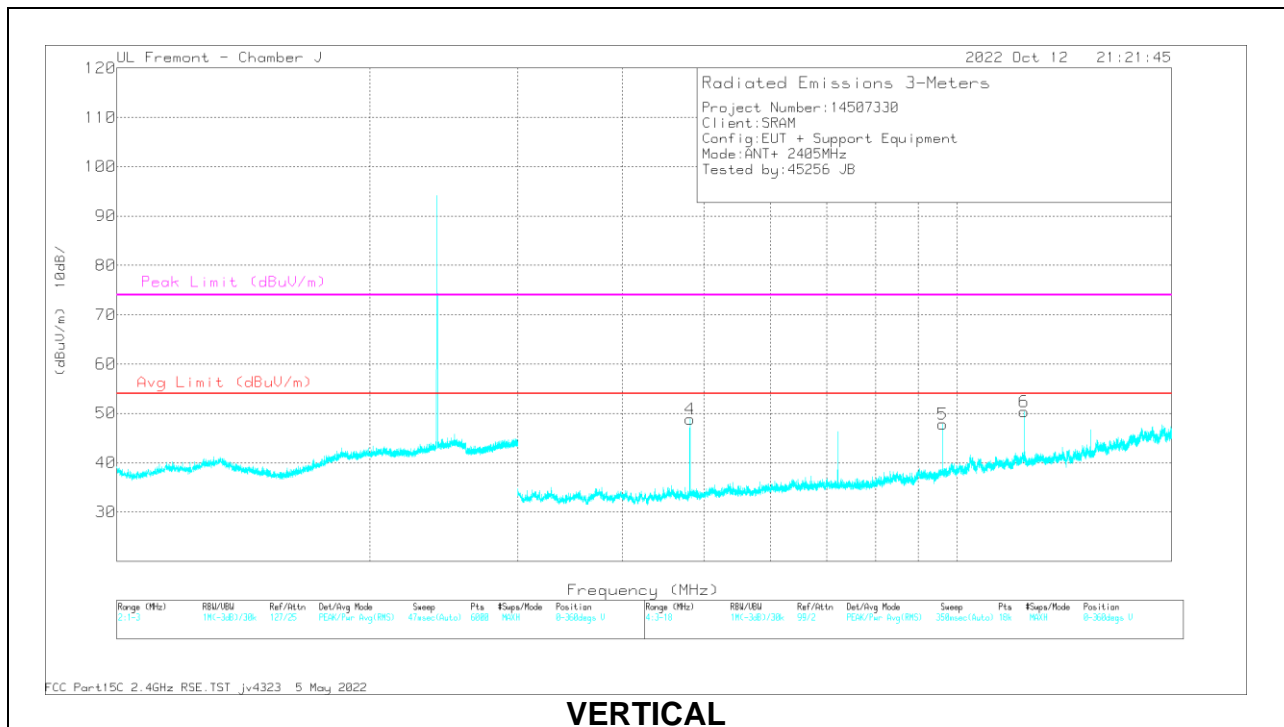
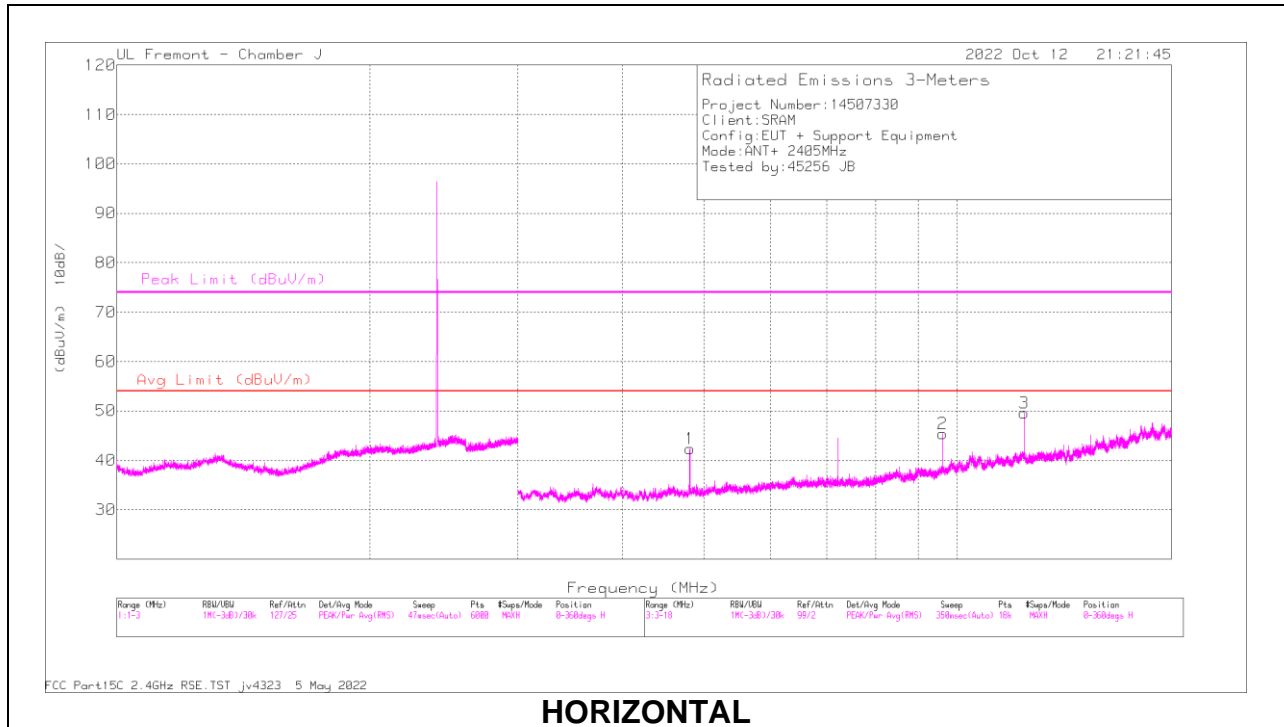
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	Amp/Cbl/Fitr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2483.5	57.88	Pk	32.5	-39.1	0	51.28	-	-	74	-22.72	285	322	V
	* 2483.5	57.88	AVG	32.5	-39.1	-13.98	37.3	54	-16.7	-	-	285	322	V
2	2522.812	59.95	Pk	32.7	-39	0	53.65	-	-	74	-20.35	285	322	V
	2522.812	59.95	AVG	32.7	-39	-13.98	39.67	54	-14.33	-	-	285	322	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



