CERTIFICATION TEST REPORT

Report Number. : 12292087-E3V2

Applicant	:	SRAM LLC 1000 W Fulton Market 4th Floor Chicago, IL 60607 U.S.A.
Model	:	12910
FCC ID	:	C9O-RDB1
IC	:	10161A-RDB1
EUT Description	:	Rear Derailleur with AIREA, BLE and ANT+ Radios
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C ISED RSS-210 ISSUE 9 ISED RSS-GEN ISSUE 5

Date Of Issue:
June 28, 2018

Prepared by:
UL Verification Services Inc.
47173 Benicia Street
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TEL: (510) 771-1000
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NVLAP TESTING

NVLAP Lab code: 200065-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	6/22/2018	Initial Issue	--
V2	6/28/2018	Updated Section 5.3 and 9	Steven Tran

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UL VERIFICATION SERVICES INC.
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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SRAM LLC
1000 W Fulton Market 4th Floor
Chicago, IL 60607 U.S.A.

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

MODEL: 12910

SERIAL NUMBER: 1113010066 (Conducted), 1113010068 (Radiated)

DATE TESTED: May 16, 2018 – June 13, 2018

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Complies
ISED RSS-210 Issue 9	Complies
ISED RSS-GEN Issue 5	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. 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 NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
UL Verification Services Inc. By:

Dan Coronia
CONSUMER TECHNOLOGY DIVISION
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Prepared By:

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UL Verification Services Inc.

2. 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, RSS-GEN Issue 5, and RSS-210 Issue 9.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☒ Chamber A (ISED:2324B-1)	☐ Chamber D (ISED:22541-1)
☒ Chamber B (ISED:2324B-2)	☐ Chamber E (ISED:22541-2)
☐ Chamber C (ISED:2324B-3)	☐ Chamber F (ISED:22541-3)
	☐ Chamber G (ISED:22541-4)
	☐ Chamber H (ISED:22541-5)

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through C are covered under ISED company address code 2324B with site numbers 2324B -1 through 2324B-3, respectively. Chambers D through H are covered under ISED company address code 22541 with site numbers 22541 -1 through 22541-5, respectively.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://nist.gov/standards/scopes/2000650.htm.

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4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

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

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 dB

Uncertainty figures are valid to a confidence level of 95%.

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5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT is a Rear Derailleur with AIREA, BLE and ANT+ Radios, powered by 7.4v, 2.2wh Li-Ion battery.

5.2. MAXIMUM FUNDAMENTAL FIELD STRENGTH

The transmitter has a maximum peak fundamental field strength as follows:

Frequency Range (MHz)	Mode	Peak E-field Strength (dBuV/m)	Avg E-field Strength (dBuV/m)	Distance (m)
2405 - 2475	ANT +	91.10	90.65	3.00

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a chip antenna Johanson Technology, 2450AT42B100E, with a maximum gain of 0 dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was A-1.0.

The test utility software used during testing was Lightblue v2.6.4

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

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List			
Description	**Manufacturer**	**Model**	**Serial Number**
Ipod Touch	Apple	MKJ02LL/A	CCQVRHY2GGNL

TEST SETUP

The EUT is powered by 7.4v Li-Ion battery. The iPod Touch wirelessly sends commands to the EUT.

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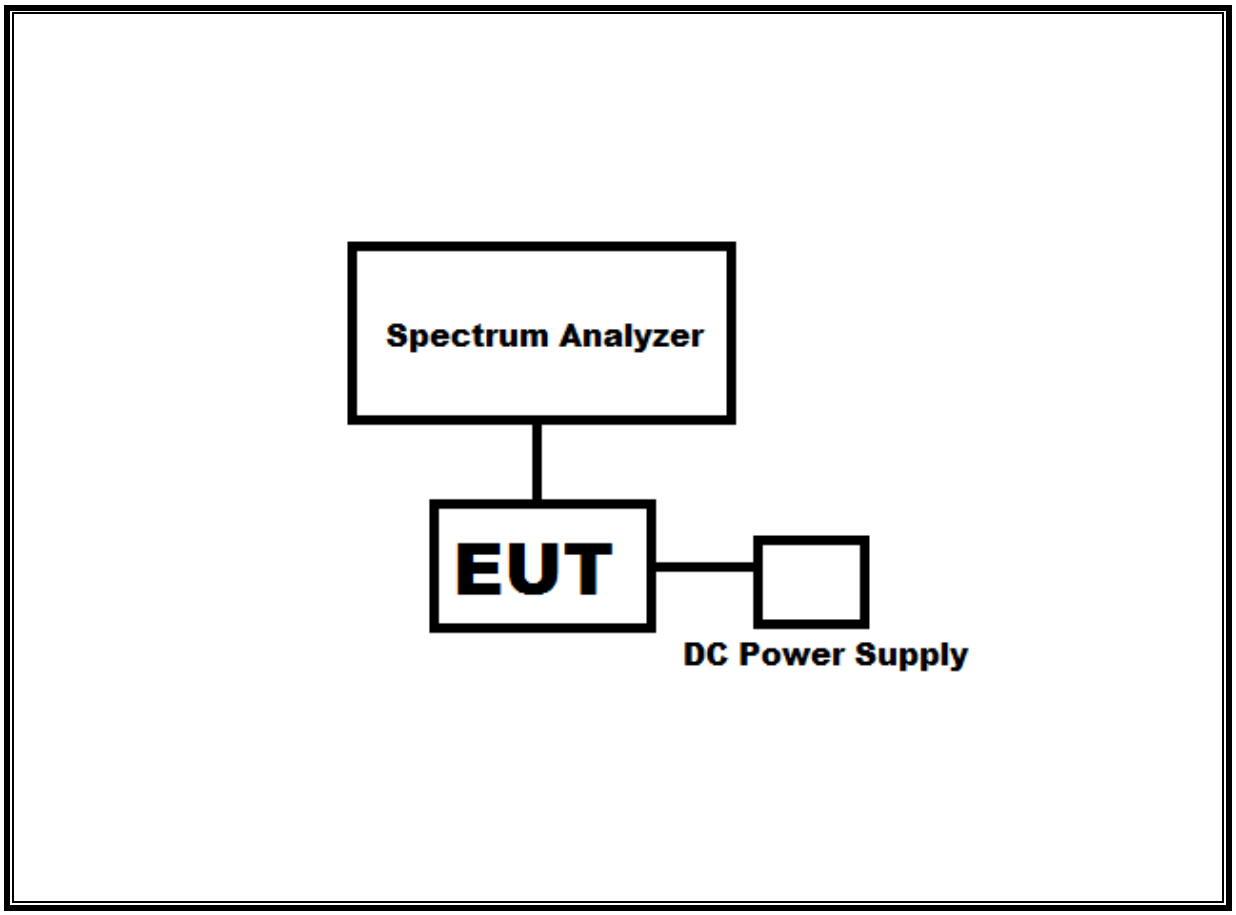
SETUP DIAGRAM FOR CONDUCTED TESTS



*Note – The DC power supply is used only during testing. During normal operation the EUT is powered by a supplied battery pack

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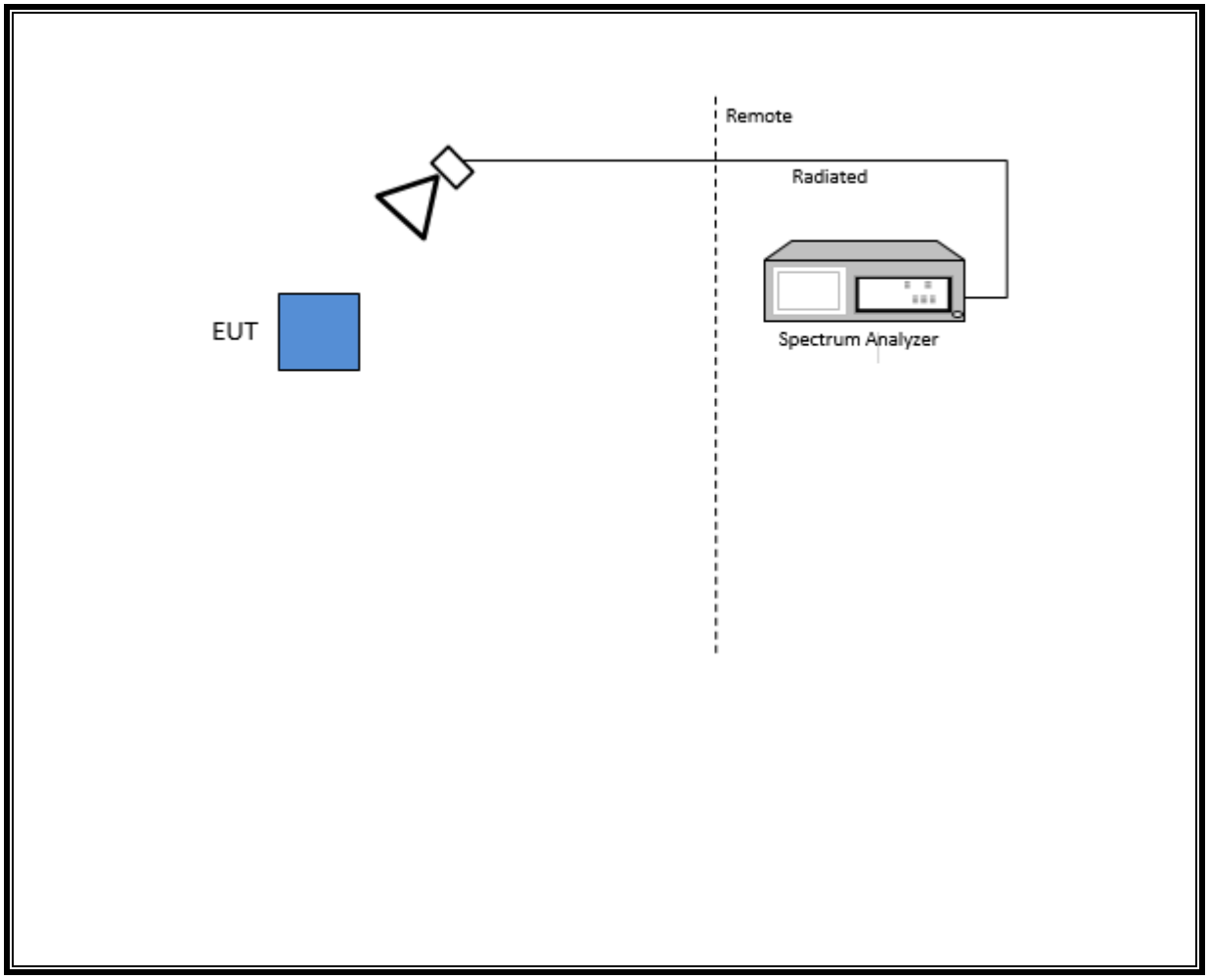
SETUP DIAGRAM FOR RADIATED TESTS



