CERTIFICATION TEST REPORT

Report Number. : 13276062A

Applicant	:	RF CONTROLS LLC Suite 200 1400 S 3rd St SAINT LOUIS, MO, 63104 US
Model	:	CS-490 NA
FCC ID	:	WFQCS-490
IC	:	10717A-CS490
EUT Description	:	RF ID Reader
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C ISED RSS-247 ISSUE 2 ISED RSS-GEN ISSUE 5

Date Of Issue: 2020-07-13

Prepared by:
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NVLAP Lab code: 100414-0

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REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	--	Initial Issue	bm

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TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: **RF Controls LLC**

EUT DESCRIPTION: RF ID Reader

MODEL: CS-490

SERIAL NUMBER: non-serialized

DATE TESTED: April 2020 – May 2020

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

UL LLC 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 LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC 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 LLC By: Bob Delisi

Principal Engineer
Consumer Technology Division

Prepared By: Bart Mucha

Test Engineer
Consumer Technology Division

2. TEST RESULTS SUMMARY

FCC Clause	ISED Clause	Requirement	Result	Comment
See Comment	-	Duty Cycle	Reporting purposes only	Per ANSI C63.10, Section 11.6.
See Comment	RSS-GEN 6.7	20dB BW/99% OBW	Compliant	ANSI C63.10 Sections 6.9.2 and 6.9.3
15.247 (a)(1)	RSS-247 (5.1) (b)	Hopping Frequency Separation	Compliant	None.
15.247 (a)(1)(iii)	RSS-247 (5.1) (d)	Number of Hopping Channels	Compliant	None.
15.247 (a)(1)(iii)	RSS-247 (5.1) (d)	Average Time of Occupancy	Compliant	None.
15.247 (b)(1)	RSS-247 (5.4) (b)	Output Power	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	Compliant	None.

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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 v05, RSS-GEN Issue 5, and RSS-247 Issue 2.

4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 333 Pfingsten Road, Northbrook, Illinois, USA.

333 Pfingsten Road
☒ Chamber 10m (ISED:2180A-1)

UL NBK is accredited by NVLAP, Laboratory Code 100414-0

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}
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.39 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.07 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.52 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.17 dB

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 RF ID reader built into antenna assembly.

The radio and antenna is manufactured by RF Controls.

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
902 - 928	Circular Polarization	28.28	672.98
902 - 928	Linear Polarization	23.62	230.14

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio is mounted together with an antenna. The maximum measured antenna gain is 12.49dBi in linear polarization. In circular polarization maximum gain was 7.706dBi when measured with linear vertical antenna.

6.4. SOFTWARE AND FIRMWARE

- AIC MCU: AIC_5xx 0b4_20_022 init load.hex
- Atmel BSA: bsa_ver 18 103119 init load.bin
- Atmel Reader: rf_reader_5xx ver 0x0B 011320 initial load.bin
- Control Software: RF-TEST LAPTOP_1_0_0_182

6.5. WORST-CASE CONFIGURATION AND MODE

Device can be mounted either on the wall or ceiling and the major lobe is always from front of the antenna. Single orientation was tested (wall mount). Testing ceiling mount was considered not necessary since the side radiation spurious emissions were checked by rotating the antenna about horizontal axis. The antenna can be electronically set to either transmit in circular polarization, horizontal polarization and vertical polarization. Antenna is designed to read tags at large distances. Testing with tags present was not possible due to necessary distance to tag therefore all testing was conducted without tags present.

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop Computer	HP	-	-	-
PoE Adapter	StarTech	POEINJ100	-	-

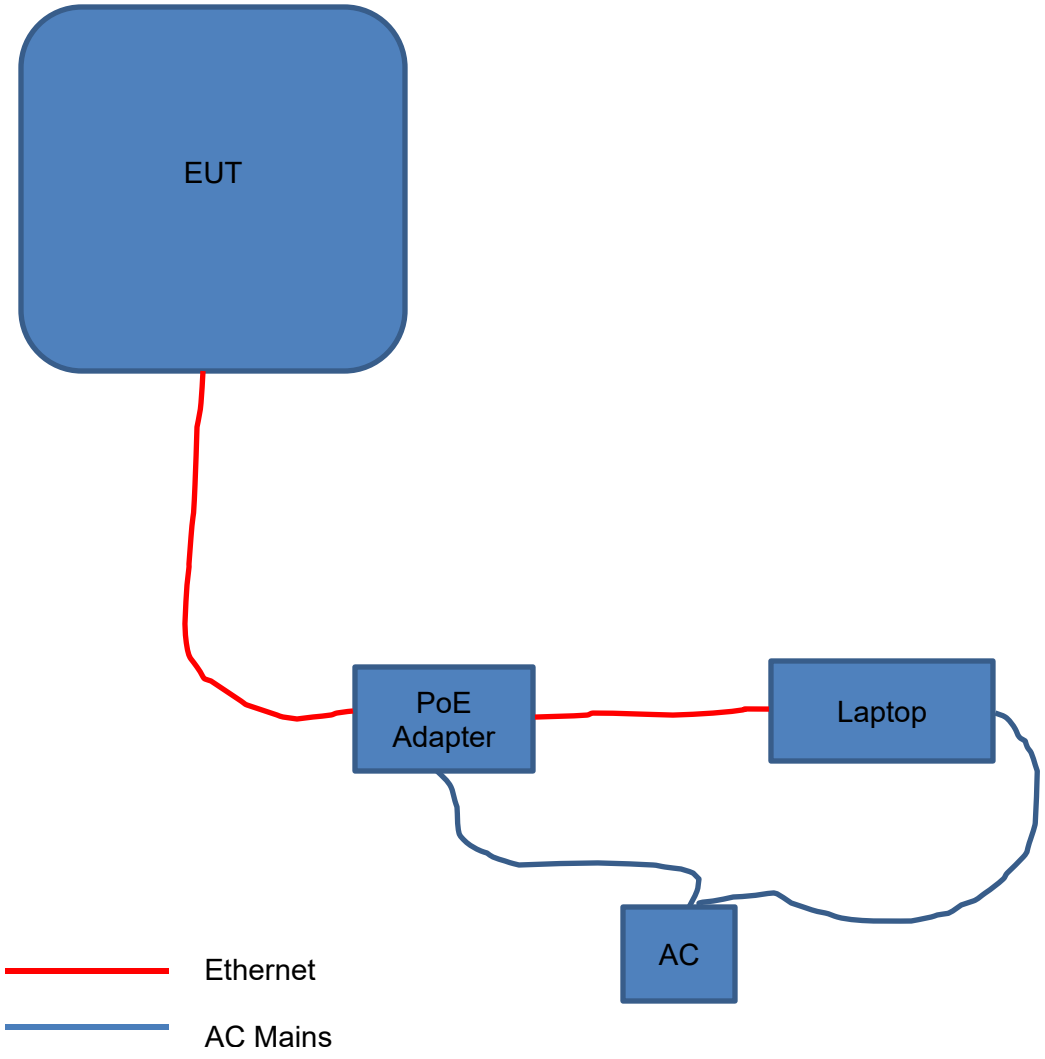
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Ethernet +PoE	1	RJ-45	Cat 5	50m	-

TEST SETUP

The device is stand alone combination of radio and antenna. Device is powered via 48VDC PoE and controller via Ethernet. PoE adapter is not sold with the device.

SETUP DIAGRAMS



7. TEST AND MEASUREMENT EQUIPMENT

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

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC4328	2019-12-28	2020-12-31
Bicon Antenna	Chase	VBA6106A	EMC4078	2019-04-05	2020-04-30
Log-P Antenna	Chase	UPA6109	EMC4313	2019-04-05	2020-04-30
Loop Antenna	EMCO	6502/1	EMC4026	2020-01-28	2021-01-31
Antenna Array	UL	BOMS	EMC4276	2019-07-02	2020-07-31
EMI Test Receiver	Rohde & Schwarz	ESU	EMC4323	2019-12-26	2020-12-31
EMI Test Receiver	Rohde & Schwarz	ESR	EMC4377	2019-12-30	2020-12-31
Transient Limiter	Electro-Metrics	EM7600-2	EMC4224	N/A	N/A
High-Pass Filter	Solar Electronics	2803-150	EMC4327	N/A	N/A
Attenuator	HP	8494B	2831A00838	N/A	N/A
LISN - L1	Solar Electronics	8602-50-TS-50-N	EMC4066	2019-12-16	2020-12-31
LISN - L2	Solar Electronics	8602-50-TS-50-N	EMC4064	2019-12-16	2020-12-31
Signal Analyzer	Aglient	N9030A PXA	EMC4360	2019-12-22	2020-12-31

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8. MEASUREMENT METHODS

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

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

Carrier Frequency Separation: ANSI C63.10-2013 Section 7.8.2

Number of Hopping Frequencies: ANSI C63.10-2013 Section 7.8.3

Time of Occupancy (Dwell Time): ANSI C63.10-2013 Section 7.8.4

Peak Output Power: ANSI C63.10-2013 Section 7.8.5

Conducted Spurious Emissions: ANSI C63.10-2013 Section 7.8.8

Conducted Band-Edge: ANSI C63.10-2013 Section 6.10.4

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

AC Power-line conducted emissions: ANSI C63.10-2013, Section 6.2.

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9. ANTENNA PORT TEST RESULTS

9.1. Duty Cycle

Limits

For reporting purpose only

TEST PROCEDURE

ANSI C63.10

Section 11.6, Zero span spectrum analyzer method.

TEST RESULTS

Duty Cycle: 100%

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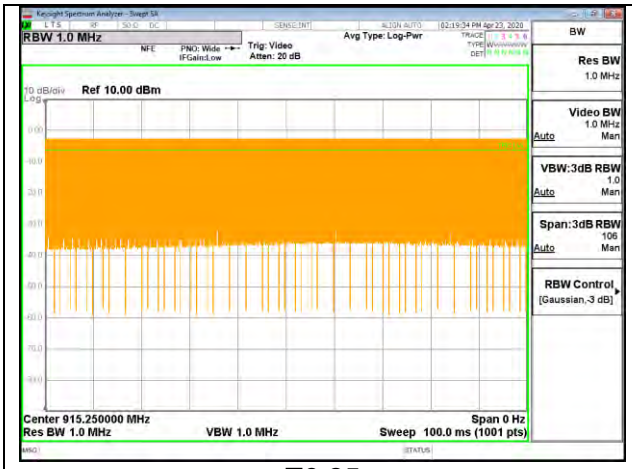
Duty Cycle Data



T6.25

T12.5

T25

9.2. 20 dB AND 99% BANDWIDTH

LIMITS

FCC 15.247 (a)(1)(i)
RSS-247, section 5.1 (c)

The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1-5% of the 20 dB bandwidth and 99% Occupied Bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS:

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Circular, T6.25, Low Ch	902.75	0.2630	0.2427
Circular, T12.5, Low Ch		0.1298	0.1211
Circular, T25, Low Ch		0.0720	0.0670
Circular, T6.25, Middle Ch	915.25	0.2631	0.2430
Circular, T12.5, Middle Ch		0.1298	0.1211
Circular, T25, Middle Ch		0.0712	0.0669
Circular, T6.25, High Ch	927.25	0.2636	0.2434
Circular, T12.5, High Ch		0.1297	0.1210
Circular, T25, High Ch		0.0713	0.0670
Linear, T6.25, Low Ch	902.75	0.2629	0.2430
Linear, T12.5, Low Ch		0.1297	0.1210
Linear, T25, Low Ch		0.0711	0.0668
Linear, T6.25, Middle Ch	915.25	0.2628	0.2428
Linear, T12.5, Middle Ch		0.1298	0.1210
Linear, T25, Middle Ch		0.0714	0.0671
Linear, T6.25, High Ch	927.25	0.2631	0.2430
Linear, T12.5, High Ch		0.1299	0.1210
Linear, T25, High Ch		0.0715	0.0671

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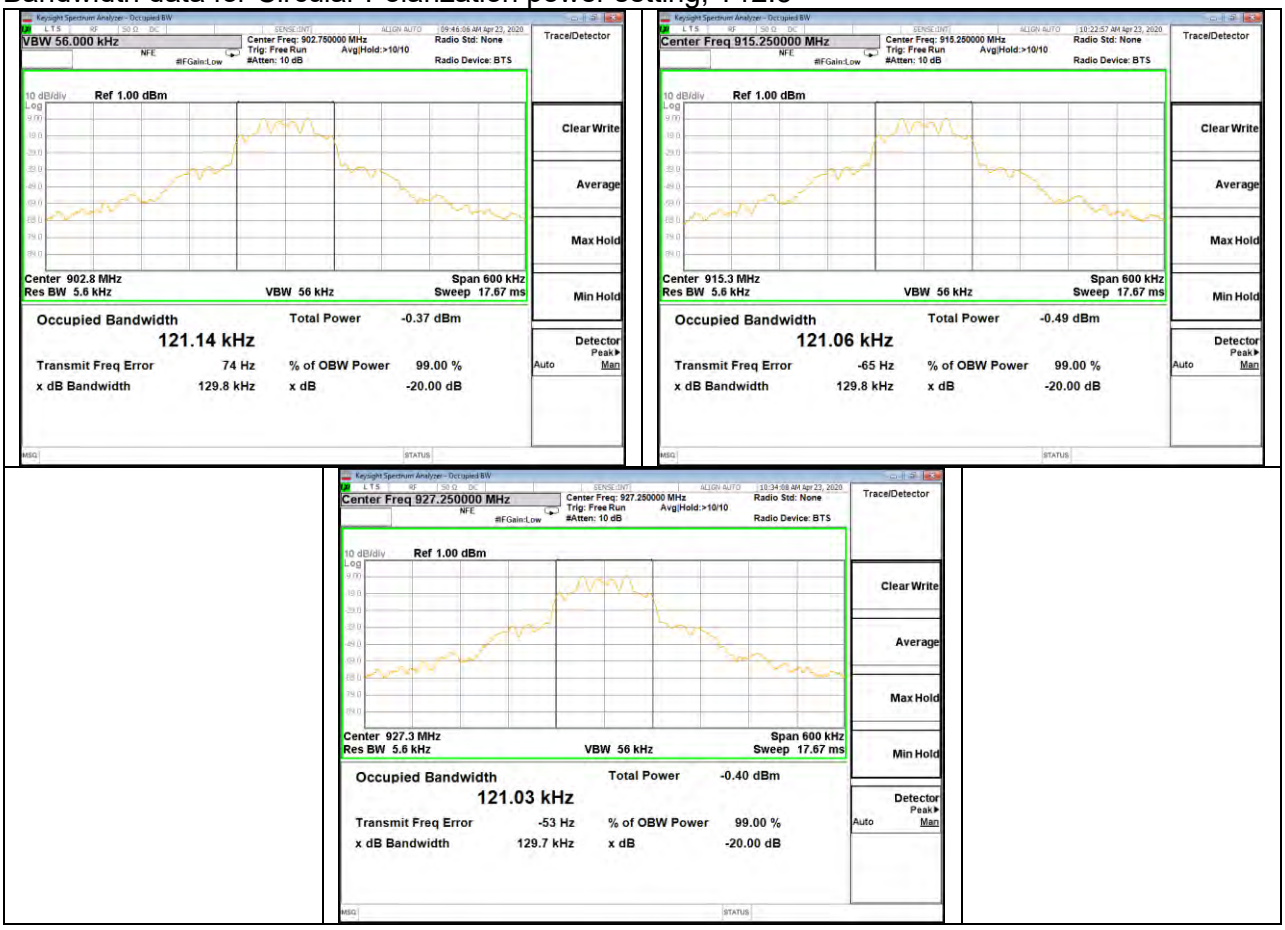
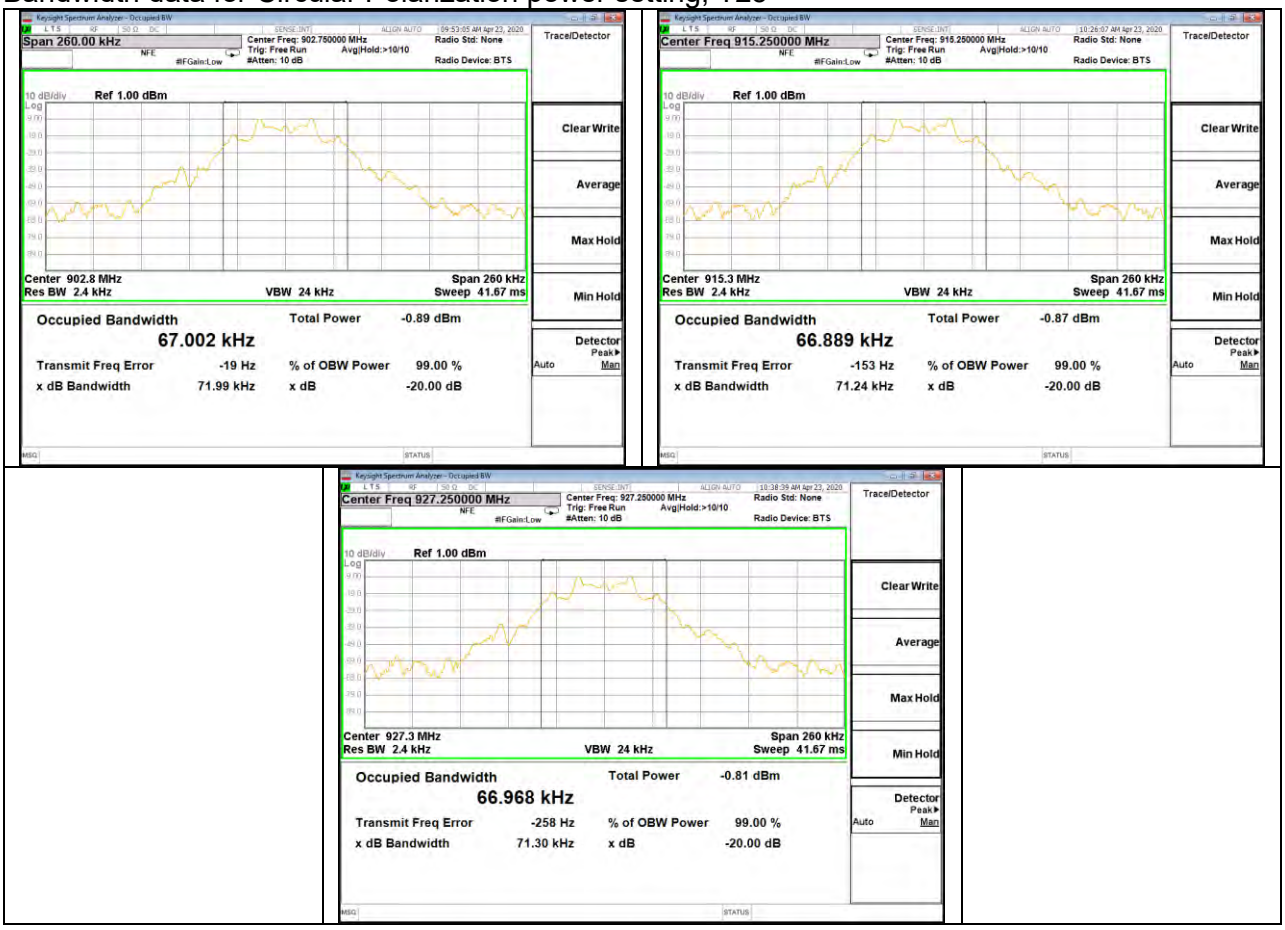
Bandwidth data for Circular Polarization power setting, T6.25

Bandwidth data for Circular Polarization power setting, T12.5

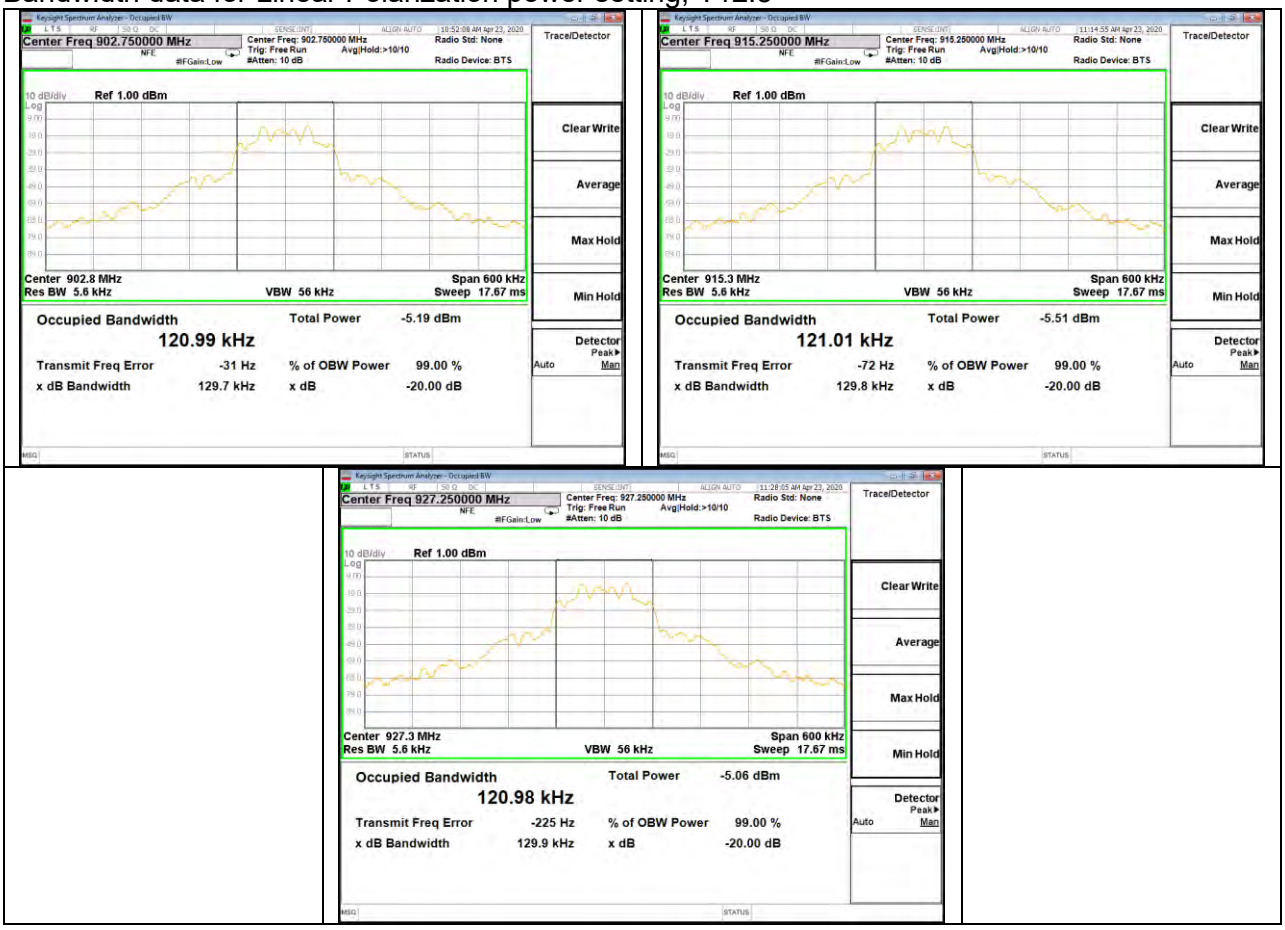


Bandwidth data for Circular Polarization power setting, T25

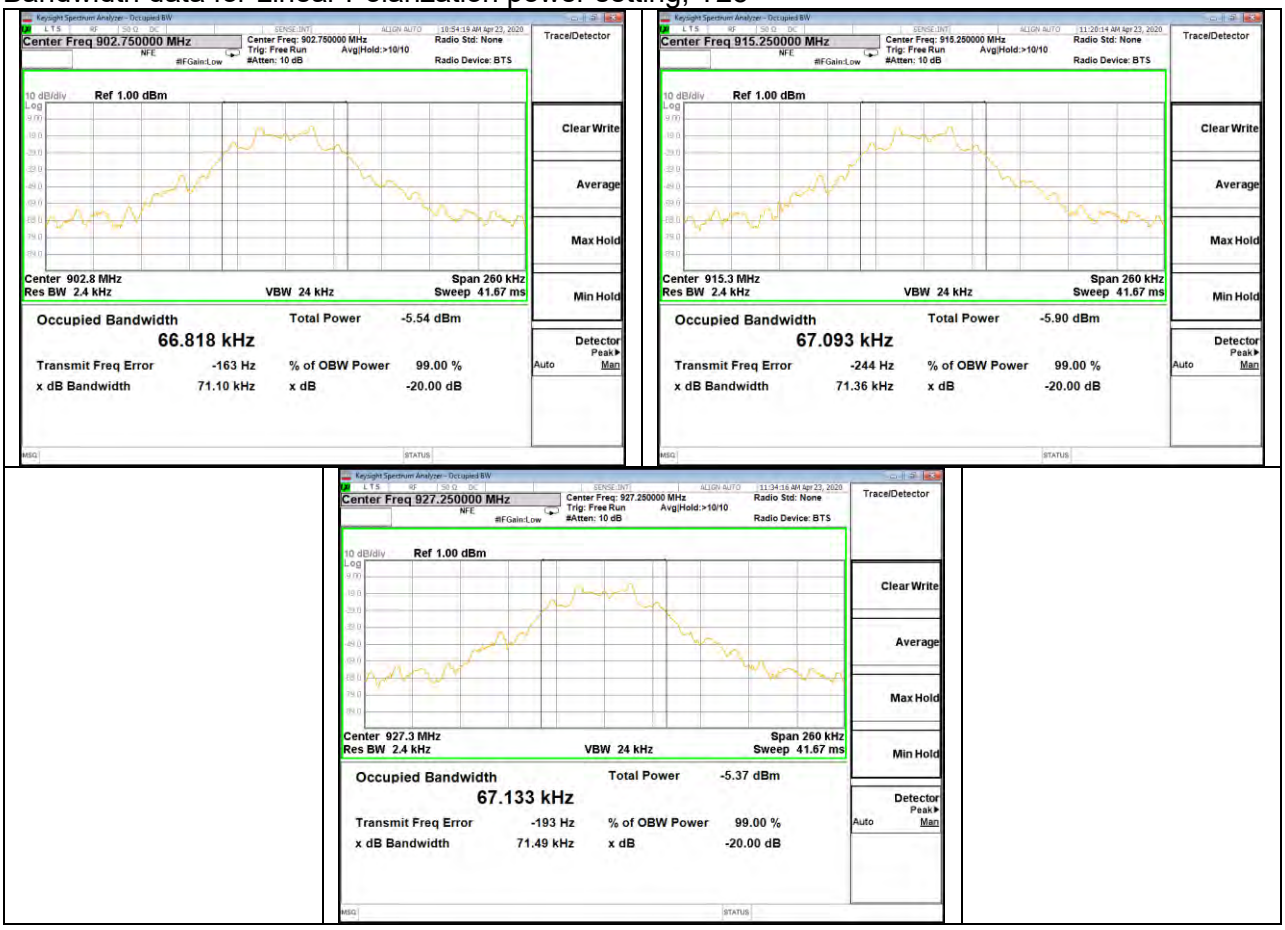


Bandwidth data for Linear Polarization power setting, T6.25

Bandwidth data for Linear Polarization power setting, T12.5



Bandwidth data for Linear Polarization power setting, T25



9.3. HOPPING FREQUENCY SEPARATION

LIMITS

FCC §15.247 (a) (1)

RSS-247 (5.1) (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel. The VBW is set to ≥ RBW. The sweep time is coupled. Alternatively RBW and VBW can be adjusted to clearly show frequency separation.

RESULTS

Test Frequency (MHz)	Frequency separation from prvious channel MHz	Test Frequency (MHz)	Frequency separation from prvious channel MHz	Test Frequency (MHz)	Frequency separation from prvious channel MHz	Test Frequency (MHz)	Frequency separation from prvious channel MHz	Test Frequency (MHz)	Frequency separation from prvious channel MHz
902.7525	-	907.752	0.50	912.7515	0.50	917.7525	0.50	922.7535	0.50
903.2535	0.50	908.2515	0.50	913.2525	0.50	918.2535	0.50	923.2515	0.50
903.7515	0.50	908.7525	0.50	913.7505	0.50	918.7515	0.50	923.751	0.50
904.2525	0.50	909.252	0.50	914.2545	0.50	919.2525	0.50	924.2505	0.50
904.7535	0.50	909.7545	0.50	914.7525	0.50	919.7535	0.50	924.7515	0.50
905.2515	0.50	910.2525	0.50	915.2505	0.50	920.2515	0.50	925.2525	0.50
905.751	0.50	910.7535	0.50	915.7545	0.50	920.7525	0.50	925.7535	0.50
906.2535	0.50	911.2515	0.50	916.2525	0.50	921.2535	0.50	926.2515	0.50
906.753	0.50	911.7525	0.50	916.7535	0.50	921.7515	0.50	926.7525	0.50
907.2525	0.50	912.2535	0.50	917.2515	0.50	922.2525	0.50	927.2505	0.50

9.4. NUMBER OF HOPPING CHANNELS

LIMITS

FCC §15.247 (a) (1) (i)

RSS-247 (5.1) (c)

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

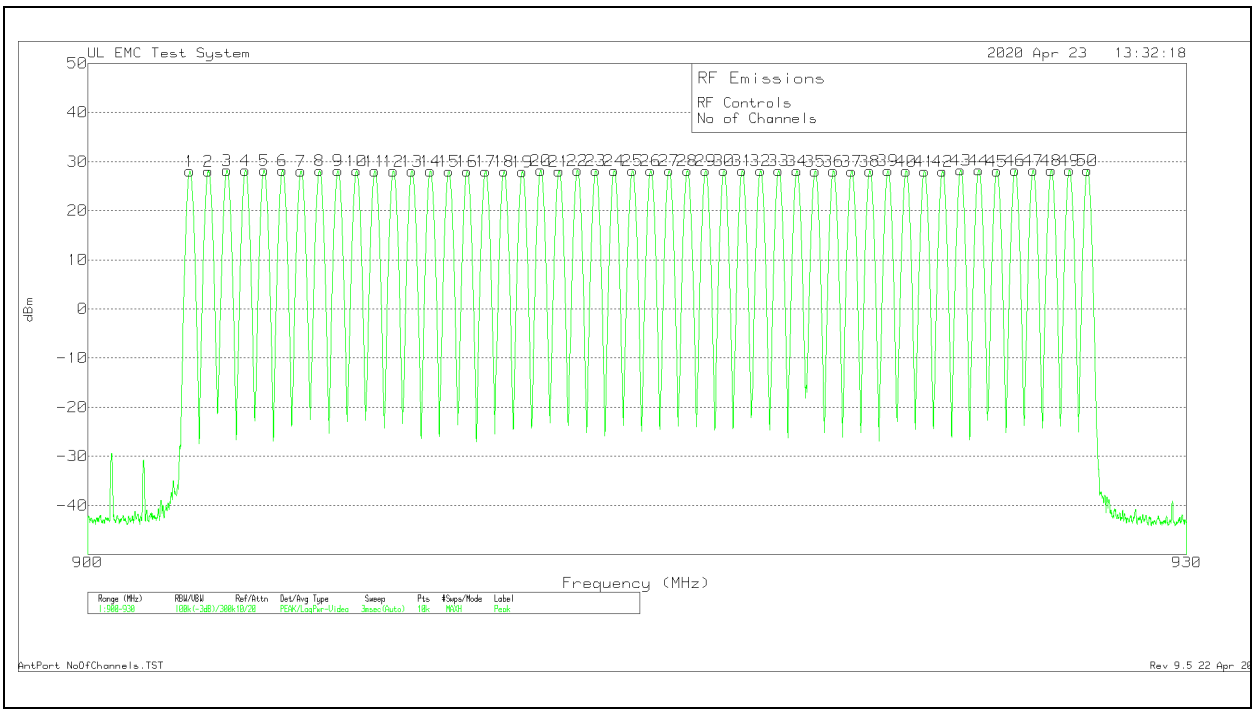
TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to less than 30% of the channel spacing or 20 dB BW, whichever is smaller to clearly identify the individual channels. The analyzer is set to Max Hold.

RESULTS

Normal Mode: 50 Channels Observed

Channel	Test Frequency (MHz)	Channel	Test Frequency (MHz)	Channel	Test Frequency (MHz)	Channel	Test Frequency (MHz)	Channel	Test Frequency (MHz)
1	902.7525	11	907.752	21	912.7515	31	917.7525	41	922.7535
2	903.2535	12	908.2515	22	913.2525	32	918.2535	42	923.2515
3	903.7515	13	908.7525	23	913.7505	33	918.7515	43	923.751
4	904.2525	14	909.252	24	914.2545	34	919.2525	44	924.2505
5	904.7535	15	909.7545	25	914.7525	35	919.7535	45	924.7515
6	905.2515	16	910.2525	26	915.2505	36	920.2515	46	925.2525
7	905.751	17	910.7535	27	915.7545	37	920.7525	47	925.7535
8	906.2535	18	911.2515	28	916.2525	38	921.2535	48	926.2515
9	906.753	19	911.7525	29	916.7535	39	921.7515	49	926.7525
10	907.2525	20	912.2535	30	917.2515	40	922.2525	50	927.2505



9.5. AVERAGE TIME OF OCCUPANCY

LIMITS

FCC §15.247 (a) (1) (i)

RSS-247 (5.1) (c)

For FHSs in the band 902-928 MHz: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping channels and the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 20-second period. If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping channels and the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 10-second period.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan.

Time of Occupancy is independed of the Tier setting (6.25, 12.5, 25). 1s, 20s and 65s sweep is conducted and number of times the same channel is repeated is counted.

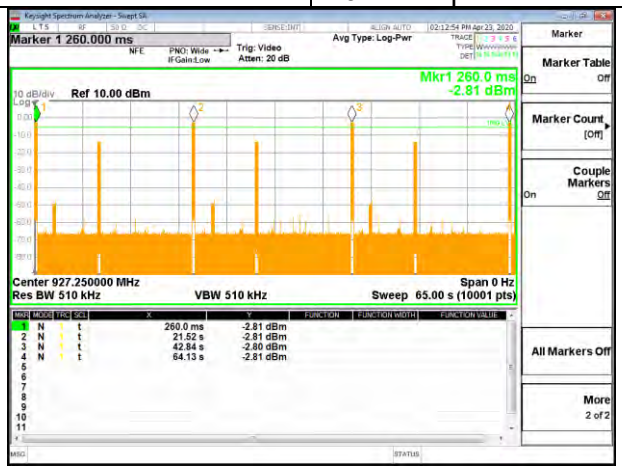
RESULTS

Modulated	Pulse Width (sec)	Number of Pulses in 20 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
Normal Mode					
TX	0.3978	1	0.39780	0.4	-0.0022

Time of Occupancy Data

1s sweep

20s sweep



65s sweep

9.6. PEAK OUTPUT POWER

LIMITS

§15.247 (b) (2) & (4)

RSS-247 (5.4) (a)

For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels.

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

Measurements perform using a wideband gated RF power meter or spectrum analyzer per ANSI C63.10 Section 7.8.5.

RESULTS

Measurements to determine the EUT gain are included in sections 9.6.1 and 9.6.2. These gain calculations use the conducted power measurements given in section 9.6.3.