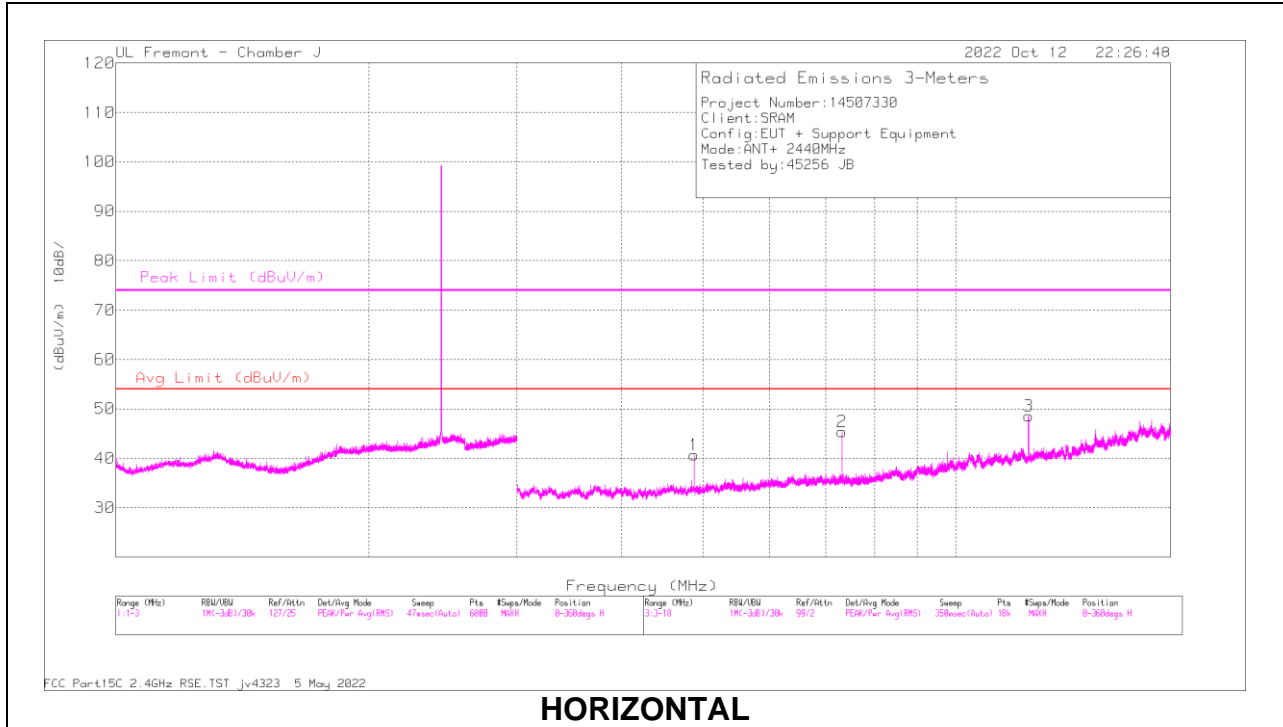
RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	Amp/Cbl/Filtr/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
1	* 4809.723	57.48	PK	34	-47.6	0	43.88	-	-	74	-30.12	234	304	H
	* 4809.723	57.48	AVG	34	-47.6	-13.98	29.9	54	-24.1	-	-	234	304	H
2	9618.764	60.79	PK	36.8	-44.7	0	52.89	-	-	-	-	358	238	H
	9618.764	60.79	AVG	36.8	-44.7	-13.98	38.91	54	-15.09	-	-	358	238	H
3	* 12023.375	59.85	PK	38.9	-43.1	0	55.65	-	-	74	-18.35	209	101	H
	* 12023.375	59.85	AVG	38.9	-43.1	-13.98	41.7	54	-12.3	-	-	209	101	H
4	* 4809.47	66.9	PK	34	-47.6	0	53.3	-	-	74	-20.7	39	197	V
	* 4809.47	66.9	AVG	34	-47.6	-13.98	39.32	54	-14.68	-	-	39	197	V
5	9621.308	63.2	PK	36.8	-44.7	0	55.3	-	-	-	-	242	221	V
	9621.308	63.2	AVG	36.8	-44.7	-13.98	41.32	54	-12.68	-	-	242	221	V
6	* 12023.583	60.51	PK	38.9	-43.1	0	56.31	-	-	74	-17.69	199	112	V
	* 12023.583	60.51	AVG	38.9	-43.1	-13.98	42.33	54	-11.67	-	-	199	112	V