6. 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 No.**	**Cal Date**	**Cal Due**
Spectrum Analyzer	Agilent	N9030A	T1210	07/17/17	07/17/18
Spectrum Analyzer	Agilent	N9030A	T1466	04/16/18	04/16/19
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB1	T130	10/16/17	10/16/18
Antenna, Horn, 1-18GHz	ETS Lindgren	3117	T862	05/24/18	05/24/19
RF Preamplifier, 10kHz - 1GHz	HP	8447D	T15	08/14/17	08/14/18
RF Preamplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	T1165	11/25/17	11/25/18
RF Preamplifier, 1-8GHz	Miteq	AMF-4D-01000800-30-29P	T1573	11/25/17	11/25/18
High Pass Filter 3GHz	Micro-Tronics	HPM17543	T486	11/25/17	11/25/18
Antenna, Active Loop 9kHz – 30MHz	Com-Power	AL-130R	T1866	10/10/17	10/10/18
Antenna, Horn, 18-26GHz	ARA	MWH-1826G	T89	01/18/18	01/18/19
Spectrum Analyzer	Keysight	N9030A	T1113	12/21/17	12/21/18
RF Preamplifier, 1-26GHz	Agilent	8449B	T404	07/23/17	07/23/18
RF Power Meter	Agilent	N1911A	T229	08/14/17	08/14/18
RF Power Sensor	Agilent	N1921A	T1225	04/10/18	04/10/19

Test Software List			
Description	**Manufacturer**	**Model**	**Version**
Radiated Software	UL	UL EMC	Rev 9.5, Dec 01, 2016
Antenna Port Software	UL	UL RF	Ver 8.3, May 31, 2018

7. MEASUREMENT METHODS

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

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8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

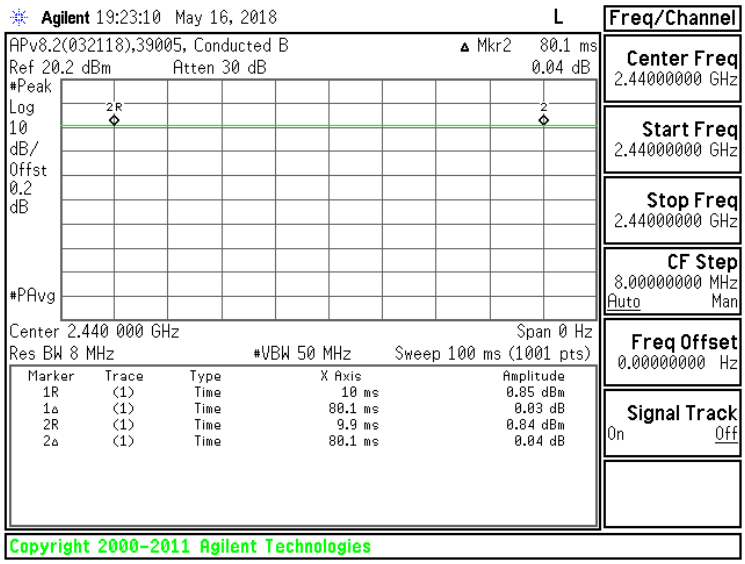
PROCEDURE

KDB 789033 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/T Minimum VBW (kHz)
ANT+	1.00	1.00	1.000	100.0%	0.00	0.010

DUTY CYCLE PLOTS



ANT+

8.2. 99% BANDWIDTH

LIMITS

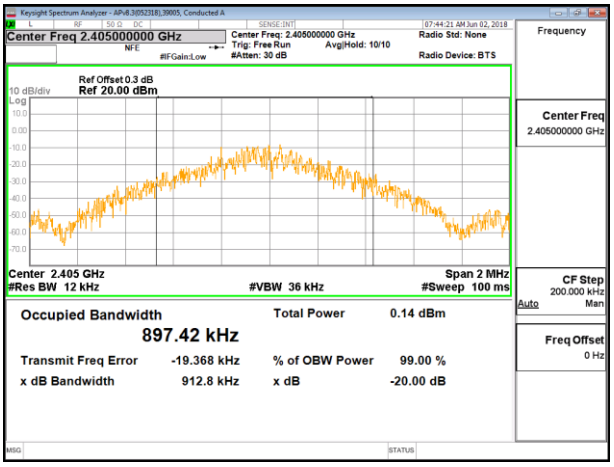
None; for reporting purposes only.

TEST PROCEDURE

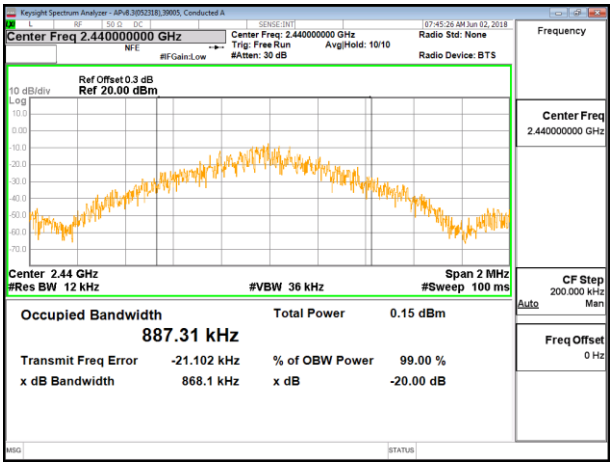
The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

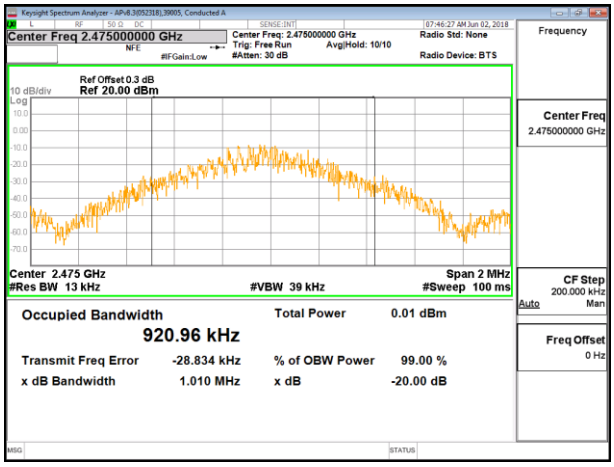
Channel	Frequency (MHz)	99% Bandwidth (KHz)
Low	2405	897.42
Mid	2440	887.31
High	2475	920.96



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

8.3. 20dB BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

Test table results for FCC Rule Part15.215(c): Compliant.