9.6.1. EiRP levels and Antenna Gain Information – EUT Landscape

EUT: Landscape Orientation, EUT Configurations: Circular														
Substitution Field Strength Measurements with Signal Generator and Substition Antenna						EiRP and ERP Levels with Subsititution Setup				EUT EiRP Levels			EUT Antenna Gain	
Test Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor dB/m	Path Factor dBm	Level dBuV/m	Polarity	Voltage at sub antenna dBm	Sub Antenna Factor dBi	EiRP Level dBm	ERP Level dBm	EUT Field Strength Levles dBuV/m	FS Delta EUT - Substitution dB	EiRP Level dBm	Conducted Power Measured dBm	Antenna Gain dBi
902.75	72.56	23	9.6	105.16	H	2.06	6.1	8.16	6.01	131.86	26.7	34.86	28.232	6.628
915.25	71.99	23.1	9.6	104.69	H	2	6.2	8.2	6.05	132.3	27.61	35.81	28.234	7.576
927.25	71.82	23.4	9.6	104.82	H	2.01	6	8.01	5.86	132.63	27.81	35.82	28.379	7.441
902.75	71.78	23	9.6	104.38	V	2.06	6.1	8.16	6.01	130.46	26.08	34.24	28.232	6.008
915.25	71.21	23.1	9.6	103.91	V	2	6.2	8.2	6.05	131.65	27.74	35.94	28.234	7.706
927.25	70.95	23.4	9.6	103.95	V	2.01	6.1	8.11	5.96	131.4	27.45	35.56	28.379	7.181

EUT: Landscape Orientation, EUT Configurations: Horizontal														
Substitution Field Strength Measurements with Signal Generator and Substition Antenna						EiRP and ERP Levels with Subsititution Setup				EUT EiRP Levels			EUT Antenna Gain	
Test Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor dB/m	Path Factor dBm	Level dBuV/m	Polarity	Voltage at sub antenna dBm	Sub Antenna Factor dBi	EiRP Level dBm	ERP Level dBm	EUT Field Strength Levles dBuV/m	FS Delta EUT - Substitution dB	EiRP Level dBm	Conducted Power Measured dBm	Antenna Gain dBi
902.75	72.56	23	9.6	105.16	H	2.06	6.1	8.16	6.01	132.62	27.46	35.62	23.489	12.131
915.25	71.99	23.1	9.6	104.69	H	2	6.2	8.2	6.05	131.14	26.45	34.65	23.146	11.504
927.25	71.82	23.4	9.6	104.82	H	2.01	6	8.01	5.86	130.71	25.89	33.9	23.619	10.281

EUT: Landscape Orientation, EUT Configurations: Vertical														
Substitution Field Strength Measurements with Signal Generator and Substition Antenna						EiRP and ERP Levels with Subsititution Setup				EUT EiRP Levels			EUT Antenna Gain	
Test Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor dB/m	Path Factor dBm	Level dBuV/m	Polarity	Voltage at sub antenna dBm	Sub Antenna Factor dBi	EiRP Level dBm	ERP Level dBm	EUT Field Strength Levles dBuV/m	FS Delta EUT - Substitution dB	EiRP Level dBm	Conducted Power Measured dBm	Antenna Gain dBi
902.75	71.78	23	9.6	104.38	V	2.06	6.1	8.16	6.01	130.53	26.15	34.31	23.489	10.821
915.25	71.21	23.1	9.6	103.91	V	2	6.2	8.2	6.05	129.71	25.8	34	23.146	10.854
927.25	70.95	23.4	9.6	103.95	V	2.01	6.1	8.11	5.96	131.51	27.56	35.67	23.619	12.051

9.6.2. EiRP levels and Antenna Gain Information – EUT Portrait

EUT: Portrait Orientation, EUT Configurations: Circular														
Generator and Substition Antenna						EiRP and ERP Levels with Subsititution Setup				EUT EiRP Levels			EUT Antenna Gain	
Test Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor dB/m	Path Factor dBm	Level dBuV/m	Polarity	Voltage at sub antenna dBm	Sub Antenna Factor dBi	EiRP Level dBm	ERP Level dBm	EUT Field Strength Levles dBuV/m	FS Delta EUT - Substitution dB	EiRP Level dBm	Conducted Power Measured dBm	Antenna Gain dBi
902.75	72.56	23	9.6	105.16	H	2.06	6.1	8.16	6.01	129.73	24.57	32.73	28.232	4.498
915.25	71.99	23.1	9.6	104.69	H	2	6.2	8.2	6.05	130.54	25.85	34.05	28.234	5.816
927.25	71.82	23.4	9.6	104.82	H	2.01	6	8.01	5.86	130.94	26.12	34.13	28.379	5.751
902.75	71.78	23	9.6	104.38	V	2.06	6.1	8.16	6.01	130.99	26.61	34.77	28.232	6.538
915.25	71.21	23.1	9.6	103.91	V	2	6.2	8.2	6.05	131.53	27.62	35.82	28.234	7.586
927.25	70.95	23.4	9.6	103.95	V	2.01	6.1	8.11	5.96	131.73	27.78	35.89	28.379	7.511

EUT: Portrait Orientation, EUT Configurations: Horizontal														
Generator and Substition Antenna						EiRP and ERP Levels with Subsititution Setup				EUT EiRP Levels			EUT Antenna Gain	
Test Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor dB/m	Path Factor dBm	Level dBuV/m	Polarity	Voltage at sub antenna dBm	Sub Antenna Factor dBi	EiRP Level dBm	ERP Level dBm	EUT Field Strength Levles dBuV/m	FS Delta EUT - Substitution dB	EiRP Level dBm	Conducted Power Measured dBm	Antenna Gain dBi
902.75	71.78	23	9.6	104.38	V	2.06	6.1	8.16	6.01	132.2	27.82	35.98	23.489	12.491
915.25	71.21	23.1	9.6	103.91	V	2	6.2	8.2	6.05	130.95	27.04	35.24	23.146	12.094
927.25	70.95	23.4	9.6	103.95	V	2.01	6.1	8.11	5.96	129.71	25.76	33.87	23.619	10.251

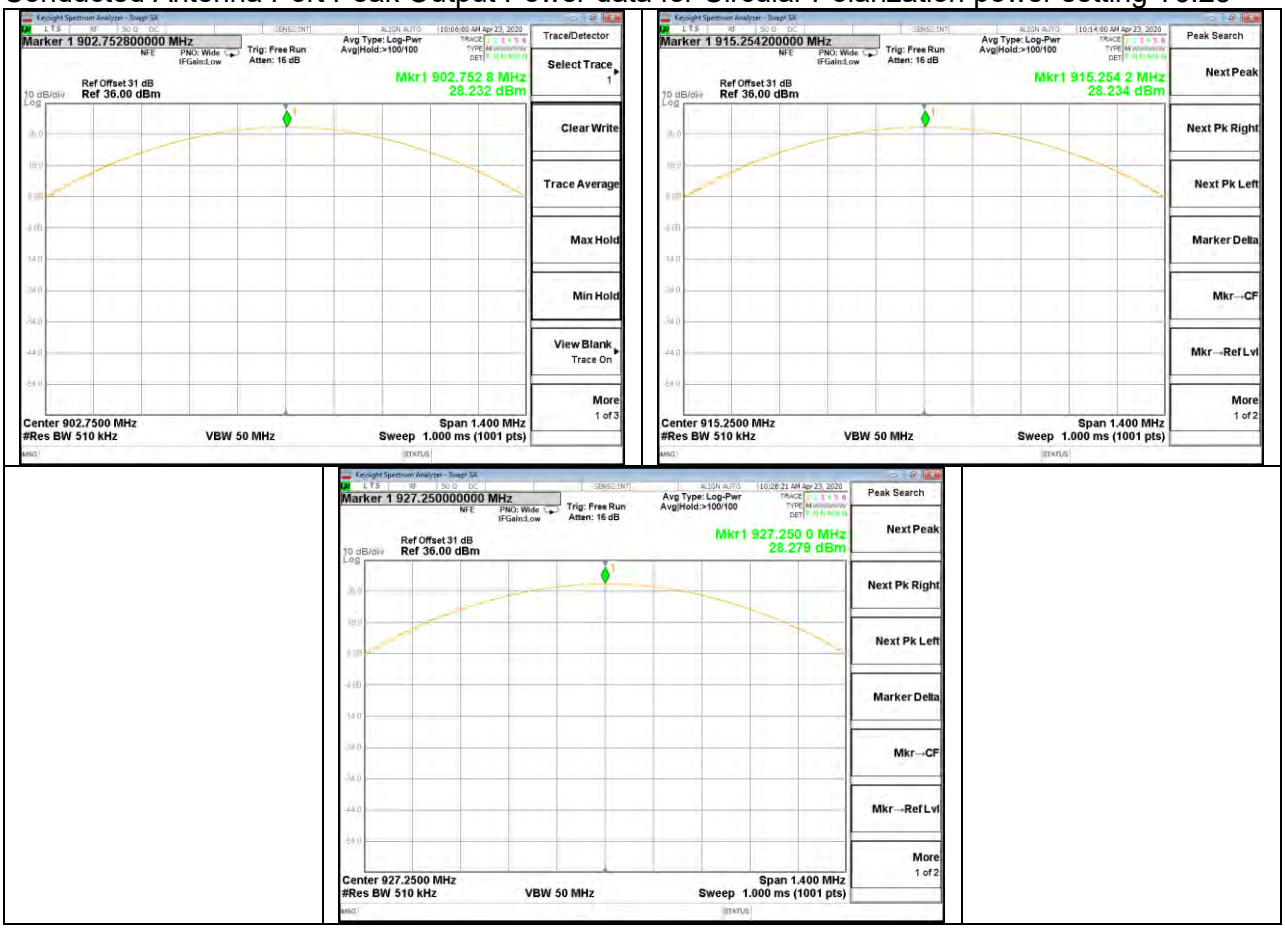
EUT: Portreit Orientation, EUT Configurations: Vertical														
Generator and Substition Antenna						EiRP and ERP Levels with Subsititution Setup				EUT EiRP Levels			EUT Antenna Gain	
Test Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor dB/m	Path Factor dBm	Level dBuV/m	Polarity	Voltage at sub antenna dBm	Sub Antenna Factor dBi	EiRP Level dBm	ERP Level dBm	EUT Field Strength Levles dBuV/m	FS Delta EUT - Substitution dB	EiRP Level dBm	Conducted Power Measured dBm	Antenna Gain dBi
902.75	72.56	23	9.6	105.16	H	2.06	6.1	8.16	6.01	128.41	23.25	31.41	23.489	7.921
915.25	71.99	23.1	9.6	104.69	H	2	6.2	8.2	6.05	129.75	25.06	33.26	23.146	10.114
927.25	71.82	23.4	9.6	104.82	H	2.01	6	8.01	5.86	132.4	27.58	35.59	23.619	11.971

Maximum Conducted Power Levels

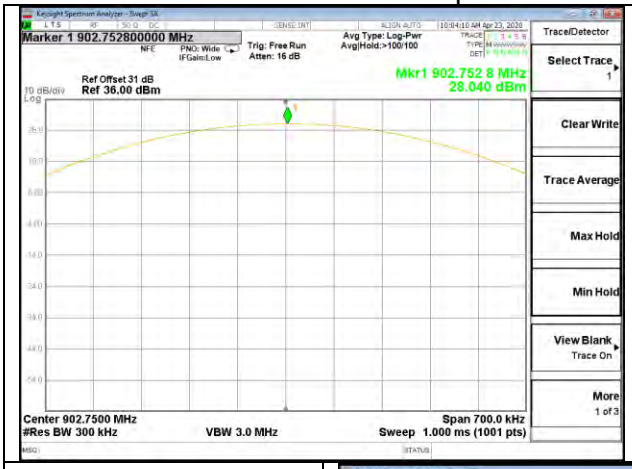
	Maximum Conducted Power dBm	Antenna Gain dBi	*Conducted Power Limit dBm	Margin dB
Circular Low Ch dBm	28.23	6.63	29.37	-1.14
Circular Mid Ch dBm	28.23	7.71	28.29	-0.06
Circular High Ch dBm	28.28	7.51	28.49	-0.21
Linear Low Ch dBm	23.49	12.49	23.51	-0.02
Linear Mid Ch dBm	23.15	12.09	23.91	-0.76
Linear High Ch dBm	23.62	12.05	23.95	-0.33
*The maximum conducted power limit is based on the measured antenna gain.				

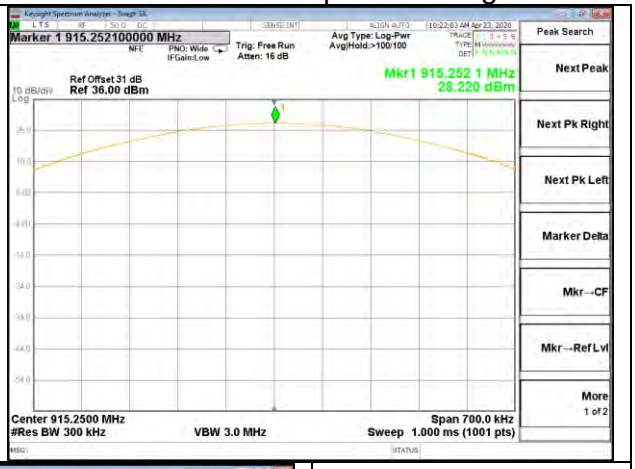
9.6.3. Conducted Antenna Port Power Measurements

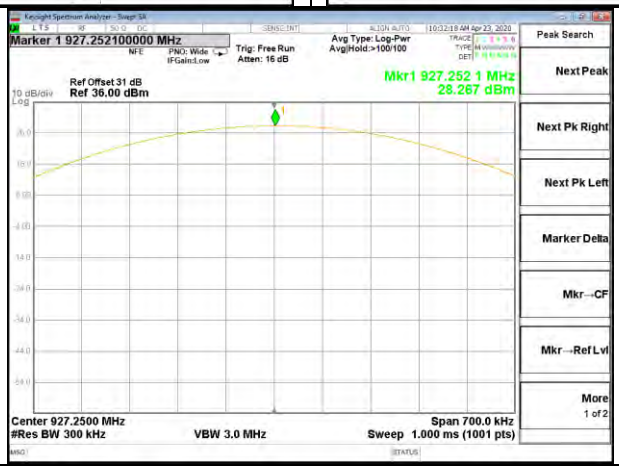
Conducted Antenna Port Peak Output Power data for Circular Polarization power setting T6.25



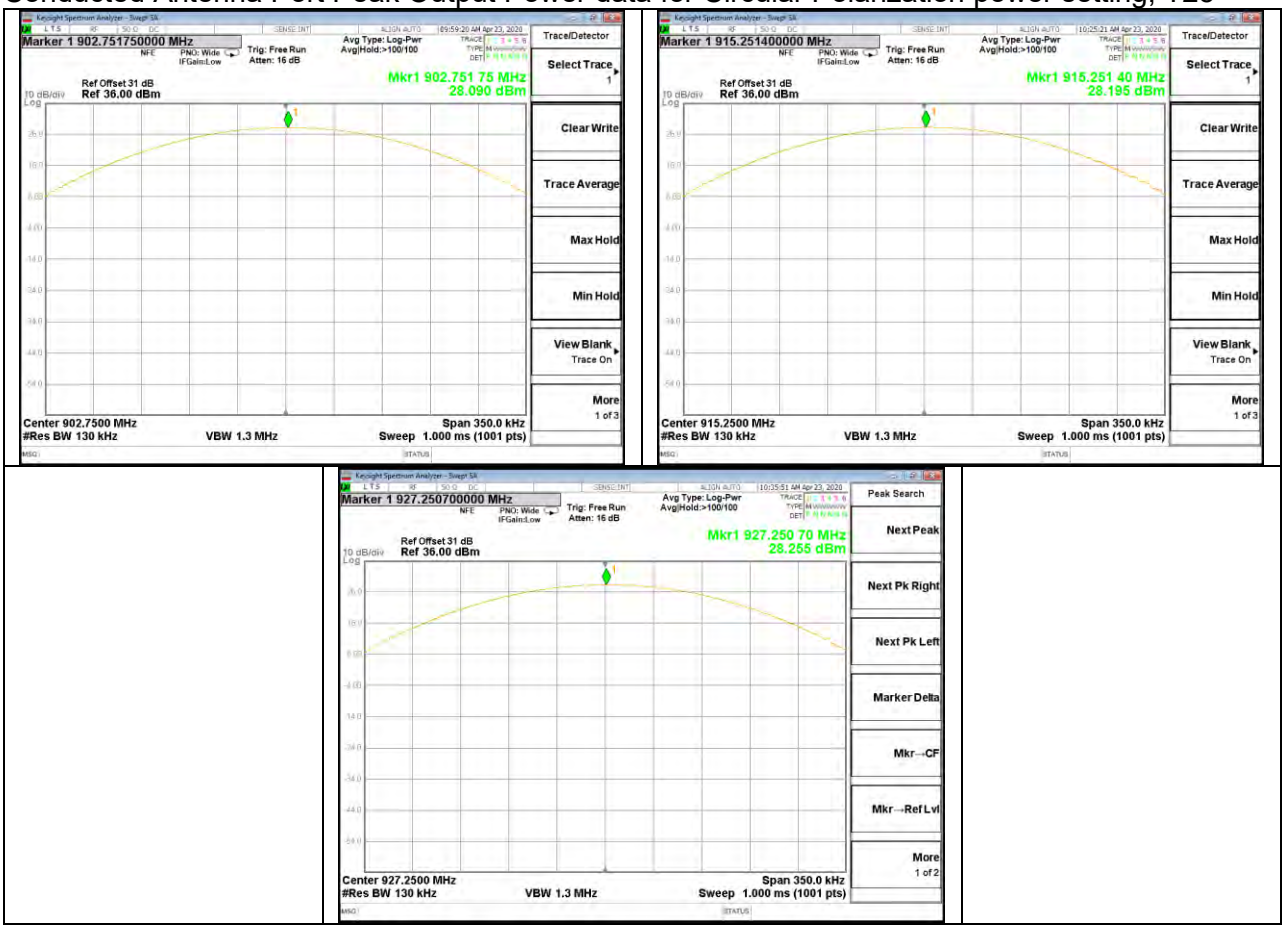
Conducted Antenna Port Peak Output Power data for Circular Polarization power setting T12.5



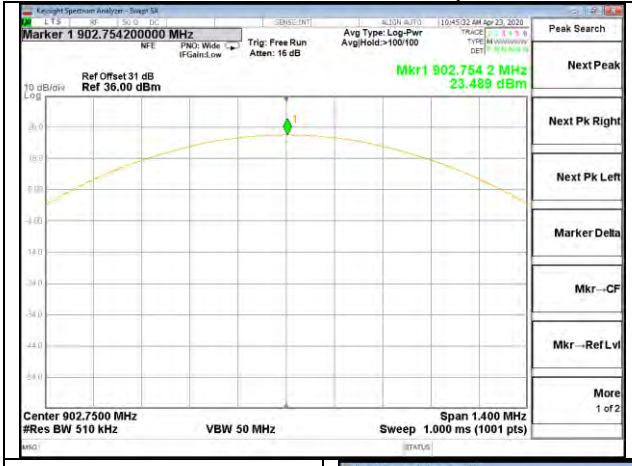


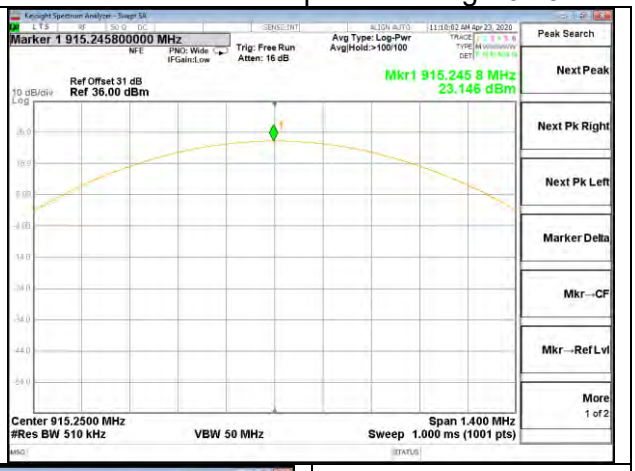


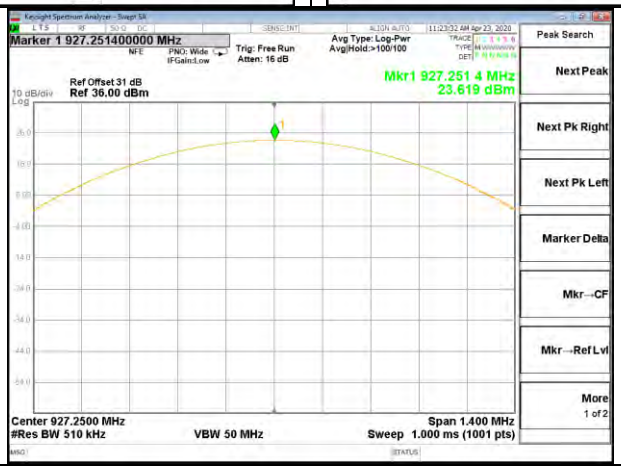
Conducted Antenna Port Peak Output Power data for Circular Polarization power setting, T25



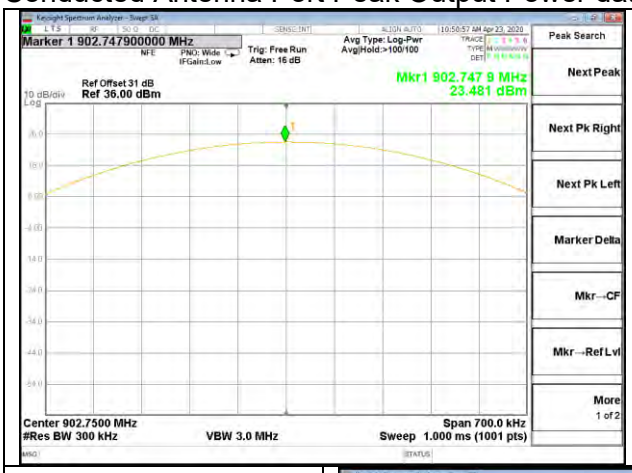
Conducted Antenna Port Peak Output Power data for Linear Polarization power setting T6.25

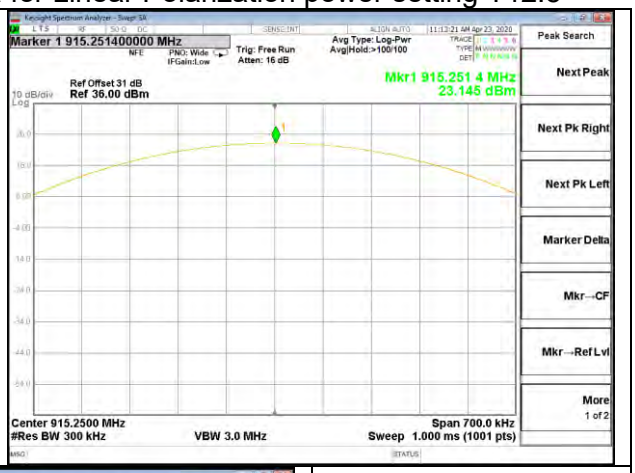


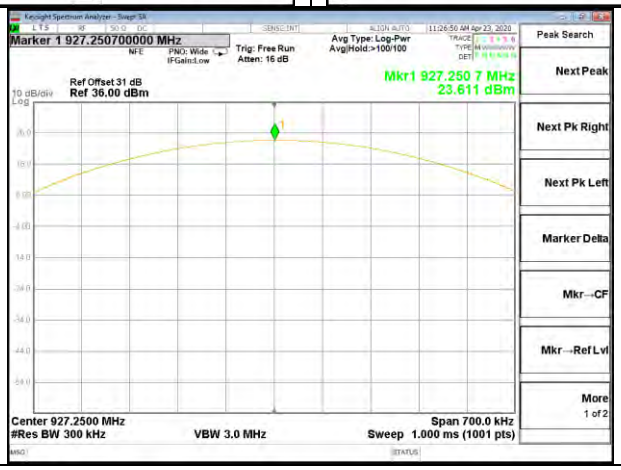




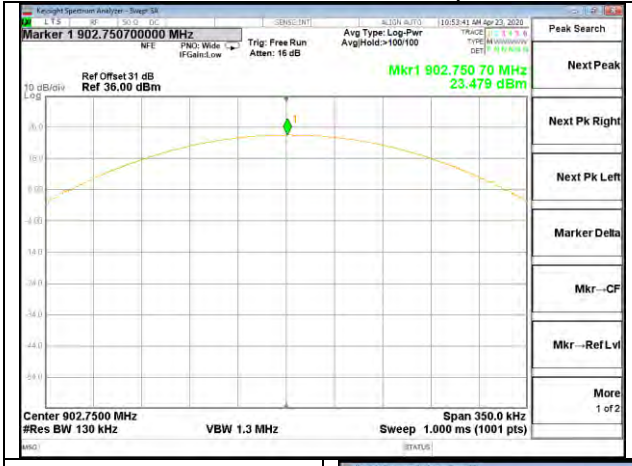
Conducted Antenna Port Peak Output Power data for Linear Polarization power setting T12.5

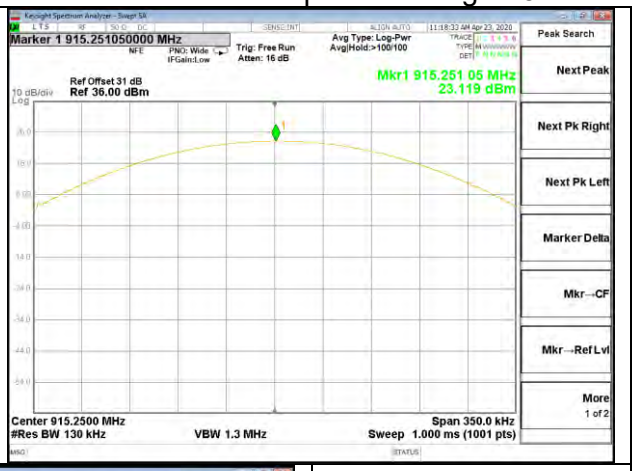


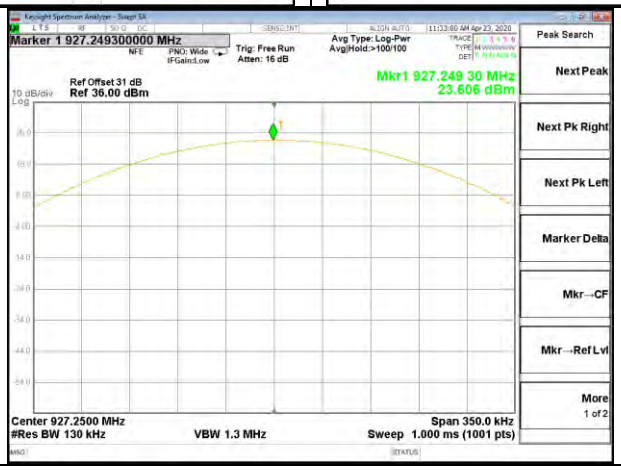




Conducted Antenna Port Peak Output Power data for Linear Polarization power setting T25







9.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

RSS-247 5.5

Limit = -20 dBc

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz.The video bandwidth is set to 300 kHz.

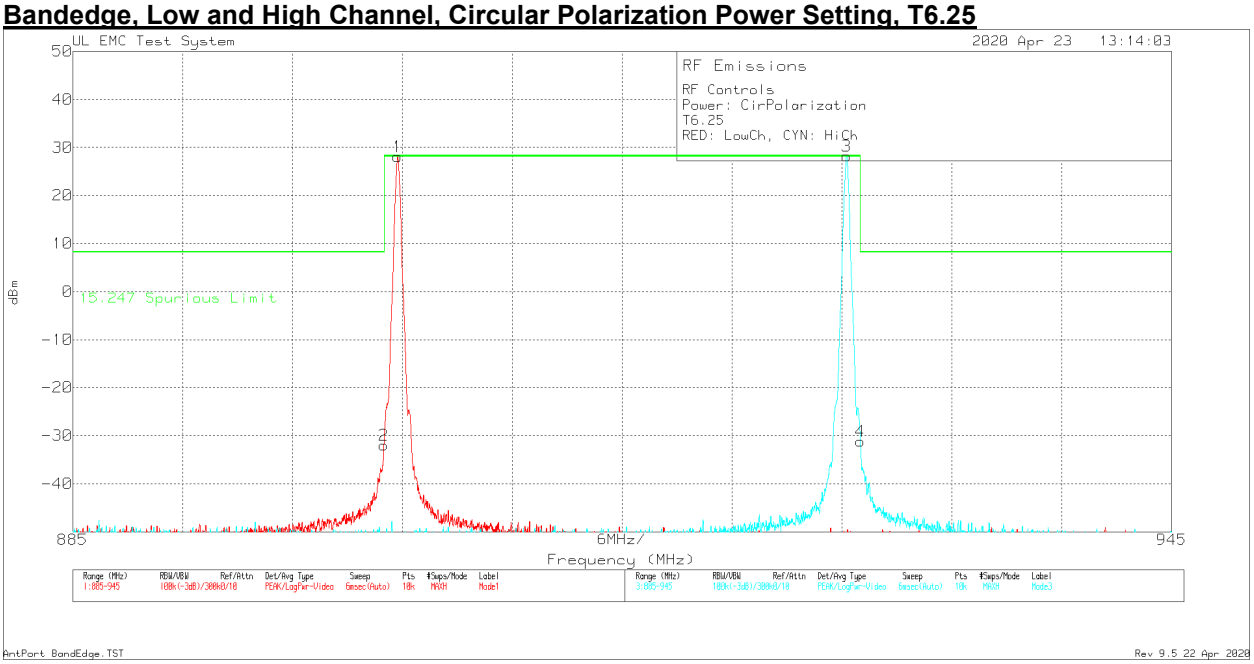
The spectrum from 30 MHz to 10 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The authorized bandedges at 902MHz and 928MHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

UL LLC
333 Pfingsten Road, Northbrook, IL 60062; USA TEL:(847) 272-8800

Bandedge, Low and High Channel, Circular Polarization Power Setting, T6.25



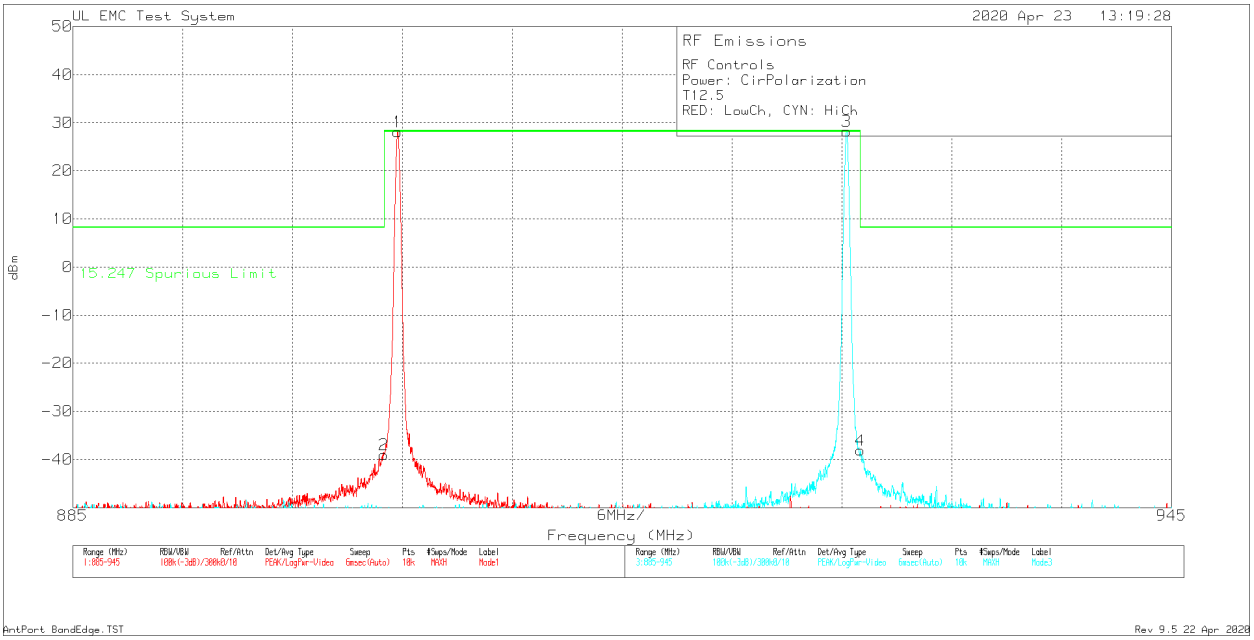
RF Controls
Power: CirPolarization
T6.25
RED: LowCh, CYN: HiCh

Trace Markers

No.	Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading dBm	Limit:1
Low Channel						
1	902.751	-2.9dBm Pk	31	0	28.1	28.2
					Margin (dB)	-.1
2	902.000	-62.97dBm Pk	31	0	-31.97	8.2
					Margin (dB)	-40.17
High Channel						
3	927.249	-2.7dBm Pk	30.9	0	28.2	28.2
					Margin (dB)	0
4	928.000	-62.18dBm Pk	31	0	-31.18	8.2
					Margin (dB)	-39.38

LIMIT 1: 15.247 Spurious Limit
Pk - Peak detector

Bandedge, Low and High Channel, Circular Polarization Power Setting, T12.5



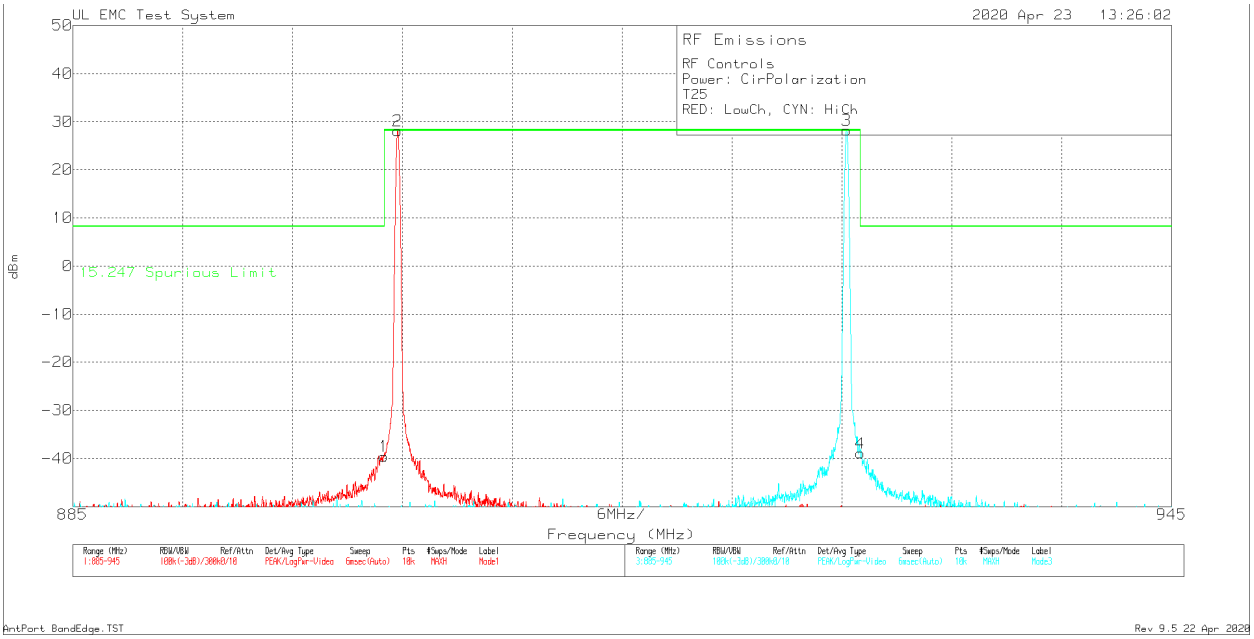
RF Controls
Power: CirPolarization
T12.5
RED: LowCh, CYN: HiCh

Trace Markers

No.	Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading dBm	Limit:1
Low Channel						
1	902.751	-2.92dBm Pk	31	0	28.08	28.19
					Margin (dB)	-.11
2	902.000	-70.01dBm Pk	31	0	-39.01	8.19
					Margin (dB)	-47.2
High Channel						
3	927.249	-2.71dBm Pk	30.9	0	28.19	28.19
					Margin (dB)	0
4	928.000	-69.11dBm Pk	31	0	-38.11	8.19
					Margin (dB)	-46.3

LIMIT 1: 15.247 Spurious Limit
Pk - Peak detector

Bandedge, Low and High Channel, Circular Polarization Power Setting, T25



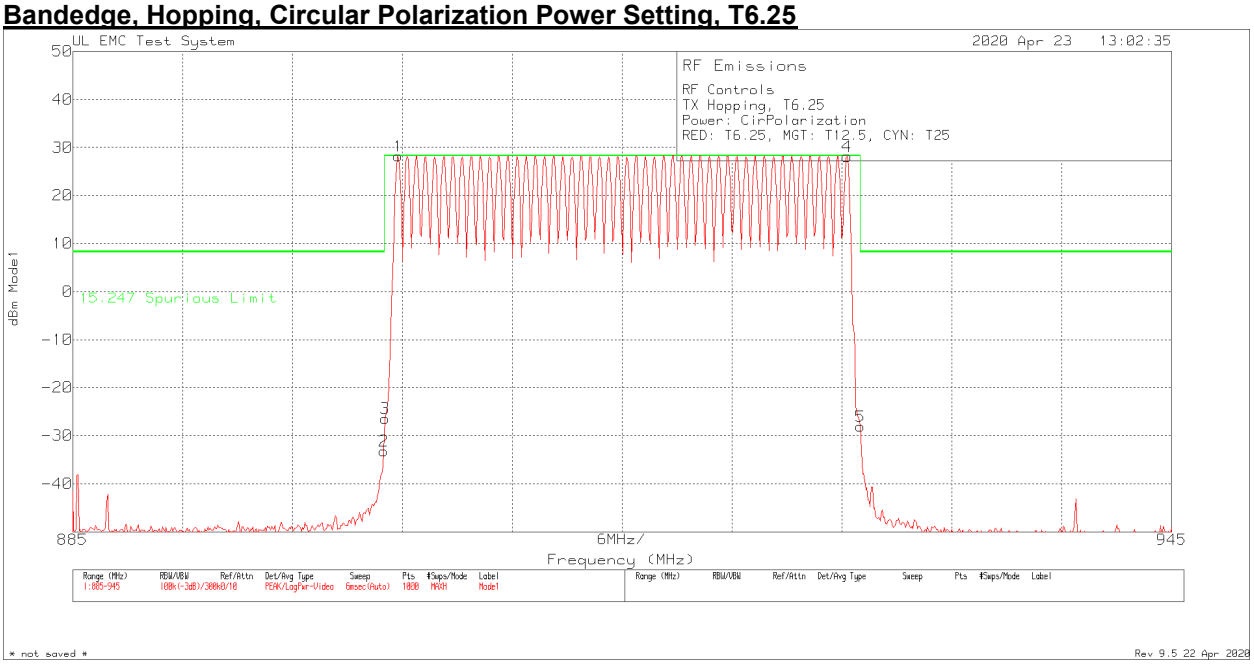
RF Controls
Power: CirPolarization
T25
RED: LowCh, CYN: HiCh

Trace Markers

No.	Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading dBm	Limit:1
Low Channel						
1	902.000	-70.59dBm Pk	31	0	-39.59	8.19
					Margin (dB)	-47.78
2	902.751	-2.92dBm Pk	31	0	28.08	28.19
					Margin (dB)	-.11
High Channel						
3	927.252	-2.71dBm Pk	30.9	0	28.19	28.19
					Margin (dB)	0
4	928.000	-69.92dBm Pk	31	0	-38.92	8.19
					Margin (dB)	-47.11

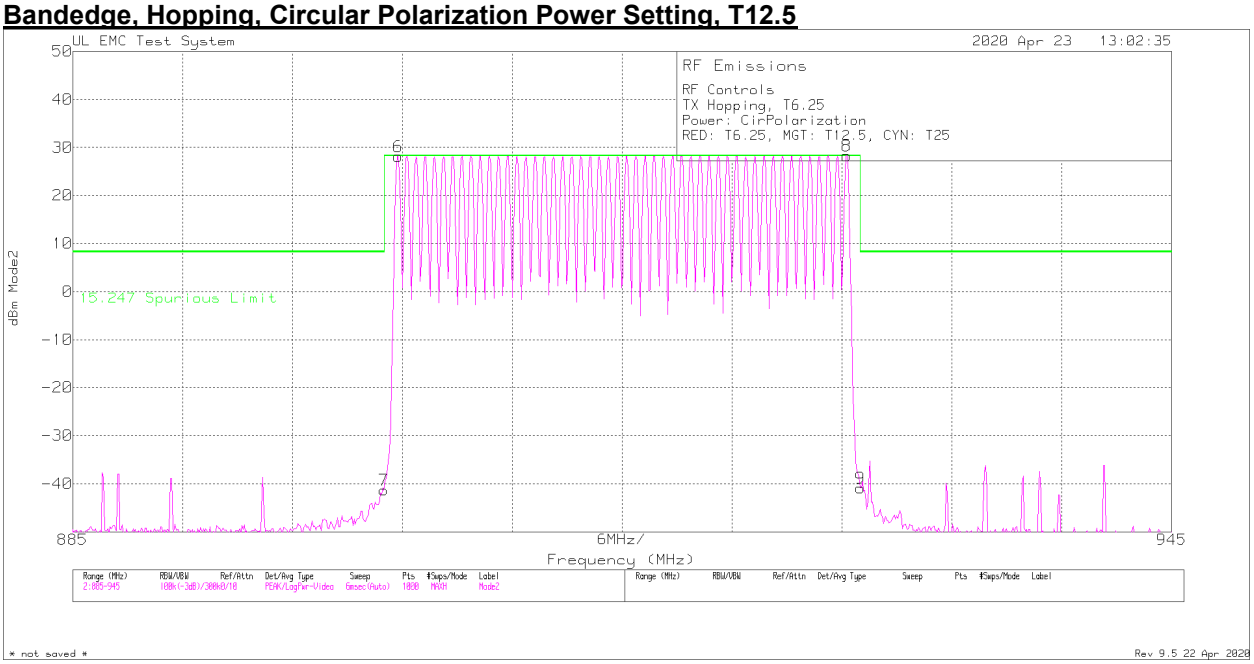
LIMIT 1: 15.247 Spurious Limit
Pk - Peak detector

Bandedge, Hopping, Circular Polarization Power Setting, T6.25



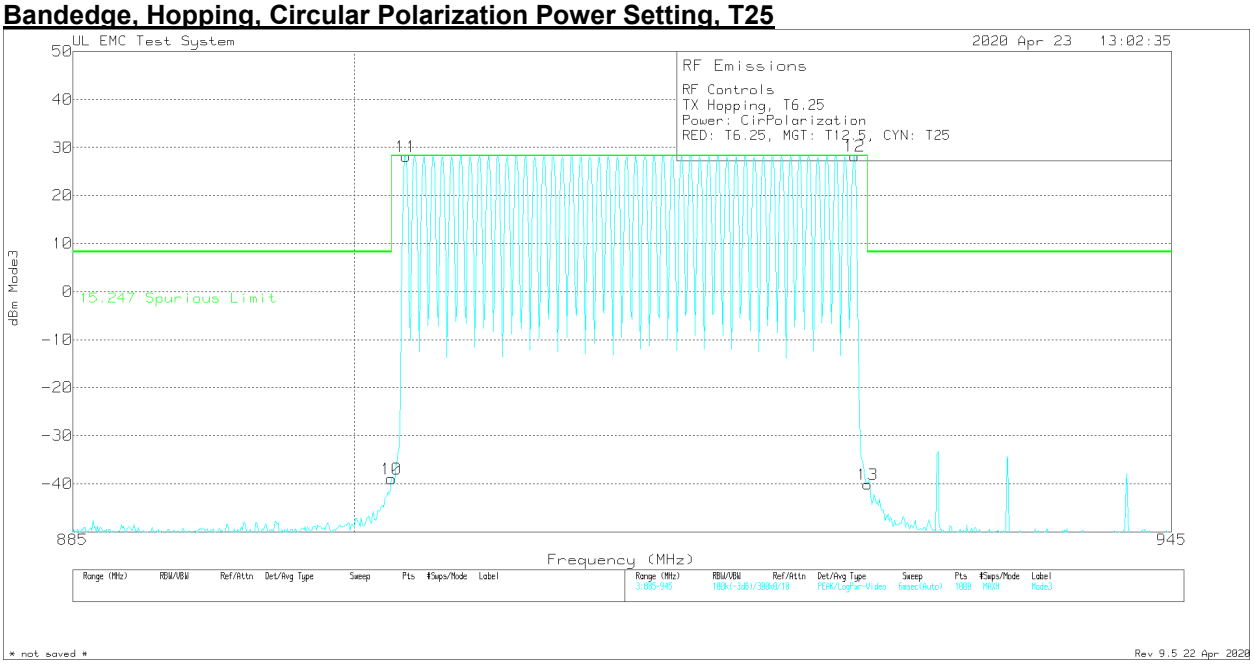
No.	Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading dBm	Limit:1
T6.25						
1	902.7778	-2.82dBm Pk	31	0	28.18	28.27
					Margin (dB)	-.09
2	902.000	-64.2dBm Pk	31	0	-33.2	8.27
					Margin (dB)	-41.47
3	902.057	-57.44dBm Pk	31	0	-26.44	28.27
					Margin (dB)	-54.71
4	927.2822	-2.79dBm Pk	30.9	0	28.11	28.27
					Margin (dB)	-.16
5	928.000	-59.08dBm Pk	31	0	-28.08	8.27
					Margin (dB)	-36.35