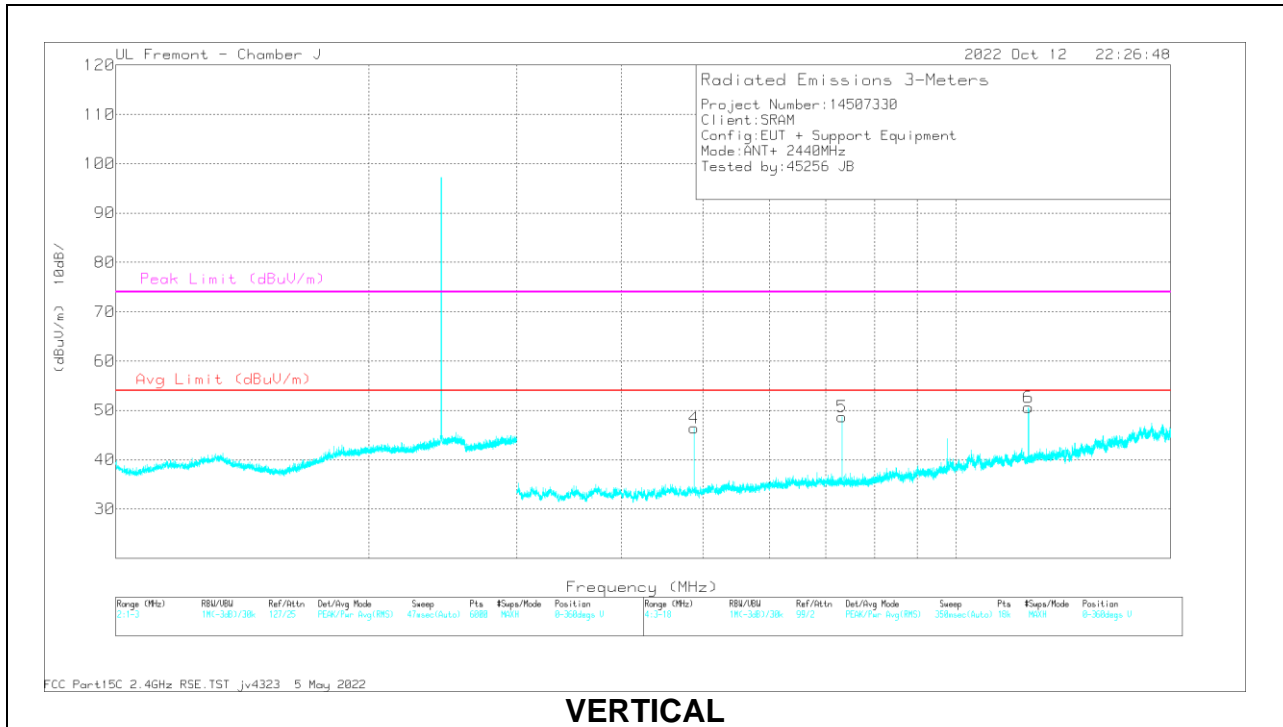
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