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Frequency Edge (MHz)	Limit (MHz)	Margin (MHz)
Low	2405	0.9128	2404.5436	2400	-4.54
Mid	2440	0.8681	N/A	N/A	N/A
High	2475	1.0100	2475.5050	2483.5	-7.99

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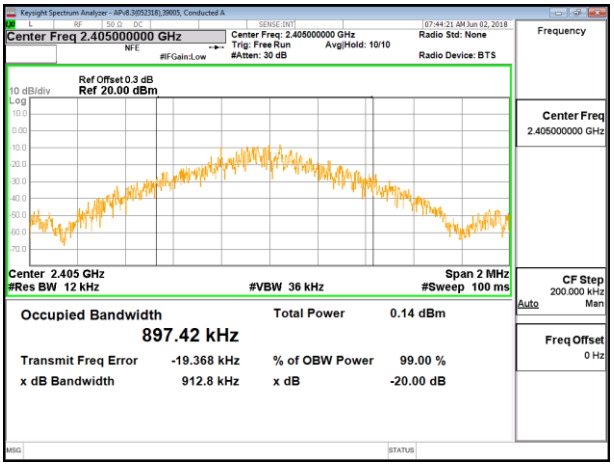
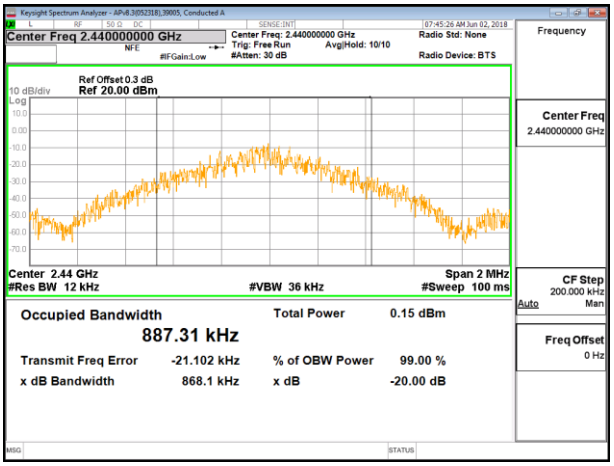
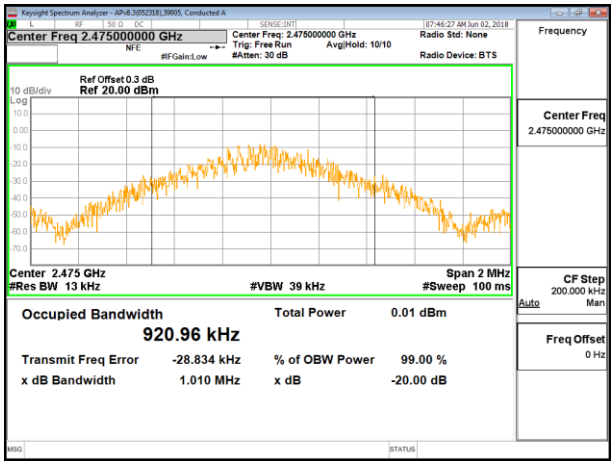


LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

9. RADIATED TEST RESULTS

LIMITS

FCC 15.249
FCC §15.205 and §15.209

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 (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100 **	3
88–216	150 **	3
216–960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 MHz, 76–88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

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 measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T (10 Hz) video bandwidth with peak detector 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.

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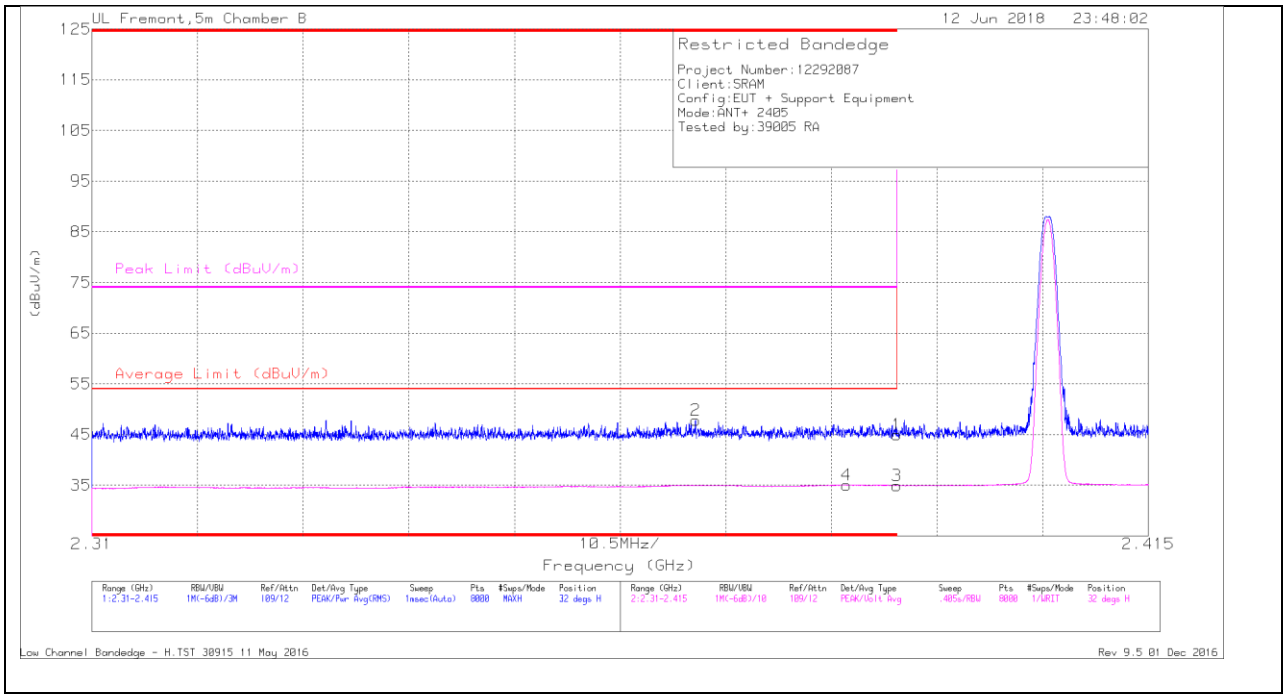
9.1. TRANSMITTER ABOVE 1 GHz

BANDEDGE (LOW CHANNEL)

HORIZONTAL RESULT

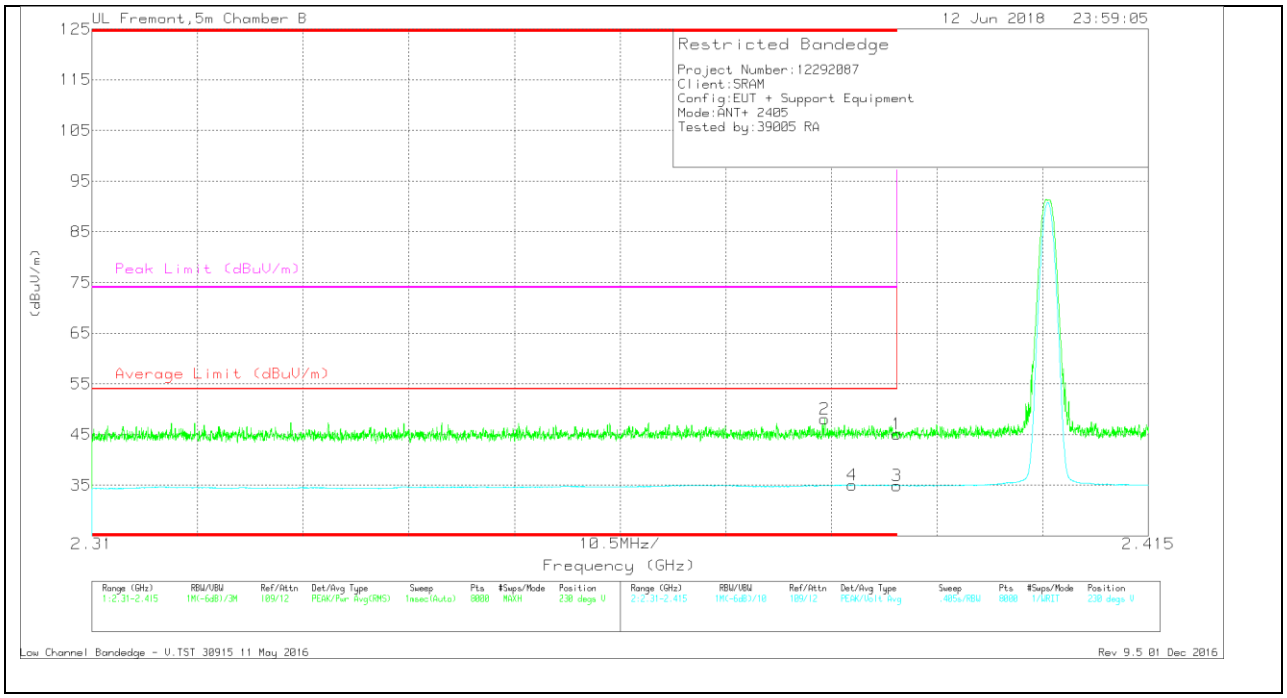


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/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	34.68	Pk	31.8	-21.5	44.98	-	-	74	-29.02	32	349	H
2	* 2.37	37.46	Pk	31.7	-21.3	47.86	-	-	74	-26.14	32	349	H
3	* 2.39	24.61	VA1T	31.8	-21.5	34.91	54	-19.09	-	-	32	349	H
4	* 2.385	24.66	VA1T	31.8	-21.4	35.06	54	-18.94	-	-	32	349	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