Bandedge, Hopping, Circular Polarization Power Setting, T12.5



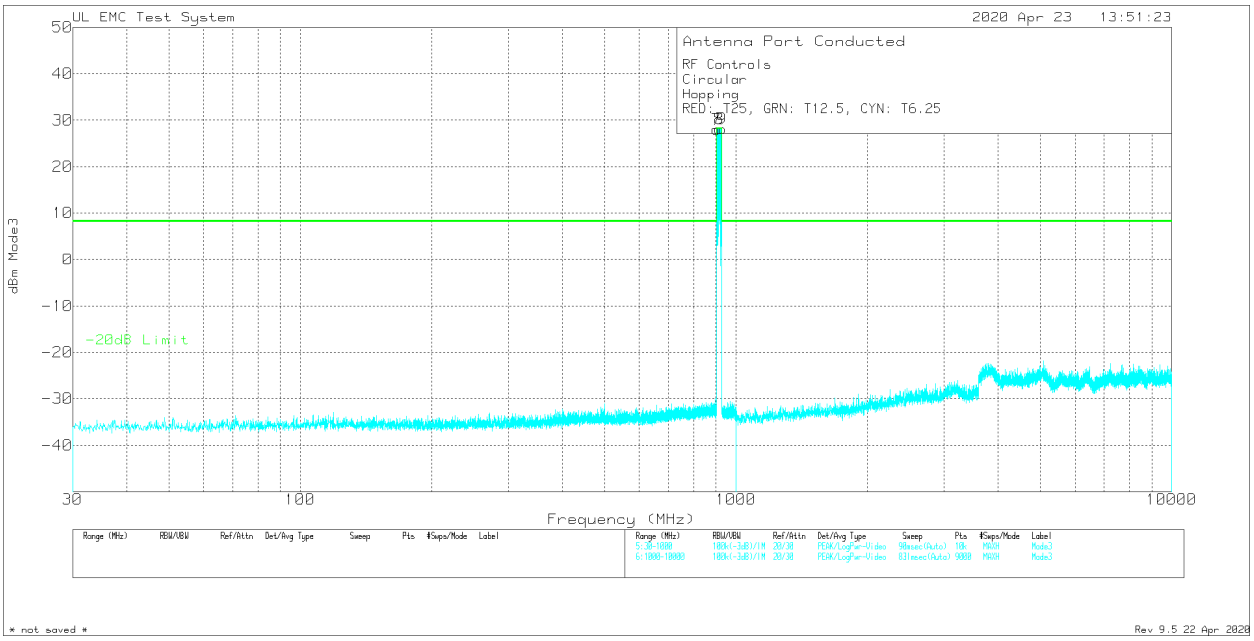
No.	Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading dBm	Limit:1
T12.5						
6	902.7778	-2.87dBm Pk	31	0	28.13	28.27
					Margin (dB)	-.14
7	902.000	-72.32dBm Pk	31	0	-41.32	8.27
					Margin (dB)	-49.59
8	927.2522	-2.65dBm Pk	30.9	0	28.25	28.27
					Margin (dB)	-.02
9	928.000	-71.89dBm Pk	31	0	-40.89	8.27
					Margin (dB)	-49.16

Bandedge, Hopping, Circular Polarization Power Setting, T25



No.	Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading dBm	Limit:1
T25						
10	902.000	-69.99dBm Pk	31	0	-38.99	8.27
					Margin (dB)	-47.26
11	902.7778	-2.87dBm Pk	31	0	28.13	28.27
					Margin (dB)	-.14
12	927.2822	-2.66dBm Pk	30.9	0	28.24	28.27
					Margin (dB)	-.03
13	928.000	-71.14dBm Pk	31	0	-40.14	8.27
					Margin (dB)	-48.41

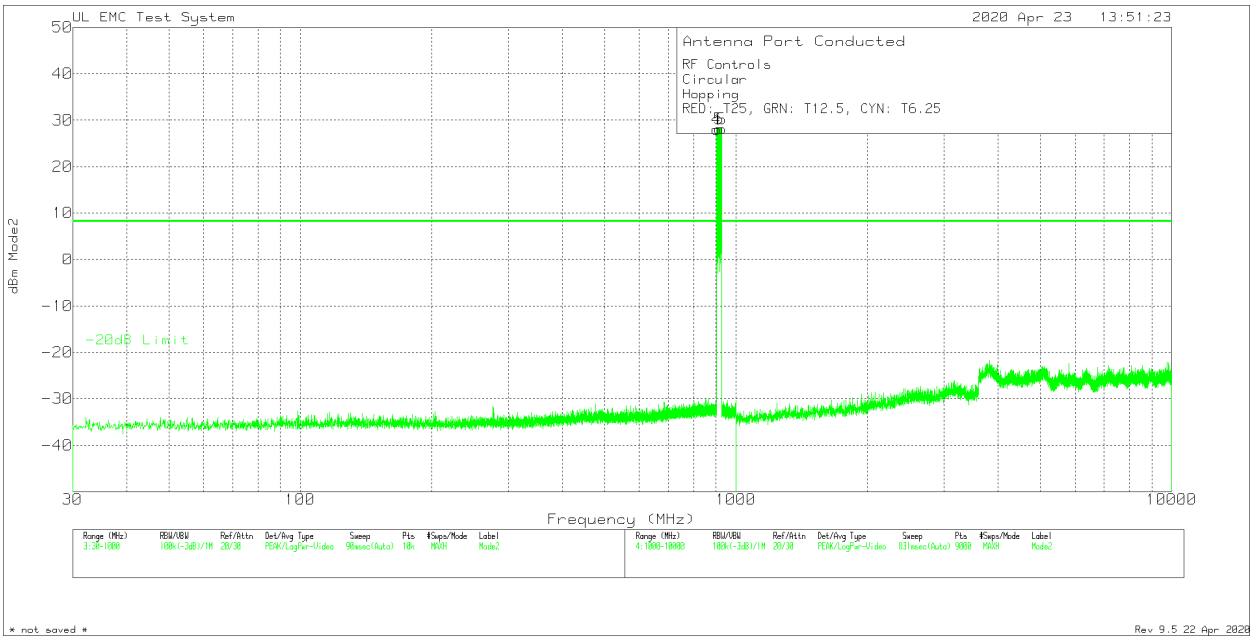
SPURIOUS EMISSIONS, 30MHz – 10GHz, Circular Polarization Power Setting, T6.25



No.	Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading dBm	Limit:1
T6.25						
7	902.709	-2.96dBm Pk	31	0	28.04	28.24
					Margin (dB)	-.2
8	915.222	-2.86dBm Pk	31	0	28.14	28.24
					Margin (dB)	-.1
9	927.25	-2.74dBm Pk	30.9	0	28.16	28.24
					Margin (dB)	-.08

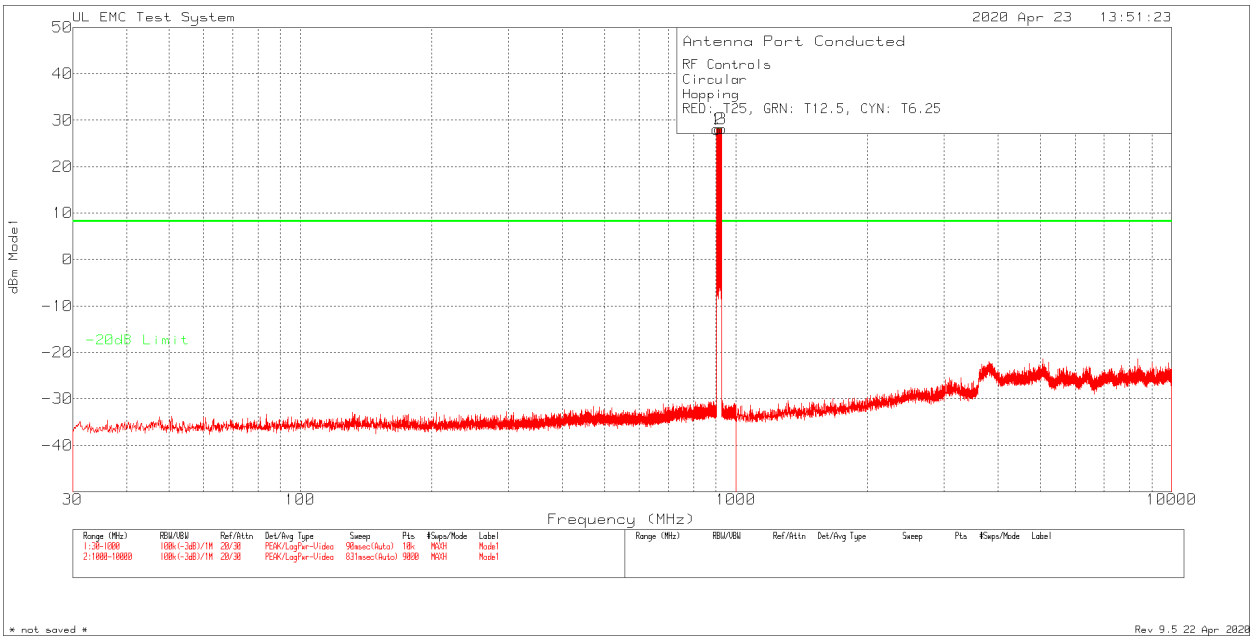
* no spurious emissions recorded.

SPURIOUS EMISSIONS, 30MHz – 10GHz, Circular Polarization Power Setting, T12.5



No.	Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading dBm	Limit:1
T12.5						
4	902.709	-2.95dBm Pk	31	0	28.05	28.24
					Margin (dB)	-.19
5	915.222	-2.87dBm Pk	31	0	28.13	28.24
					Margin (dB)	-.11
6	927.25	-2.73dBm Pk	30.9	0	28.17	28.24
					Margin (dB)	-.07

SPURIOUS EMISSIONS, 30MHz – 10GHz, Circular Polarization Power Setting, T25



No.	Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading dBm	Limit:1
T25						
1	902.709	-2.94dBm Pk	31	0	28.06	28.24
					Margin (dB)	-.18
2	915.222	-2.86dBm Pk	31	0	28.14	28.24
					Margin (dB)	-.1
3	927.25	-2.72dBm Pk	30.9	0	28.18	28.24
					Margin (dB)	-.06

10. RADIATED TEST RESULTS

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 for the 30-1000 MHz range, 9 kHz for peak detection measurements or 9 kHz for quasi-peak detection measurements for the 0.15-30 MHz range and 200 Hz for peak detection measurements or 200 Hz for quasi-peak detection measurements for the 9 to 150 kHz range. Peak detection is used unless otherwise noted as quasi-peak.

For pre-scans above 1GHz – 4GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3MHz, 4GHz-10GHz the resolution bandwidth is set to 500kHz, the video bandwidth is set to 1MHz.

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.

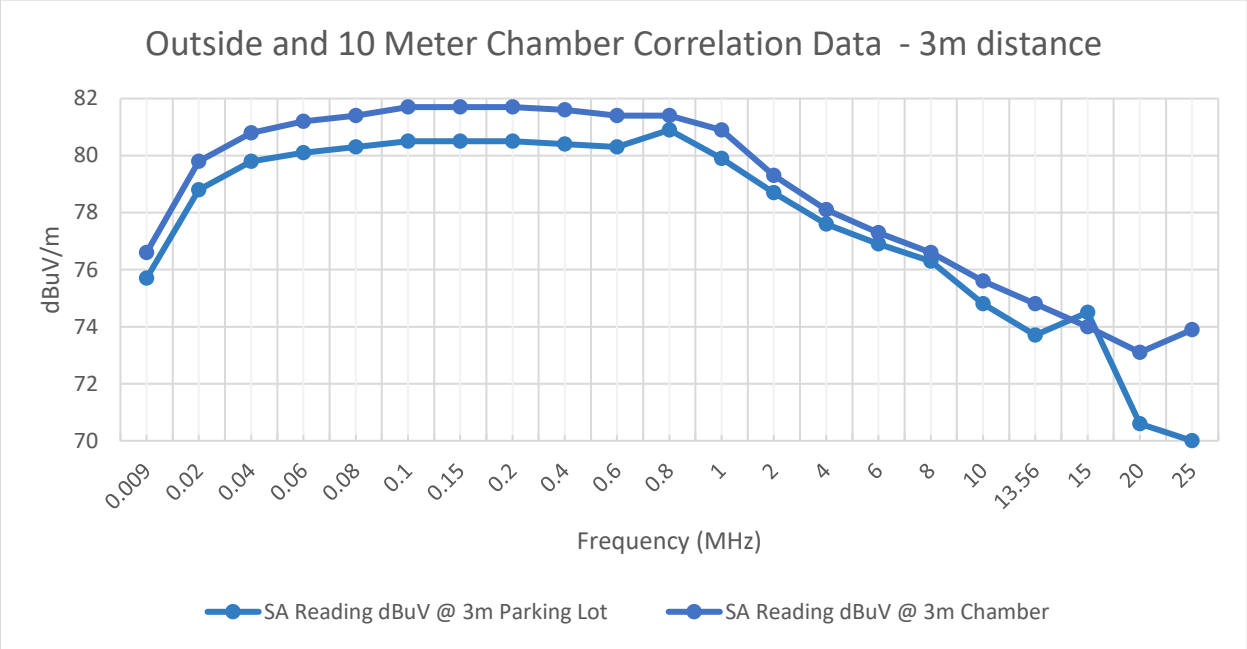
The spectrum from 1 GHz to 10GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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.

10.1. RADIATED SPURIOUS EMISSIONS 9kHz-30MHz

10.1.1. Site correlation Data between 10m SAC and Outside

Correlation Data for measurements 9kHz-30MHz between Outside and 10m semi-anechoic chamber at Underwriter Laboratories in Northbrook, IL.

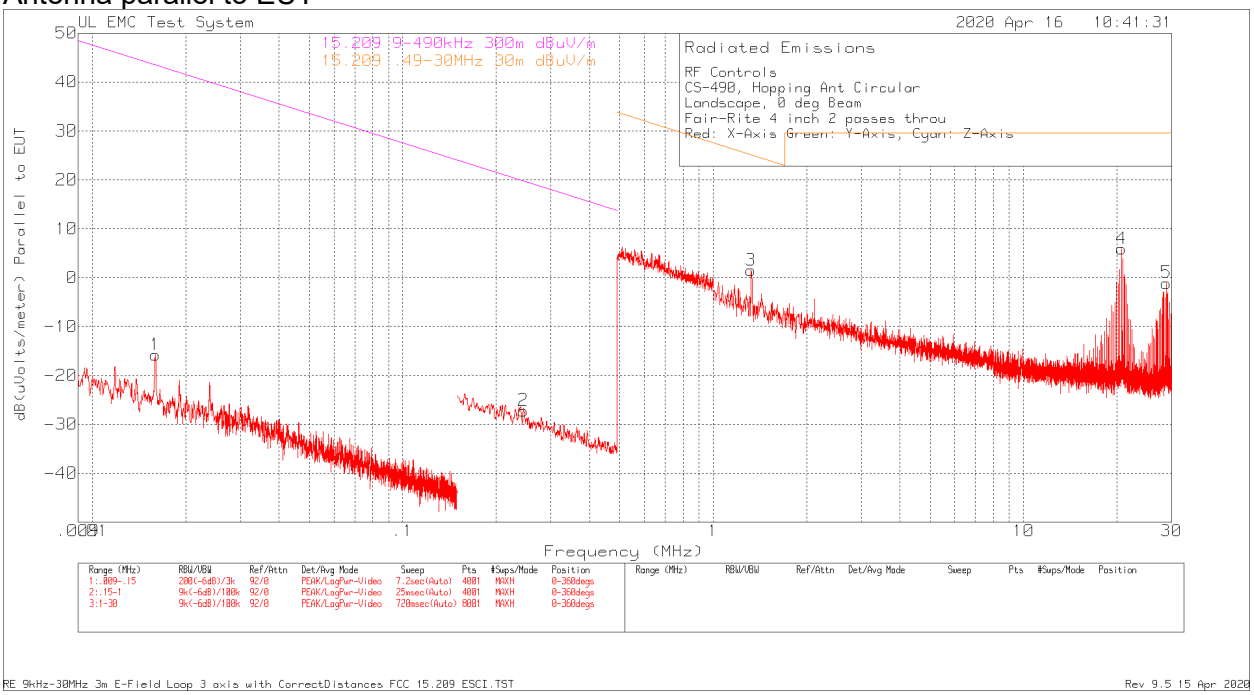


Correlation measurements were conducted using a signal source with an antenna outside in open area (parking lot). Immediately following the measurements the same setup was moved inside the 10 meter semi-anechoic chamber and the measurements were repeated. The above plot shows the difference in levels measured between outside and the 10 meter semi anechoic chamber.

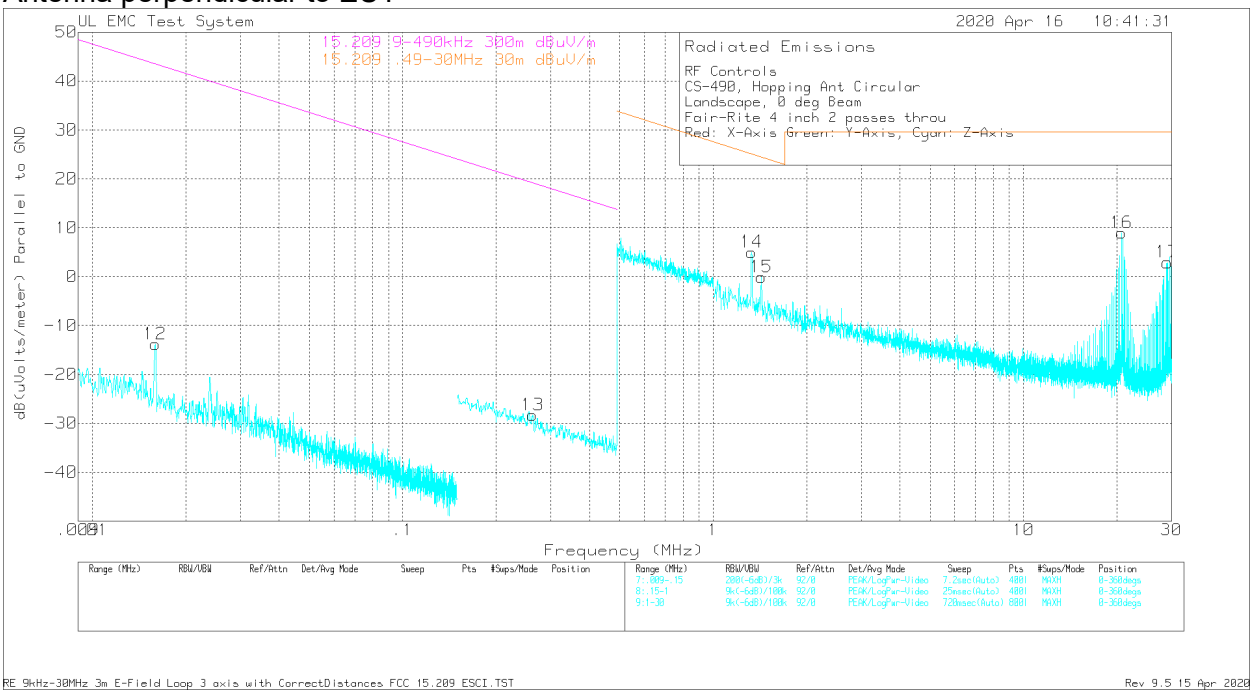
10.1.2. Radiated Spurious emissions 9kHz-30MHz

EUT oriented Landscape, Circular polarization

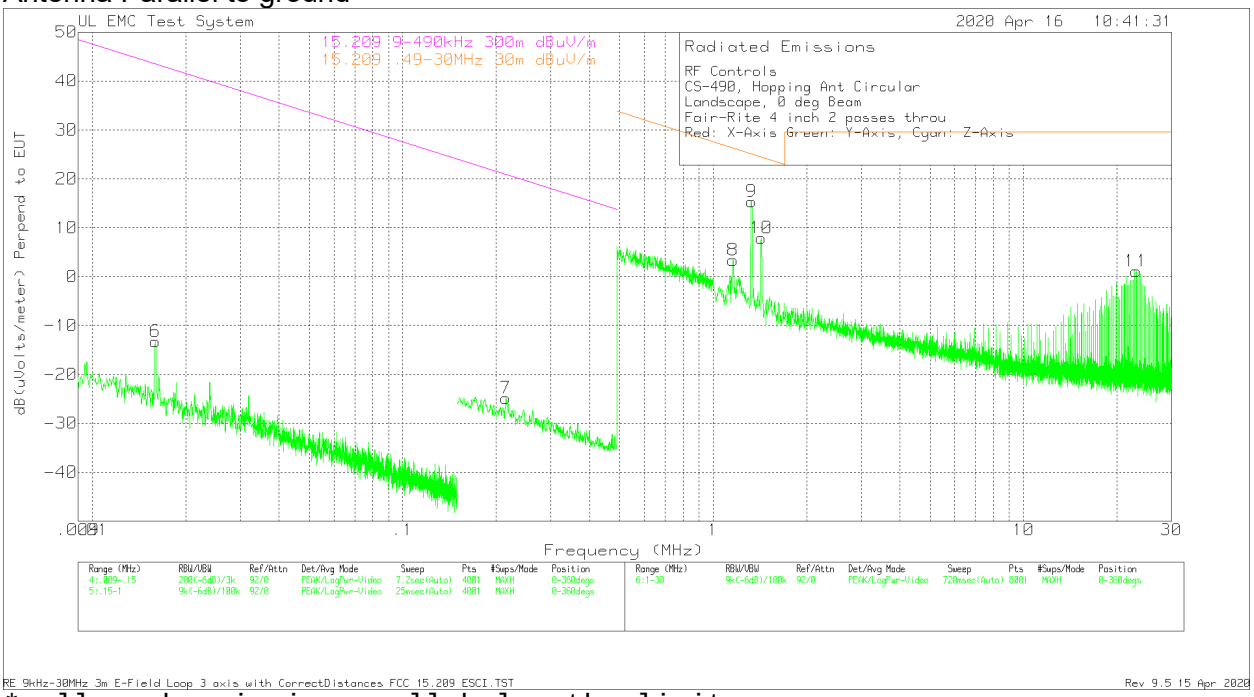
Antenna parallel to EUT



Antenna perpendicular to EUT



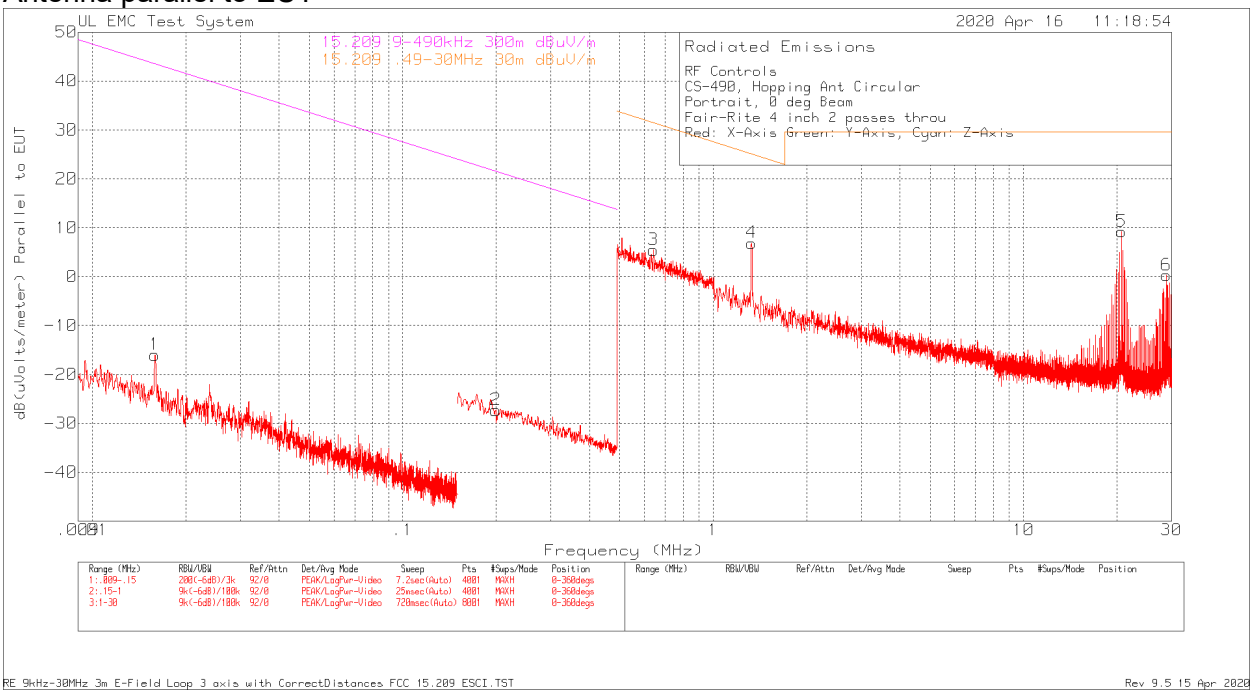
Antenna Parallel to ground



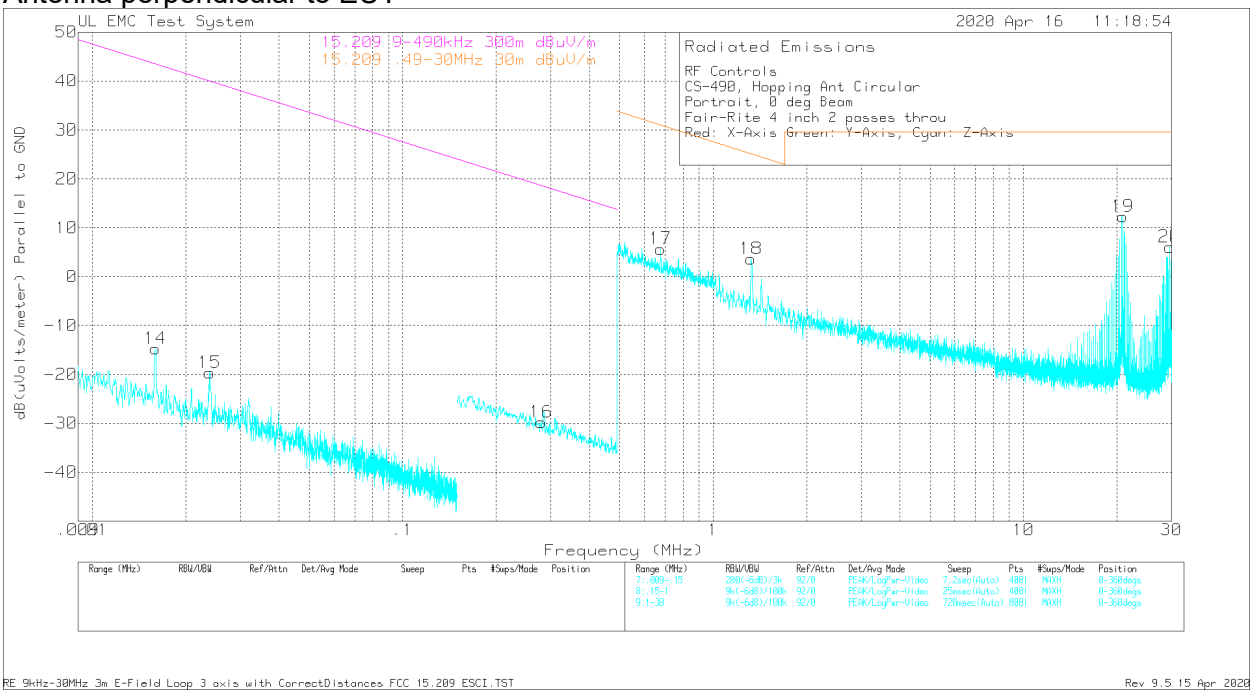
* all peak emissions well below the limits

RF Controls												
CS-490, Hopping Ant Circular												
Landscape, 0 deg Beam												
Fair-Rite 4 inch 2 passes throu												
Red: X-Axis Green: Y-Axis, Cyan: Z-Axis												
Trace MArkers												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	300mTo3m & 30mTo3m dB	Level dBuV/m	Limit 15.209 9-490kHz @300m dBuV/m	Margin (dB)	Limit 15.209 .49-30MHz @30m dBuV/m	Margin (dB)	Azimuth [Degs]
Parallel to EUT												
1	0.01593	43.19	Pk	20.9	0.1	-80	-15.81	43.55	-59.36	-	-	0-360
2	0.24521	40.99	Pk	11.7	0.1	-80	-27.21	19.81	-47.02	-	-	0-360
3	1.32625	29.29	Pk	12.1	0.1	-40	1.49	-	-	25.14	-23.65	0-360
4	20.662	34.85	Pk	10.5	0.5	-40	5.85	-	-	29.54	-23.69	0-360
5	28.82913	29	Pk	9.3	0.6	-40	-1.1	-	-	29.54	-30.64	0-360
Perpendicular to EUT												
6	0.01593	45.69	Pk	20.9	0.1	-80	-13.31	43.55	-56.86	-	-	0-360
7	0.21518	43.21	Pk	11.8	0.1	-80	-24.89	20.95	-45.84	-	-	0-360
8	1.1595	31.19	Pk	12.1	0.1	-40	3.39	-	-	26.31	-22.92	0-360
9	1.32988	43.13	Pk	12.1	0.1	-40	15.33	-	-	25.12	-9.79	0-360
10	1.42775	35.69	Pk	12.1	0.1	-40	7.89	-	-	24.5	-16.61	0-360
11	23.06538	30.62	Pk	10	0.5	-40	1.12	-	-	29.54	-28.42	0-360
Parallel to Ground												
12	0.01593	45.22	Pk	20.9	0.1	-80	-13.78	43.55	-57.33	-	-	0-360
13	0.26225	39.85	Pk	11.7	0.1	-80	-28.35	19.23	-47.58	-	-	0-360
14	1.32988	32.79	Pk	12.1	0.1	-40	4.99	-	-	25.12	-20.13	0-360
15	1.43138	27.67	Pk	12.1	0.1	-40	-0.13	-	-	24.48	-24.61	0-360
16	20.66563	37.93	Pk	10.5	0.5	-40	8.93	-	-	29.54	-20.61	0-360
17	29.072	33.1	Pk	9.3	0.5	-40	2.9	-	-	29.54	-26.64	0-360
Pk - Peak detector												

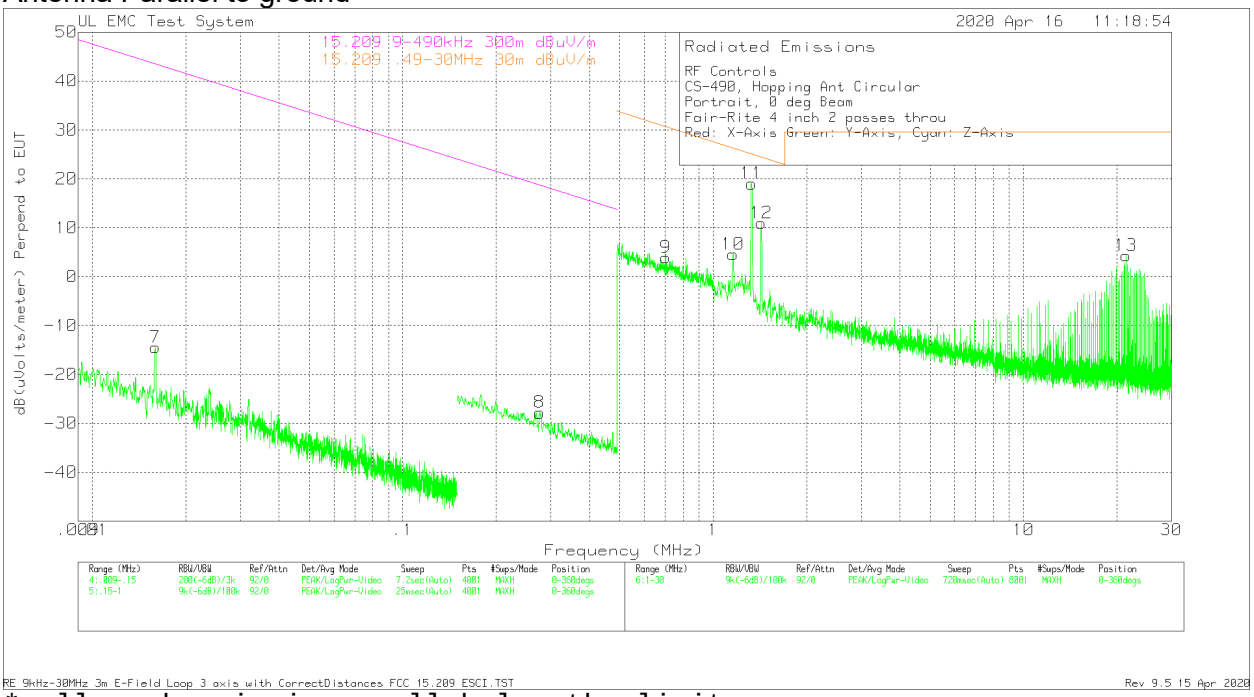
EUT oriented Portrait, Circular polarization
Antenna parallel to EUT



Antenna perpendicular to EUT



Antenna Parallel to ground



* all peak emissions well below the limits

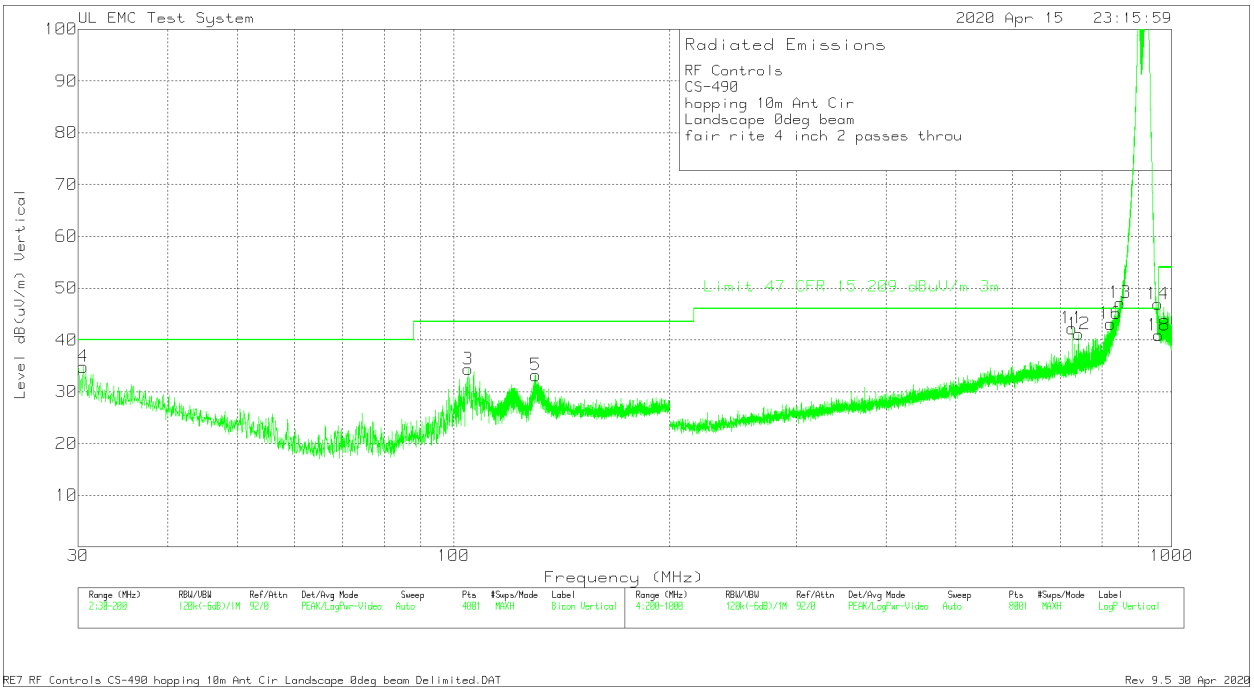
RF Controls
CS-490, Hopping Ant Circular
Portrait, 0 deg Beam
Fair-Rite 4 inch 2 passes throu
Red: X-Axis Green: Y-Axis, Cyan: Z-Axis

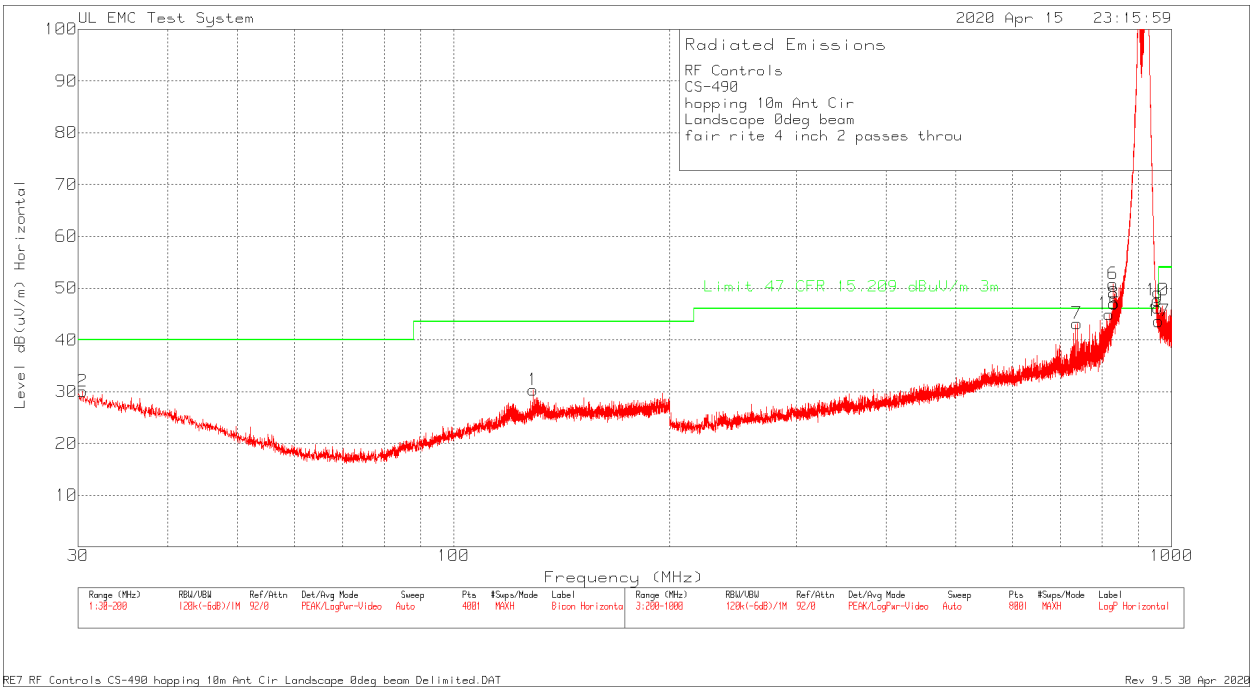
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	300mTo3m & 30mTo3m dB	Level dBuV/m	Limit 15.209 9-490kHz @300m dBuV/m	Margin (dB)	Limit 15.209 .49-30MHz @30m dBuV/m	Margin (dB)	Azimuth [Degs]
Parallel to EUT												
2	0.19942	40.8	Pk	11.8	0.1	-80	-27.3	21.61	-48.91	-	-	0-360
3	0.64182	33.54	Pk	11.8	0.1	-40	5.44	-	-	31.45	-26.01	0-360
4	1.32988	34.69	Pk	12.1	0.1	-40	6.89	-	-	25.12	-18.23	0-360
5	20.662	38.18	Pk	10.5	0.5	-40	9.18	-	-	29.54	-20.36	0-360
6	28.82913	30.36	Pk	9.3	0.6	-40	0.26	-	-	29.54	-29.28	0-360
Perpendicular to EUT												
7	0.01593	44.5	Pk	20.9	0.1	-80	-14.5	43.55	-58.05	-	-	0-360
8	0.2761	40.46	Pk	11.6	0.1	-80	-27.84	18.78	-46.62	-	-	0-360
9	0.70295	31.96	Pk	11.8	0.1	-40	3.86	-	-	30.66	-26.8	0-360
10	1.1595	32.36	Pk	12.1	0.1	-40	4.56	-	-	26.31	-21.75	0-360
11	1.32988	46.81	Pk	12.1	0.1	-40	19.01	-	-	25.12	-6.11	0-360
12	1.42775	38.75	Pk	12.1	0.1	-40	10.95	-	-	24.5	-13.55	0-360
13	21.38338	33.49	Pk	10.3	0.5	-40	4.29	-	-	29.54	-25.25	0-360
Parallel to Ground												
14	0.015965	44.28	Pk	20.9	0.1	-80	-14.72	43.53	-58.25	-	-	0-360
15	0.023875	41.96	Pk	18.3	0.1	-80	-19.64	40.04	-59.68	-	-	0-360
16	0.2795	38.55	Pk	11.6	0.1	-80	-29.75	18.68	-48.43	-	-	0-360
17	0.67718	33.76	Pk	11.8	0.1	-40	5.66	-	-	30.99	-25.33	0-360
18	1.32625	31.45	Pk	12.1	0.1	-40	3.65	-	-	25.14	-21.49	0-360
19	20.90125	41.36	Pk	10.4	0.5	-40	12.26	-	-	29.54	-17.28	0-360
20	29.55413	36.36	Pk	9.2	0.5	-40	6.06	-	-	29.54	-23.48	0-360