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

MID CHANNEL RESULTS



HORIZONTAL



VERTICAL

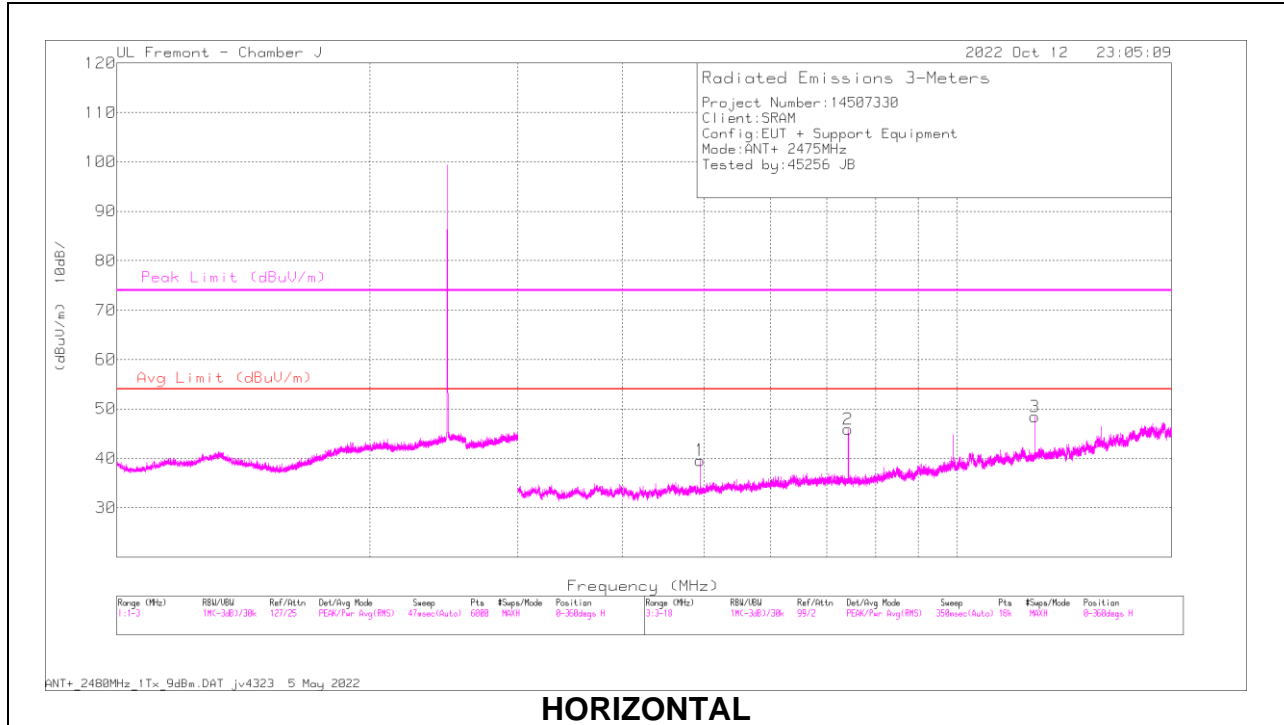
RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	Amp/Cbl/Filtr/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
1	* 4880.035	61.32	PK	34.1	-47	0	48.42	-	-	74	-25.58	72	180	H
	* 4880.035	61.32	AVG	34.1	-47	-13.98	34.44	54	-19.56	-	-	72	180	H
2	* 7319.119	62.43	PK	35.9	-45.9	0	52.43	-	-	74	-21.57	42	191	H
	* 7319.119	62.43	AVG	35.9	-45.9	-13.98	38.45	54	-15.55	-	-	42	191	H
3	* 12198.253	60.41	PK	39.1	-43.3	0	56.21	-	-	74	-17.79	30	258	H
	* 12198.253	60.41	AVG	39.1	-43.3	-13.98	42.23	54	-11.77	-	-	30	258	H
4	* 4879.49	64.7	PK	34.1	-47	0	51.8	-	-	74	-22.2	37	190	V
	* 4879.49	64.7	AVG	34.1	-47	-13.98	37.82	54	-16.18	-	-	37	190	V
5	* 7319.071	62.35	PK	35.9	-45.9	0	52.35	-	-	74	-21.65	17	210	V
	* 7319.071	62.35	AVG	35.9	-45.9	-13.98	38.37	54	-15.63	-	-	17	210	V
6	* 12198.355	61.6	PK	39.1	-43.3	0	57.4	-	-	74	-16.6	40	176	V
	* 12198.355	61.6	AVG	39.1	-43.3	-13.98	43.42	54	-10.58	-	-	40	176	V

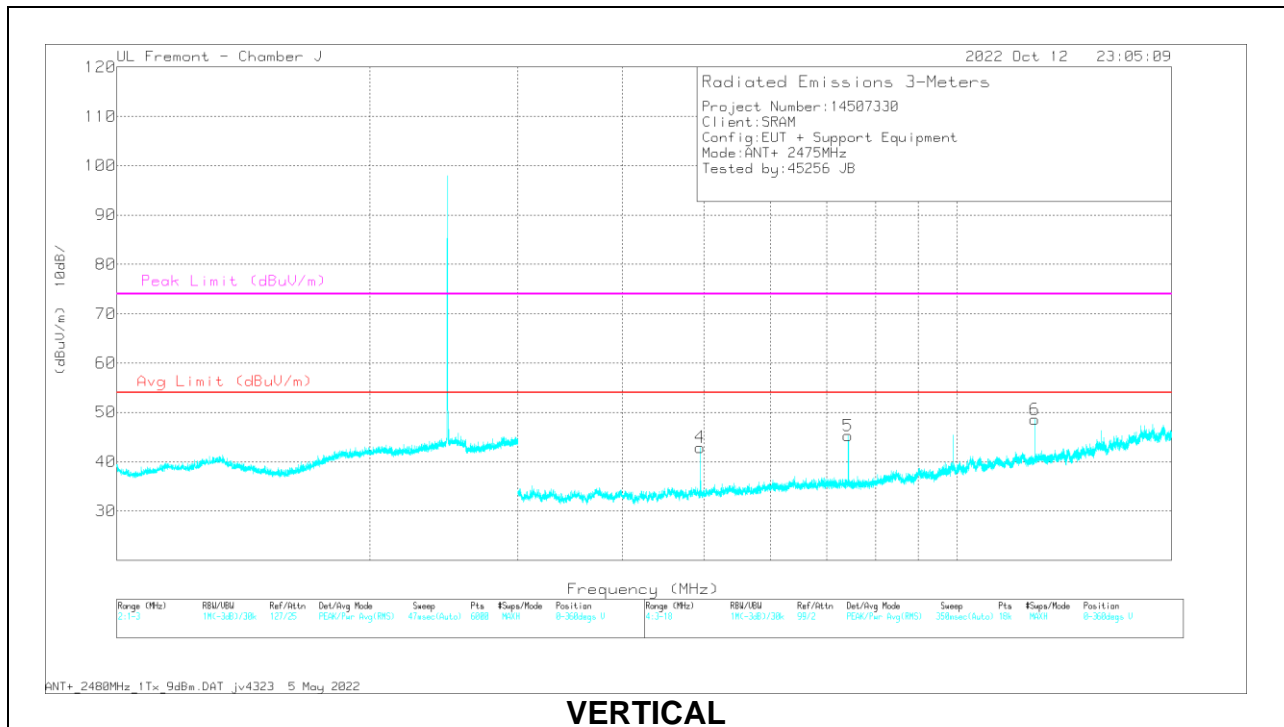
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