VERTICAL RESULT



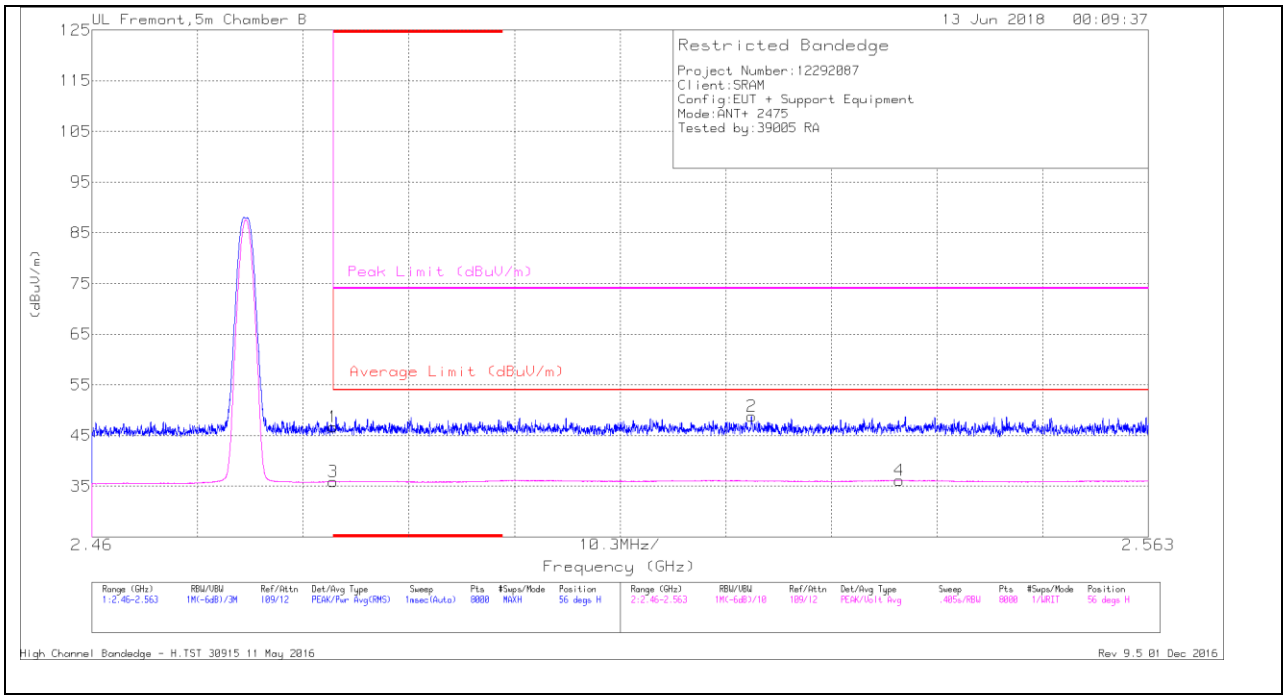
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 2.383	37.82	Pk	31.7	-21.5	48.02	-	-	74	-25.98	230	272	V
4	* 2.386	24.63	VA1T	31.8	-21.4	35.03	54	-18.97	-	-	230	272	V
1	* 2.39	34.76	Pk	31.8	-21.5	45.06	-	-	74	-28.94	230	272	V
3	* 2.39	24.58	VA1T	31.8	-21.5	34.88	54	-19.12	-	-	230	272	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

BANDEDGE (HIGH CHANNEL)

HORIZONTAL RESULT

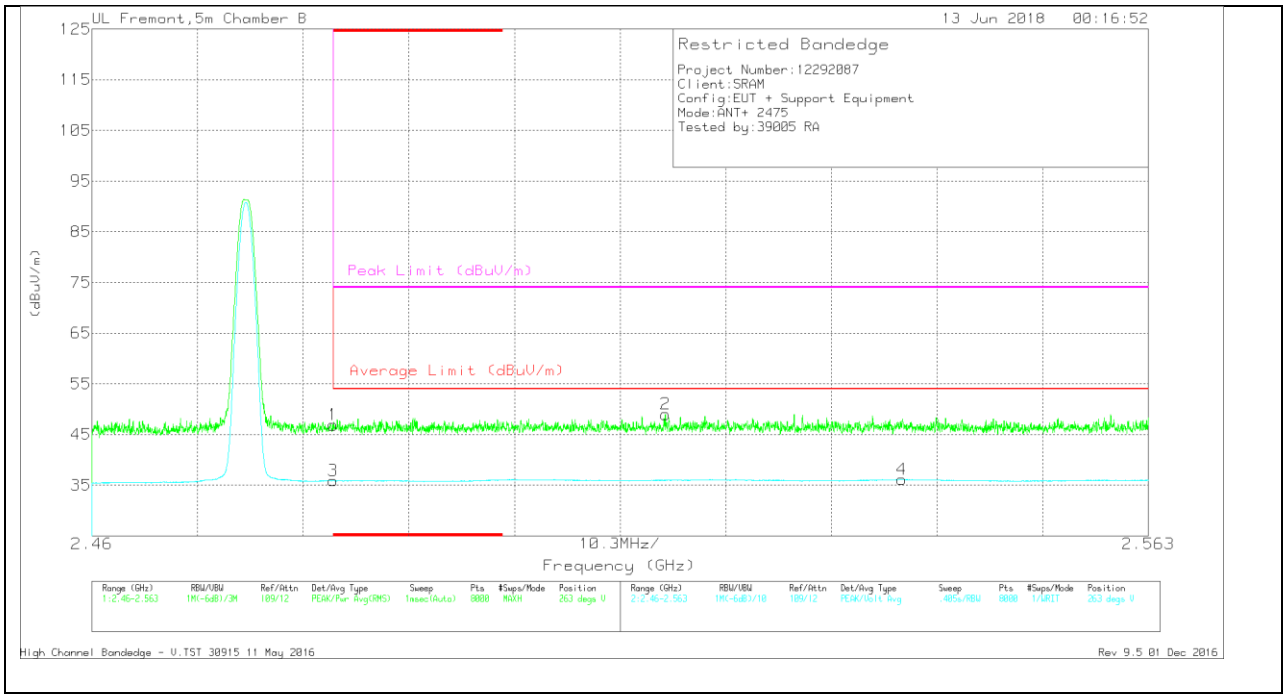


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/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	* 2.484	35.84	Pk	32.4	-21.5	46.74	-	-	74	-27.26	56	204	H
3	* 2.484	24.98	VA1T	32.4	-21.5	35.88	54	-18.12	-	-	56	204	H
2	2.524	37.82	Pk	32.4	-21.4	48.82	-	-	74	-25.18	56	204	H
4	2.539	25.09	VA1T	32.3	-21.2	36.19	54	-17.81	-	-	56	204	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

VERTICAL RESULT



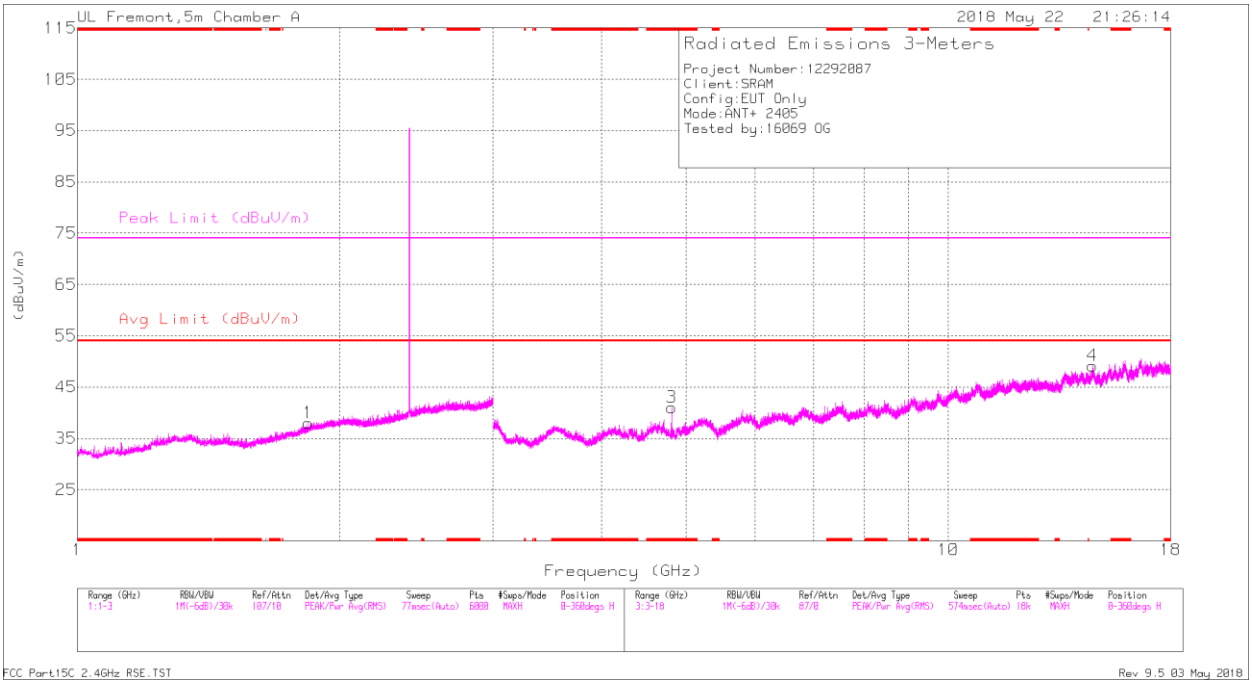
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/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	* 2.484	35.98	Pk	32.4	-21.5	46.88	-	-	74	-27.12	263	260	V
3	* 2.484	24.96	VA1T	32.4	-21.5	35.86	54	-18.14	-	-	263	260	V
2	2.516	37.89	Pk	32.4	-21.3	48.99	-	-	74	-25.01	263	260	V
4	2.539	25.07	VA1T	32.3	-21.2	36.17	54	-17.83	-	-	263	260	V