Pk - Peak detector

10.2. Radiated Spurious Emissions 30MHz-1GHz

EUT Oriented Landscape, Circular Polarization, Antenna steered 0,0





RF Controls
CS-490
hopping 10m Ant Cir
Landscape 0deg beam
fair rite 4 inch 2 passes throu
Trace MArkers

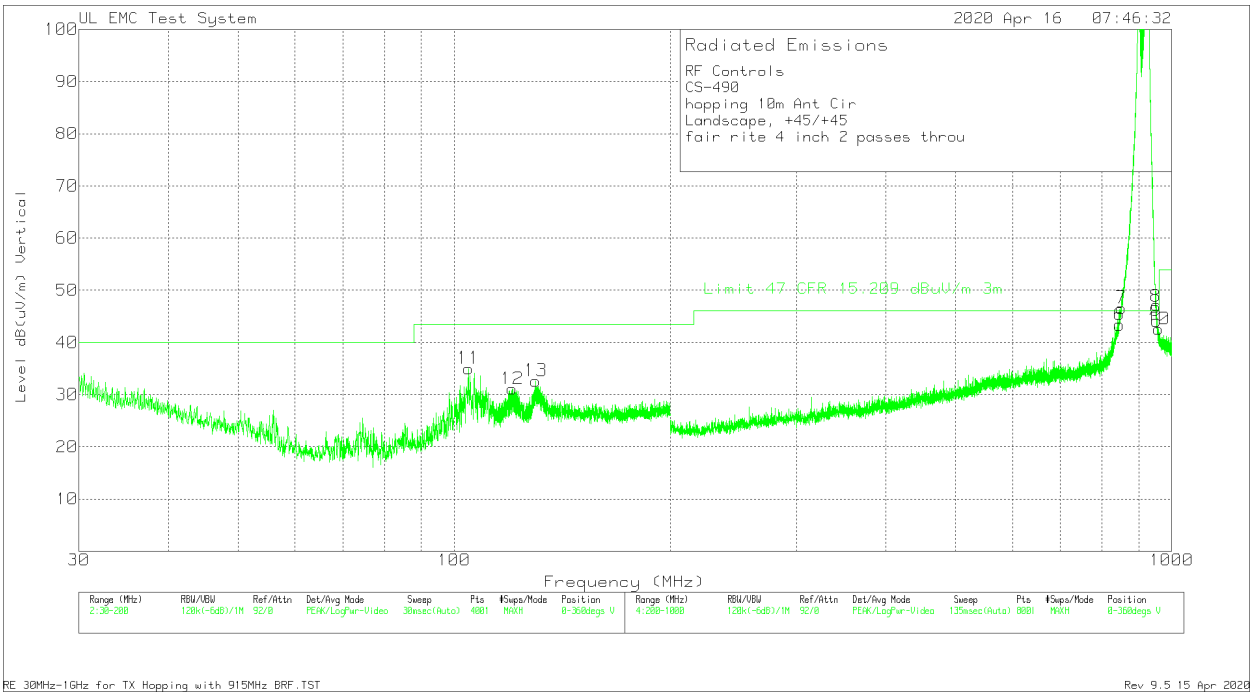
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	BRF Factor dB	Level @ 3m dBuV/m	Limit 47 CFR 15.209 @ 3m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	* 129.025	35.6	Pk	14	-29.8	10.5	-	30.3	43.52	-13.22	0-360	401	H
2	30.425	31.75	Pk	17.9	-30.1	10.5	-	30.05	-	-	0-360	251	H
3	104.7575	42.15	Pk	11.5	-29.8	10.5	-	34.35	-	-	0-360	101	V
4	30.4675	36.51	Pk	17.9	-30.1	10.5	-	34.81	-	-	0-360	101	V
5	* 130.215	38.37	Pk	14.1	-29.8	10.5	-	33.17	43.52	-10.35	0-360	101	V
6	829.3	41.4	Pk	23.1	-27.5	10.5	3.3	50.8	-	-	0-360	99	H
7	738.3	38.52	Pk	20.9	-27.3	10.5	0.5	43.12	-	-	0-360	99	H
8	830.8	37.37	Pk	23.1	-27.5	10.5	3.6	47.07	-	-	0-360	99	H
9	958	34.59	Pk	24	-27.1	10.5	4.2	46.19	-	-	0-360	199	H
10	955.9	35.08	Pk	24	-27	10.5	5.1	47.68	-	-	0-360	99	H
15	818	37.65	Pk	22.7	-27.5	10.5	1.6	44.95	-	-	0-360	99	H
17	* 960	32.51	Pk	24.1	-27.1	10.5	3.6	43.61	46.02	-2.41	0-360	99	H
11	726.3	37.62	Pk	20.8	-27.2	10.5	0.5	42.22	-	-	0-360	199	V
12	742.8	36.2	Pk	21.1	-27.2	10.5	0.5	41.1	-	-	0-360	199	V
13	847.7	31.93	Pk	23.2	-27.5	10.5	9	47.13	-	-	0-360	399	V
14	956.7	34.61	Pk	24.1	-27	10.5	4.7	46.91	-	-	0-360	99	V
16	822.3	35.1	Pk	22.8	-27.4	10.5	2.1	43.1	-	-	0-360	299	V
18	* 960	29.77	Pk	24.1	-27.1	10.5	3.6	40.87	46.02	-5.15	0-360	299	V

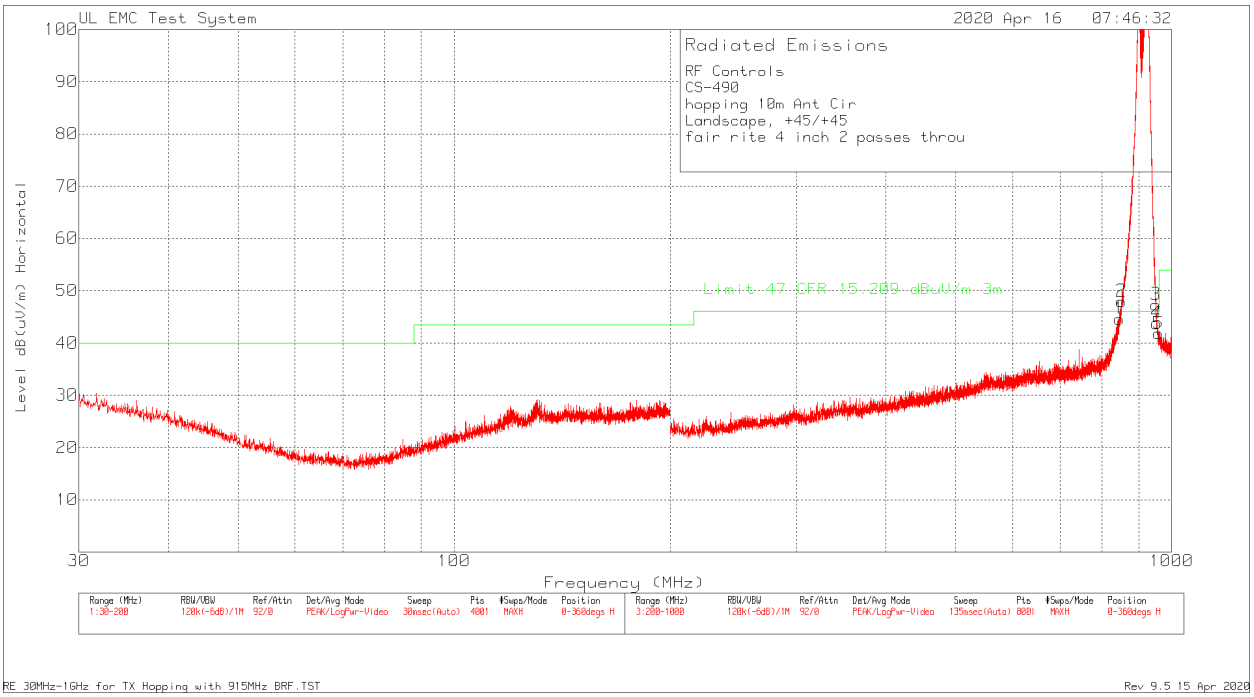
Radiated Emission Data

	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	BRF Factor dB	Level @ 3m dBuV/m	Limit 47 CFR 15.209 @ 3m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	30.5112	33.56	Qp	17.9	-30.1	10.5	-	31.86	-	-	212	112	V
	738.3	36.59	Qp	20.9	-27.3	10.5	0.5	41.19	-	-	191	100	H
	726.3	33.71	Qp	20.8	-27.2	10.5	0.5	38.31	-	-	190	189	V

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

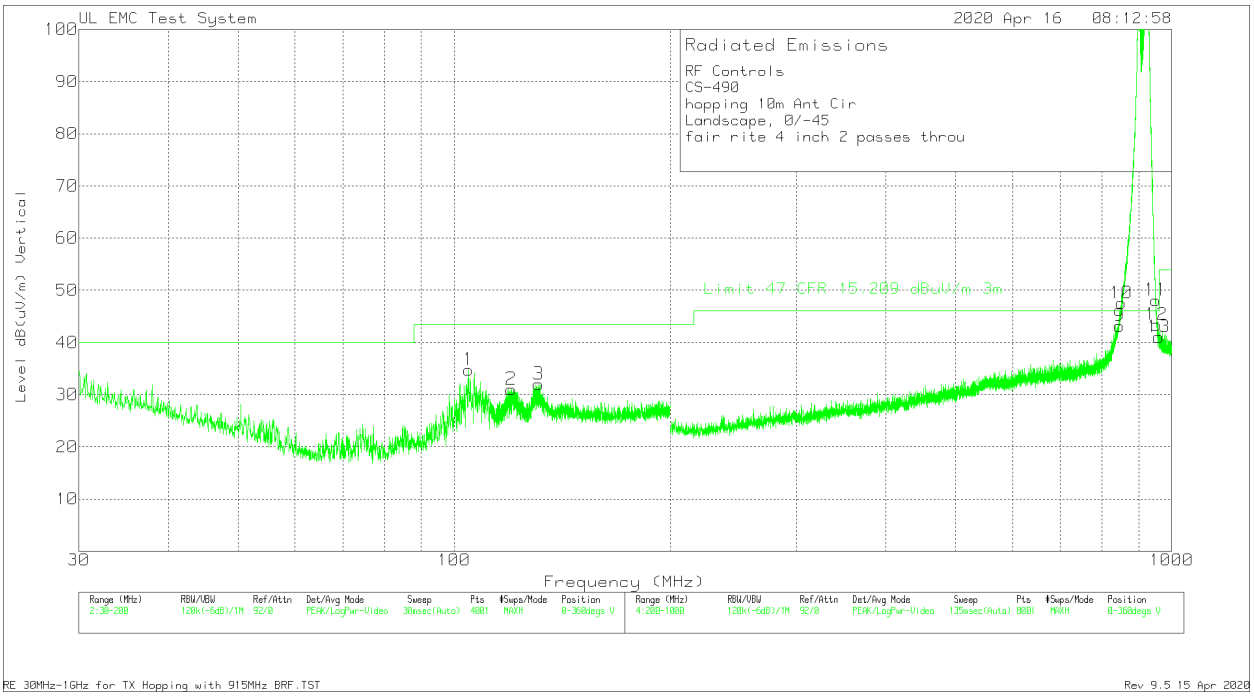
EUT Oriented Landscape, Circular Polarization, Antenna steered 45,45

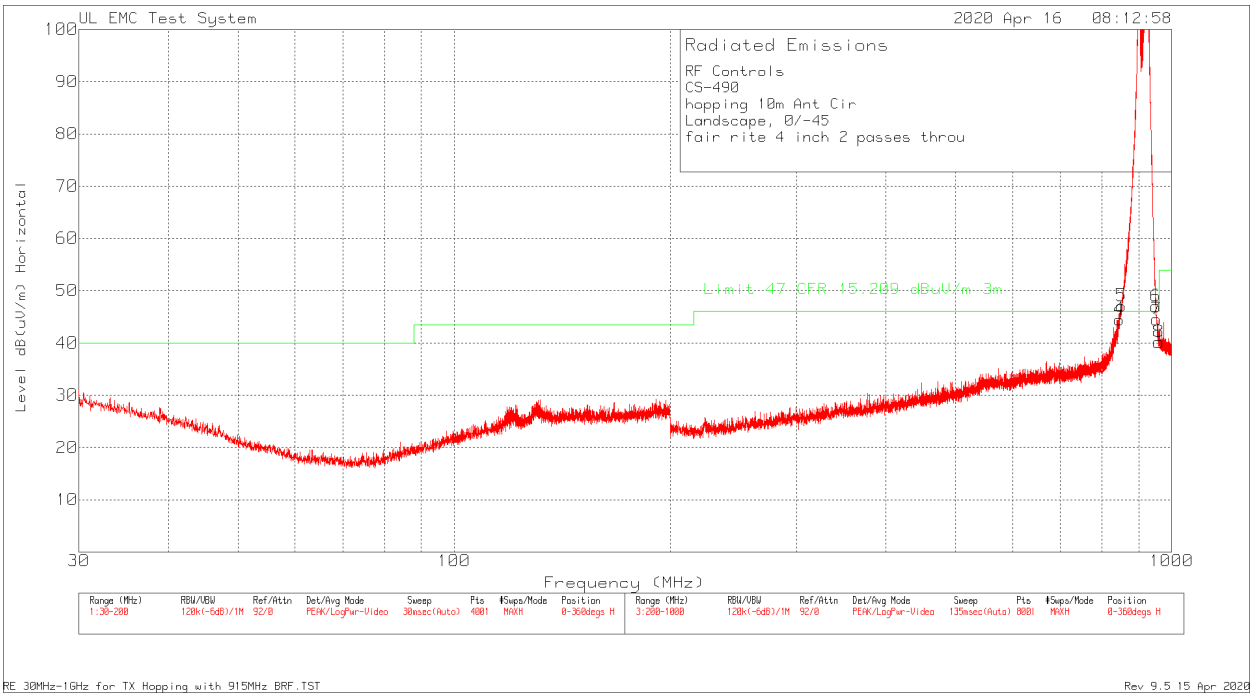




RF Controls													
CS-490													
hopping 10m Ant Cir													
Landscape, +45/+45													
fair rite 4 inch 2 passes throu													
Trace MArkers													
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	BRF Factor dB	Level @ 3m dBuV/m	Limit 47 CFR 15.209 @ 3m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
11	104.7575	42.83	Pk	11.5	-29.8	10.5	-	35.03	-	-	0-360	101	V
12	* 120.61	37.02	Pk	13.4	-29.8	10.5	-	31.12	43.52	-12.4	0-360	101	V
13	* 130.0025	37.85	Pk	14.1	-29.8	10.5	-	32.65	43.52	-10.87	0-360	101	V
1	845.6	30.43	Pk	23.3	-27.6	10.5	8	44.63	-	-	0-360	100	H
2	850.8	30.97	Pk	23.2	-27.3	10.5	10.6	47.97	-	-	0-360	299	H
3	951.1	30.63	Pk	23.9	-27.1	10.5	9.4	47.33	-	-	0-360	299	H
4	952.2	28.37	Pk	23.9	-27	10.5	8	43.77	-	-	0-360	100	H
5	* 960	30.6	Pk	24.1	-27.1	10.5	3.7	41.8	46.02	-4.22	0-360	299	H
6	845.6	29.2	Pk	23.3	-27.6	10.5	8	43.4	-	-	0-360	299	V
7	850.8	29.59	Pk	23.2	-27.3	10.5	10.6	46.59	-	-	0-360	199	V
8	951.1	30.16	Pk	23.9	-27.1	10.5	9.4	46.86	-	-	0-360	299	V
9	952.3	28.86	Pk	23.9	-27	10.5	7.9	44.16	-	-	0-360	99	V
10	* 960	31.37	Pk	24.1	-27.1	10.5	3.7	42.57	46.02	-3.45	0-360	99	V
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band													
Pk - Peak detector													

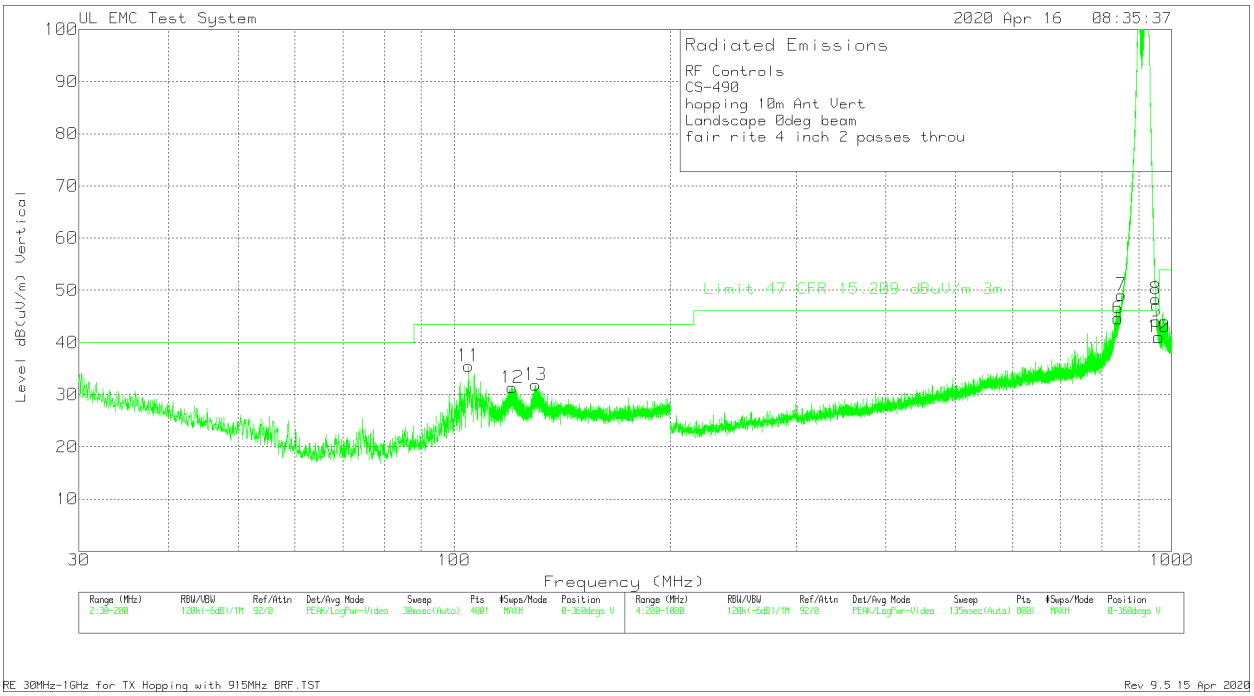
EUT Oriented Landscape, Circular Polarization, Antenna steered 0,-45

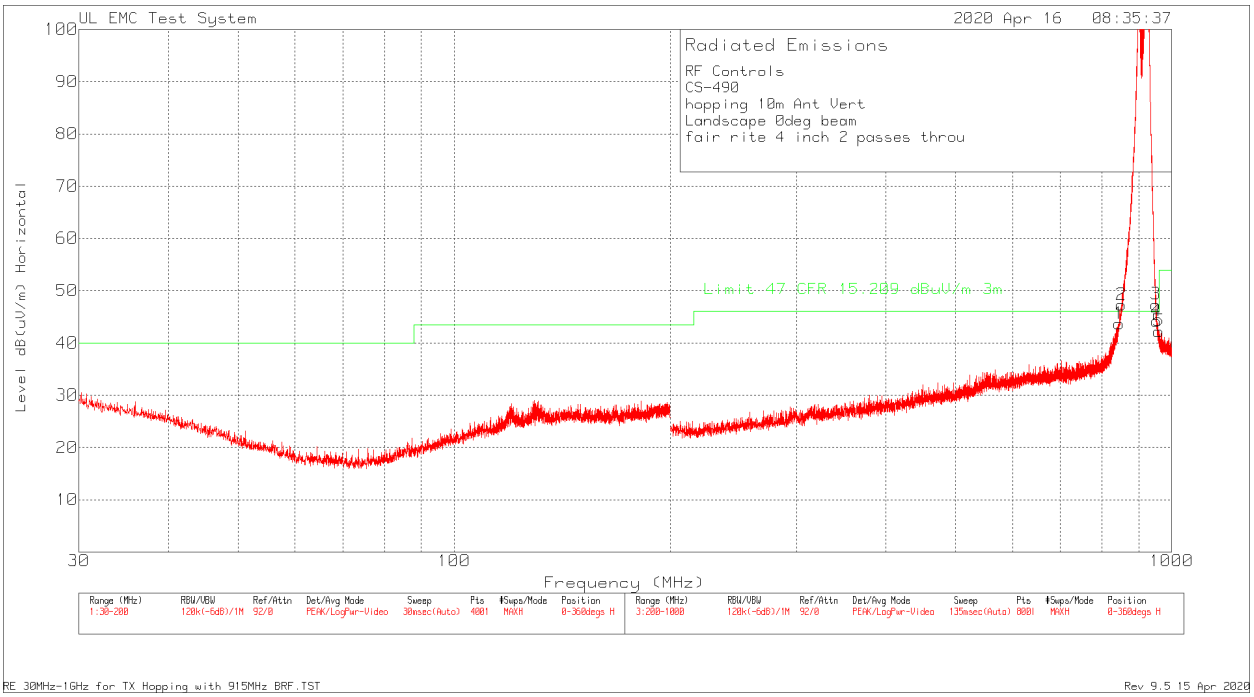




RF Controls													
CS-490													
hopping 10m Ant Cir													
Landscape, 0/-45													
fair rite 4 inch 2 passes throu													
Trace MArkers													
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	BRF Factor dB	Level @ 3m dBuV/m	Limit 47 CFR 15.209 @ 3m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	104.7575	42.58	Pk	11.5	-29.8	10.5	-	34.78	-	-	0-360	101	V
2	* 120.1425	37.03	Pk	13.3	-29.8	10.5	-	31.03	43.52	-12.49	0-360	101	V
3	* 131.15	37.2	Pk	14.1	-29.8	10.5	-	32	43.52	-11.52	0-360	101	V
4	845.8	30.18	Pk	23.3	-27.6	10.5	8.1	44.48	-	-	0-360	199	H
5	851.4	29.8	Pk	23.2	-27.3	10.5	10.9	47.1	-	-	0-360	99	H
6	950.5	29.51	Pk	23.9	-27.1	10.5	10.2	47.01	-	-	0-360	399	H
7	952.5	29.32	Pk	24	-27	10.5	7.7	44.52	-	-	0-360	399	H
8	* 960	29.06	Pk	24.1	-27.1	10.5	3.6	40.16	46.02	-5.86	0-360	99	H
9	845.8	28.85	Pk	23.3	-27.6	10.5	8.1	43.15	-	-	0-360	98	V
10	851.3	30.23	Pk	23.2	-27.3	10.5	10.9	47.53	-	-	0-360	98	V
11	950.4	30.49	Pk	23.9	-27.1	10.5	10.3	48.09	-	-	0-360	199	V
12	952.6	28.31	Pk	24	-27	10.5	7.6	43.41	-	-	0-360	298	V
13	* 960	29.94	Pk	24.1	-27.1	10.5	3.6	41.04	46.02	-4.98	0-360	98	V
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band													
Pk - Peak detector													

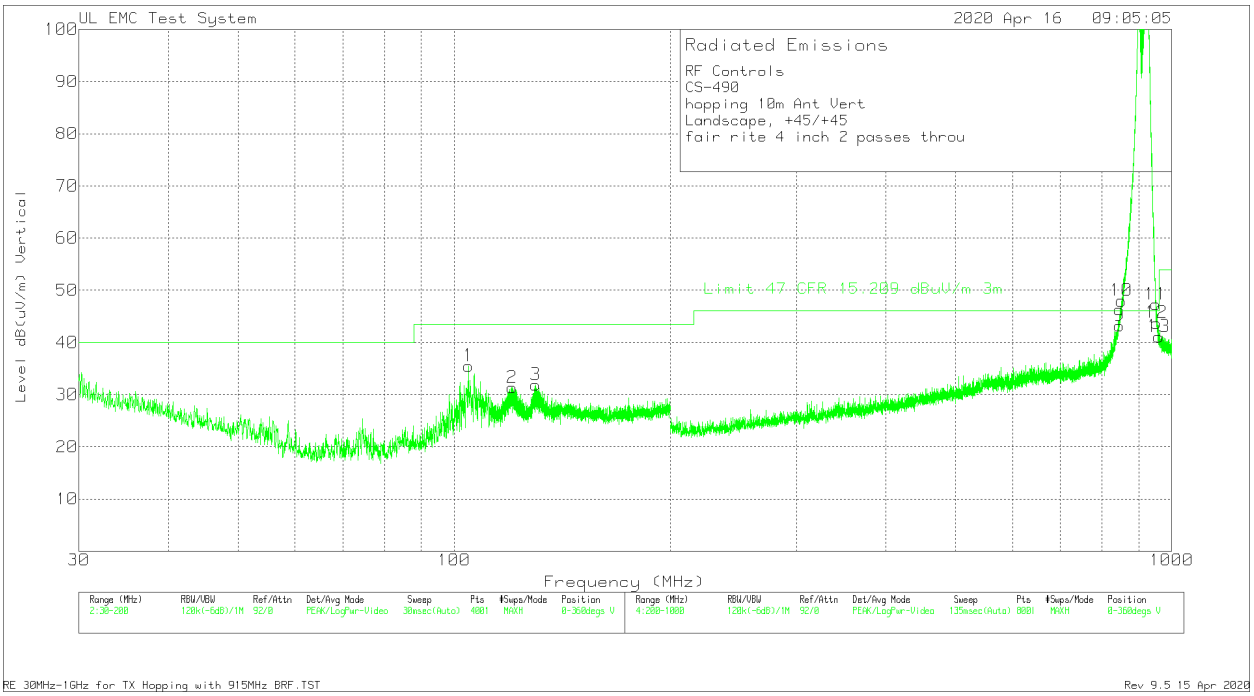
EUT Oriented Landscape, Vertical Polarization, Antenna steered 0,0

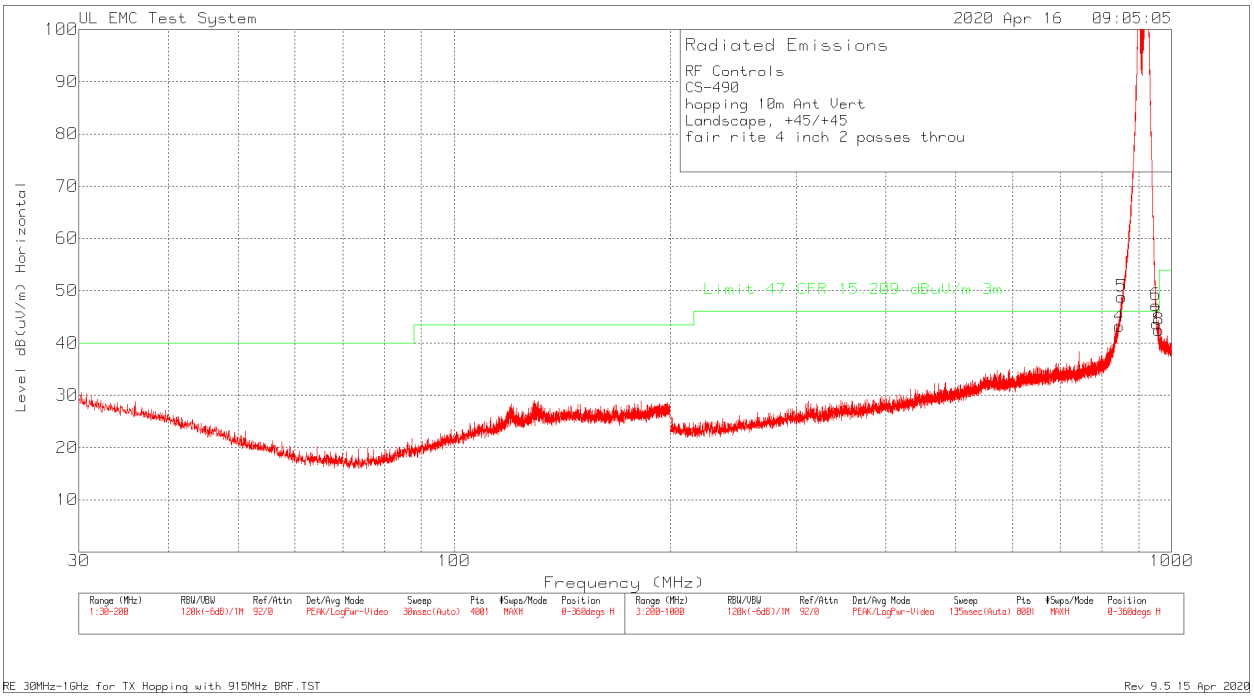




RF Controls													
CS-490													
hopping 10m Ant Vert													
Landscape 0deg beam													
fair rite 4 inch 2 passes throu													
Trace MArkers													
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	BRF Factor dB	Level @ 3m dBuV/m	Limit 47 CFR 15.209 @ 3m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
11	104.7575	43.33	Pk	11.5	-29.8	10.5	-	35.53	-	-	0-360	101	V
12	* 120.61	37.27	Pk	13.4	-29.8	10.5	-	31.37	43.52	-12.15	0-360	101	V
13	* 129.96	37.09	Pk	14.1	-29.8	10.5	-	31.89	43.52	-11.63	0-360	101	V
1	845.1	29.67	Pk	23.3	-27.6	10.5	7.8	43.67	-	-	0-360	100	H
2	851.4	30.01	Pk	23.2	-27.3	10.5	10.9	47.31	-	-	0-360	100	H
3	950.4	29.77	Pk	23.9	-27.1	10.5	10.3	47.37	-	-	0-360	399	H
4	952.9	29.39	Pk	24	-27	10.5	7.3	44.19	-	-	0-360	399	H
5	* 960	31.16	Pk	24.1	-27.1	10.5	3.6	42.26	46.02	-3.76	0-360	299	H
6	843	31.55	Pk	23.2	-27.6	10.5	7	44.65	-	-	0-360	299	V
7	850.9	32.08	Pk	23.2	-27.3	10.5	10.6	49.08	-	-	0-360	199	V
8	950.3	30.52	Pk	23.9	-27.1	10.5	10.5	48.32	-	-	0-360	199	V
9	952.9	29.3	Pk	24	-27	10.5	7.3	44.1	-	-	0-360	98	V
10	* 960	29.94	Pk	24.1	-27.1	10.5	3.6	41.04	46.02	-4.98	0-360	98	V
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band													
Pk - Peak detector													

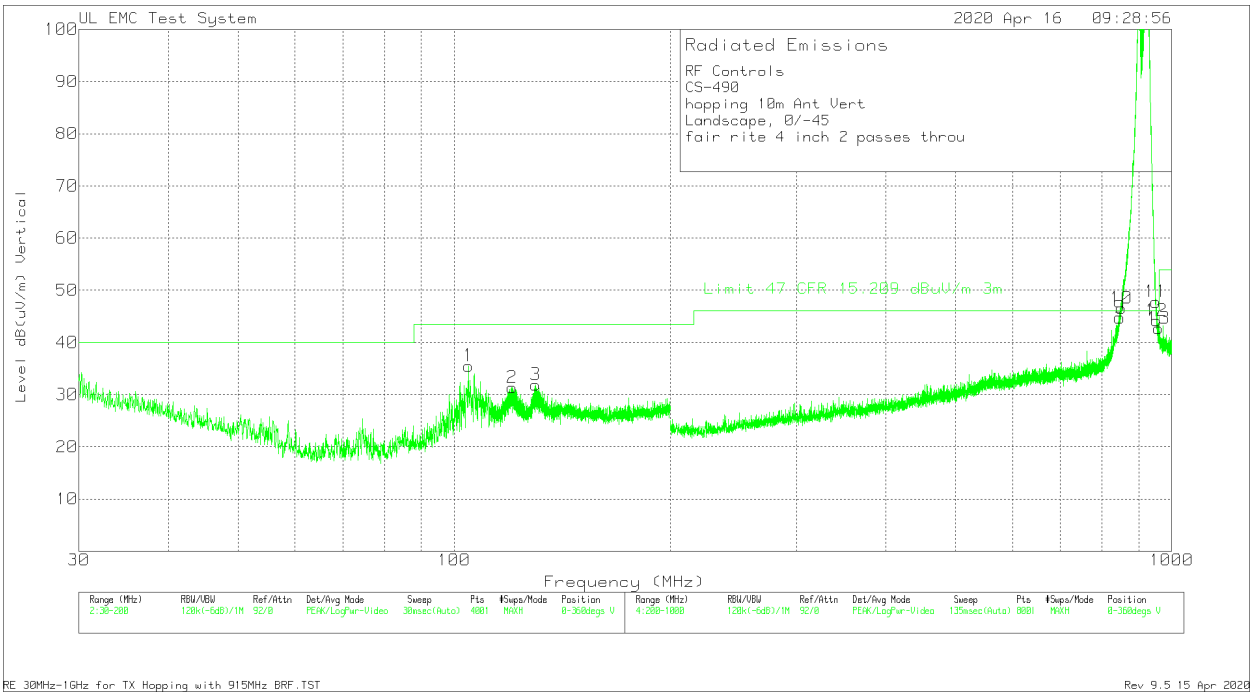
EUT Oriented Landscape, Vertical Polarization, Antenna steered 45,45

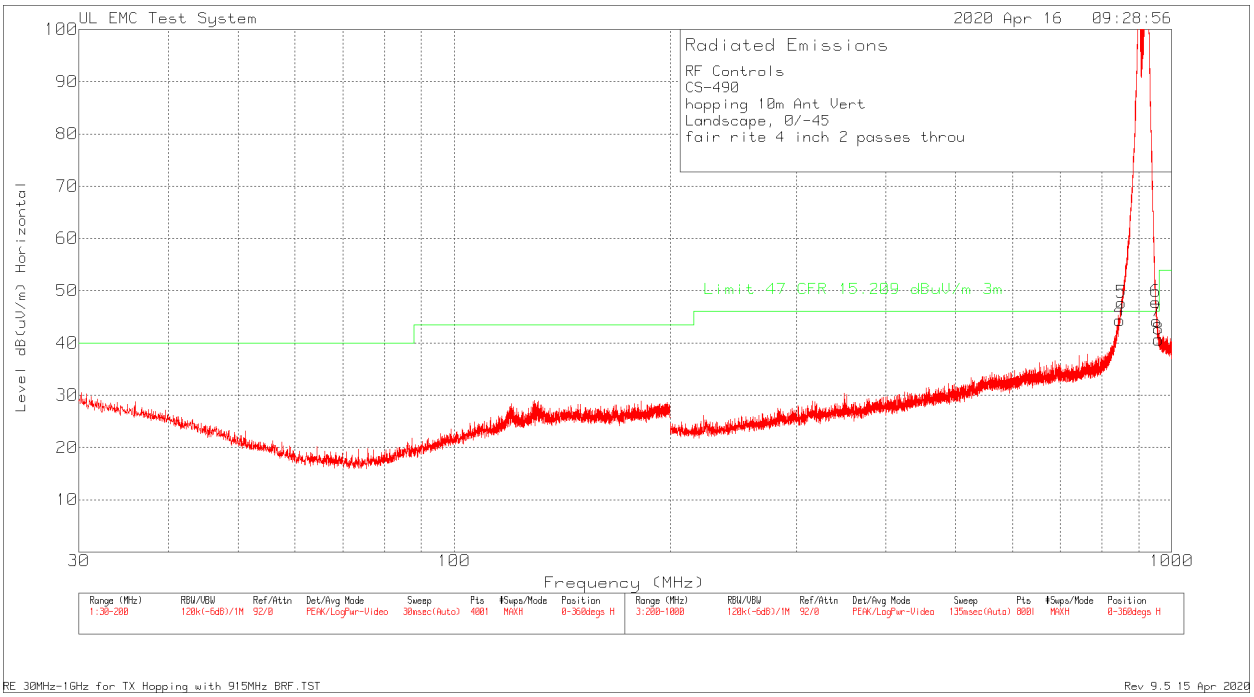




RF Controls													
CS-490													
hopping 10m Ant Vert													
Landscape, +45/+45													
fair rite 4 inch 2 passes throu													
Trace MArkers													
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	BRF Factor dB	Level @ 3m dBuV/m	Limit 47 CFR 15.209 @ 3m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	104.7575	43.33	Pk	11.5	-29.8	10.5	-	35.53	-	-	0-360	101	V
2	* 120.61	37.27	Pk	13.4	-29.8	10.5	-	31.37	43.52	-12.15	0-360	101	V
3	* 129.96	37.09	Pk	14.1	-29.8	10.5	-	31.89	43.52	-11.63	0-360	101	V
4	845.8	28.88	Pk	23.3	-27.6	10.5	8.1	43.18	-	-	0-360	100	H
5	852	31.16	Pk	23.2	-27.3	10.5	11.3	48.86	-	-	0-360	299	H
6	950.5	29.74	Pk	23.9	-27.1	10.5	10.2	47.24	-	-	0-360	199	H
7	952.7	28.7	Pk	24	-27	10.5	7.5	43.7	-	-	0-360	199	H
8	* 960	31.31	Pk	24.1	-27.1	10.5	3.7	42.51	46.02	-3.51	0-360	199	H
9	845.5	29.04	Pk	23.3	-27.6	10.5	8	43.24	-	-	0-360	99	V
10	851.6	30.6	Pk	23.2	-27.3	10.5	11	48	-	-	0-360	399	V
11	950.6	30	Pk	23.9	-27.1	10.5	10	47.3	-	-	0-360	99	V
12	953	29.06	Pk	24	-27	10.5	7.2	43.76	-	-	0-360	399	V
13	* 960	29.9	Pk	24.1	-27.1	10.5	3.7	41.1	46.02	-4.92	0-360	199	V
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band													
Pk - Peak detector													