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

HIGH CHANNEL RESULTS



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	206805 ACF (dB) - 3mH	Amp/Cbl/Filtr/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
1	* 4950.051	58.92	PK	34.2	-47.1	0	46.02	-	-	74	-27.98	5	185	H
	* 4950.051	58.92	AVG	34.2	-47.1	-13.98	32.04	54	-21.96	-	-	5	185	H
2	* 7424.228	62.39	PK	35.9	-45.8	0	52.49	-	-	74	-21.51	40	179	H
	* 7424.228	62.39	AVG	35.9	-45.8	-13.98	38.51	54	-15.49	-	-	40	179	H
3	* 12373.235	59.68	PK	39	-43.3	0	55.38	-	-	74	-18.62	32	240	H
	* 12373.235	59.68	AVG	39	-43.3	-13.98	41.4	54	-12.6	-	-	32	240	H
4	* 4949.528	61.8	PK	34.2	-47.1	0	48.9	-	-	74	-25.1	35	195	V
	* 4949.528	61.8	AVG	34.2	-47.1	-13.98	34.92	54	-19.08	-	-	35	195	V
5	* 7424.005	62.06	PK	35.9	-45.8	0	52.16	-	-	74	-21.84	235	332	V
	* 7424.005	62.06	AVG	35.9	-45.8	-13.98	38.18	54	-15.82	-	-	235	332	V
6	* 12376.52	57.37	PK	39	-43.1	0	53.27	-	-	74	-20.73	30	221	V
	* 12376.52	57.37	AVG	39	-43.1	-13.98	39.29	54	-14.71	-	-	30	221	V