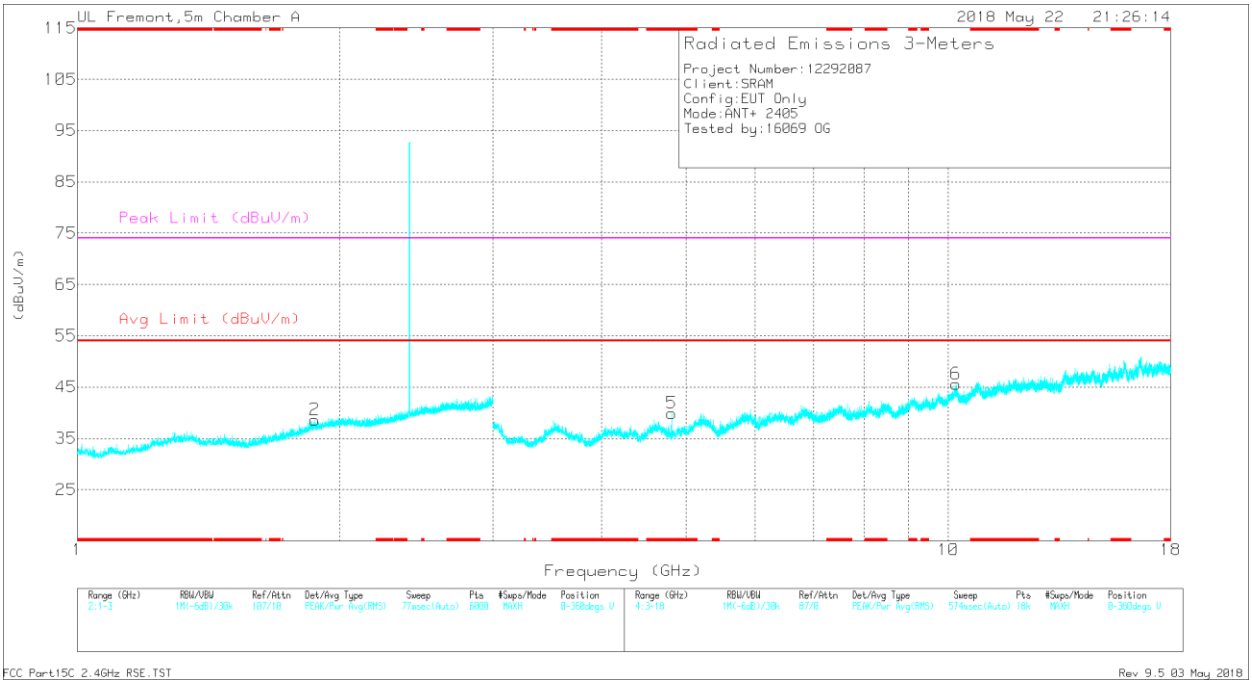
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL RESULTS



HORIZTONAL



VERTICAL

Radiated Emissions

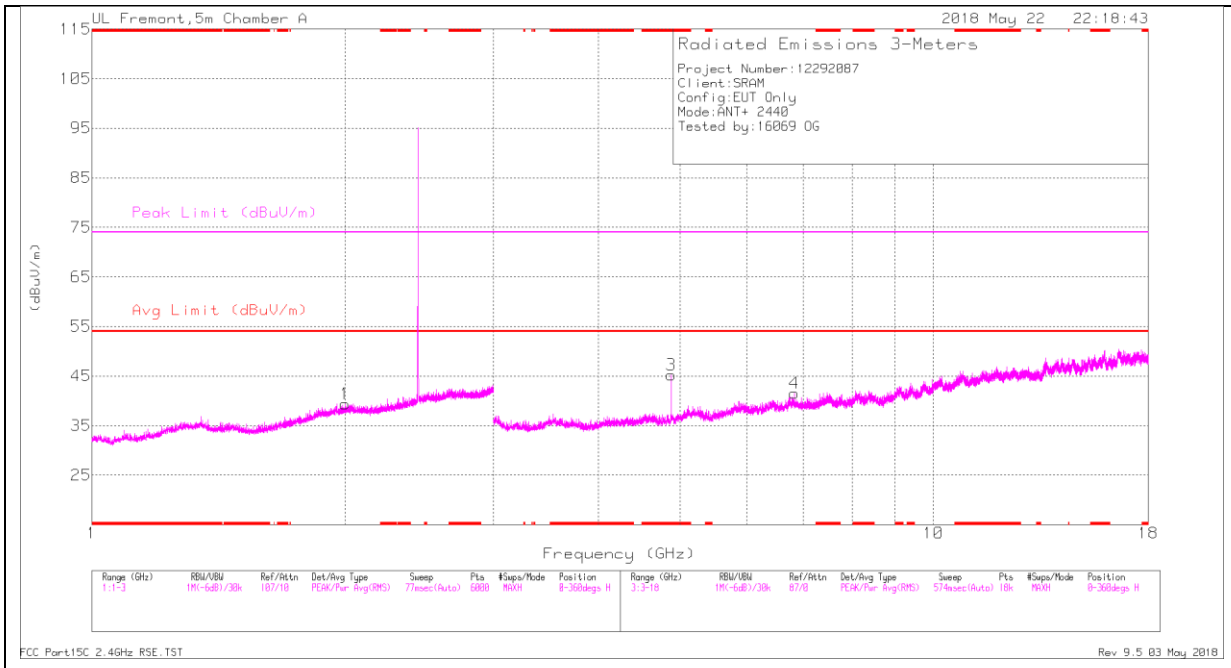
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 4.811	39.46	PKFH	34.2	-27.2	0	46.46	-	-	74	-27.54	292	136	H
	* 4.81	31.54	VA1T	34.2	-27.2	0	38.54	54	-15.46	-	-	292	136	H
5	* 4.81	40.06	PKFH	34.2	-27.2	0	47.06	-	-	74	-26.94	210	244	V
	* 4.81	29.42	VA1T	34.2	-27.2	0	36.42	54	-17.58	-	-	210	244	V
1	1.84	34.03	PKFH	30.8	-23.3	0	41.53	-	-	74	-32.47	184	198	H
	1.842	22.08	VA1T	30.8	-23.3	0	29.58	54	-24.42	-	-	184	198	H
2	1.869	22.06	VA1T	31	-23.3	0	29.76	54	-24.24	-	-	184	198	V
	1.873	34.72	PKFH	31	-23.3	0	42.42	-	-	74	-31.58	184	198	V
6	10.2	33.9	PKFH	37.4	-19.2	0	52.1	-	-	74	-21.9	210	201	V
	10.201	21.46	VA1T	37.4	-19.2	0	39.66	54	-14.34	-	-	210	201	V
4	14.645	32.36	PKFH	39.8	-17.8	0	54.36	-	-	74	-19.64	292	198	H
	14.648	19.99	VA1T	39.8	-17.7	0	42.09	54	-11.91	-	-	292	198	H

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

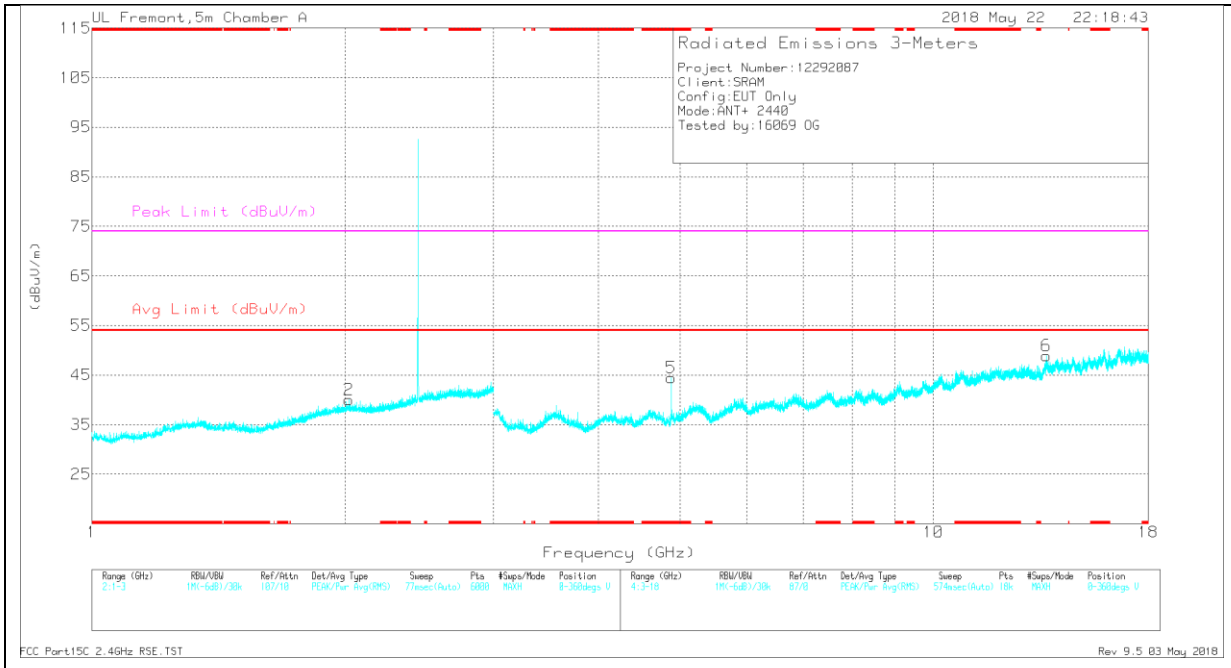
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