EUT Oriented Landscape, Vertical Polarization, Antenna steered 0,-45





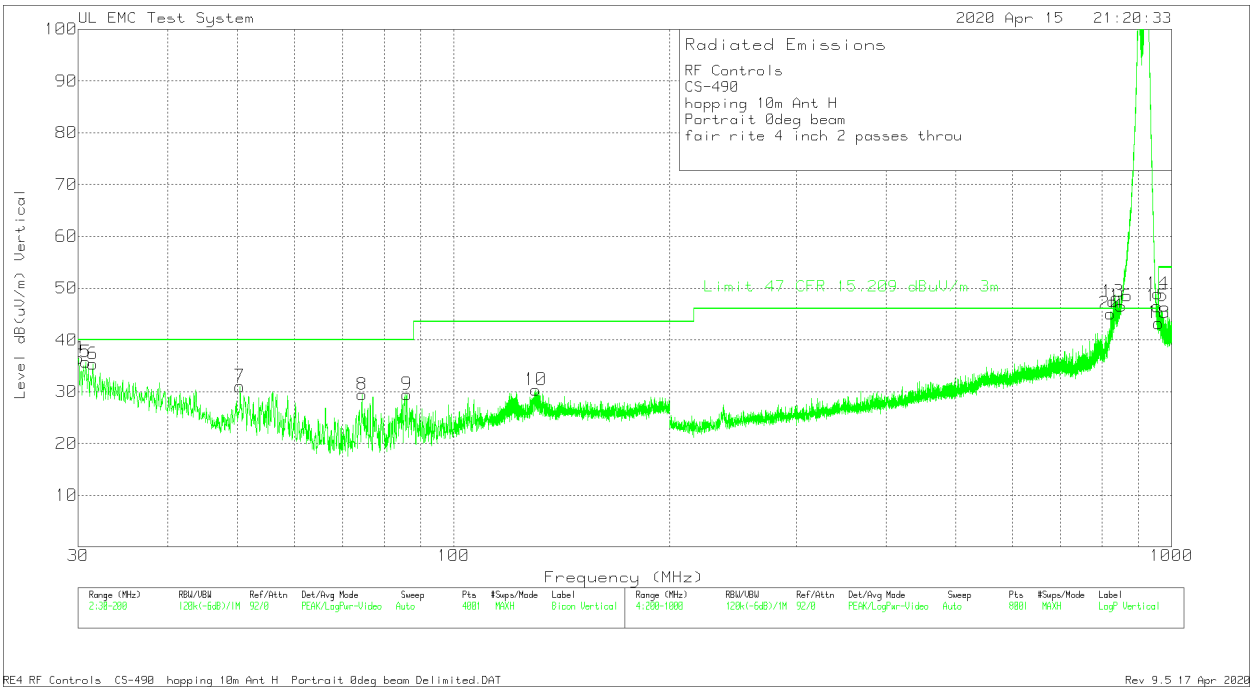
RF Controls
CS-490
hopping 10m Ant Vert
Landscape, 0/-45
fair rite 4 inch 2 passes throu
Trace MArkers

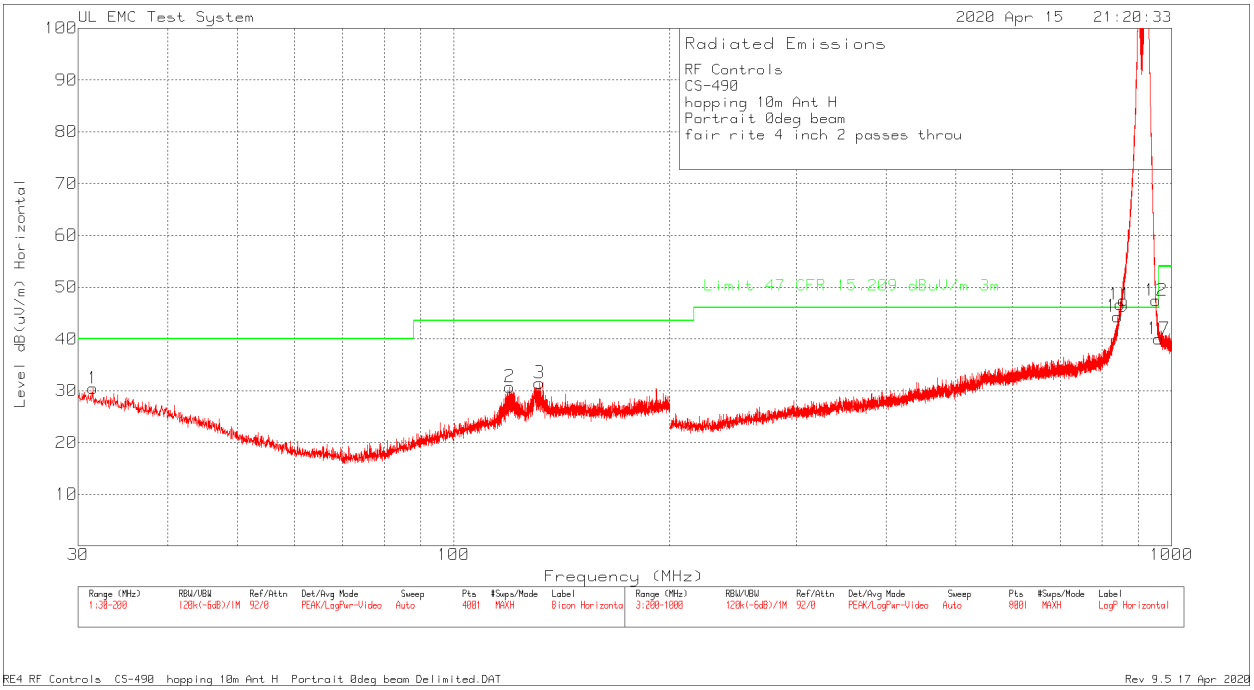
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	BRF Factor dB	Level @ 3m dBuV/m	Limit 47 CFR 15.209 @ 3m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	104.7575	43.33	Pk	11.5	-29.8	10.5	-	35.53	-	-	0-360	101	V
2	* 120.61	37.27	Pk	13.4	-29.8	10.5	-	31.37	43.52	-12.15	0-360	101	V
3	* 129.96	37.09	Pk	14.1	-29.8	10.5	-	31.89	43.52	-11.63	0-360	101	V
4	846.7	29.49	Pk	23.3	-27.5	10.5	8.5	44.29	-	-	0-360	99	H
5	851.4	30.43	Pk	23.2	-27.3	10.5	10.9	47.73	-	-	0-360	299	H
6	950.6	30.57	Pk	23.9	-27.1	10.5	10	47.87	-	-	0-360	299	H
7	952.9	29.37	Pk	24	-27	10.5	7.3	44.17	-	-	0-360	399	H
8	* 960	29.46	Pk	24.1	-27.1	10.5	3.7	40.66	46.02	-5.36	0-360	99	H
9	846.7	29.97	Pk	23.3	-27.5	10.5	8.5	44.77	-	-	0-360	399	V
10	851.4	29.24	Pk	23.2	-27.3	10.5	10.9	46.54	-	-	0-360	99	V
11	950.5	30.26	Pk	23.9	-27.1	10.5	10.2	47.76	-	-	0-360	298	V
12	952.9	29.39	Pk	24	-27	10.5	7.3	44.19	-	-	0-360	399	V
13	* 960	31.48	Pk	24.1	-27.1	10.5	3.7	42.68	46.02	-3.34	0-360	399	V

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

UL LLC
333 Pfingsten Road, Northbrook, IL 60062; USA TEL:(847) 272-8800

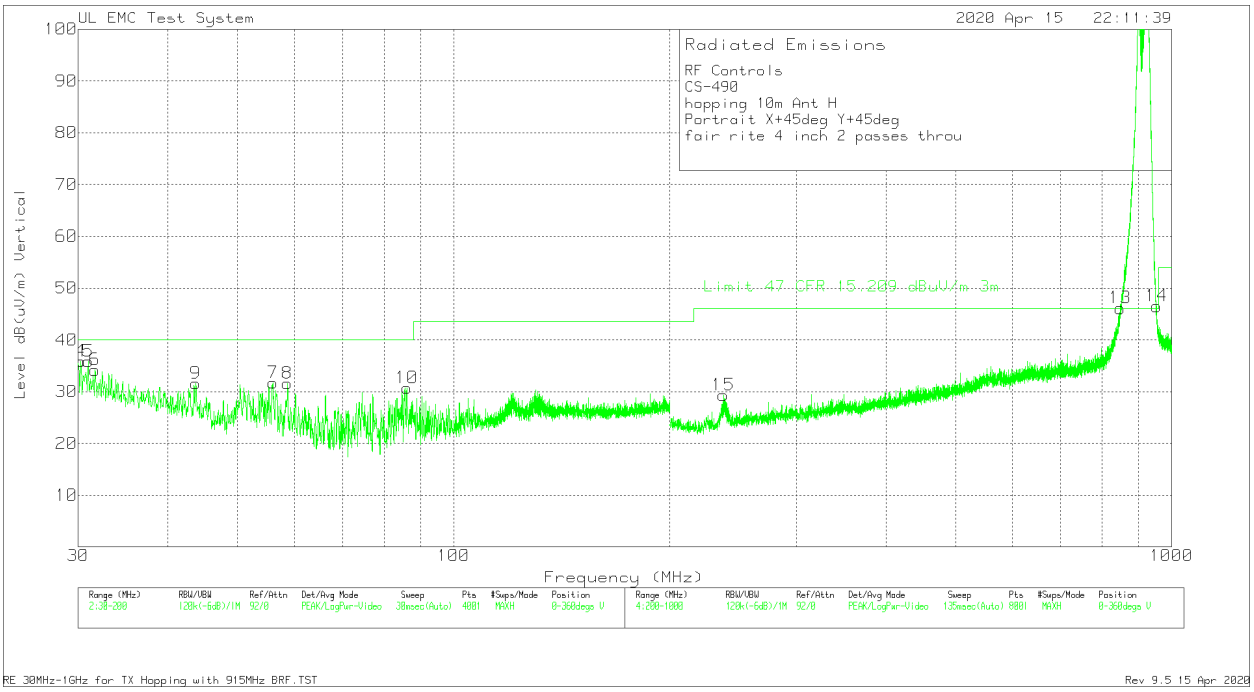
EUT Oriented Portrait, Horizontal Polarization, Antenna steered 0,0

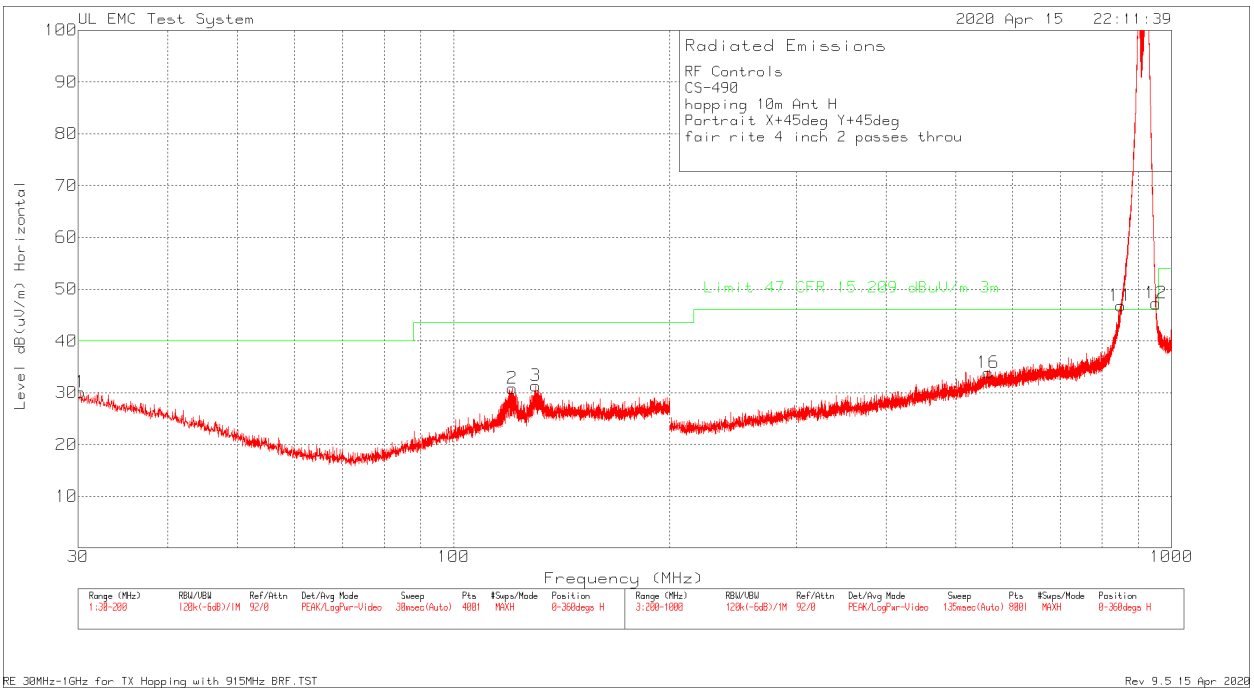




RF Controls													
CS-490													
hopping 10m Ant H													
Portrait 0deg beam													
fair rite 4 inch 2 passes throu													
Trace MArkers													
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	BRF Factor dB	Level @ 3m dBuV/m	Limit 47 CFR 15.209 @ 3m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	31.445	32.55	Pk	17.5	-30.1	10.5	-	30.45	-	-	0-360	251	H
2	* 119.6325	36.76	Pk	13.3	-29.8	10.5	-	30.76	43.52	-12.76	0-360	401	H
3	* 131.66	36.6	Pk	14.2	-29.8	10.5	-	31.5	43.52	-12.02	0-360	401	H
4	30.0425	37.99	Pk	18.1	-30.1	10.5	-	36.49	-	-	0-360	101	V
5	30.7225	37.51	Pk	17.8	-30.1	10.5	-	35.71	-	-	0-360	101	V
6	31.445	37.43	Pk	17.5	-30.1	10.5	-	35.33	-	-	0-360	101	V
7	50.4425	40.63	Pk	10	-30.1	10.5	-	31.03	-	-	0-360	101	V
8	74.54	42.56	Pk	6.4	-30	10.5	-	29.46	-	-	0-360	251	V
9	86.0575	40.61	Pk	8.3	-29.9	10.5	-	29.51	-	-	0-360	101	V
10	130.215	35.57	Pk	14.1	-29.8	10.5	-	30.37	-	-	0-360	101	V
11	847.6	31.57	Pk	23.2	-27.5	10.5	8.9	46.67	-	-	0-360	99	H
12	951.9	31.58	Pk	23.9	-27	10.5	8.4	47.38	-	-	0-360	99	H
17	824.3	31.87	Pk	22.9	-27.5	10.5	2.4	40.17	-	-	0-360	299	H
19	* 960	30.53	Pk	24.1	-27.1	10.5	3.7	41.73	46.02	-4.29	0-360	399	H
13	828.4	38.21	Pk	23.1	-27.5	10.5	3.1	47.41	-	-	0-360	99	V
14	957.8	37.1	Pk	24	-27	10.5	4.3	48.9	-	-	0-360	299	V
15	955.1	33.4	Pk	24	-27	10.5	5.6	46.5	-	-	0-360	99	V
16	850.7	29.72	Pk	23.2	-27.4	10.5	10.5	46.52	-	-	0-360	99	V
18	822.3	37.44	Pk	22.8	-27.4	10.5	2.1	45.44	-	-	0-360	99	V
20	* 960	33.42	Pk	24.1	-27.1	10.5	3.6	44.52	46.02	-1.5	0-360	199	V
Radiated Emission Data													
	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	EMC4078 Bicon dB/m	BiConPath Amp Attn dB	10m to 3m Factor dB	BRF Factor dB	Corrected Reading Level dB(uV/m)	Limit 47 CFR 15.209 dBuV/m 3m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	30.017798	36.34	Qp	18.1	-30.1	10.5	-	34.84	-	-	344	102	V
	30.75334	35.93	Qp	17.8	-30.1	10.5	-	34.13	-	-	1	101	V
	31.46288	35.8	Qp	17.5	-30.1	10.5	-	33.7	-	-	355	102	V
* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band													
Pk - Peak detector													
Qp - Quasi-Peak detector													

EUT Oriented Portrait, Horizontal Polarization, Antenna steered 45,45





RF Controls
CS-490
hopping 10m Ant H
Portrait X+45deg Y+45deg
fair rite 4 inch 2 passes throu
Trace MArkers

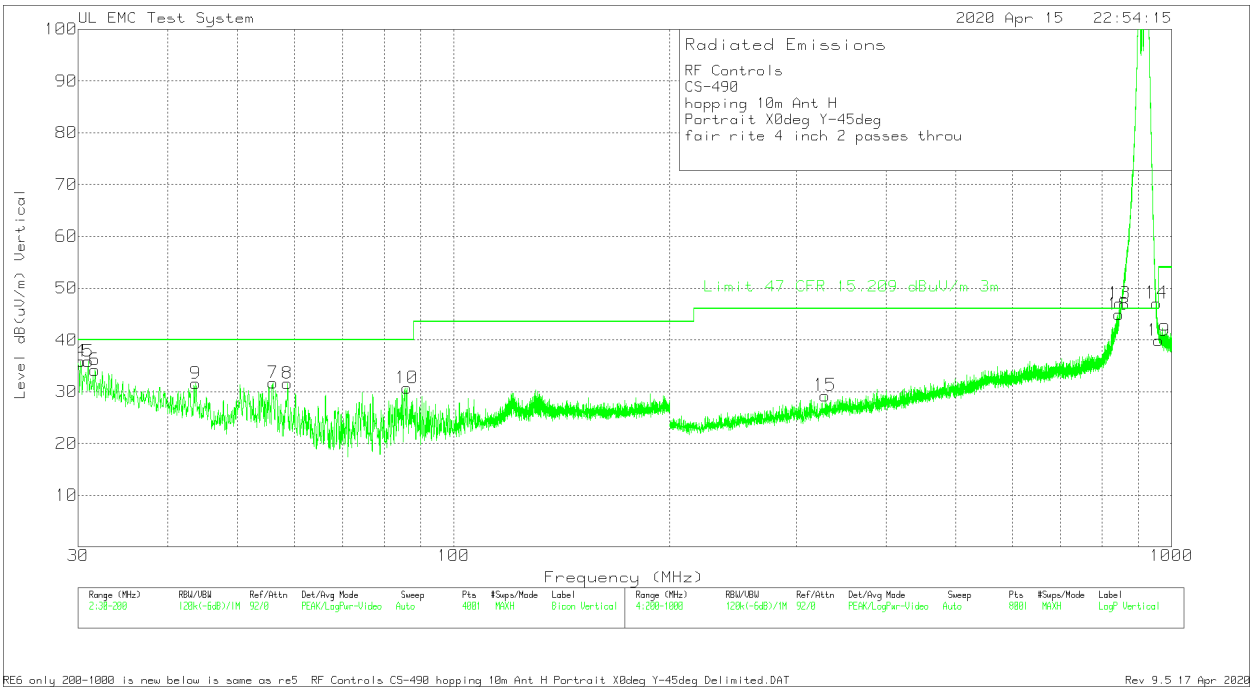
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	BRF Factor dB	Level @ 3m dBuV/m	Limit 47 CFR 15.209 @ 3m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	30.255	31.71	Pk	18	-30.1	10.5	-	30.11	-	-	0-360	401	H
2	* 120.78	36.71	Pk	13.4	-29.8	10.5	-	30.81	43.52	-12.71	0-360	401	H
3	* 130.215	36.53	Pk	14.1	-29.8	10.5	-	31.33	43.52	-12.19	0-360	401	H
4	30.255	37.49	Pk	18	-30.1	10.5	-	35.89	-	-	0-360	101	V
5	30.9775	37.78	Pk	17.7	-30.1	10.5	-	35.88	-	-	0-360	101	V
6	31.6575	36.38	Pk	17.4	-30.1	10.5	-	34.18	-	-	0-360	101	V
7	56.01	43.3	Pk	8	-30.1	10.5	-	31.7	-	-	0-360	101	V
8	58.73	43.75	Pk	7.3	-30	10.5	-	31.55	-	-	0-360	251	V
9	43.77	38.4	Pk	12.7	-30	10.5	-	31.6	-	-	0-360	101	V
10	86.0575	41.79	Pk	8.3	-29.9	10.5	-	30.69	-	-	0-360	101	V
11	849.2	30.76	Pk	23.2	-27.4	10.5	9.7	46.76	-	-	0-360	100	H
12	951.3	30.85	Pk	23.9	-27.1	10.5	9.1	47.25	-	-	0-360	299	H
16	555.5	30.84	Pk	19.7	-27.5	10.5	0.3	33.84	-	-	0-360	399	H
17	843.1	32.51	Pk	23.2	-27.6	10.5	7	45.61	-	-	0-360	100	H
19	* 960	31.58	Pk	24.1	-27.1	10.5	3.6	42.68	46.02	-3.34	0-360	100	H
13	847.9	30.81	Pk	23.2	-27.5	10.5	9.1	46.11	-	-	0-360	399	V
14	952.8	31.59	Pk	24	-27	10.5	7.4	46.49	-	-	0-360	301	V
15	237.5	36.62	Pk	11.3	-29.2	10.5	0.1	29.32	-	-	0-360	301	V
18	843.4	31.1	Pk	23.2	-27.6	10.5	7.1	44.3	-	-	0-360	98	V
20	* 960	29.74	Pk	24.1	-27.1	10.5	3.6	40.84	46.02	-5.18	0-360	199	V

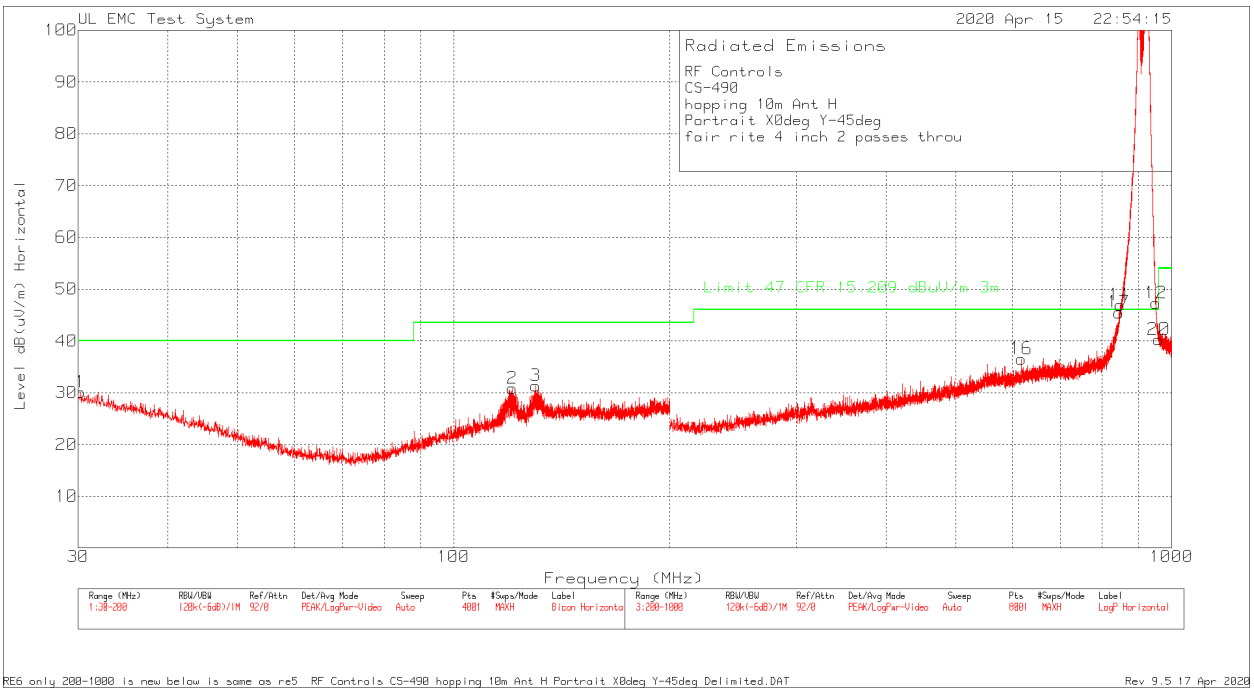
Radiated Emission Data

	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	BRF Factor dB	Level @ 3m dBuV/m	Limit 47 CFR 15.209 @ 3m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	30.0198	34.73	Qp	18.1	-30.1	10.5	-	33.23	-	-	25	110	V
	31.6959	34.74	Qp	17.4	-30.1	10.5	-	32.54	-	-	354	103	V

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

EUT Oriented Portrait, Horizontal Polarization, Antenna steered 0,-45





RF Controls
CS-490
hopping 10m Ant H
Portrait X0deg Y-45deg
fair rite 4 inch 2 passes throu
Trace MArkers

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	BRF Factor dB	Level @ 3m dBuV/m	Limit 47 CFR 15.209 @ 3m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	30.255	31.71	Pk	18	-30.1	10.5	-	30.11	-	-	0-360	401	H
2	* 120.78	36.71	Pk	13.4	-29.8	10.5	-	30.81	43.52	-12.71	0-360	401	H
3	* 130.215	36.53	Pk	14.1	-29.8	10.5	-	31.33	43.52	-12.19	0-360	401	H
4	30.255	37.49	Pk	18	-30.1	10.5	-	35.89	-	-	0-360	101	V
5	30.9775	37.78	Pk	17.7	-30.1	10.5	-	35.88	-	-	0-360	101	V
6	31.6575	36.38	Pk	17.4	-30.1	10.5	-	34.18	-	-	0-360	101	V
7	56.01	43.3	Pk	8	-30.1	10.5	-	31.7	-	-	0-360	101	V
8	58.73	43.75	Pk	7.3	-30	10.5	-	31.55	-	-	0-360	251	V
9	43.77	38.4	Pk	12.7	-30	10.5	-	31.6	-	-	0-360	101	V
10	86.0575	41.79	Pk	8.3	-29.9	10.5	-	30.69	-	-	0-360	101	V
11	847.6	31.83	Pk	23.2	-27.5	10.5	8.9	46.93	-	-	0-360	100	H
12	951.3	30.86	Pk	23.9	-27.1	10.5	9.1	47.26	-	-	0-360	399	H
16	617.7	32.63	Pk	20.2	-27.1	10.5	0.3	36.53	-	-	0-360	299	H
17	844.7	31.68	Pk	23.3	-27.6	10.5	7.6	45.48	-	-	0-360	199	H
20	* 960	29.19	Pk	24.1	-27.1	10.5	3.6	40.29	46.02	-5.73	0-360	299	H
13	845.8	32.73	Pk	23.3	-27.6	10.5	8.1	47.03	-	-	0-360	99	V
14	952.9	32.3	Pk	24	-27	10.5	7.3	47.1	-	-	0-360	99	V
15	329.3	33.05	Pk	14.1	-28.6	10.5	0.2	29.25	-	-	0-360	99	V
18	844.7	31.1	Pk	23.3	-27.6	10.5	7.6	44.9	-	-	0-360	298	V
19	* 960	28.81	Pk	24.1	-27.1	10.5	3.6	39.91	46.02	-6.11	0-360	298	V

Radiated Emission Data

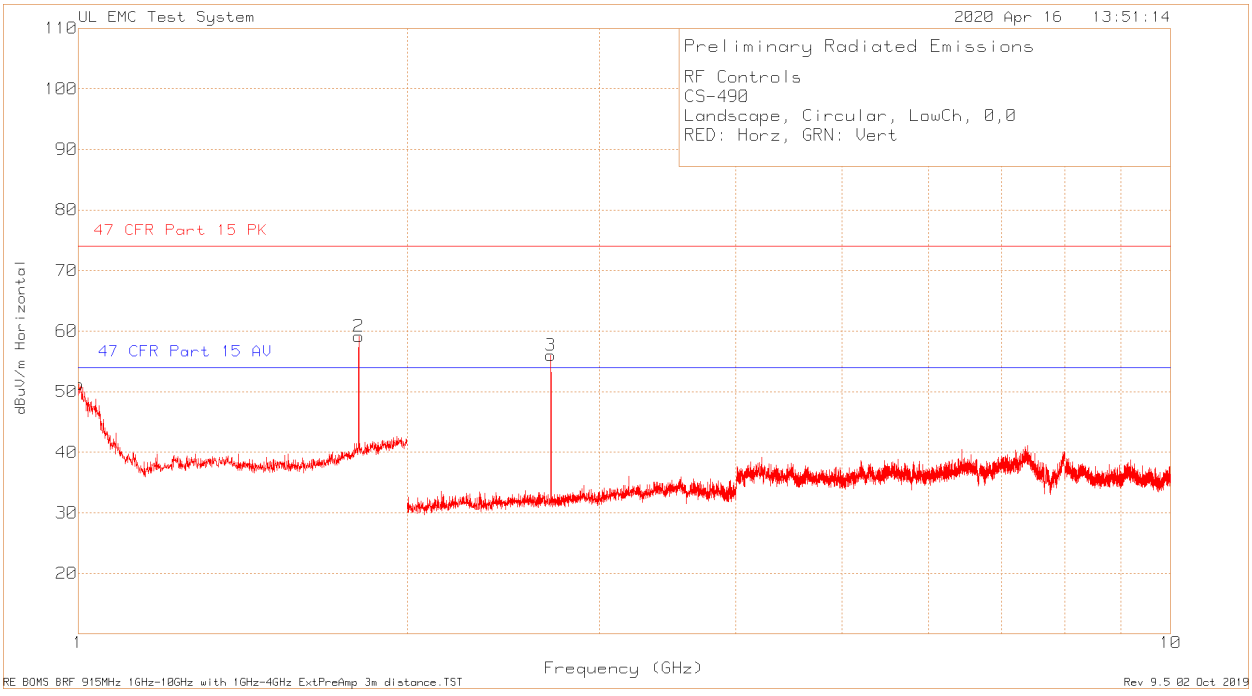
	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	10m to 3m Factor dB	BRF Factor dB	Level @ 3m dBuV/m	Limit 47 CFR 15.209 @ 3m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	30.0198	34.73	Qp	18.1	-30.1	10.5	-	33.23	-	-	25	110	V
	31.6959	34.74	Qp	17.4	-30.1	10.5	-	32.54	-	-	354	103	V

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

UL LLC
333 Pfingsten Road, Northbrook, IL 60062; USA TEL:(847) 272-8800

10.1. Radiated Spurious Emissions 1GHz-10GHz

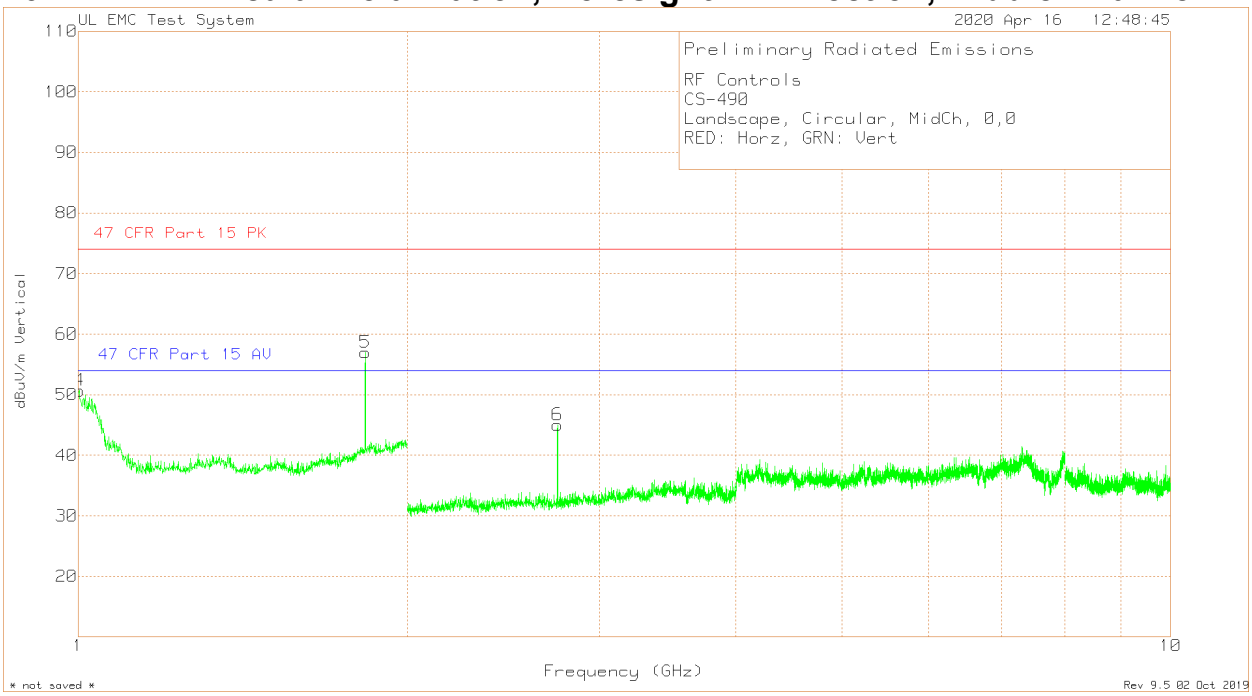
10.1.1. Circular Polarization, Boresight TX Direction, Low Channel

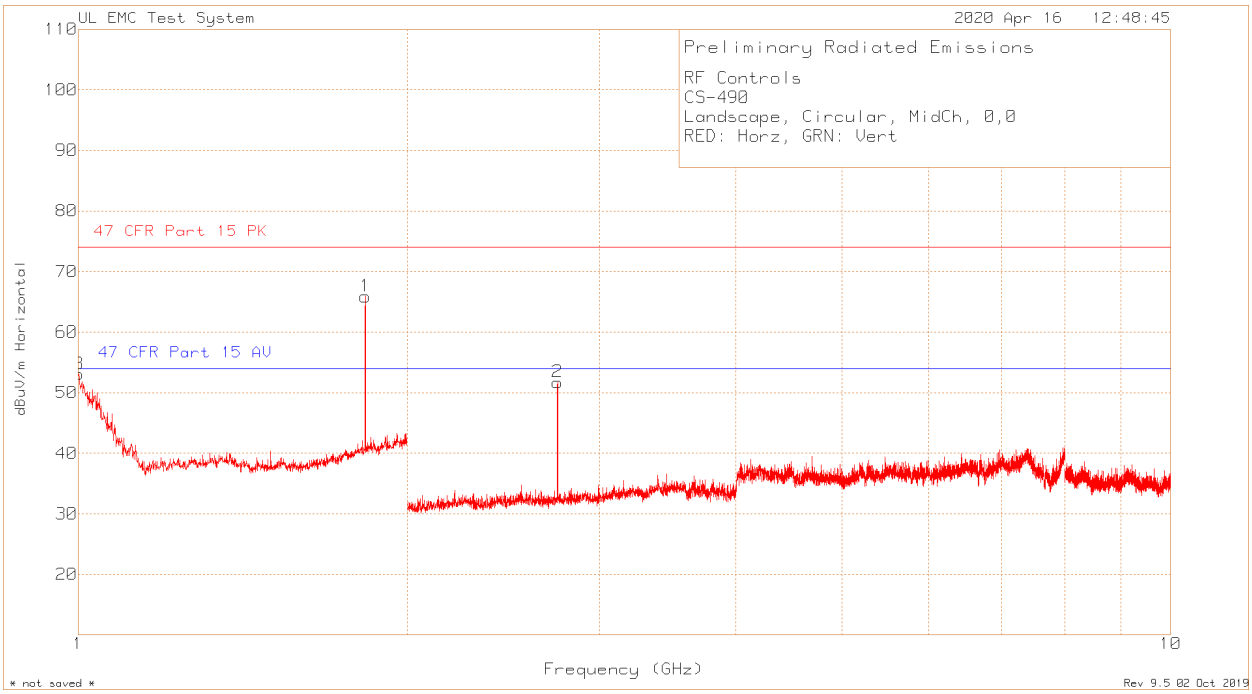


RF Controls														
CS-490														
Landscape, Circular, Low Ch, 0,0														
RED: Horz, GRN: Vert														
Trace MArkers														
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.001	78.39	Pk	27.6	1.1	-55.85	51.24	74	-22.76	54	-2.76	0-360	163	H
2	1.806	81.86	Pk	30.3	0.4	-53.43	59.13	-	-	-	-	0-360	163	H
3	2.708	84.63	Pk	22.1	-	-50.74	55.99	74	-18.01	54	1.99	0-360	163	H
4	1.002	80.71	Pk	27.6	1.1	-55.83	53.58	74	-20.42	54	-0.42	0-360	163	V
5	1.806	71.64	Pk	30.3	0.4	-53.43	48.91	-	-	-	-	0-360	163	V
6	2.708	73.65	Pk	22.1	-	-50.74	45.01	74	-28.99	54	-8.99	0-360	163	V
Radiated Emission Data														
	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	2.7083	85.36	Pk	22.1	-	-50.74	56.72	74	-17.28	-	-	213	160	H
	2.7083	82	Av	22.1	-	-50.74	53.36	74	-20.64	54	-0.64	213	160	H
	1.002	82.62	Pk	27.6	1.1	-55.83	55.49	74	-18.51	-	-	182	159	V
	1.002	69.84	Av	27.6	1.1	-55.83	42.71	74	-31.29	54	-11.29	182	159	V
Pk - Peak detector														
Av - Pwr RMS														

UL LLC
333 Pfingsten Road, Northbrook, IL 60062; USA TEL:(847) 272-8800

10.1.2. Circular Polarization, Boresight TX Direction, Middle Channel





RF Controls

CS-490

Landscape, Circular, MidCh, 0,0

RED: Horz, GRN: Vert

Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.831	87.96	Pk	30.7	0.4	-53.18	65.88	-	-	-	-	0-360	100	H
3	1.001	80.2	Pk	27.6	1.1	-55.85	53.05	74	-20.95	54	-0.95	0-360	100	H
2	2.746	80.21	Pk	22.1	-	-50.58	51.73	74	-22.27	54	-2.27	0-360	100	H
4	1.002	77.79	Pk	27.6	1.1	-55.83	50.66	74	-23.34	54	-3.34	0-360	100	V
5	1.831	79.03	Pk	30.7	0.4	-53.18	56.95	-	-	-	-	0-360	100	V
6	2.746	73.5	Pk	22.1	-	-50.58	45.02	74	-28.98	54	-8.98	0-360	100	V