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

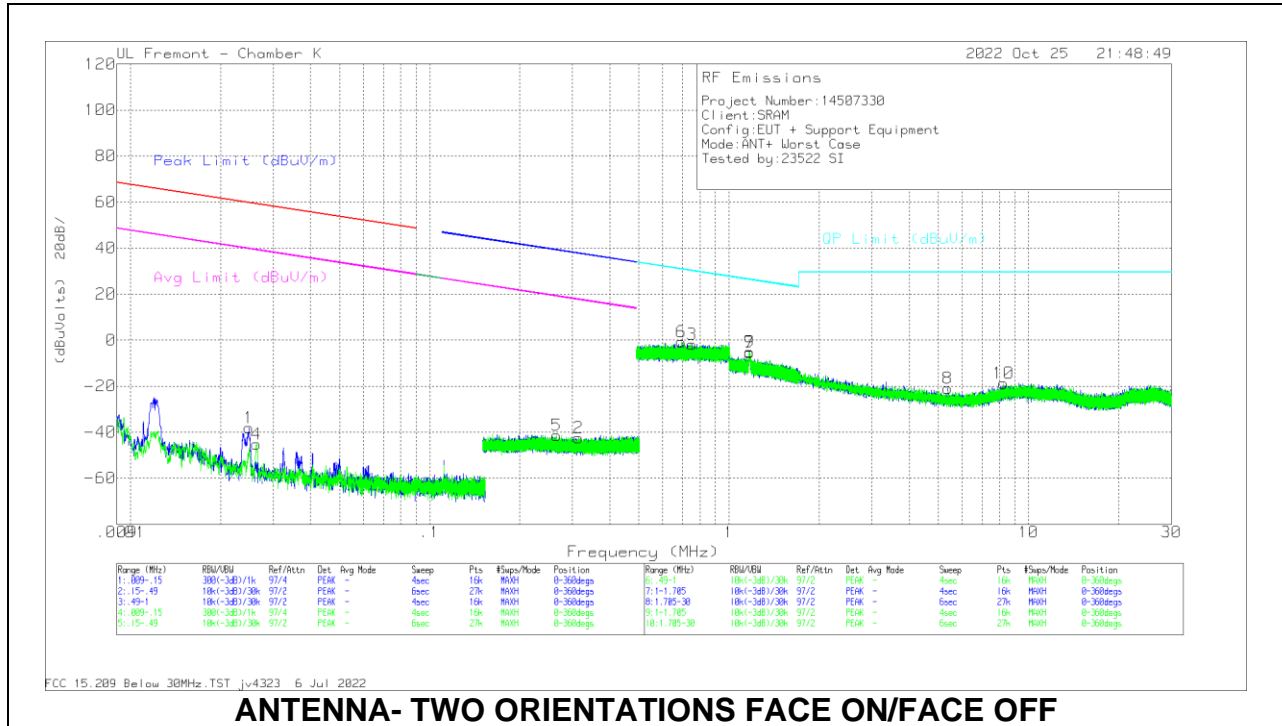
PK - RB=1MHz VB=3 x RB, Peak

AVG = Peak Reading + Duty Cycle Correction Factor

Duty Cycle Correction Factor = -13.98 dB

10.4. WORST CASE BELOW 30 MHz

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



ANTENNA- TWO ORIENTATIONS FACE ON/FACE OFF

Below 30MHz Data

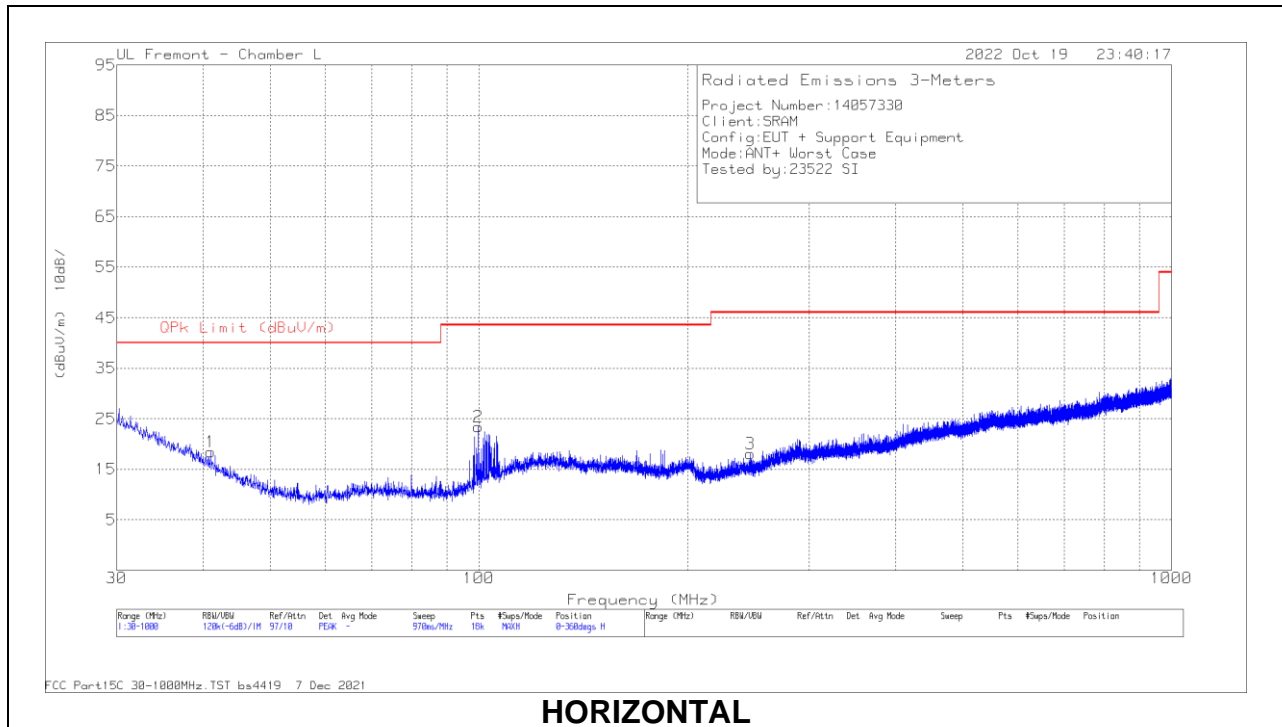
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna E(ACF)	Amp/Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Antenna Polarity (Degs)
1	.0249	15.21	Pk	58.5	-31.9	-80	-38.19	59.66	-97.85	39.66	-77.85	-	-	0-360	0-deg
2	.3135	13.42	Pk	56.2	-32.2	-80	-42.58	37.69	-80.27	17.69	-60.27	-	-	0-360	0-deg
4	.0264	8.43	Pk	58.3	-32	-80	-45.27	59.17	-104.44	39.17	-84.44	-	-	0-360	90-deg
5	.2656	14.52	Pk	56.2	-32.2	-80	-41.48	39.13	-80.61	19.13	-60.61	-	-	0-360	90-deg
3	.7532	14.14	Pk	56.2	-32.1	-40	-1.76	-	-	-	-	30.08	-31.84	0-360	0-deg
6	.6909	15.05	Pk	56.2	-32.1	-40	-.85	-	-	-	-	30.82	-31.67	0-360	90-deg
7	1.1696	20.65	Pk	46	-32.1	-40	-5.45	-	-	-	-	26.26	-31.71	0-360	0-deg
8	5.3636	15.22	Pk	35.7	-31.9	-40	-20.98	-	-	-	-	29.5	-50.48	0-360	0-deg
9	1.1702	20.92	Pk	46	-32.1	-40	-5.18	-	-	-	-	26.26	-31.44	0-360	90-deg
10	8.2288	18.27	Pk	34.7	-31.8	-40	-18.83	-	-	-	-	29.5	-48.33	0-360	90-deg