MID CHANNEL RESULTS



HORIZTONAL



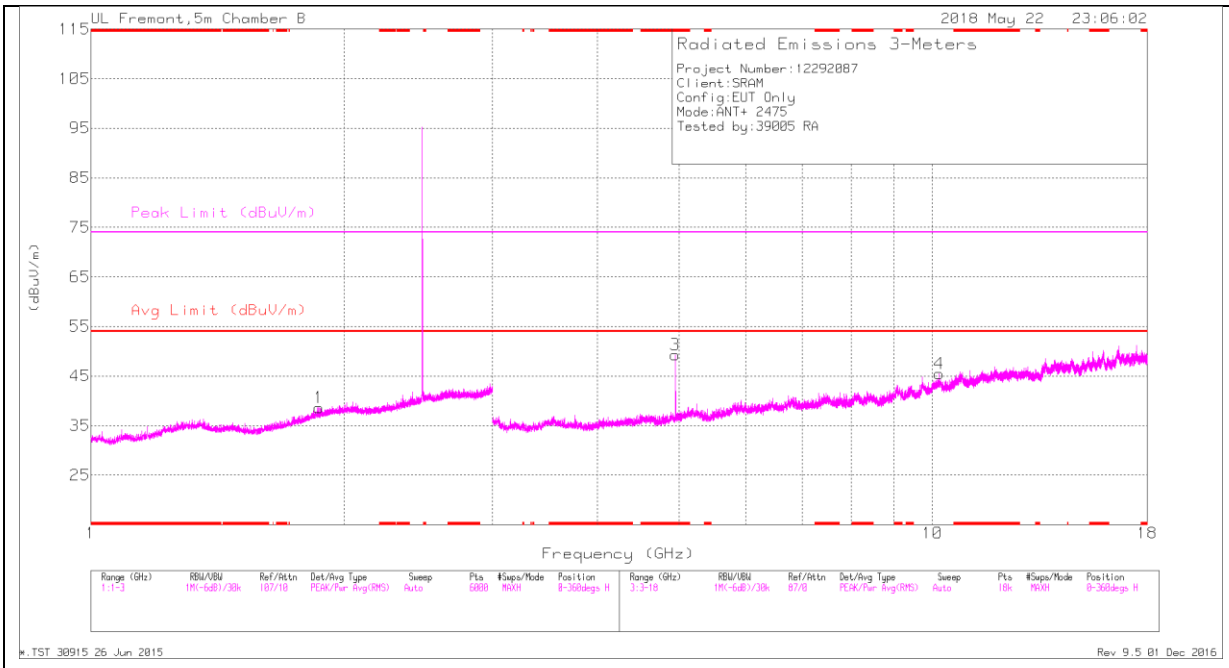
VERTICAL

Radiated Emissions

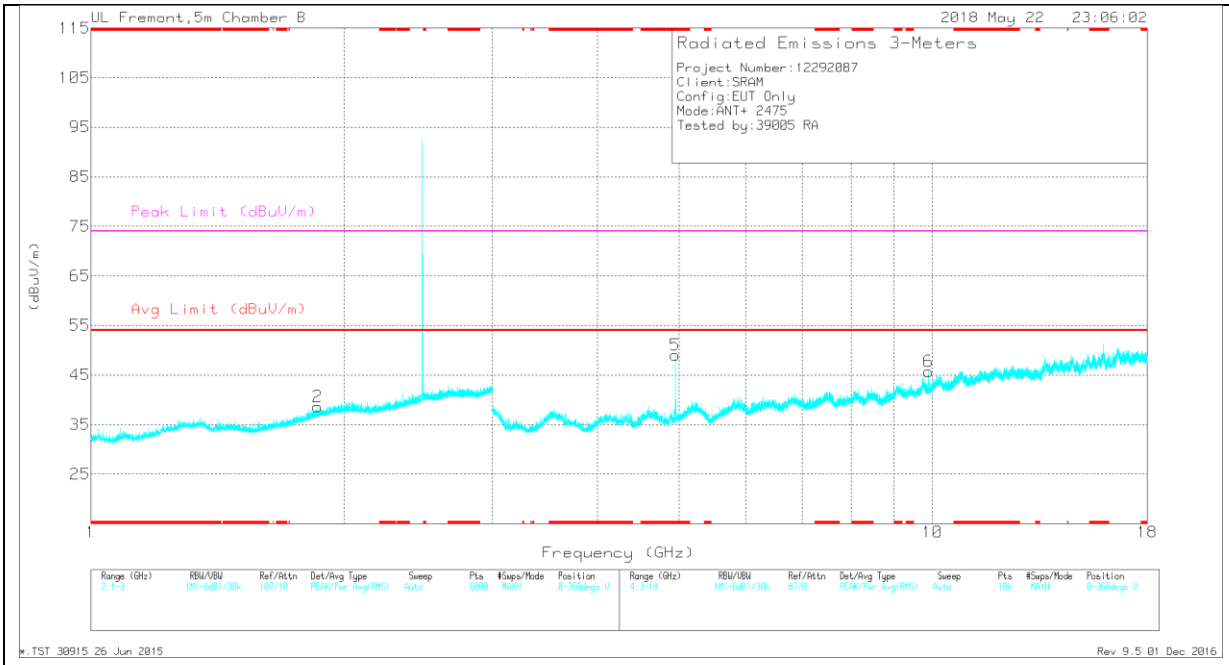
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 4.88	43.94	PKFH	34.1	-26.7	0	51.34	-	-	74	-22.66	298	134	H
	* 4.88	38.49	VA1T	34.1	-26.7	0	45.89	54	-8.11	-	-	298	134	H
5	* 4.88	41.96	PKFH	34.1	-26.7	0	49.36	-	-	74	-24.64	184	117	V
	* 4.88	33.85	VA1T	34.1	-26.7	0	41.25	54	-12.75	-	-	184	117	V
1	1.997	22.25	VA1T	31.4	-23.3	0	30.35	54	-26.65	-	-	169	199	H
	1.999	34.76	PKFH	31.4	-23.3	0	42.86	-	-	74	-31.14	169	199	H
2	2.021	22.25	VA1T	31.4	-23.3	0	30.35	54	-26.65	-	-	169	199	V
	2.022	33.98	PKFH	31.4	-23.3	0	42.08	-	-	74	-31.92	169	199	V
4	6.837	36.24	PKFH	35.5	-22.5	0	49.24	-	-	74	-24.76	298	199	H
	6.839	24.55	VA1T	35.5	-22.5	0	37.55	54	-16.45	-	-	298	199	H
6	13.612	20.99	VA1T	39.2	-18.1	0	42.09	54	-11.91	-	-	184	103	V
	13.613	32.97	PKFH	39.2	-18.1	0	54.07	-	-	74	-19.93	184	103	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

HIGH CHANNEL RESULTS



HORIZTONAL



VERTICAL

Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	* 4.95	47.14	PKFH	34.2	-27.3	54.04	-	-	74	-19.96	293	132	H
	* 4.95	42.98	VA1T	34.2	-27.3	49.88	54	-4.12	-	-	293	132	H
5	* 4.95	42.8	PKFH	34.2	-27.3	49.7	-	-	74	-24.3	168	103	V
	* 4.95	36.79	VA1T	34.2	-27.3	43.69	54	-10.31	-	-	168	103	V
2	1.859	22.17	VA1T	30.9	-23.3	29.77	54	-24.23	-	-	47	110	V
	1.863	33.66	PKFH	30.9	-23.3	41.26	-	-	74	-32.74	47	110	V
1	1.866	34.14	PKFH	30.9	-23.3	41.74	-	-	74	-32.26	44	199	H
	1.866	22.08	VA1T	30.9	-23.3	29.68	54	-24.32	-	-	44	199	H
6	9.9	33.56	PKFH	37.2	-20.7	50.06	-	-	74	-23.94	169	129	V
	9.9	21.95	VA1T	37.2	-20.7	38.45	54	-15.55	-	-	169	129	V
4	10.18	21.47	VA1T	37.4	-19.1	39.77	54	-14.23	-	-	293	179	H
	10.181	33.45	PKFH	37.4	-19.1	51.75	-	-	74	-22.25	293	179	H