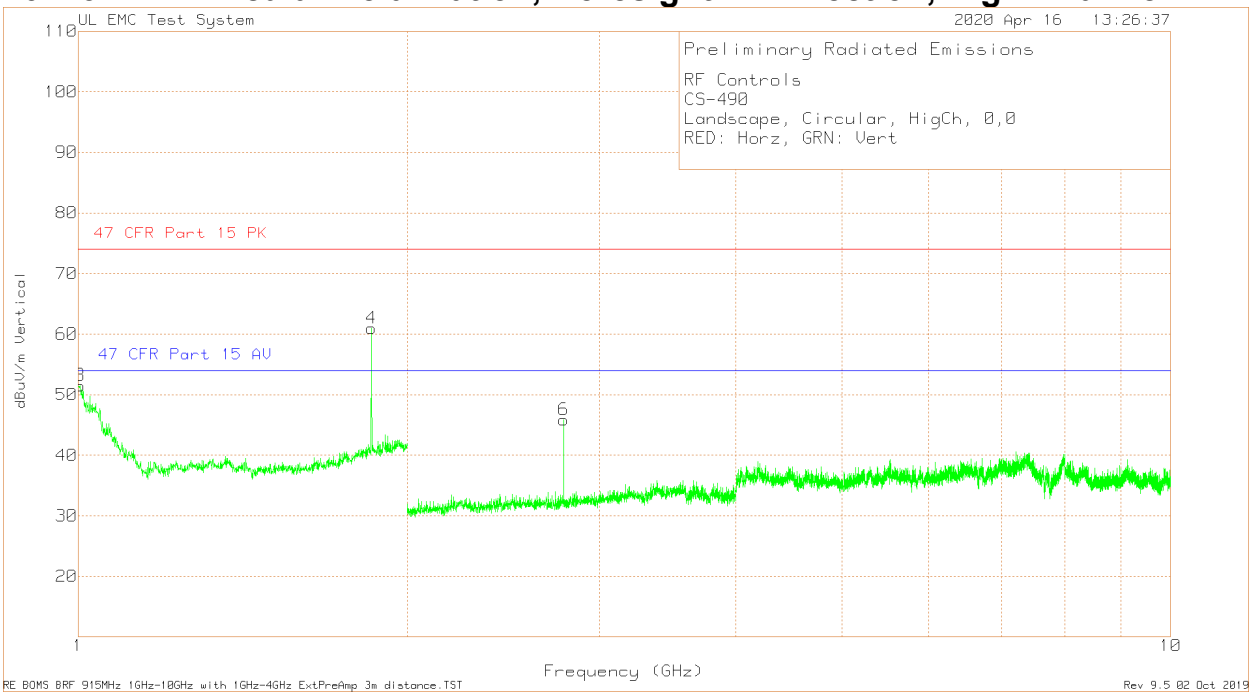
Radiated Emission Data

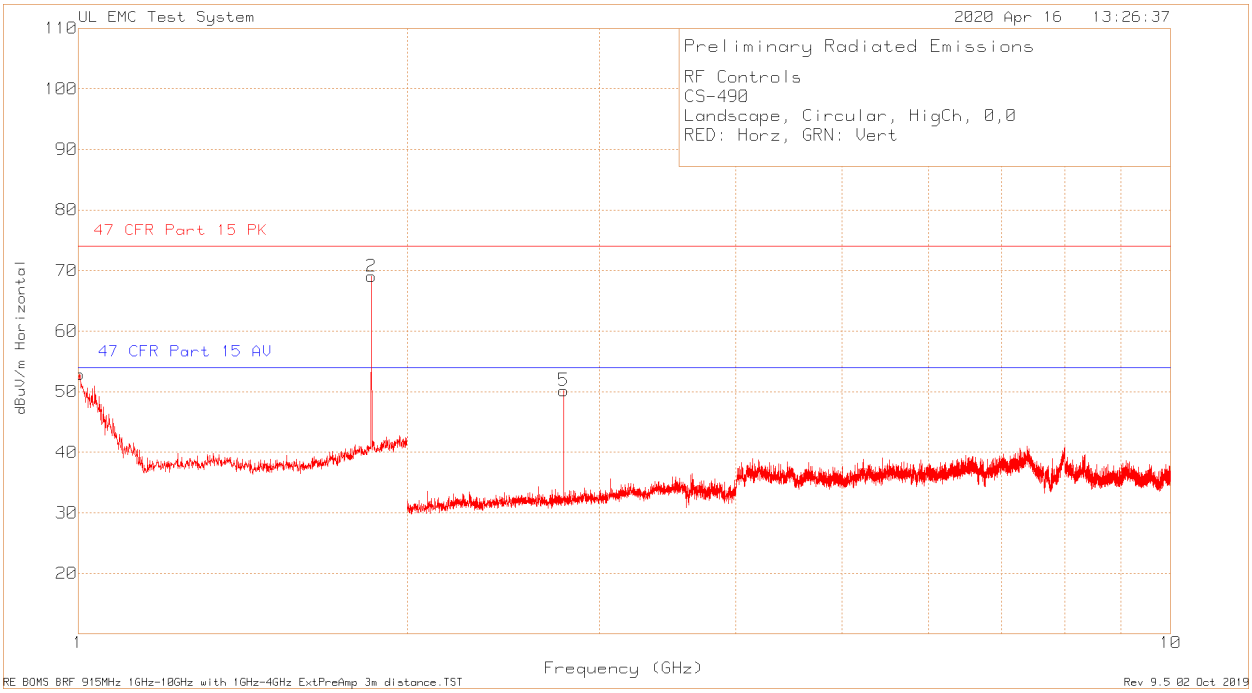
	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	1	80.5	Pk	27.6	1.1	-55.85	53.35	74	-20.65	-	-	180	198	H
	1	70.89	Av	27.6	1.1	-55.9	43.69	74	-30.31	54	-10.31	180	198	H
	2.7457	83.7	Pk	22.1	-	-50.64	55.16	74	-18.84	-	-	213	159	H
	2.7457	79.9	Av	22.1	-	-50.64	51.36	74	-22.64	54	-2.64	213	159	H

Pk - Peak detector

Av - PWR RMS

10.1.3. Circular Polarization, Boresight TX Direction, High Channel





RF Controls

CS-490

Landscape, Circular, HigCh, 0,0

RED: Horz, GRN: Vert

Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.002	79.97	Pk	27.6	1.1	-55.83	52.84	74	-21.16	54	-1.16	0-360	185	H
2	1.855	91.11	Pk	31	0.4	-53.44	69.07	-	-	-	-	0-360	185	H
5	2.781	78.42	Pk	22.2	-	-50.42	50.2	74	-23.8	54	-3.8	0-360	185	H
3	1.004	78.76	Pk	27.5	1	-55.77	51.49	74	-22.51	54	-2.51	0-360	185	V
4	1.855	83.02	Pk	31	0.4	-53.44	60.98	-	-	-	-	0-360	185	V
6	2.782	73.99	Pk	22.2	-	-50.35	45.84	74	-28.16	54	-8.16	0-360	185	V

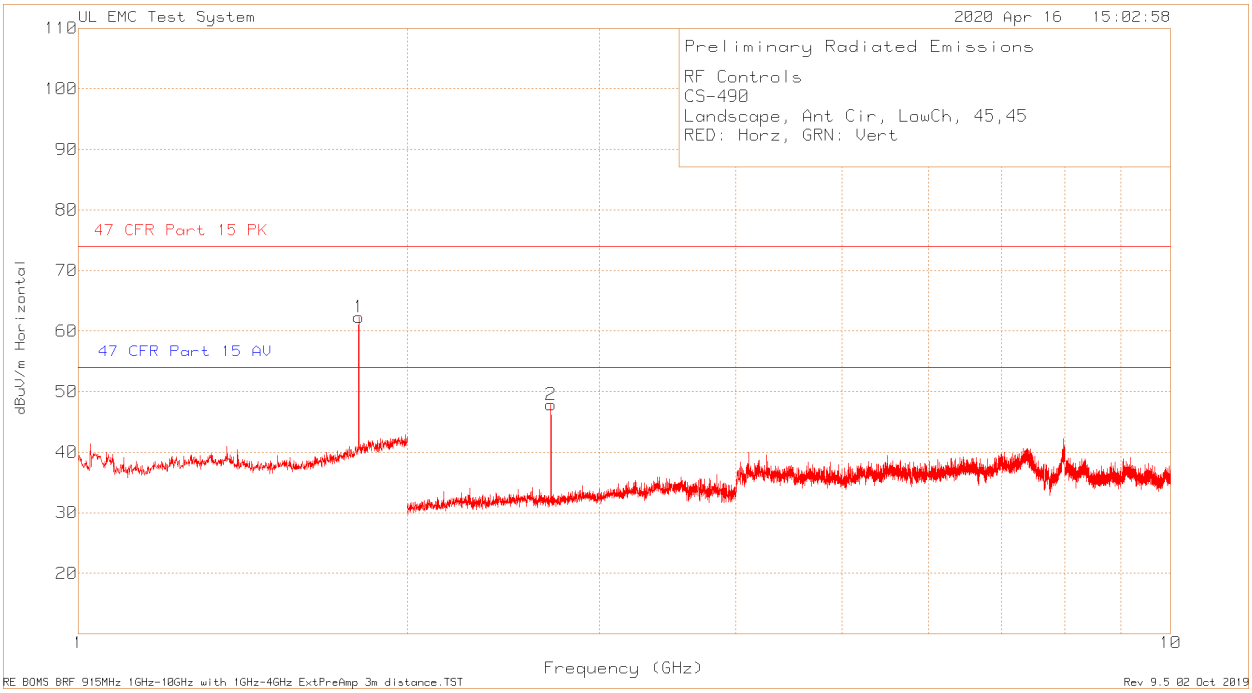
Radiated Emission Data

	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	2.7818	82.71	Pk	22.2	-	-50.37	54.54	74	-19.46	-	-	211	163	H
	2.7817	78.52	PWR RMS	22.2	-	-50.37	50.35	74	-23.65	54	-3.65	211	163	H

Pk - Peak detector

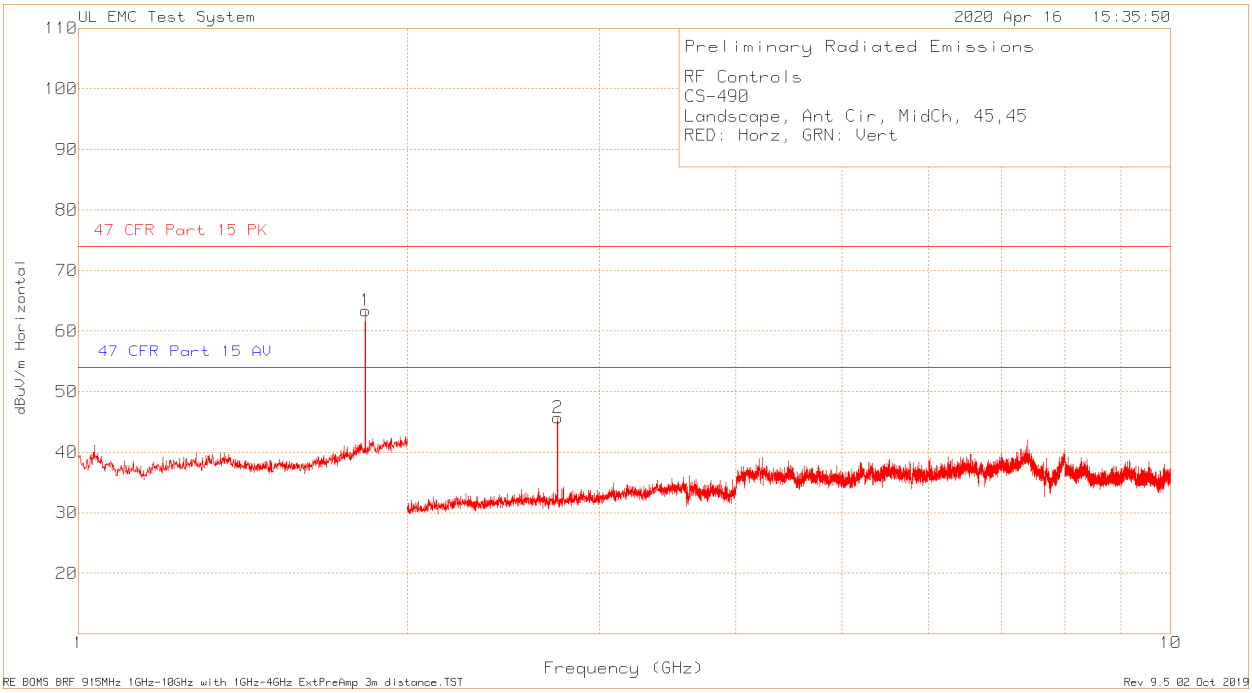
Av - Pwr RMS

10.1.4. Circular Polarization, +45° +45° TX Direction, Low Channel



RF Controls														
CS-490														
Landscape, Ant Cir, Low Ch, 45,45														
RED: Horz, GRN: Vert														
Trace MArkers														
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.806	85.05	Pk	30.3	0.4	-53.43	62.32	-	-	-	-	0-360	185	H
2	2.708	76.48	Pk	22.1	-	-50.74	47.84	74	-26.16	54	-6.16	0-360	185	H
3	1.806	74.83	Pk	30.3	0.4	-53.43	52.1	-	-	-	-	0-360	185	V
4	2.708	67.7	Pk	22.1	-	-50.74	39.06	74	-34.94	54	-14.94	0-360	185	V
Radiated Emission Data														
	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	2.7082	77.69	Pk	22.1	-	-50.74	49.05	74	-24.95	54	-4.95	223	185	H
	2.7083	73.37	Av	22.1	-	-50.74	44.73	74	-29.27	54	-9.27	223	185	H
Pk - Peak detector														
Av - Pwr RMS														

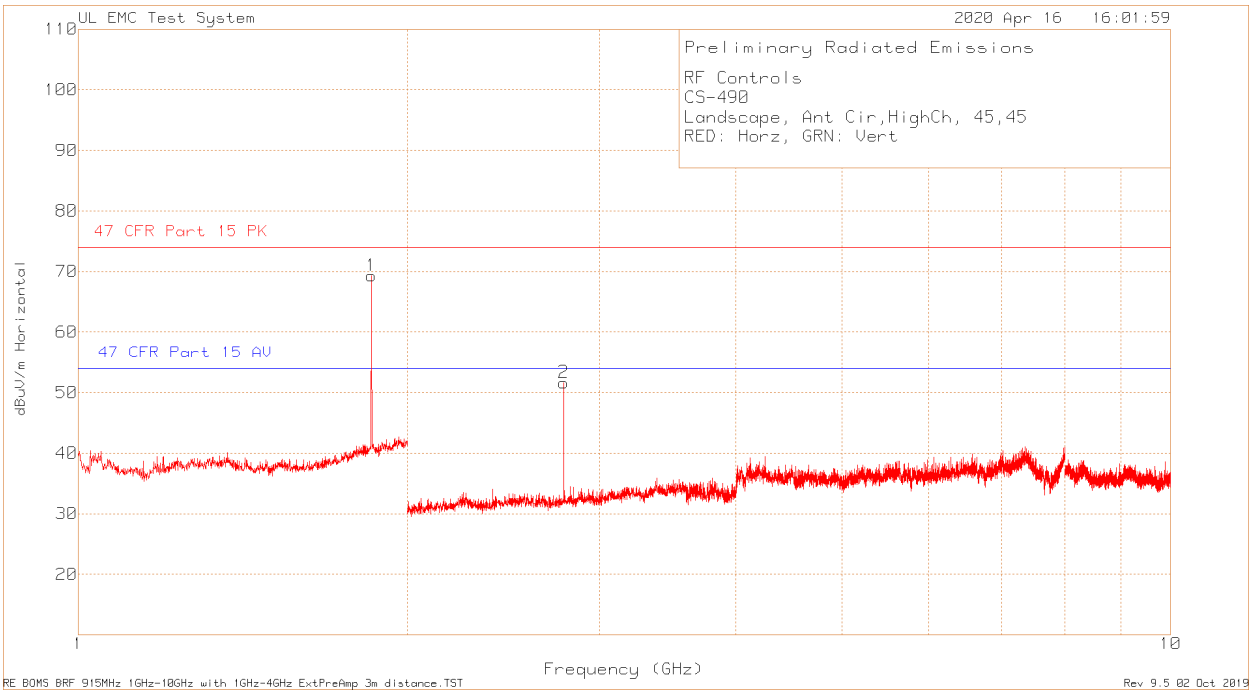
10.1.5. Circular Polarization, +45° +45° TX Direction, Middle Channel



RF Controls														
CS-490														
Landscape, Ant Cir, MidCh, 45,45														
RED: Horz, GRN: Vert														
Trace MArkers														
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.831	85.46	Pk	30.7	0.4	-53.18	63.38	-	-	-	-	0-360	185	H
2	2.746	74.2	Pk	22.1	-	-50.58	45.72	74	-28.28	54	-8.28	0-360	185	H
3	1.831	74.11	Pk	30.7	0.4	-53.18	52.03	-	-	-	-	0-360	185	V
4	2.746	68.51	Pk	22.1	-	-50.58	40.03	74	-33.97	54	-13.97	0-360	185	V
Radiated Emission Data														
	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	2.7457	75.54	Pk	22.1	-	-50.64	47	74	-27	54	-7	223	185	H
	2.7457	71.09	Av	22.1	-	-50.65	42.54	74	-31.46	54	-11.46	222	185	H
Pk - Peak detector														
Av - Pwr RMS														

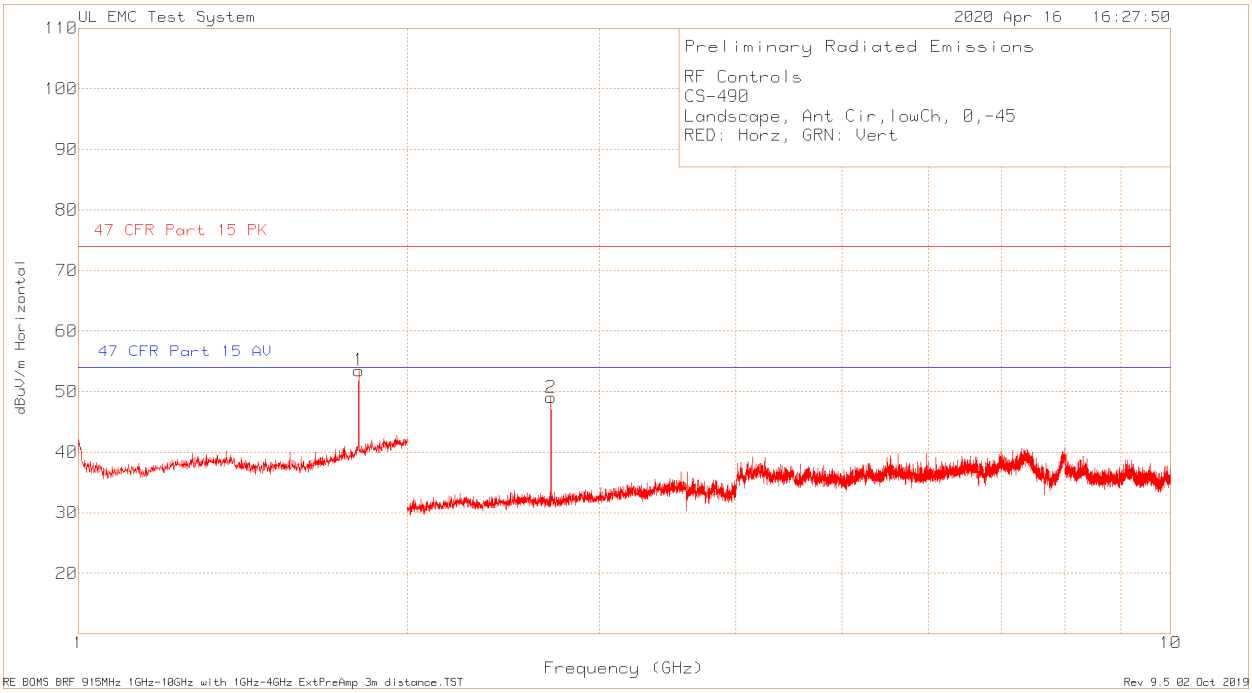
UL LLC
333 Pfingsten Road, Northbrook, IL 60062; USA TEL:(847) 272-8800

10.1.6. Circular Polarization, +45° +45° TX Direction, High Channel



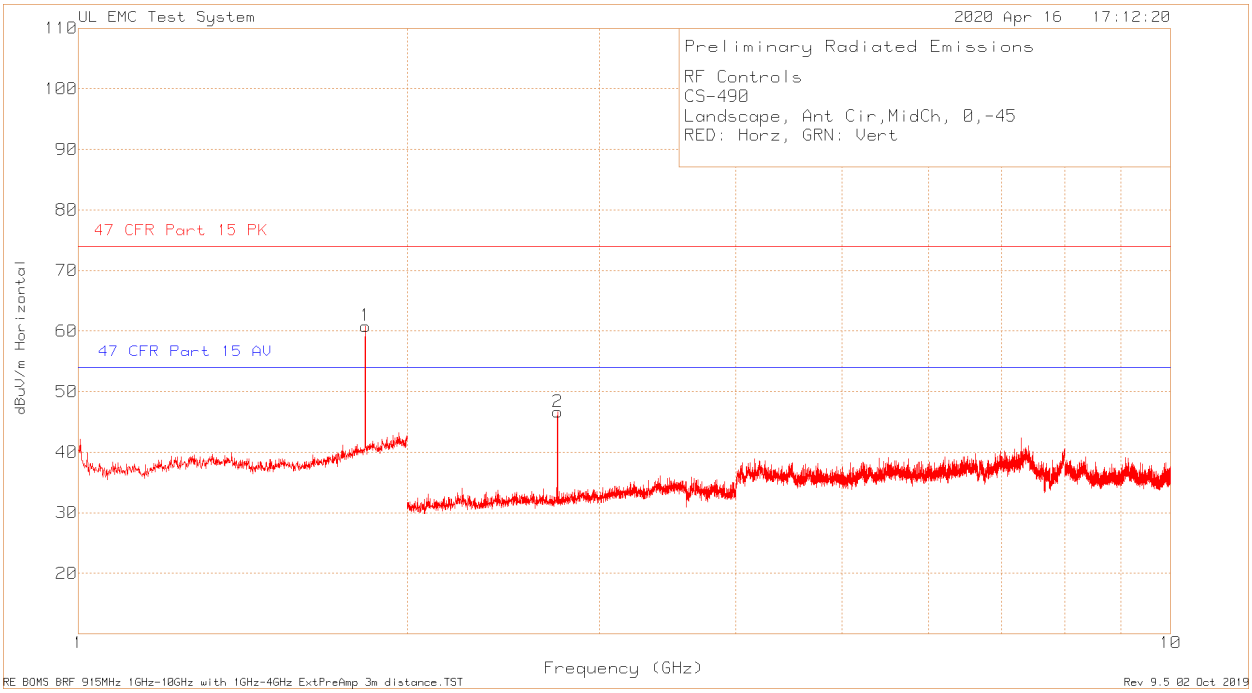
RF Controls														
CS-490														
Landscape, Ant Cir,HighCh, 45,45														
RED: Horz, GRN: Vert														
Trace MArkers														
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.855	91.33	Pk	31	0.4	-53.44	69.29	-	-	-	-	0-360	185	H
2	2.782	79.81	Pk	22.2	-	-50.35	51.66	74	-22.34	54	-2.34	0-360	185	H
3	1.855	78.45	Pk	31	0.4	-53.44	56.41	-	-	-	-	0-360	185	V
4	2.782	69.9	Pk	22.2	-	-50.35	41.75	74	-32.25	54	-12.25	0-360	185	V
Radiated Emission Data														
	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	2.7818	80.92	Pk	22.2	-	-50.36	52.76	74	-21.24	54	-1.24	99	180	H
	2.7817	77.37	Pk	22.2	-	-50.37	49.2	74	-24.8	54	-4.8	99	180	H
Pk - Peak detector														
Av - Pwr RMS														

10.1.7. Circular Polarization, 0° -45° TX Direction, Low Channel



RF Controls														
CS-490														
Landscape, Ant Cir,low Ch, 0,-45														
RED: Horz, GRN: Vert														
Trace MArkers														
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.806	76.24	Pk	30.3	0.4	-53.43	53.51	-	-	-	-	0-360	185	H
2	2.708	77.66	Pk	22.1	-	-50.74	49.02	74	-24.98	54	-4.98	0-360	185	H
3	1.806	70.72	Pk	30.3	0.4	-53.43	47.99	-	-	-	-	0-360	185	V
4	2.708	73.51	Pk	22.1	-	-50.74	44.87	74	-29.13	54	-9.13	0-360	185	V
Radiated Emission Data														
	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	2.7082	81.99	Pk	22.1	-	-50.74	53.35	74	-20.65	54	-0.65	213	140	H
	2.7082	81.3	Av	22.1	-	-50.74	52.66	74	-21.34	54	-1.34	213	140	H
Pk - Peak detector														
Av - Pwr RMS														

10.1.8. Circular Polarization, 0° -45° TX Direction, Middle Channel

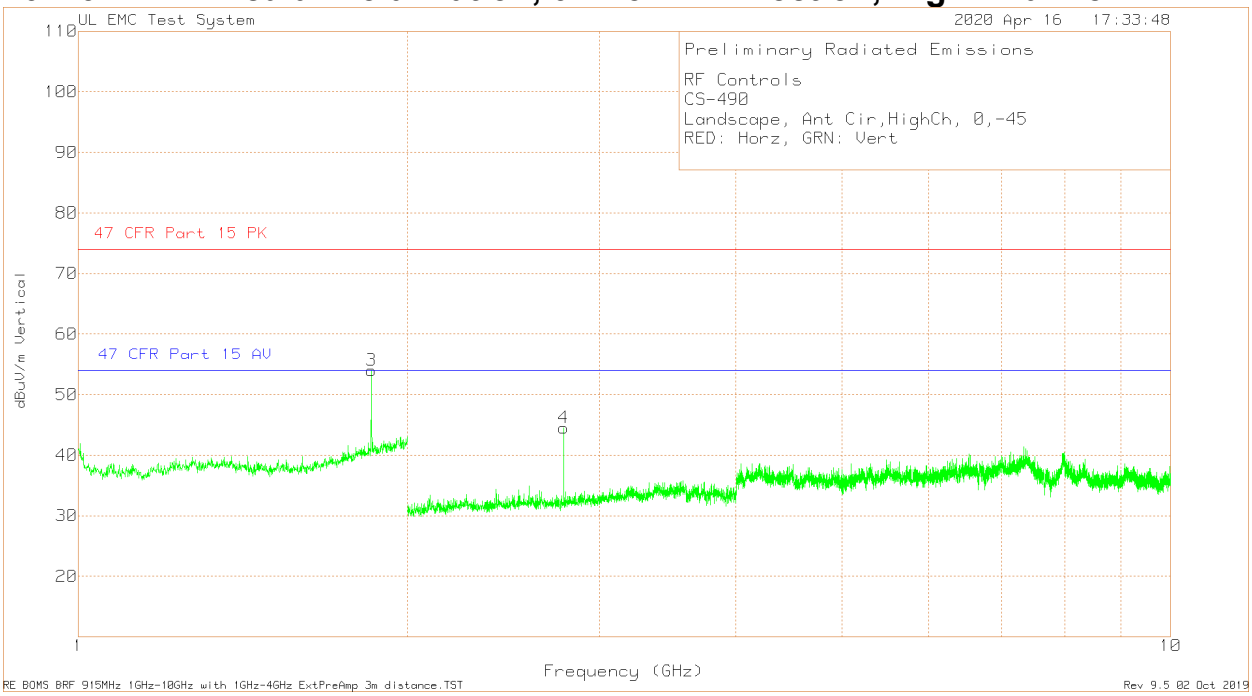


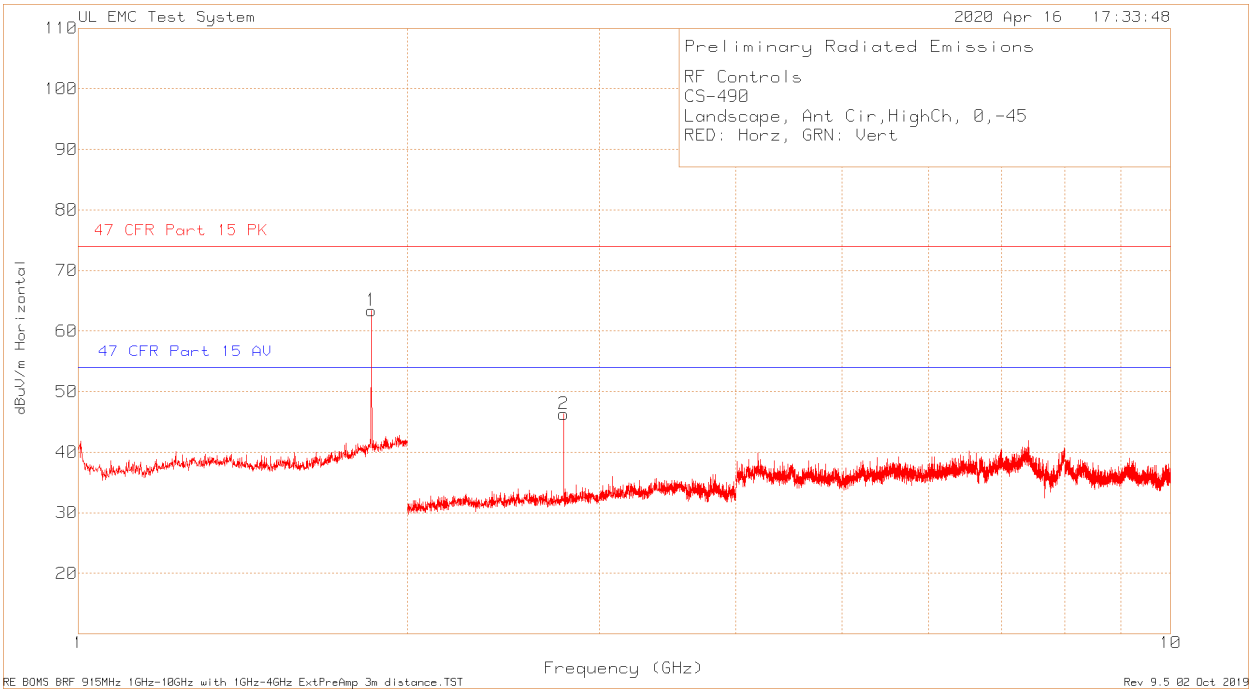
RF Controls
CS-490
Landscape, Ant Cir,MidCh, 0,-45
RED: Horz, GRN: Vert
Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.831	82.93	Pk	30.7	0.4	-53.18	60.85	-	-	-	-	0-360	185	H
2	2.746	75.15	Pk	22.1	-	-50.58	46.67	74	-27.33	54	-7.33	0-360	185	H
3	1.831	73.06	Pk	30.7	0.4	-53.18	50.98	-	-	-	-	0-360	185	V
4	2.746	73.49	Pk	22.1	-	-50.58	45.01	74	-28.99	54	-8.99	0-360	185	V

Pk - Peak detector

10.1.9. Circular Polarization, 0° -45° TX Direction, High Channel



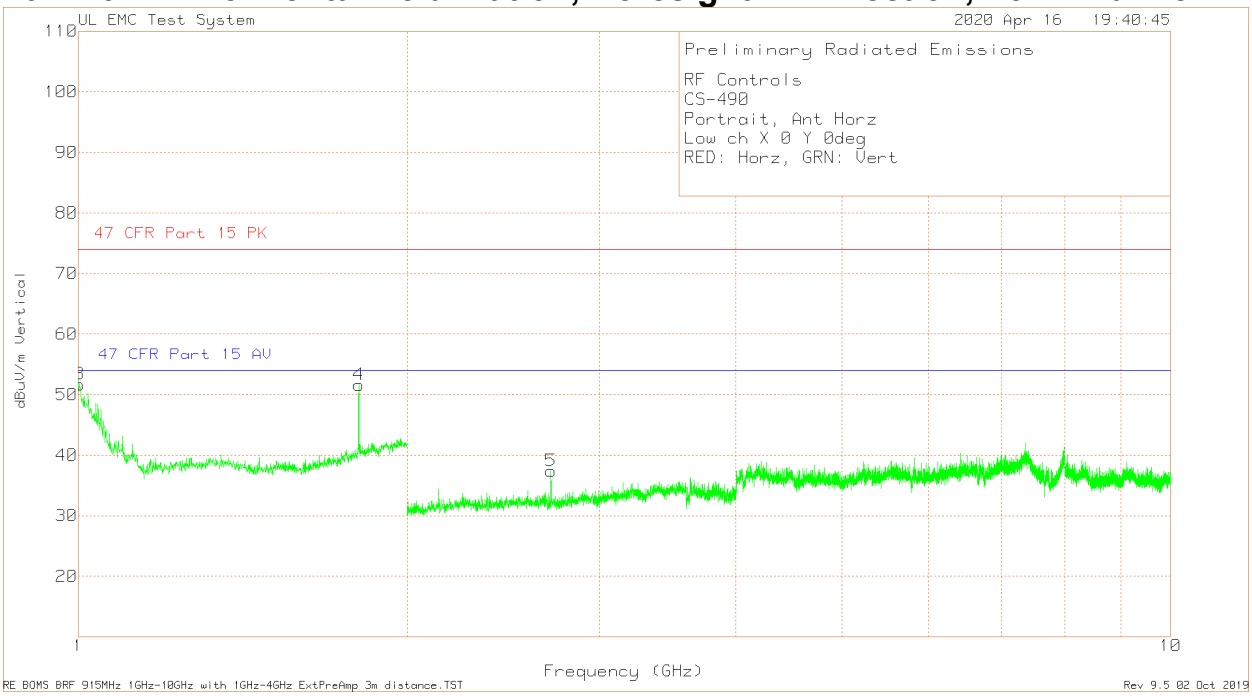


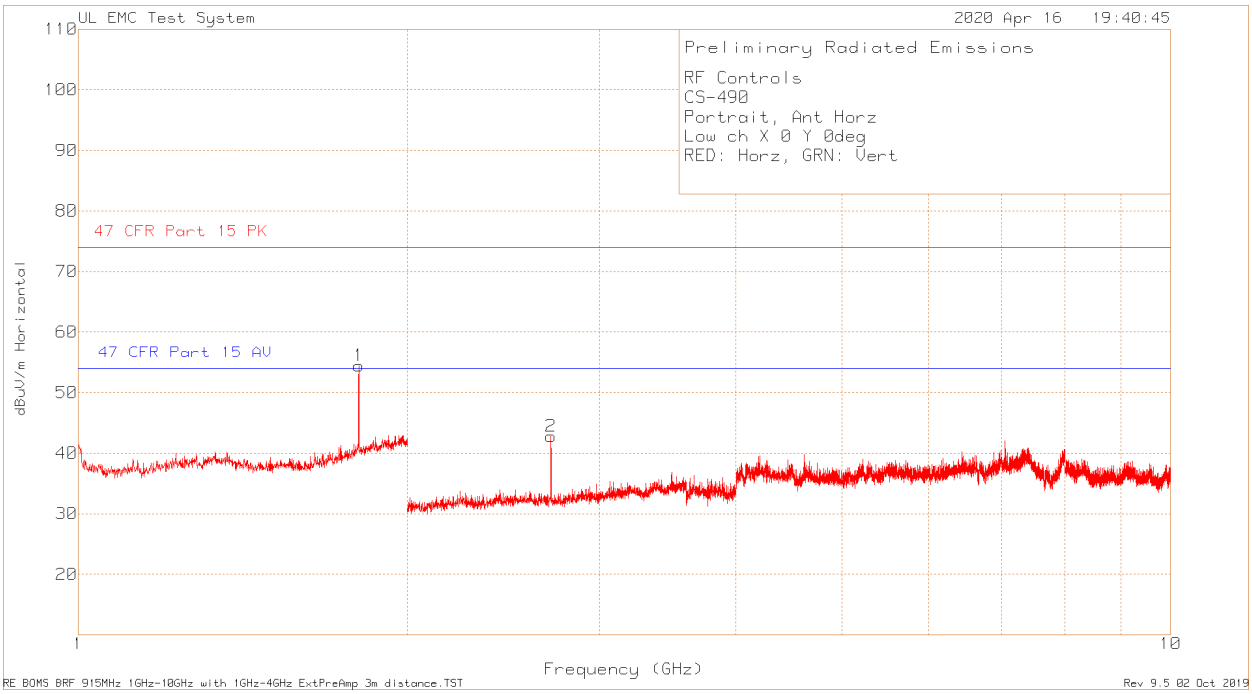
RF Controls
CS-490
Landscape, Ant Cir,HighCh, 0,-45
RED: Horz, GRN: Vert
Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.855	85.45	Pk	31	0.4	-53.44	63.41	-	-	-	-	0-360	185	H
2	2.782	74.45	Pk	22.2	-	-50.35	46.3	74	-27.7	54	-7.7	0-360	185	H
3	1.855	76.01	Pk	31	0.4	-53.44	53.97	-	-	-	-	0-360	185	V
4	2.782	72.64	Pk	22.2	-	-50.35	44.49	74	-29.5	54	-9.51	0-360	185	V

Pk - Peak detector

10.1.10. Horizontal Polarization, Boresight TX Direction, Low Channel



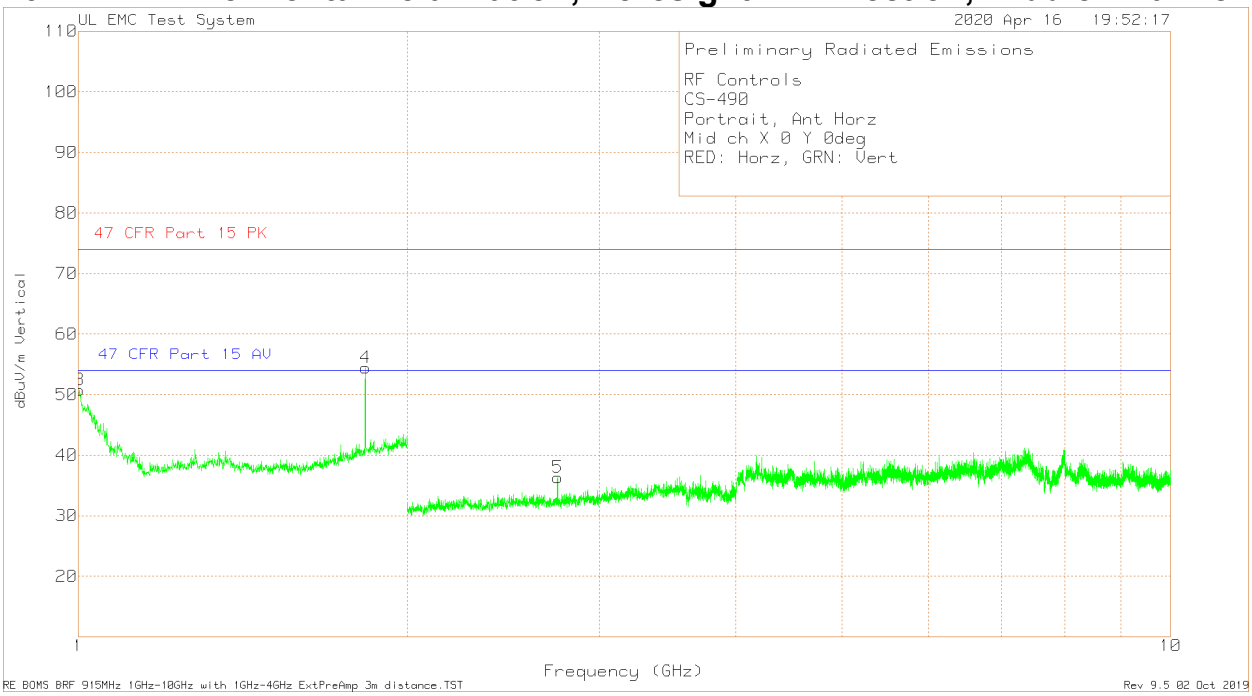


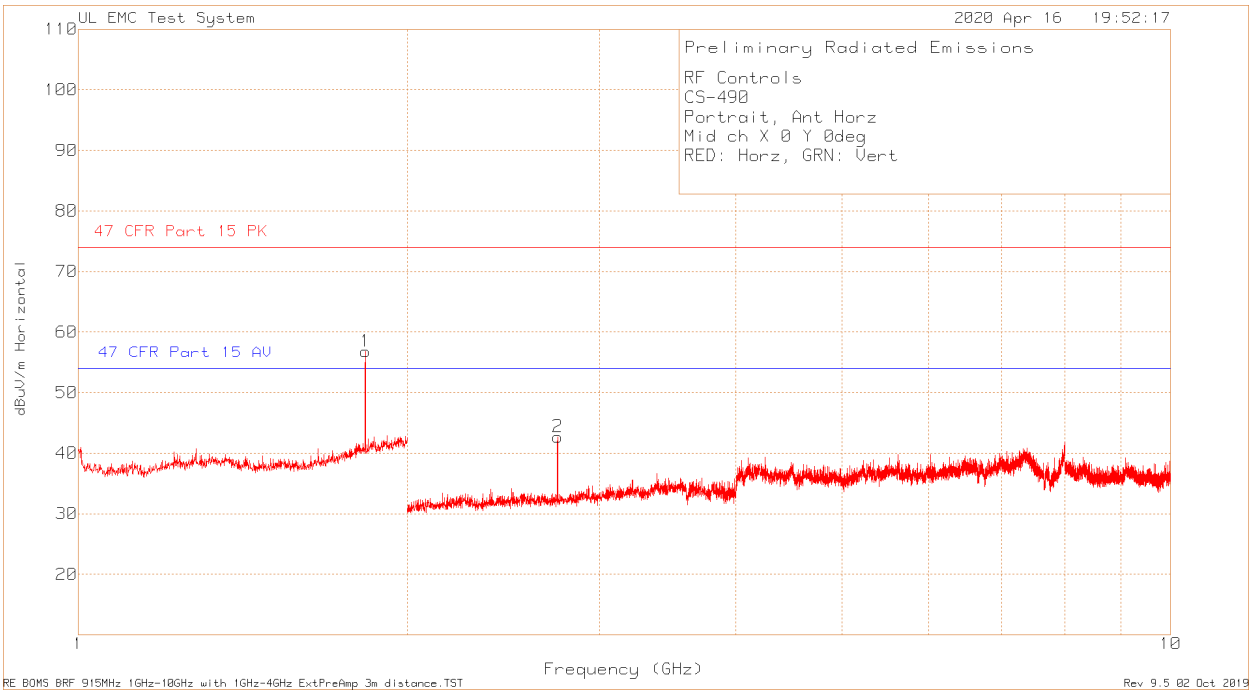
RF Controls
CS-490
Portrait, Ant Horz
Low ch X 0 Y 0deg
RED: Horz, GRN: Vert
Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.806	77.17	Pk	30.3	0.4	-53.43	54.44	-	-	-	-	0-360	184	H
2	2.708	71.41	Pk	22.1	-	-50.74	42.77	74	-31.23	54	-11.23	0-360	184	H
3	1.002	78.82	Pk	27.6	1.1	-55.83	51.69	74	-22.31	54	-2.31	0-360	184	V
4	1.806	74.32	Pk	30.3	0.4	-53.43	51.59	-	-	-	-	0-360	184	V
5	2.708	66.06	Pk	22.1	-	-50.74	37.42	74	-36.58	54	-16.58	0-360	184	V