Pk - Peak detector

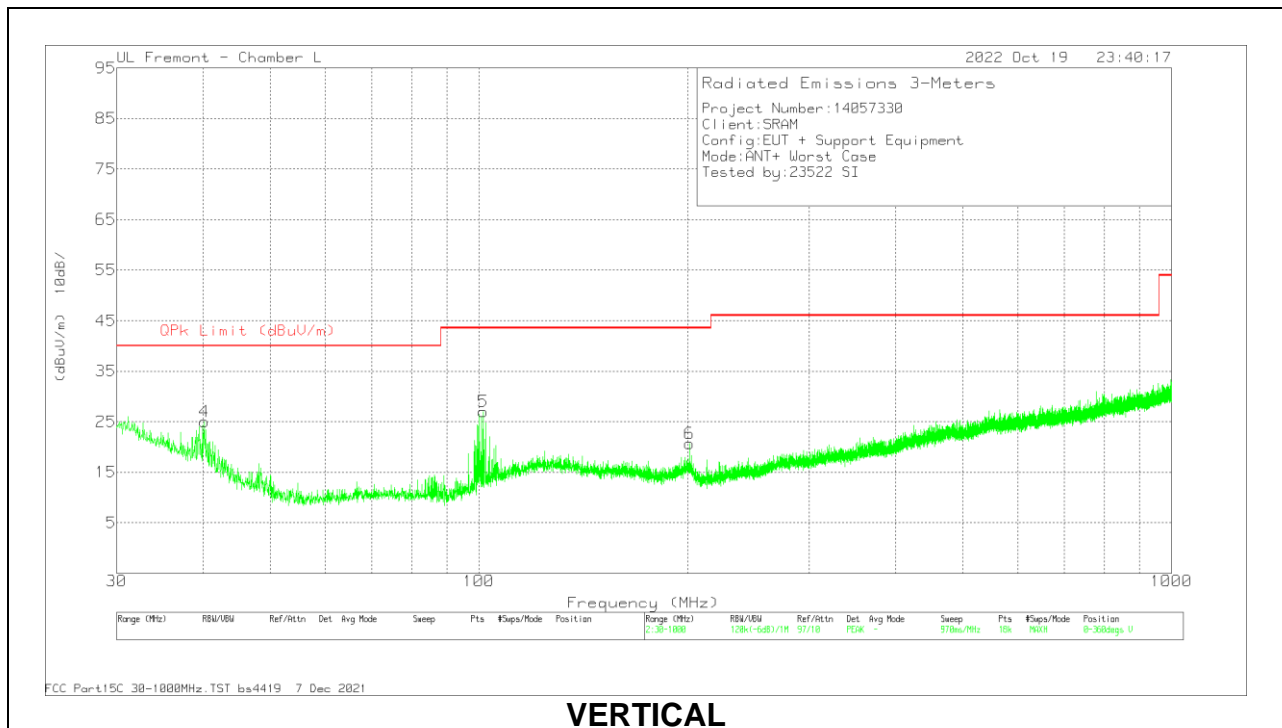
Note: The Limits in CRF 47, Part 15, Subpart C, Paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance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