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

PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

9.2. FUNDAMENTAL FREQUENCY RADIATED EMISSION

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/Pad (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	80.05	PKFH	31.9	-23.4	88.55	-	-	114	-25.45	198	242	H
	79.56	VA1T	31.9	-23.4	88.06	94	-5.94	-	-	198	242	H
	82.60	PKFH	31.9	-23.4	91.1	-	-	114	-22.9	51	257	V
	82.15	VA1T	31.9	-23.4	90.65	94	-3.35	-	-	51	257	V
2.44	77.30	PKFH	32.1	-23.3	86.1	-	-	114	-27.9	197	190	H
	76.85	VA1T	32.1	-23.3	85.65	94	-8.35	-	-	197	190	H
	80.3	PKFH	32.1	-23.3	89.1	-	-	114	-24.9	56	247	V
	79.75	VA1T	32.1	-23.3	88.55	94	-5.45	-	-	56	247	V
2.475	76.21	PKFH	32.3	-23.3	85.21	-	-	114	-28.79	158	115	H
	75.62	VA1T	32.3	-23.3	84.62	94	-9.38	-	-	158	115	H
	80.54	PKFH	32.3	-23.3	89.54	-	-	114	-24.46	54	194	V
	80.00	VA1T	32.3	-23.3	89.00	94	-5	-	-	54	194	V

PKFH - FHSS: RB=100k/1MHz VB=3 x RB, Peak
VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

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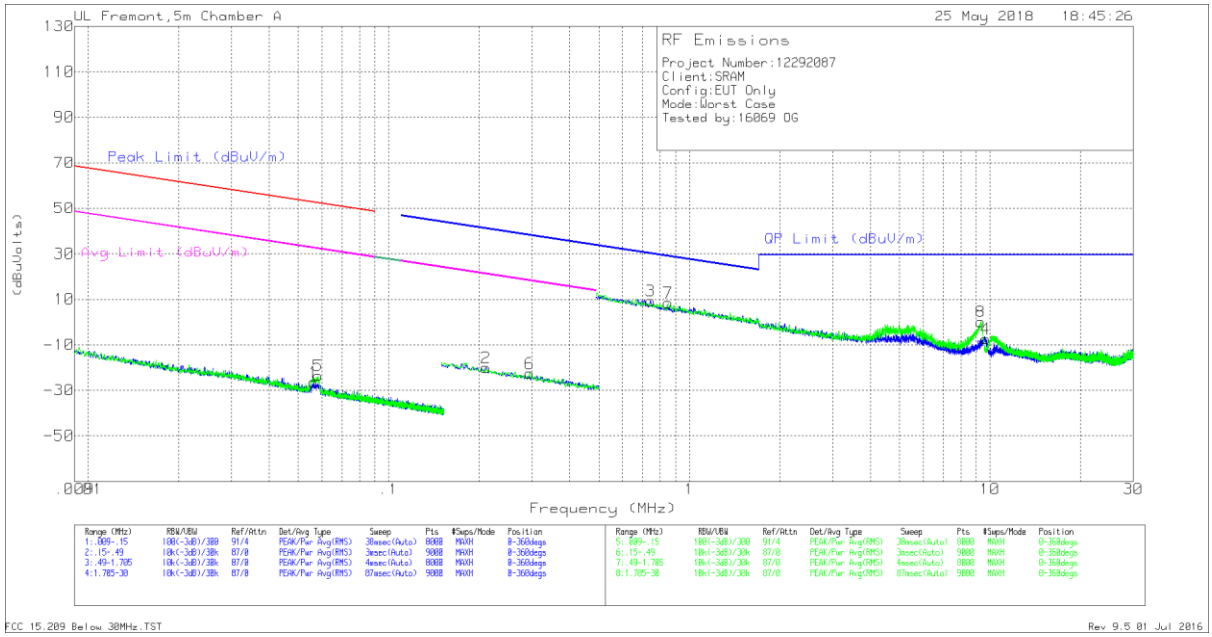
9.3. WORSE CASE BELOW 30MHz

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)

FACE ON AND FACE OFF PLOTS



NOTE: KDB 414788 OATS and Chamber Correlation Justification

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

Below 30MHz DATA

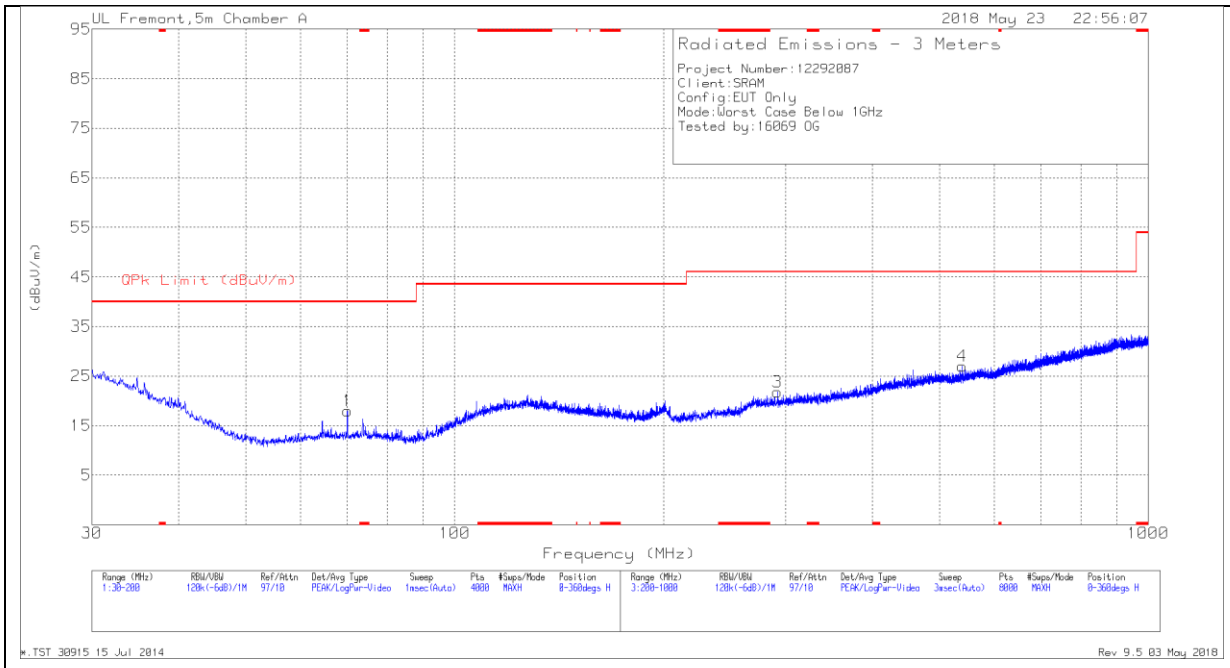
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.05624	39.01	Pk	14.4	.1	-80	-26.49	52.58	-79.07	0-360
5	.05821	41.84	Pk	14.5	.1	-80	-23.56	52.28	-75.84	0-360
2	.21056	45.92	Pk	13.9	.1	-80	-20.08	41.15	-61.23	0-360
6	.29426	43.52	Pk	13.8	.1	-80	-22.58	38.24	-60.82	0-360

Pk - Peak detector

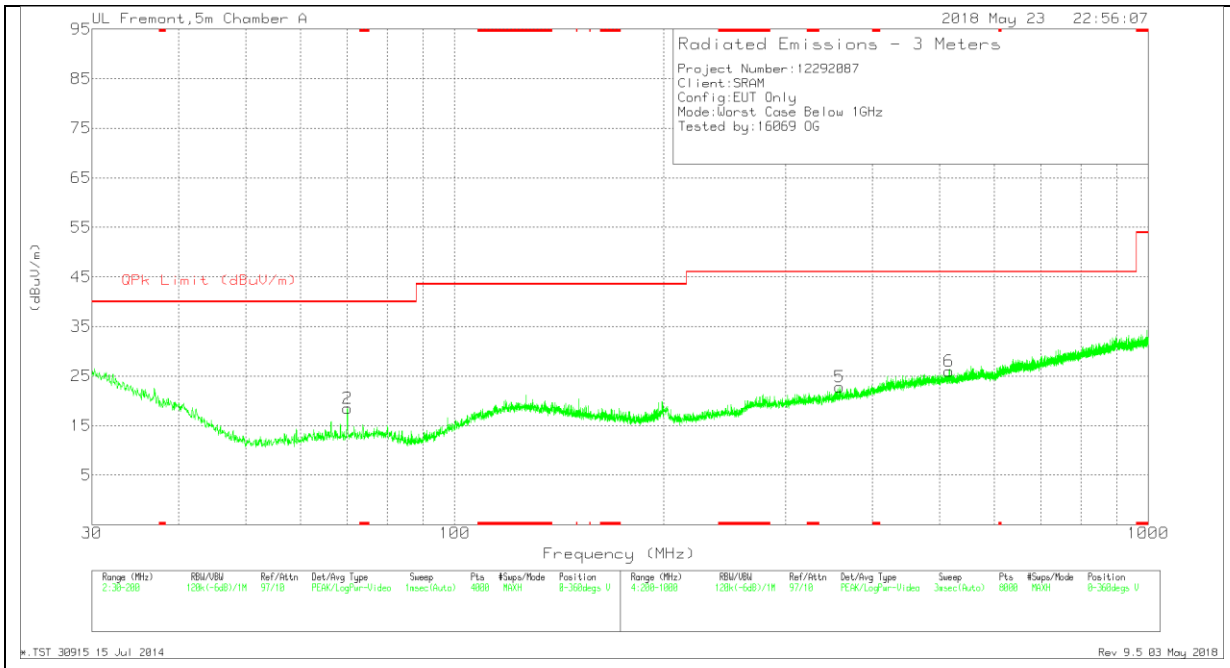
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 30m	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	.74251	35.27	Pk	14	.1	-40	9.37	30.2	-20.83	0-360
7	.85051	34.17	Pk	14.1	.1	-40	8.37	29.02	-20.65	0-360
8	9.3271	25.2	Pk	14.5	.5	-40	.2	29.5	-29.3	0-360
4	9.68971	17.57	Pk	14.6	.4	-40	-7.43	29.5	-36.93	0-360