Pk - Peak detector

10.1.11. Horizontal Polarization, Boresight TX Direction, Middle Channel



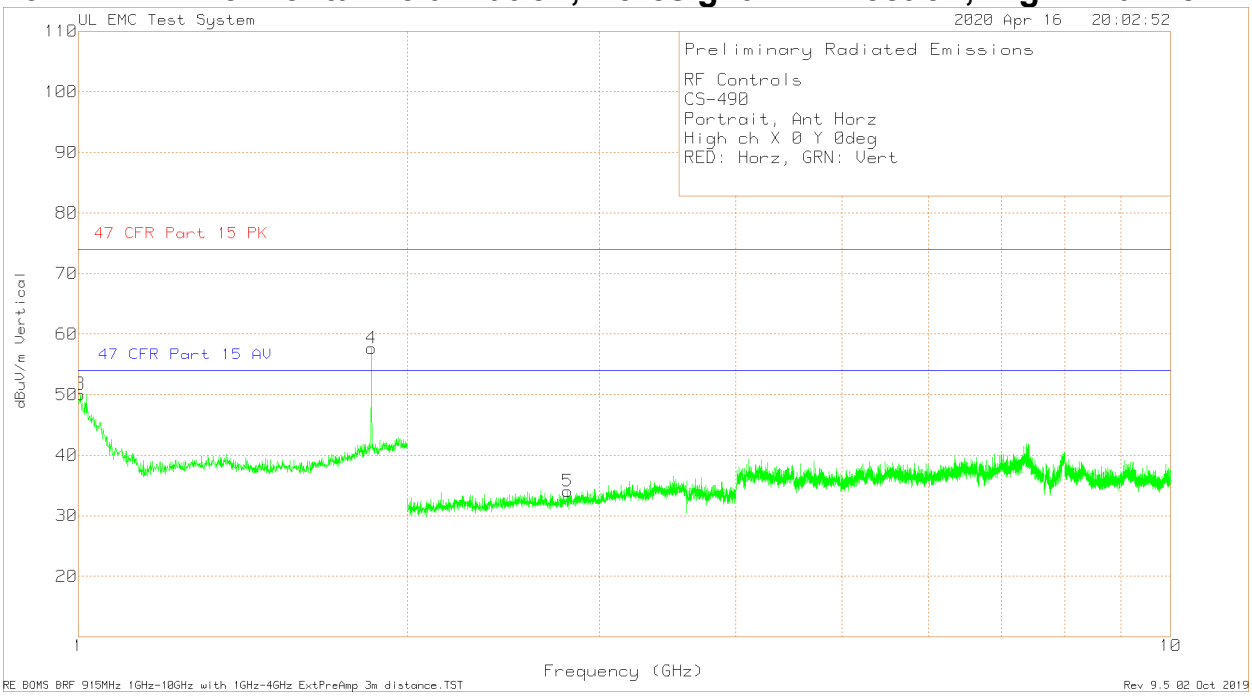


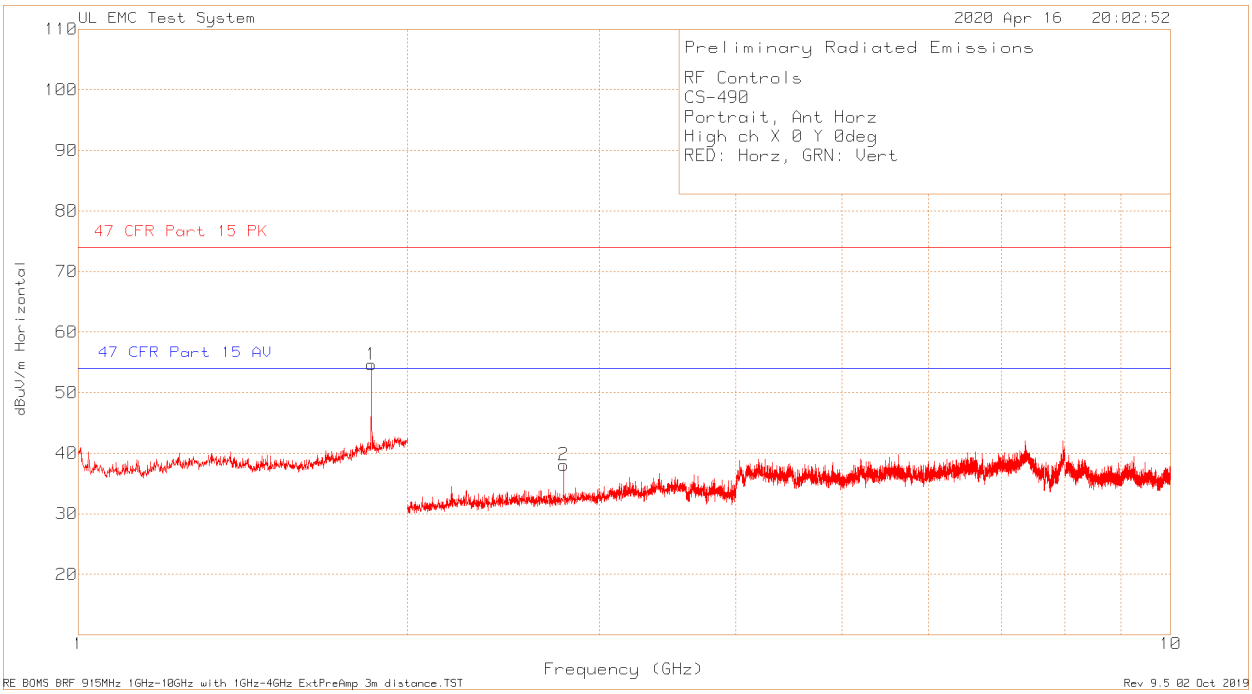
RF Controls
CS-490
Portrait, Ant Horz
Mid ch X 0 Y 0deg
RED: Horz, GRN: Vert
Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.831	78.89	Pk	30.7	0.4	-53.18	56.81	-	-	-	-	0-360	184	H
2	2.746	71.19	Pk	22.1	-	-50.58	42.71	74	-31.29	54	-11.29	0-360	184	H
3	1.002	77.92	Pk	27.6	1.1	-55.83	50.79	74	-23.21	54	-3.21	0-360	184	V
4	1.831	76.5	Pk	30.7	0.4	-53.18	54.42	-	-	-	-	0-360	184	V
5	2.746	64.78	Pk	22.1	-	-50.58	36.3	74	-37.7	54	-17.7	0-360	184	V

Pk - Peak detector

10.1.12. Horizontal Polarization, Boresight TX Direction, High Channel



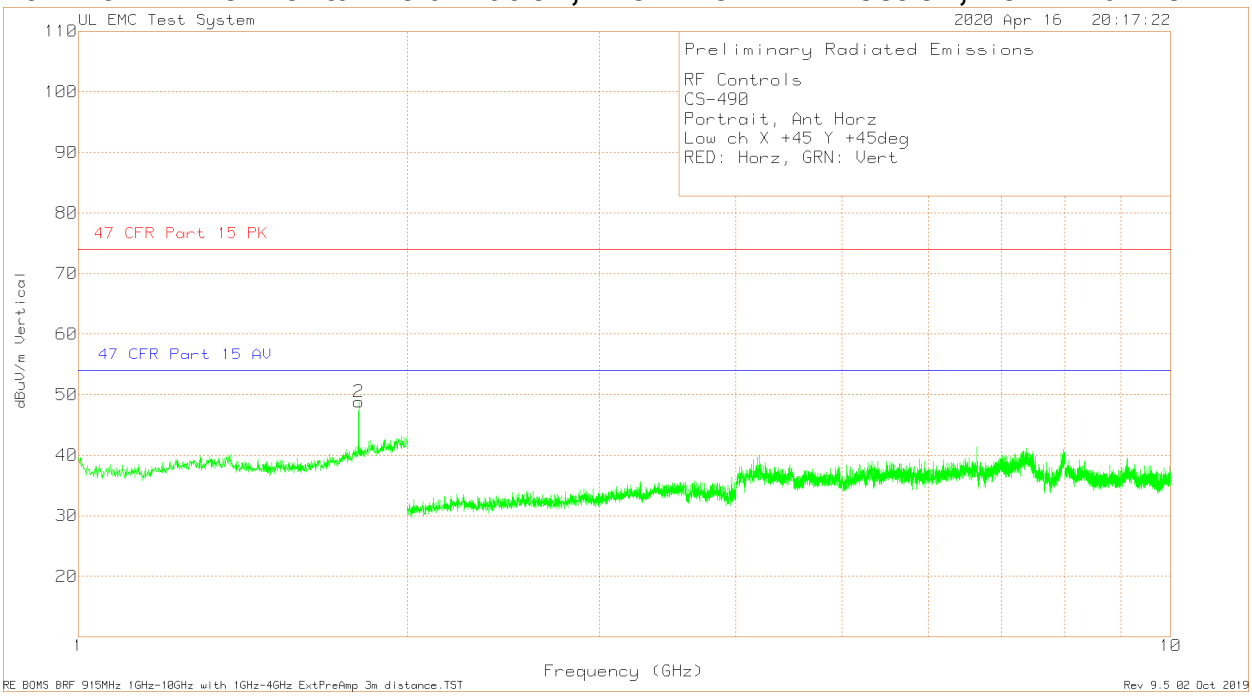


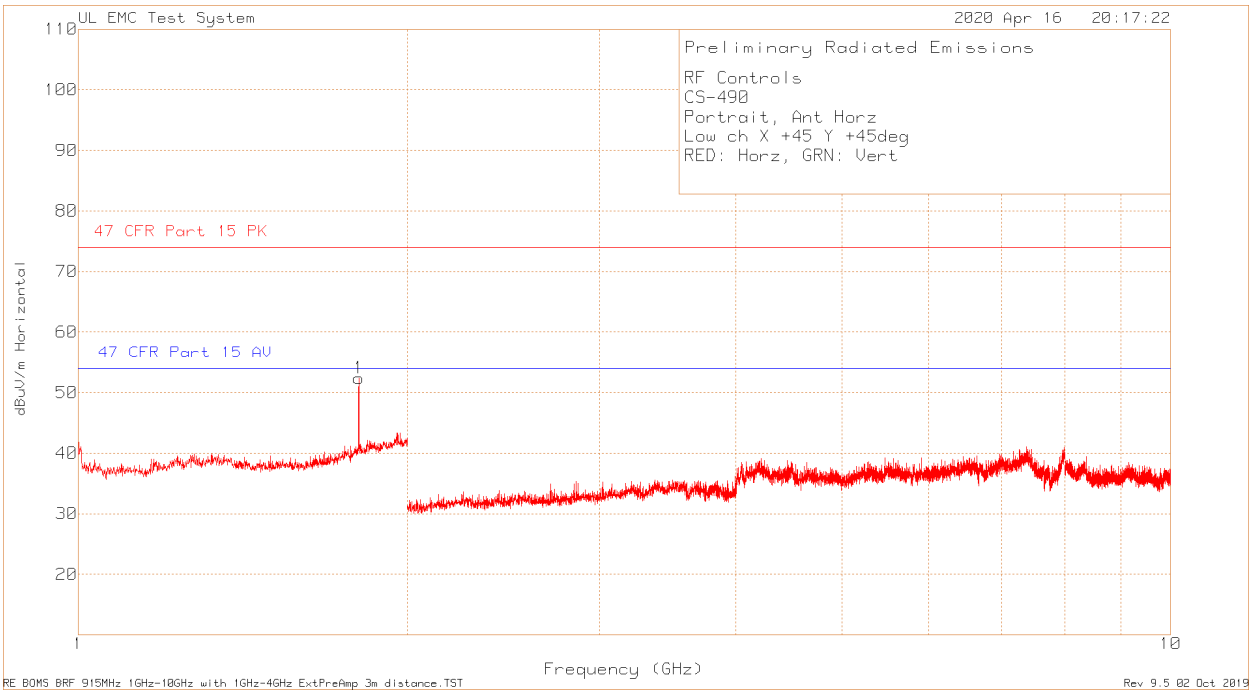
RF Controls
CS-490
Portrait, Ant Horz
High ch X 0 Y 0deg
RED: Horz, GRN: Vert
Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.855	76.71	Pk	31	0.4	-53.44	54.67	-	-	-	-	0-360	184	H
2	2.782	66.24	Pk	22.2	-	-50.35	38.09	74	-35.91	54	-15.91	0-360	184	H
3	1.004	77.33	Pk	27.5	1	-55.77	50.06	74	-23.94	54	-3.94	0-360	184	V
4	1.855	79.72	Pk	31	0.4	-53.44	57.68	-	-	-	-	0-360	184	V
5	2.806	62.1	Pk	22.2	-	-50.28	34.02	74	-39.98	54	-19.98	0-360	184	V

Pk - Peak detector

10.1.13. Horizontal Polarization, +45° +45° TX Direction, Low Channel



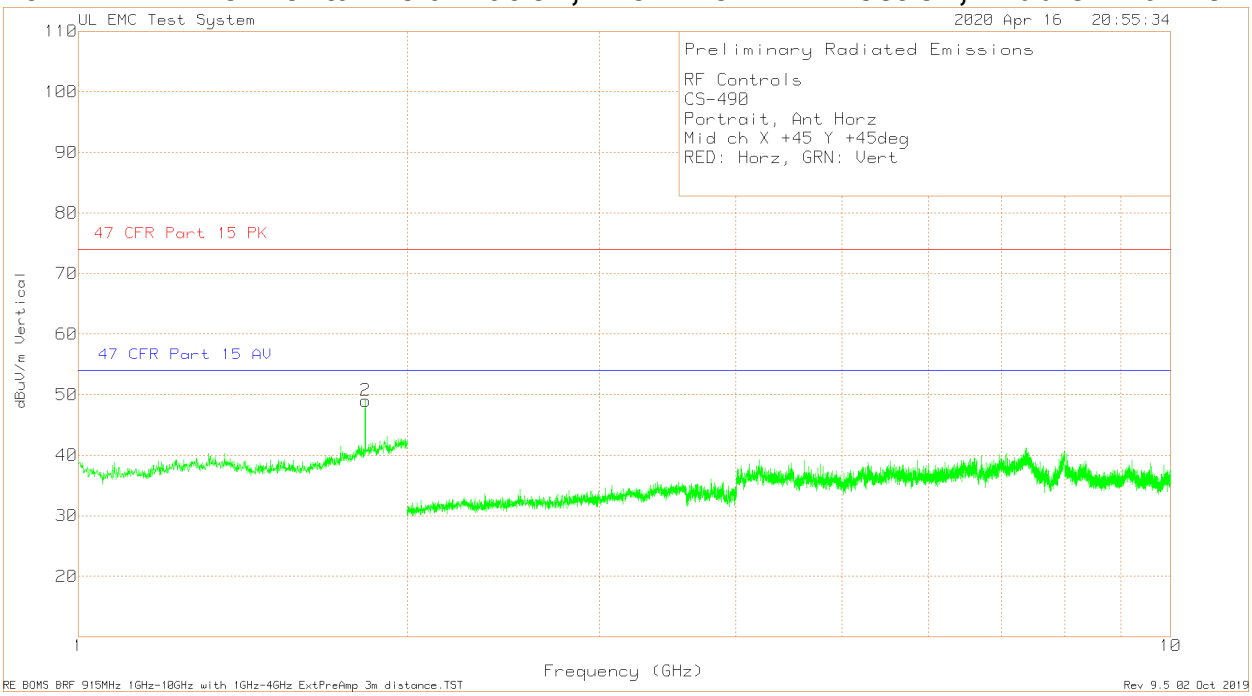


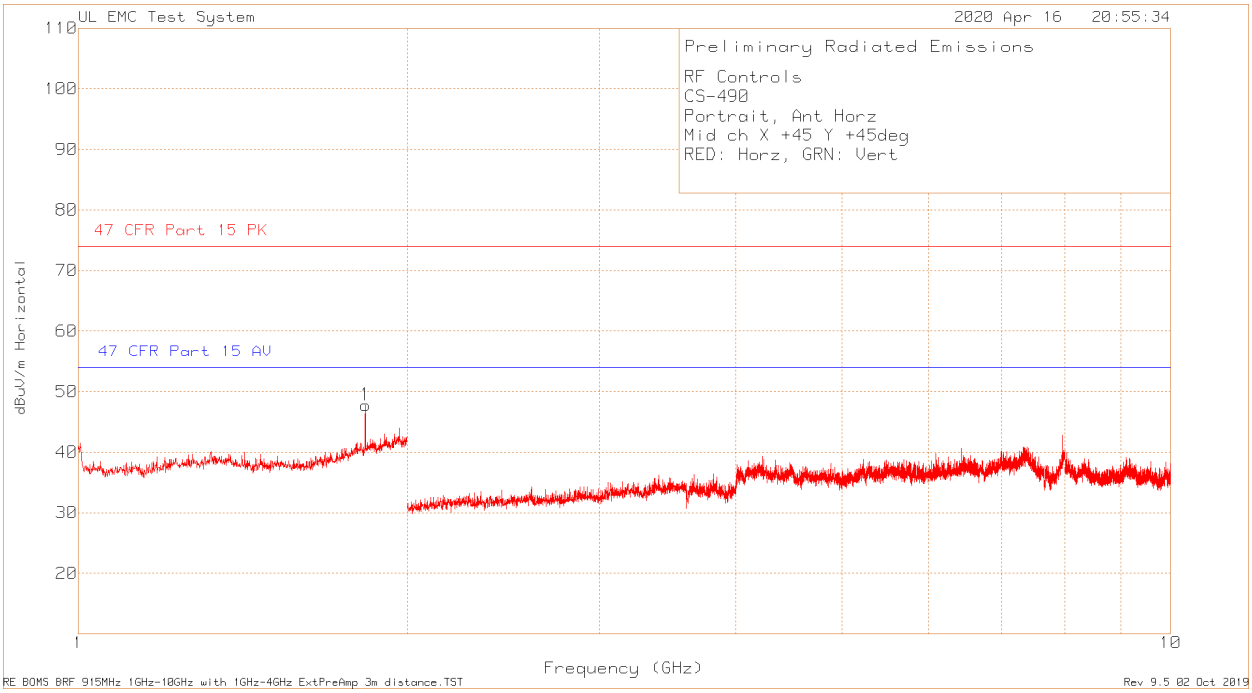
RF Controls
CS-490
Portrait, Ant Horz
Low ch X +45 Y +45deg
RED: Horz, GRN: Vert
Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.806	75.13	Pk	30.3	0.4	-53.43	52.4	-	-	-	-	0-360	184	H
2	1.806	71.53	Pk	30.3	0.4	-53.43	48.8	-	-	-	-	0-360	184	V

Pk - Peak detector

10.1.14. Horizontal Polarization, +45° +45° TX Direction, Middle Channel



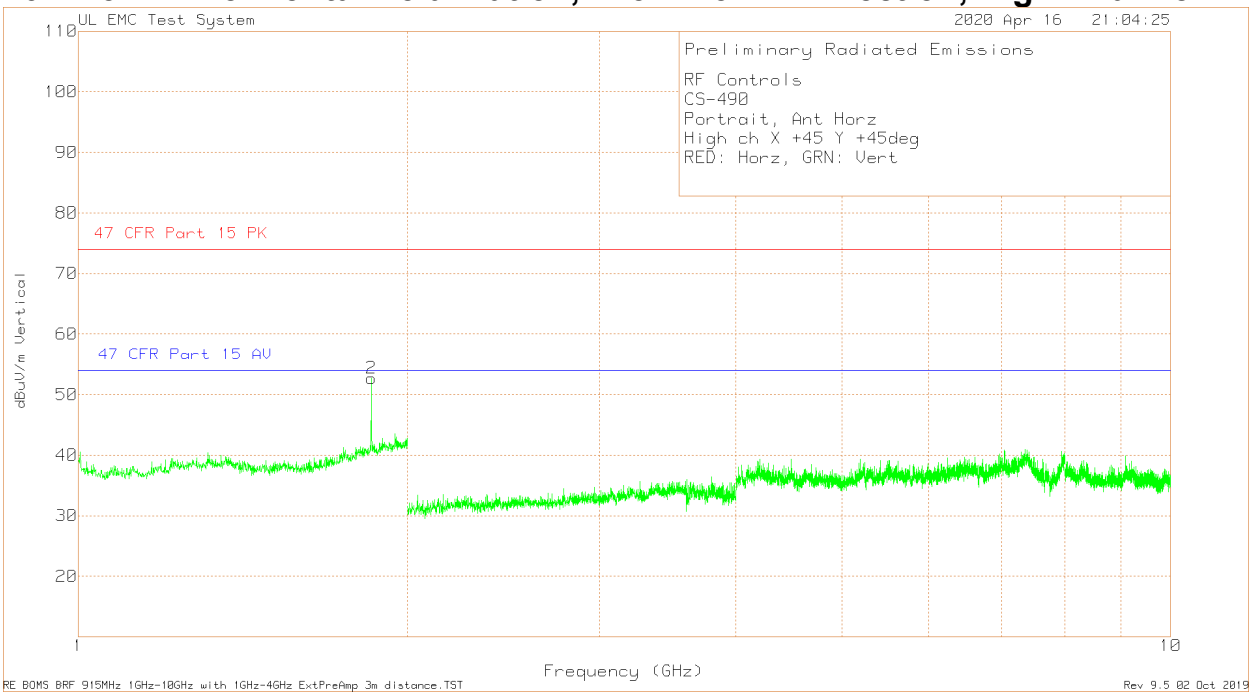


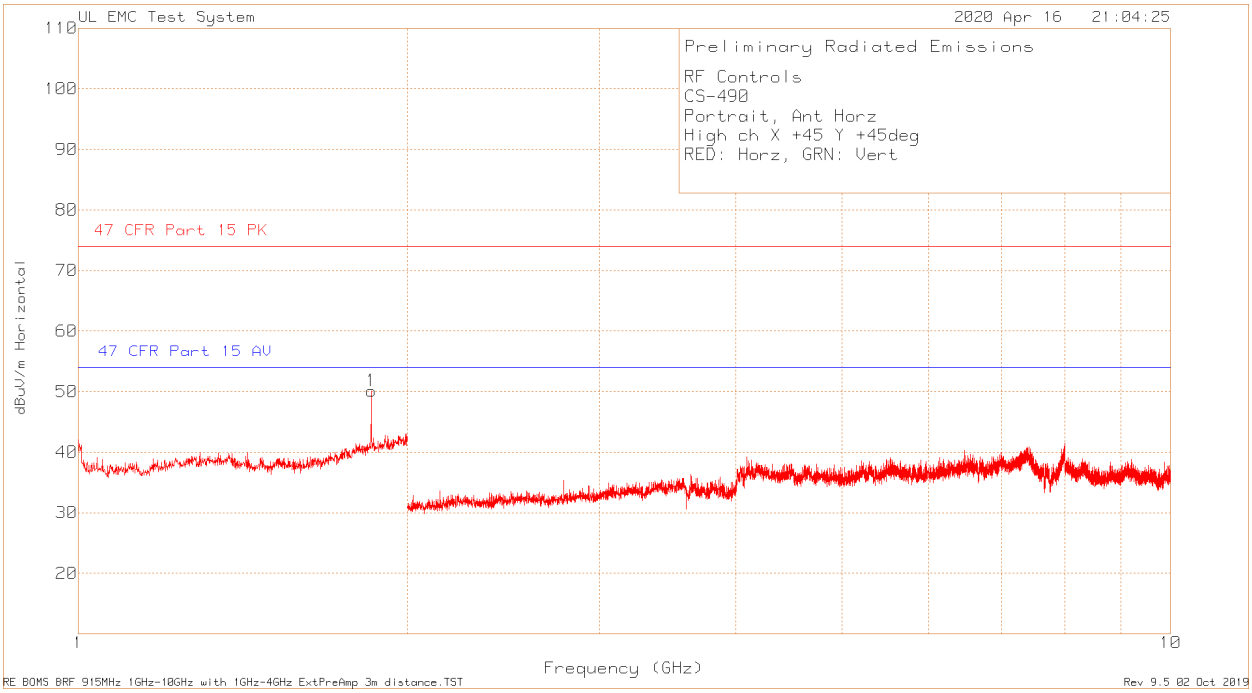
RF Controls
CS-490
Portrait, Ant Horz
Mid ch X +45 Y +45deg
RED: Horz, GRN: Vert
Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.831	69.86	Pk	30.7	0.4	-53.18	47.78	-	-	-	-	0-360	184	H
2	1.831	71.08	Pk	30.7	0.4	-53.18	49	-	-	-	-	0-360	184	V

Pk - Peak detector

10.1.15. Horizontal Polarization, +45° +45° TX Direction, High Channel





RF Controls

CS-490

Portrait, Ant Horz

High ch X +45 Y +45deg

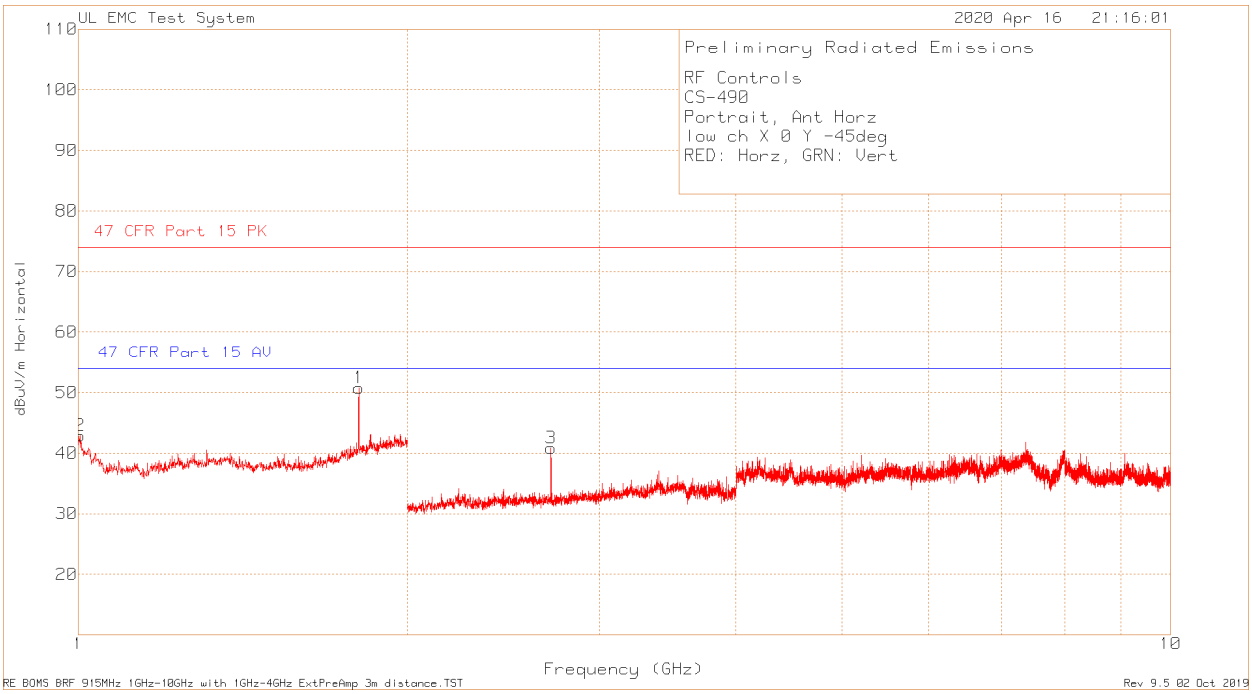
RED: Horz, GRN: Vert

Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.855	72.15	Pk	31	0.4	-53.44	50.11	-	-	-	-	0-360	184	H
2	1.855	74.77	Pk	31	0.4	-53.44	52.73	-	-	-	-	0-360	184	V

Pk - Peak detector

10.1.16. Horizontal Polarization, 0° -45° TX Direction, Low Channel

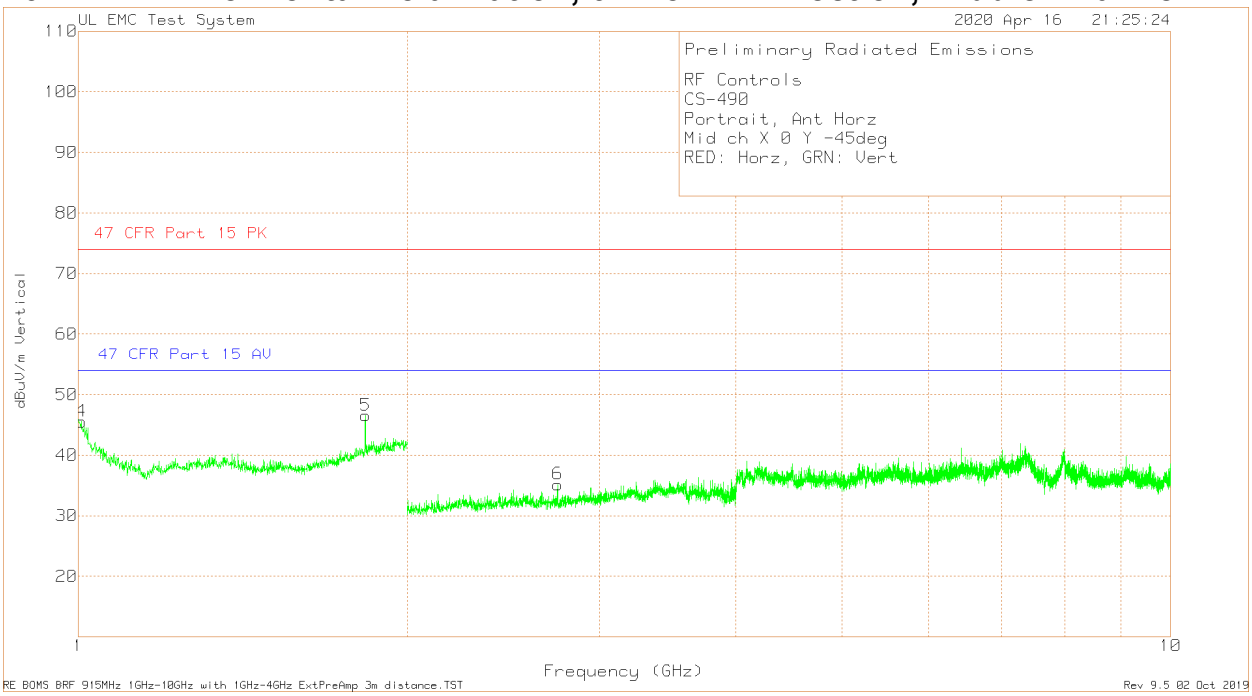


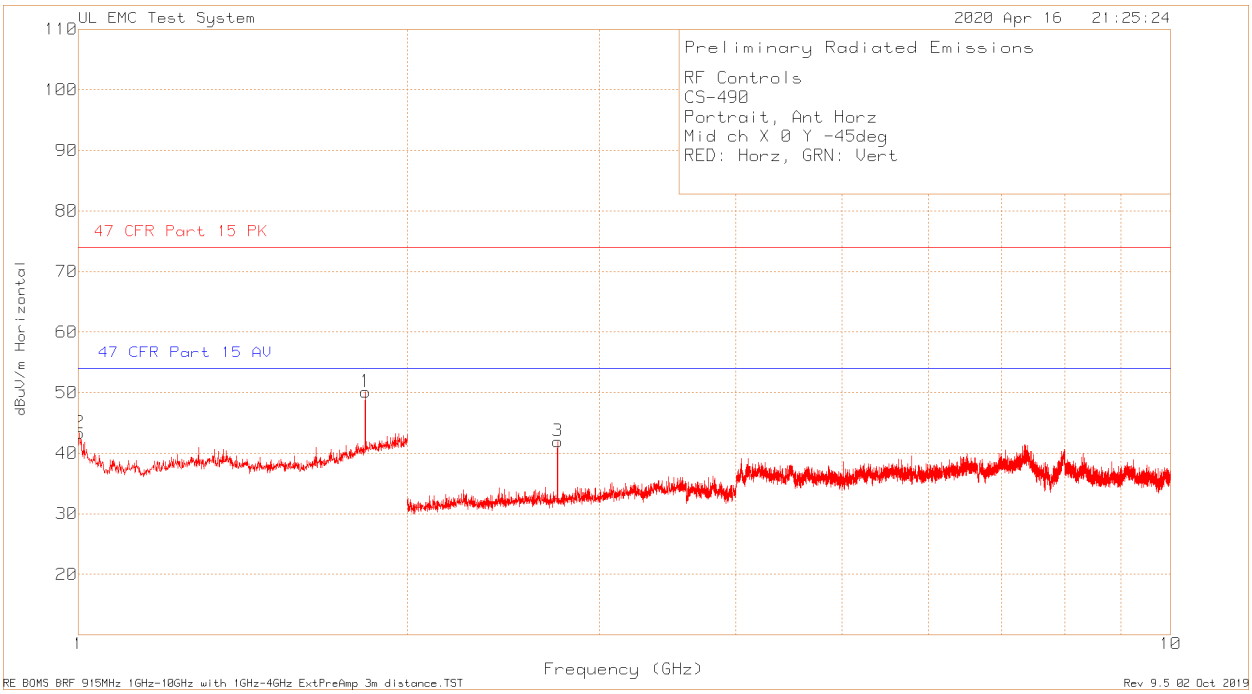
RF Controls
CS-490
Portrait, Ant Horz
low ch X 0 Y -45deg
RED: Horz, GRN: Vert
Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.806	73.51	Pk	30.3	0.4	-53.43	50.78	-	-	-	-	0-360	184	H
2	1.003	70.08	Pk	27.5	1.1	-55.81	42.87	74	-31.13	54	-11.13	0-360	184	H
3	2.708	69.5	Pk	22.1	-	-50.74	40.86	74	-33.14	54	-13.14	0-360	184	H
4	1.002	73.86	Pk	27.6	1.1	-55.83	46.73	74	-27.27	54	-7.27	0-360	184	V
5	1.806	69.27	Pk	30.3	0.4	-53.43	46.54	-	-	-	-	0-360	184	V
6	2.708	63.95	Pk	22.1	-	-50.74	35.31	74	-38.69	54	-18.69	0-360	184	V

Pk - Peak detector

10.1.17. Horizontal Polarization, 0° -45° TX Direction, Middle Channel



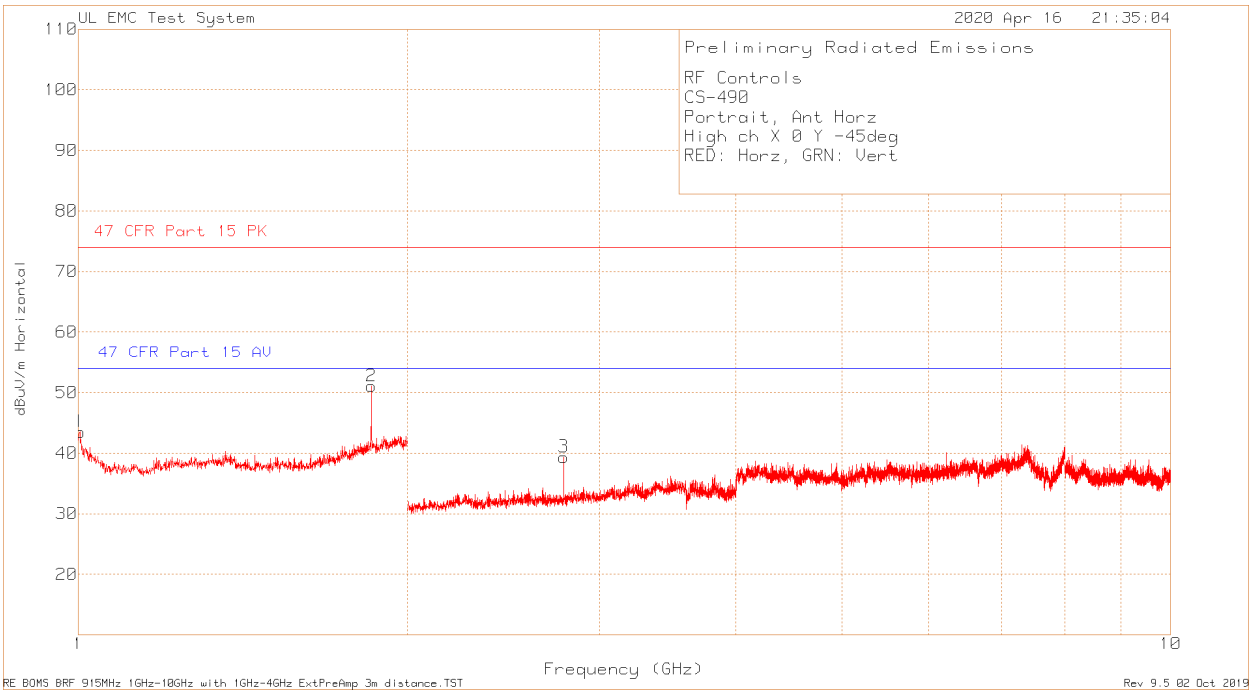


RF Controls
CS-490
Portrait, Ant Horz
Mid ch X 0 Y -45deg
RED: Horz, GRN: Vert
Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.831	72.23	Pk	30.7	0.4	-53.18	50.15	-	-	-	-	0-360	184	H
2	1.002	70.5	Pk	27.6	1.1	-55.83	43.37	74	-30.63	54	-10.63	0-360	184	H
3	2.746	70.46	Pk	22.1	-	-50.58	41.98	74	-32.02	54	-12.02	0-360	184	H
4	1.006	72.99	Pk	27.5	1	-55.94	45.55	74	-28.45	54	-8.45	0-360	184	V
5	1.831	68.64	Pk	30.7	0.4	-53.18	46.56	-	-	-	-	0-360	184	V
6	2.746	63.67	Pk	22.1	-	-50.58	35.19	74	-38.81	54	-18.81	0-360	184	V