10.5. WORST CASE BELOW 1 GHz

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



HORIZONTAL



VERTICAL

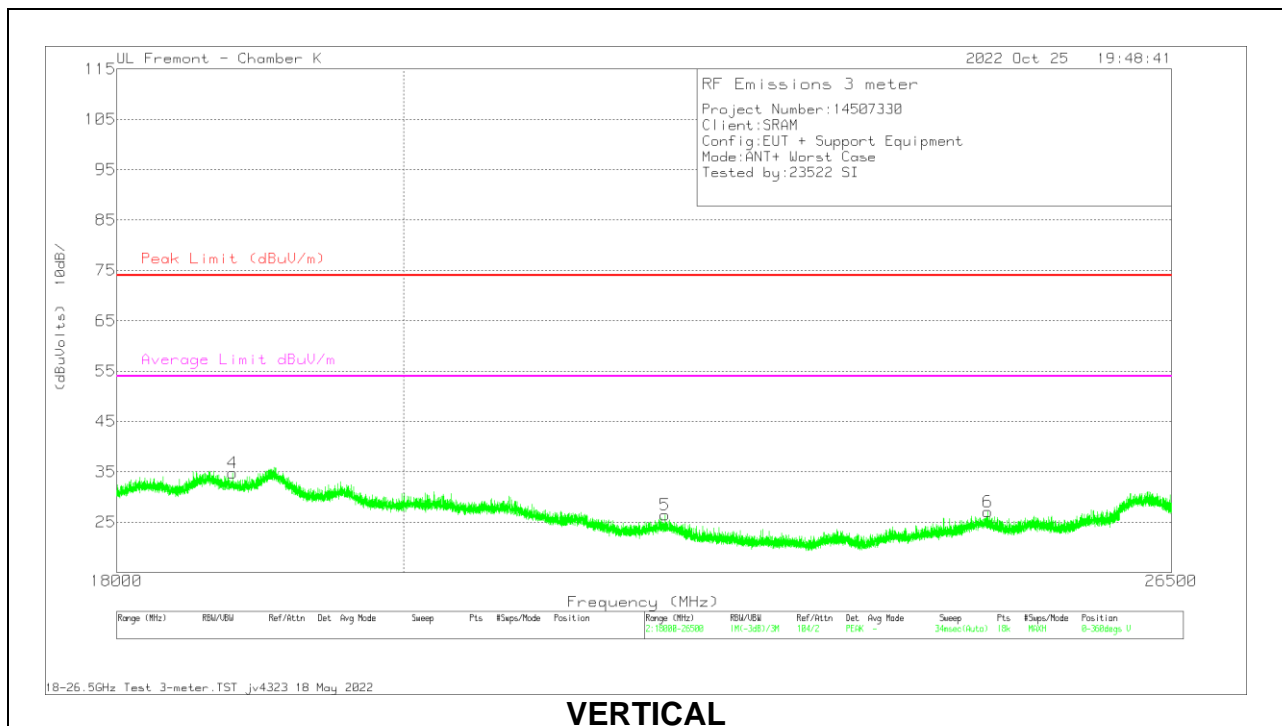
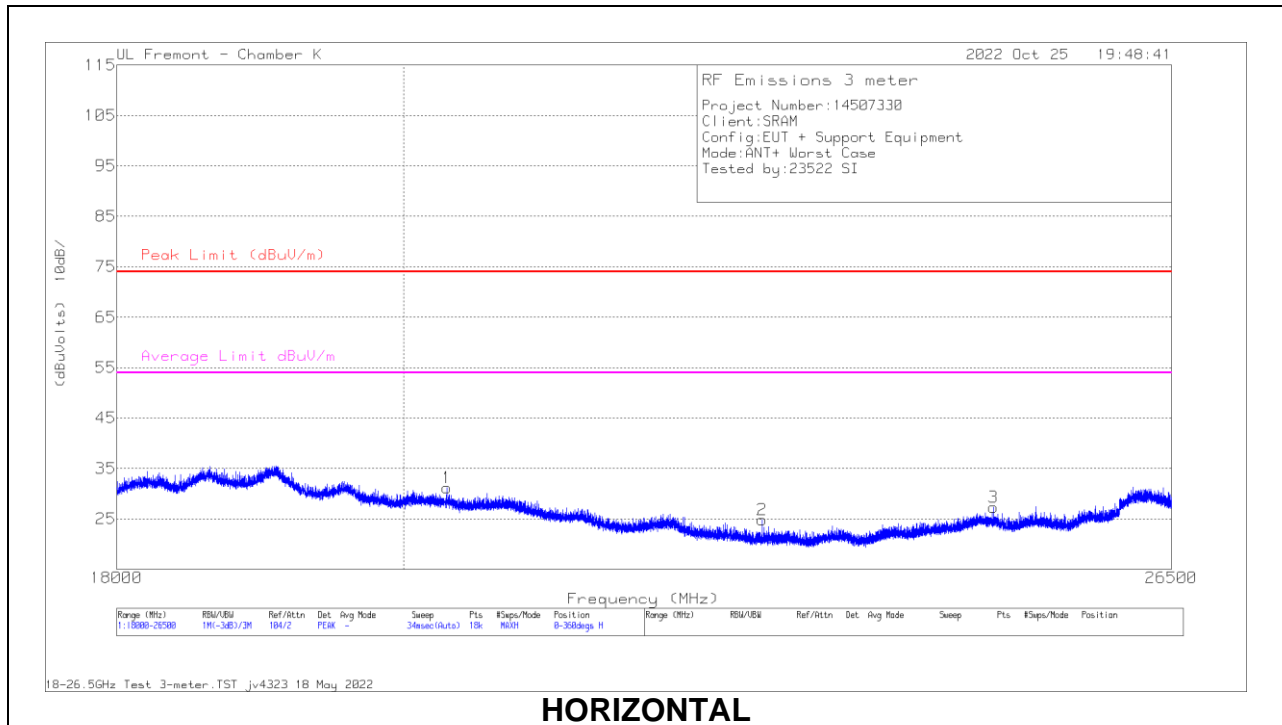
Below 1GHz Data

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	40.9934	29.97	Pk	19.7	-31.2	18.47	40	-21.53	0-360	299	H
2	99.894	37.94	Pk	16.1	-30.7	23.34	43.52	-20.18	0-360	299	H
3	246.742	29.59	Pk	18.3	-29.8	18.09	46.02	-27.93	0-360	199	H
4	40.1738	34.77	Pk	20.3	-31.2	23.87	40	-16.13	93	138	V
	40.1738	26.93	Qp	20.3	-31.2	16.03	40	-23.97	93	138	V
5	101.403	41.13	Pk	16.6	-30.7	27.03	43.52	-16.49	0-360	299	V
6	201.475	31.43	Pk	19.2	-30	20.63	43.52	-22.89	0-360	299	V

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	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	* 20317.193	39.46	Pk	33	-59.9	18.6	31.16	74	-42.84	54	-22.84	0-360	100	H
2	* 22808.164	32.46	Pk	33.6	-60.9	19.7	24.86	74	-49.14	54	-29.14	0-360	100	H
3	24824.08	33.73	Pk	34.2	-61.2	20.6	27.33	74	-46.67	54	-26.67	0-360	200	H
4	* 18781.527	44.93	Pk	32.5	-60.6	17.9	34.73	74	-39.27	54	-19.27	0-360	200	V
5	22009.165	34.64	Pk	33.3	-60.8	19.3	26.44	74	-47.56	54	-27.56	0-360	200	V
6	24775.913	33.53	Pk	34.2	-61.2	20.6	27.13	74	-46.87	54	-26.87	0-360	100	V

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