Pk - Peak detector

9.4. WORST CASE BELOW 1GHz



HORIZTONAL



VERTICAL

Below 1GHz Data

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T130 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	70.0454	32.58	Pk	12.1	-26.7	17.98	40	-22.02	0-360	100	H
2	70.0454	33.13	Pk	12.1	-26.7	18.53	40	-21.47	0-360	100	V
3	292.212	29.2	Pk	17.2	-24.6	21.8	46.02	-24.22	0-360	100	H
5	359.2207	29	Pk	18.6	-24.8	22.8	46.02	-23.22	0-360	100	V
6	516.5411	29.52	Pk	21.7	-25.2	26.02	46.02	-20	0-360	300	V
4	539.3441	30.32	Pk	22	-25.3	27.02	46.02	-19	0-360	300	H

Pk - Peak detector

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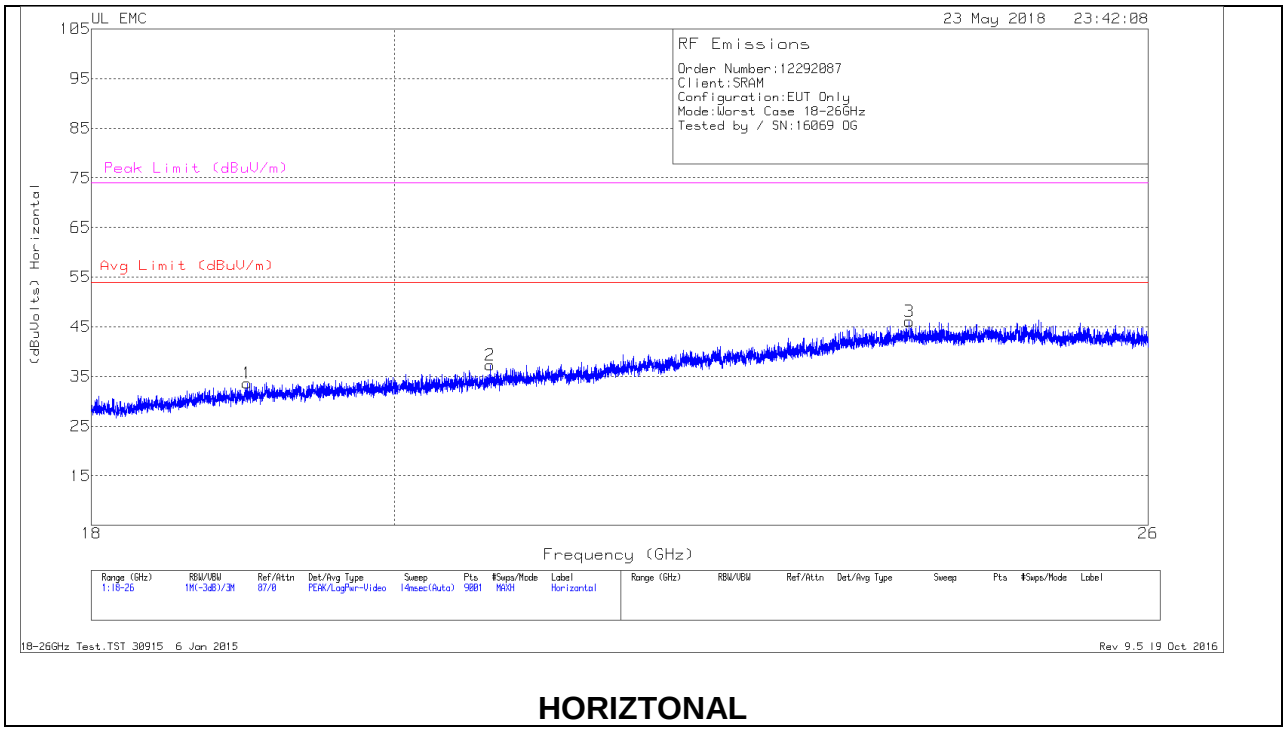
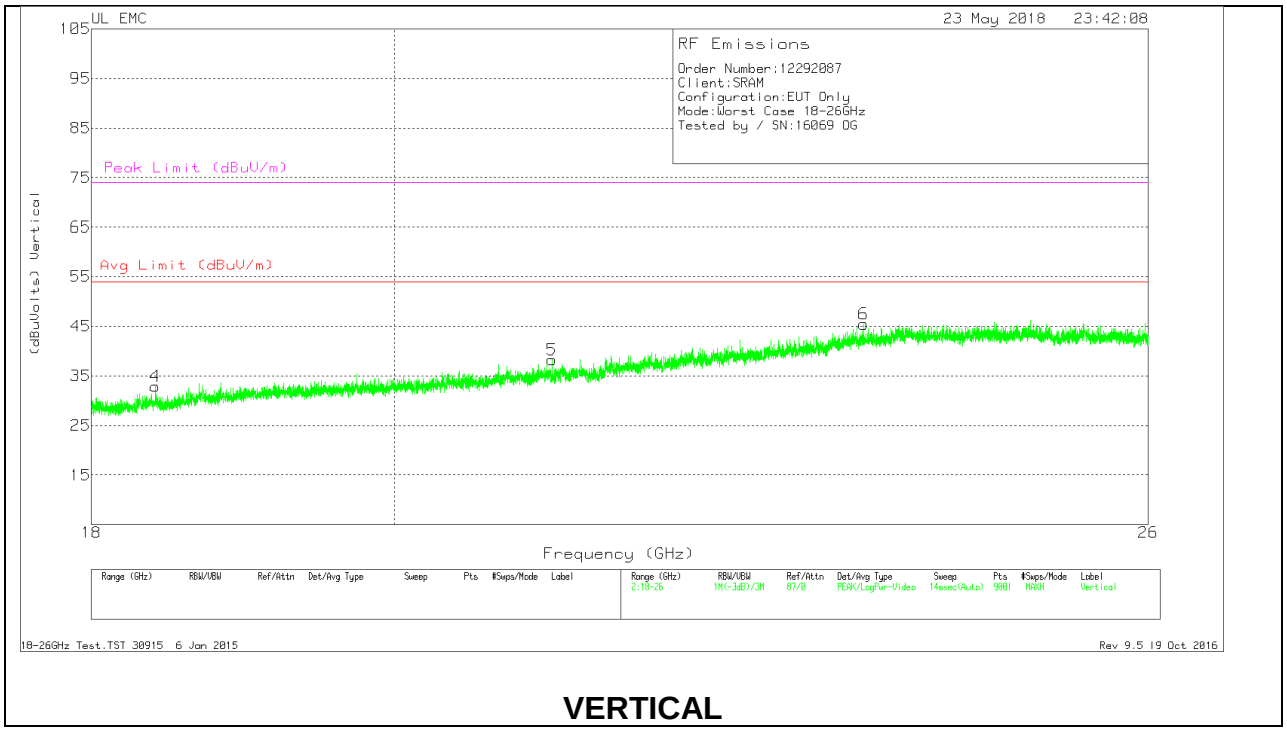
9.5. WORST CASE 18-26 GHz



HORIZTONAL



VERTICAL

18 – 26GHz DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T449 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	19.002	35.44	Pk	32.5	-24.8	-9.5	33.64	54	-20.36	74	-40.36
2	20.679	38.89	Pk	33	-25.1	-9.5	37.29	54	-16.71	74	-36.71
3	23.924	45.58	Pk	33.9	-23.9	-9.5	46.08	54	-7.92	74	-27.92
4	18.404	35.19	Pk	32.3	-25.1	-9.5	32.89	54	-21.11	74	-41.11
5	21.129	40.25	Pk	33.1	-25.6	-9.5	38.25	54	-15.75	74	-35.75
6	23.548	45.84	Pk	33.9	-24.8	-9.5	45.44	54	-8.56	74	-28.56

Pk - Peak detector