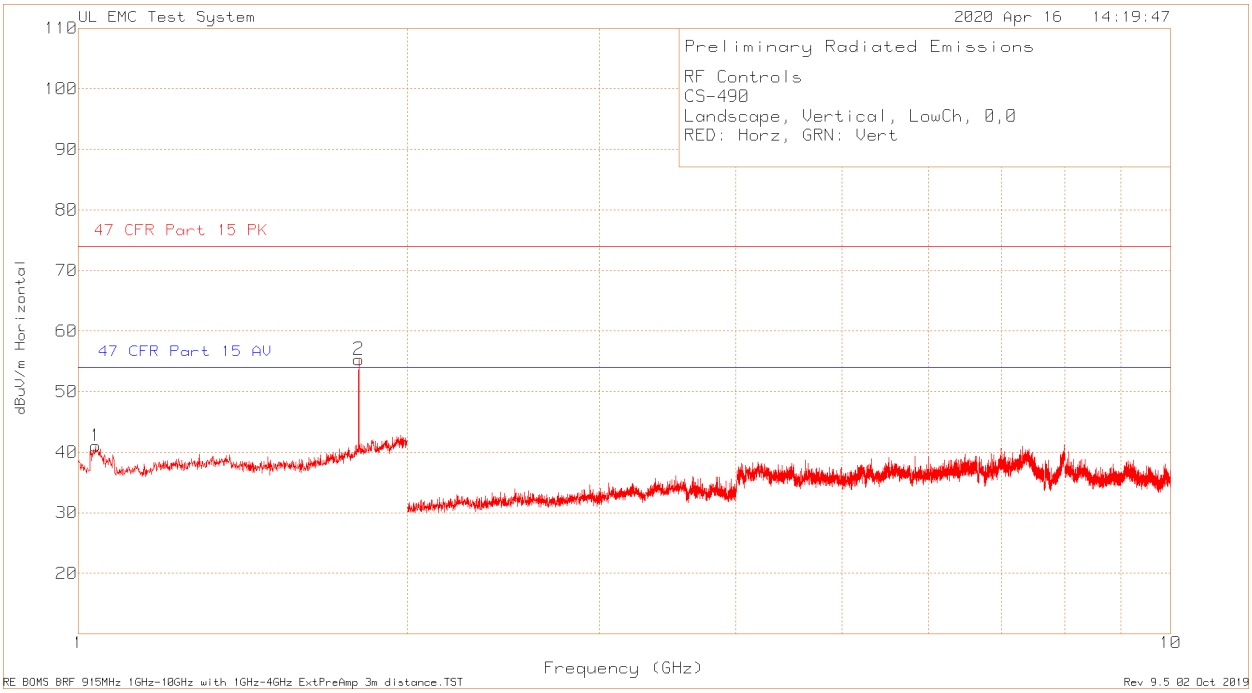
Pk - Peak detector

10.1.18. Horizontal Polarization, 0° -45° TX Direction, High Channel



RF Controls														
CS-490														
Portrait, Ant Horz														
High ch X 0 Y -45deg														
RED: Horz, GRN: Vert														
Trace MArkers														
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.003	70.71	Pk	27.5	1.1	-55.81	43.5	74	-30.5	54	-10.5	0-360	184	H
2	1.855	73.15	Pk	31	0.4	-53.44	51.11	-	-	-	-	0-360	184	H
3	2.782	67.53	Pk	22.2	-	-50.35	39.38	74	-34.62	54	-14.62	0-360	184	H
4	1.001	74.24	Pk	27.6	1.1	-55.85	47.09	74	-26.91	54	-6.91	0-360	184	V
5	1.855	74.92	Pk	31	0.4	-53.44	52.88	-	-	-	-	0-360	184	V
6	2.782	62.14	Pk	22.2	-	-50.35	33.99	74	-40.01	54	-20.01	0-360	184	V
Pk - Peak detector														

10.1.19. Vertical Polarization, Boresight TX Direction, Low Channel



RF Controls

CS-490

Landscape, Vertical, LowCh, 0,0

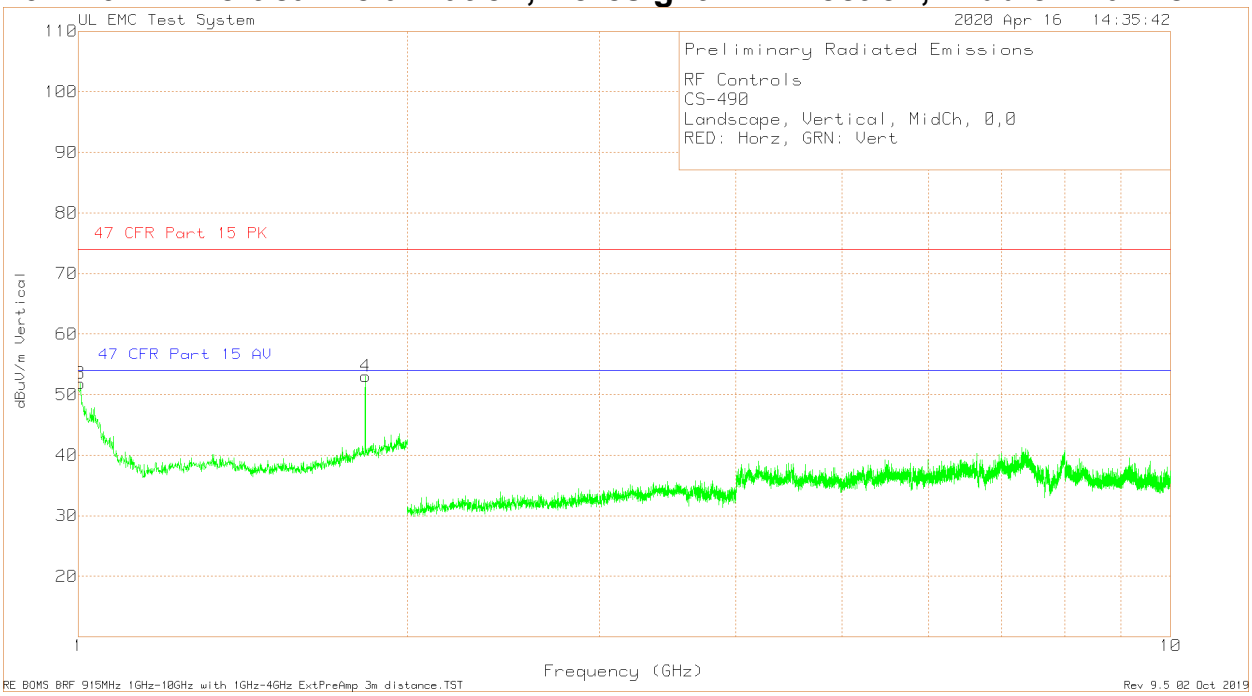
RED: Horz, GRN: Vert

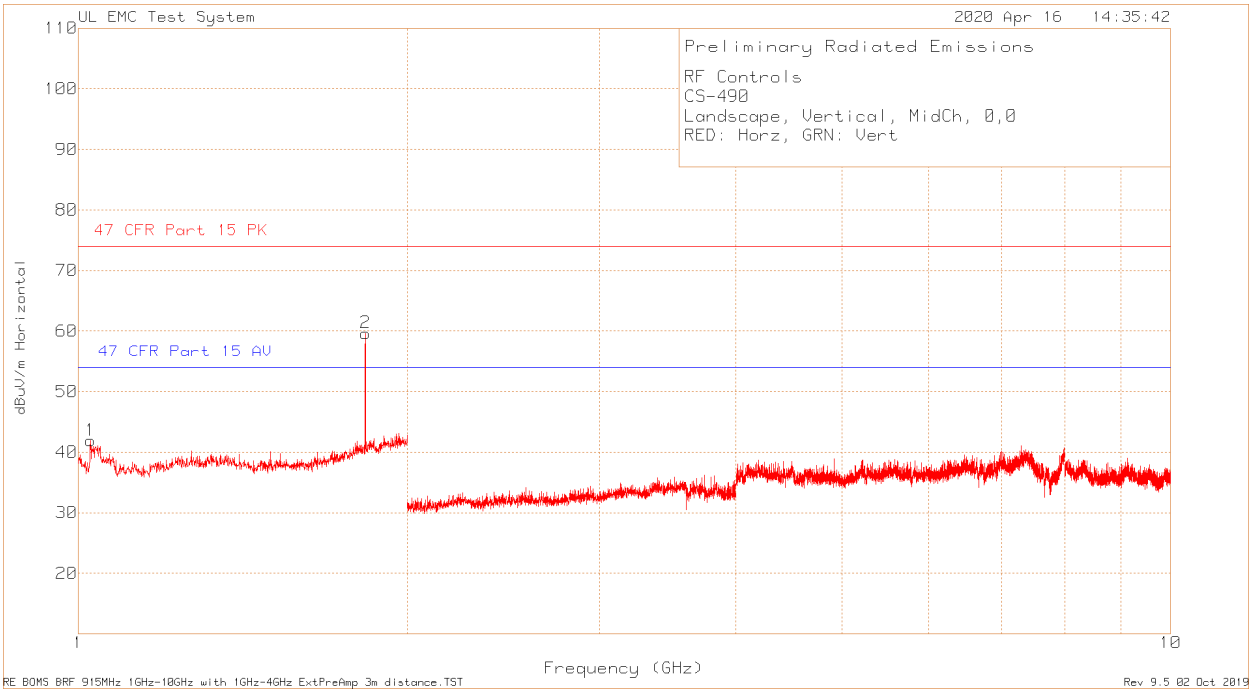
Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.037	69.62	Pk	26.8	0.7	-56.05	41.07	74	-32.93	54	-12.93	0-360	185	H
2	1.806	78.06	Pk	30.3	0.4	-53.43	55.33	-	-	-	-	0-360	185	H
3	1.002	77.05	Pk	27.6	1.1	-55.83	49.92	74	-24.08	54	-4.08	0-360	185	V
4	1.806	68.81	Pk	30.3	0.4	-53.43	46.08	-	-	-	-	0-360	185	V

Pk - Peak detector

10.1.20. Vertical Polarization, Boresight TX Direction, Middle Channel



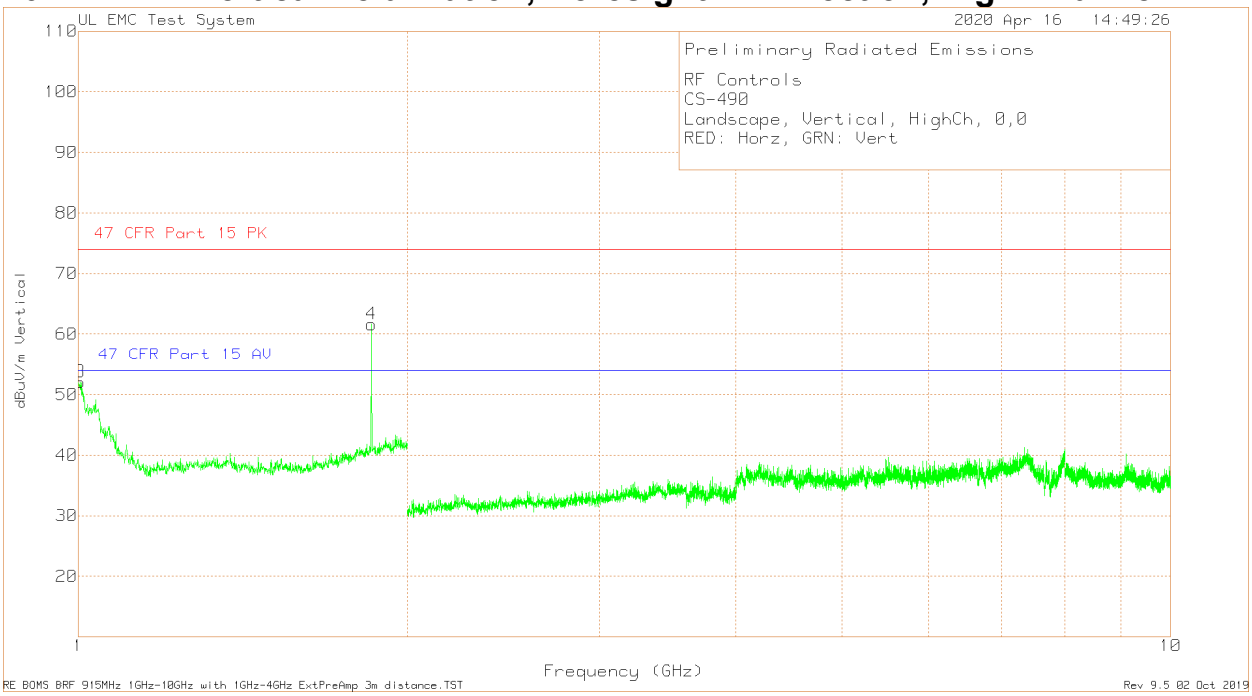


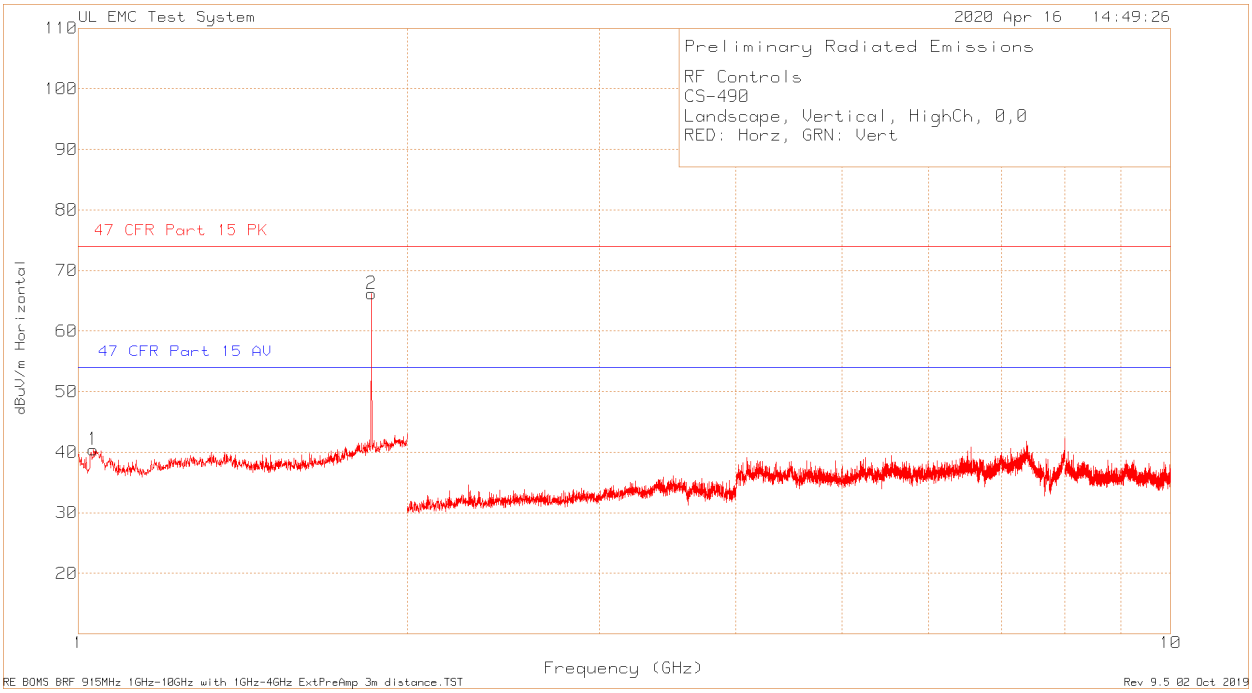
RF Controls
CS-490
Landscape, Vertical, MidCh, 0,0
RED: Horz, GRN: Vert
Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.026	70.18	Pk	27.1	0.7	-56.09	41.89	74	-32.11	54	-12.11	0-360	185	H
2	1.831	81.74	Pk	30.7	0.4	-53.18	59.66	-	-	-	-	0-360	185	H
3	1.004	79.08	Pk	27.5	1	-55.77	51.81	74	-22.19	54	-2.19	0-360	185	V
4	1.831	75.08	Pk	30.7	0.4	-53.18	53	-	-	-	-	0-360	185	V

Pk - Peak detector

10.1.21. Vertical Polarization, Boresight TX Direction, High Channel



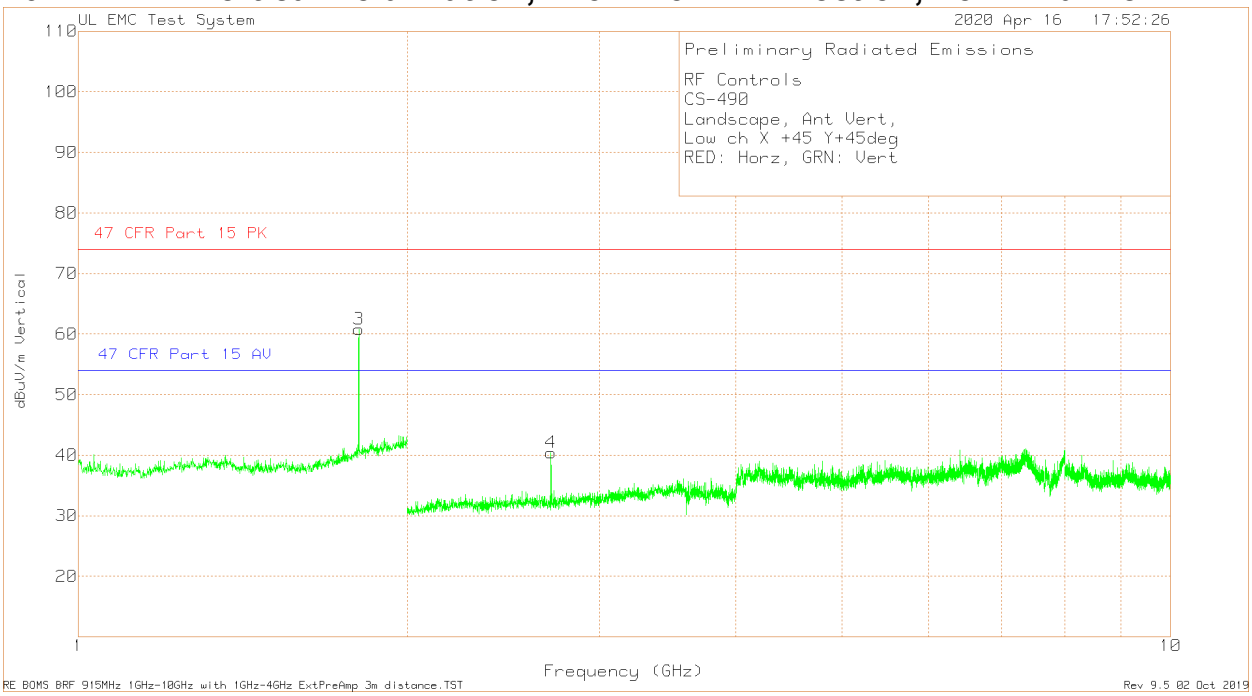


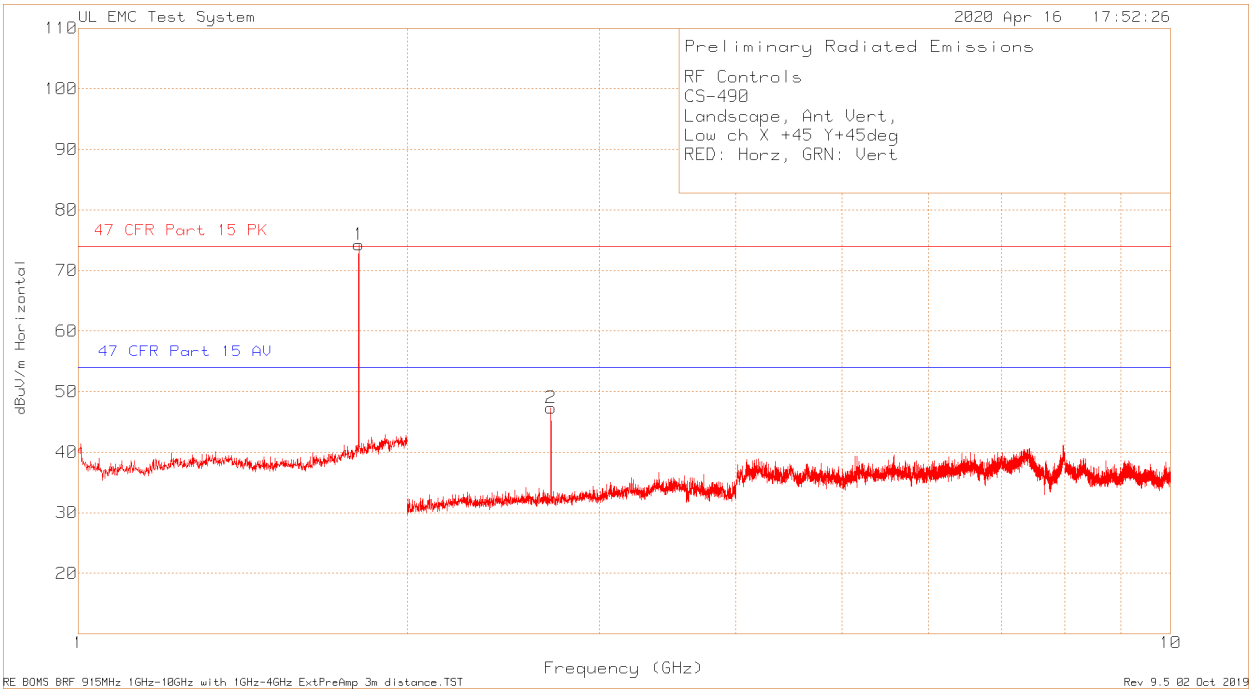
RF Controls
CS-490
Landscape, Vertical, HighCh, 0,0
RED: Horz, GRN: Vert
Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.032	68.88	Pk	26.9	0.7	-56.03	40.45	74	-33.55	54	-13.55	0-360	185	H
2	1.855	88.25	Pk	31	0.4	-53.44	66.21	-	-	-	-	0-360	185	H
3	1.003	79.3	Pk	27.5	1.1	-55.81	52.09	74	-21.91	54	-1.91	0-360	185	V
4	1.855	83.65	Pk	31	0.4	-53.44	61.61	-	-	-	-	0-360	185	V

Pk - Peak detector

10.1.22. Vertical Polarization, +45° +45° TX Direction, Low Channel



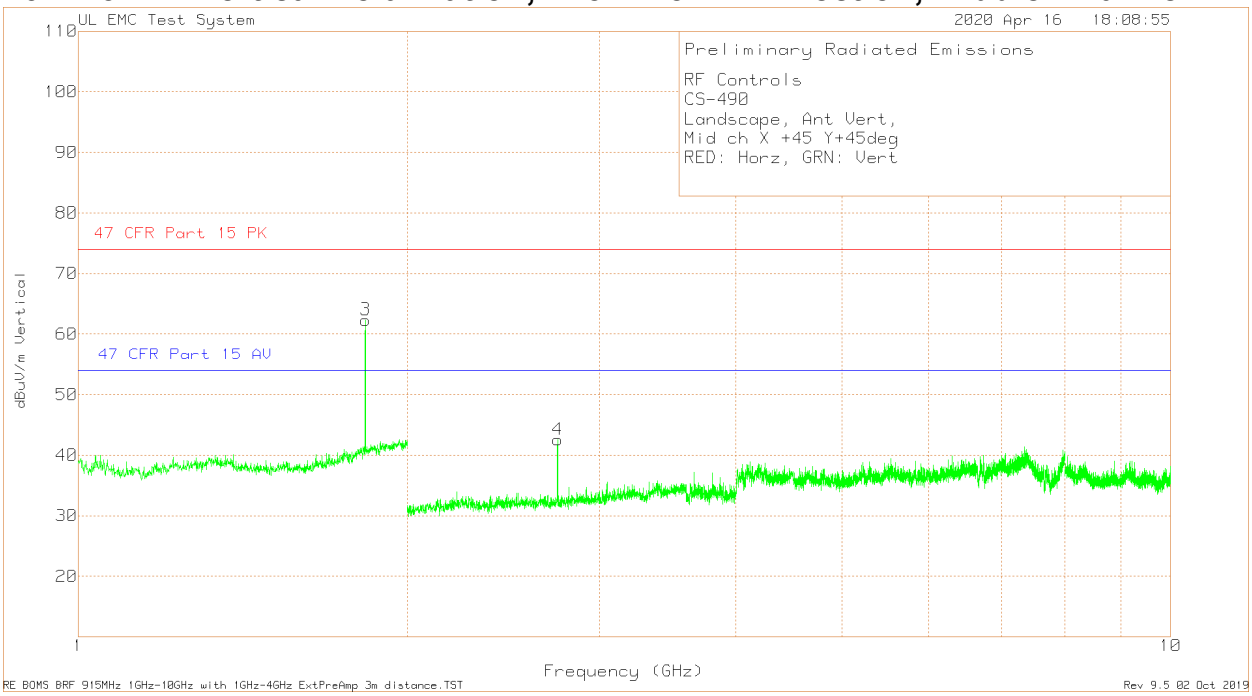


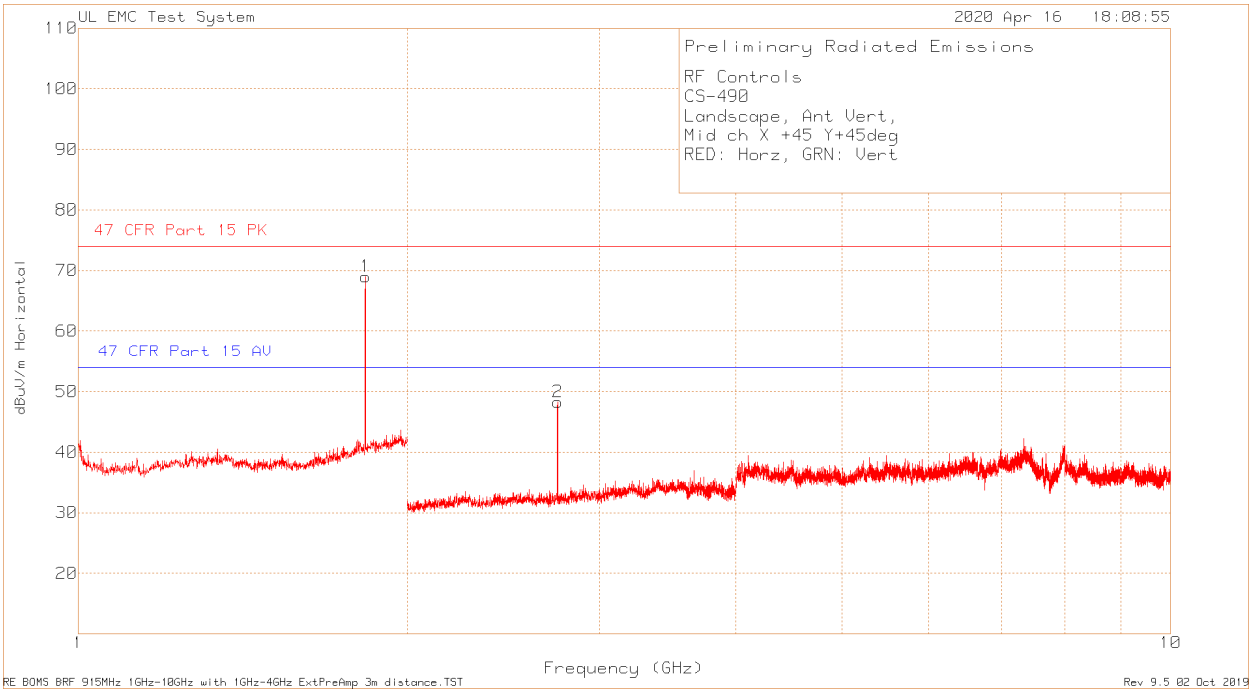
RF Controls
CS-490
Landscape, Ant Vert,
Low ch X +45 Y+45deg
RED: Horz, GRN: Vert
Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.806	96.98	Pk	30.3	0.4	-53.43	74.25	-	-	-	-	0-360	185	H
2	2.708	75.94	Pk	22.1	-	-50.74	47.3	74	-26.7	54	-6.7	0-360	185	H
3	1.806	83.52	Pk	30.3	0.4	-53.43	60.79	-	-	-	-	0-360	185	V
4	2.708	69.02	Pk	22.1	-	-50.74	40.38	74	-33.62	54	-13.62	0-360	185	V

Pk - Peak detector

10.1.23. Vertical Polarization, +45° +45° TX Direction, Middle Channel





RF Controls
CS-490
Landscape, Ant Vert,
Mid ch X +45 Y+45deg
RED: Horz, GRN: Vert
Trace MArkers

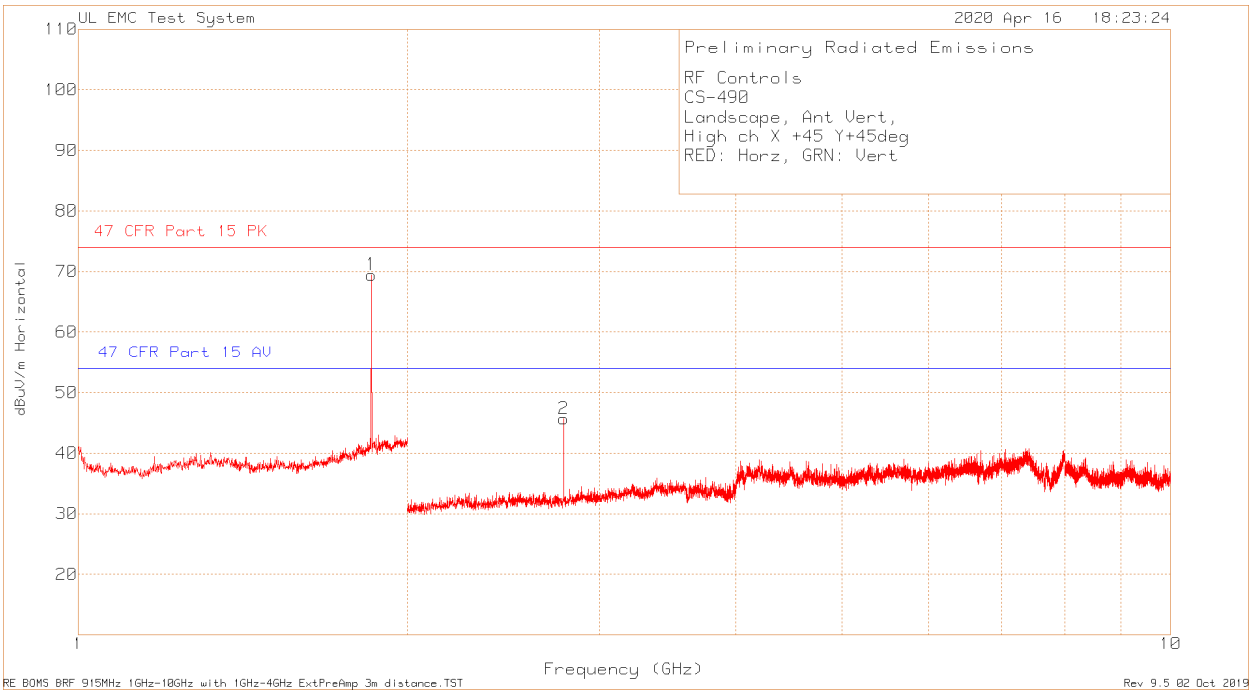
Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.831	91.07	Pk	30.7	0.4	-53.18	68.99	-	-	-	-	0-360	185	H
2	2.746	76.78	Pk	22.1	-	-50.58	48.3	74	-25.7	54	-5.7	0-360	185	H
3	1.831	84.43	Pk	30.7	0.4	-53.18	62.35	-	-	-	-	0-360	185	V
4	2.746	71.07	Pk	22.1	-	-50.58	42.59	74	-31.41	54	-11.41	0-360	185	V

Radiated Emission Data

	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	2.7457	77.5	Pk	22.1	-	-50.65	48.95	74	-25.05	54	-5.05	149	177	H
	2.7457	73.68	Av	22.1	-	-50.64	45.14	74	-28.86	54	-8.86	149	177	H

Pk - Peak detector
Av - PWR RMS

10.1.24. Vertical Polarization, +45° +45° TX Direction, High Channel

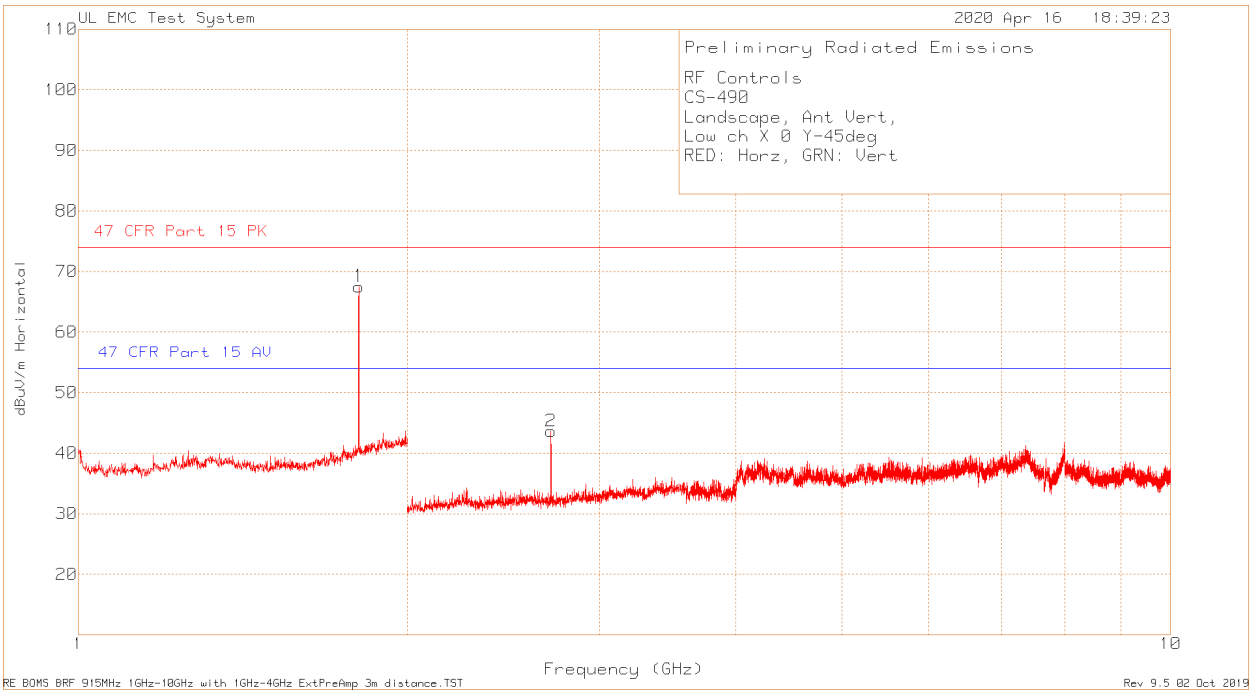


RF Controls
CS-490
Landscape, Ant Vert,
High ch X +45 Y+45deg
RED: Horz, GRN: Vert
Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.855	91.49	Pk	31	0.4	-53.44	69.45	-	-	-	-	0-360	184	H
2	2.782	73.82	Pk	22.2	-	-50.35	45.67	74	-28.33	54	-8.33	0-360	184	H
3	1.855	88	Pk	31	0.4	-53.44	65.96	-	-	-	-	0-360	184	V
4	2.782	67.92	Pk	22.2	-	-50.35	39.77	74	-34.23	54	-14.23	0-360	184	V

Pk - Peak detector

10.1.25. Vertical Polarization, 0° -45° TX Direction, Low Channel

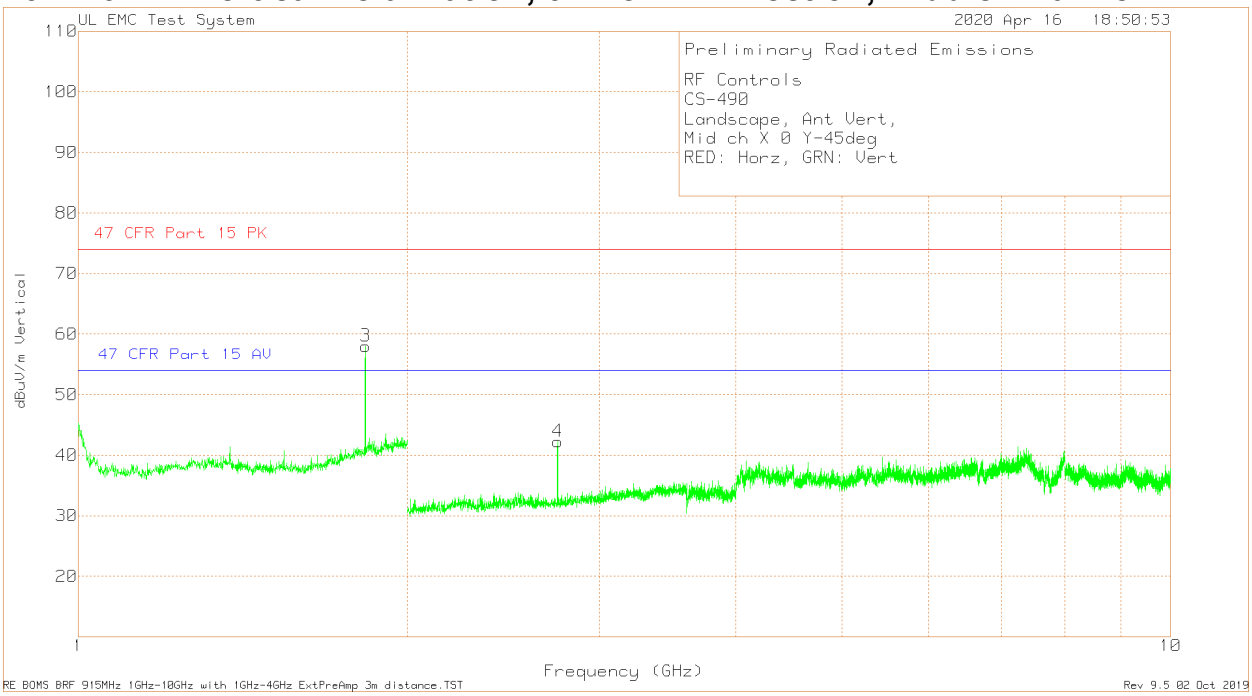


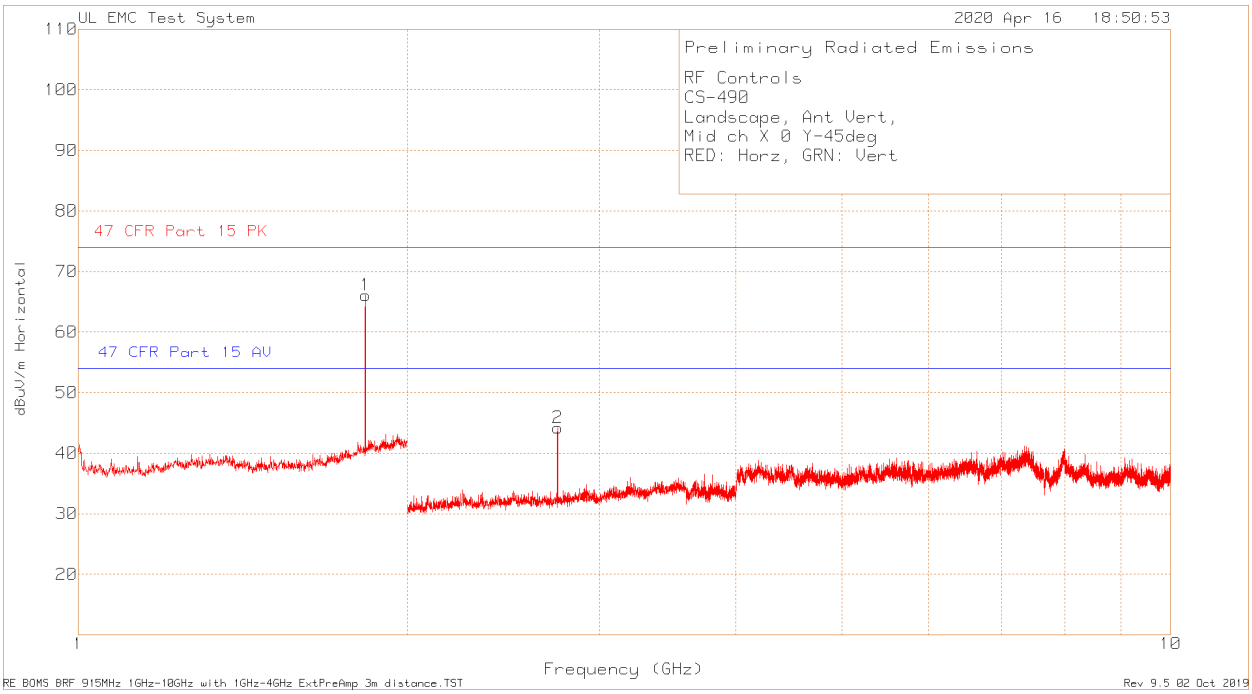
RF Controls
CS-490
Landscape, Ant Vert,
Low ch X 0 Y-45deg
RED: Horz, GRN: Vert
Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.806	90.24	Pk	30.3	0.4	-53.43	67.51	-	-	-	-	0-360	184	H
2	2.708	72.26	Pk	22.1	-	-50.74	43.62	74	-30.38	54	-10.38	0-360	184	H
3	1.806	80.32	Pk	30.3	0.4	-53.43	57.59	-	-	-	-	0-360	184	V
4	2.708	69.94	Pk	22.1	-	-50.74	41.3	74	-32.7	54	-12.7	0-360	184	V

Pk - Peak detector

10.1.26. Vertical Polarization, 0° -45° TX Direction, Middle Channel



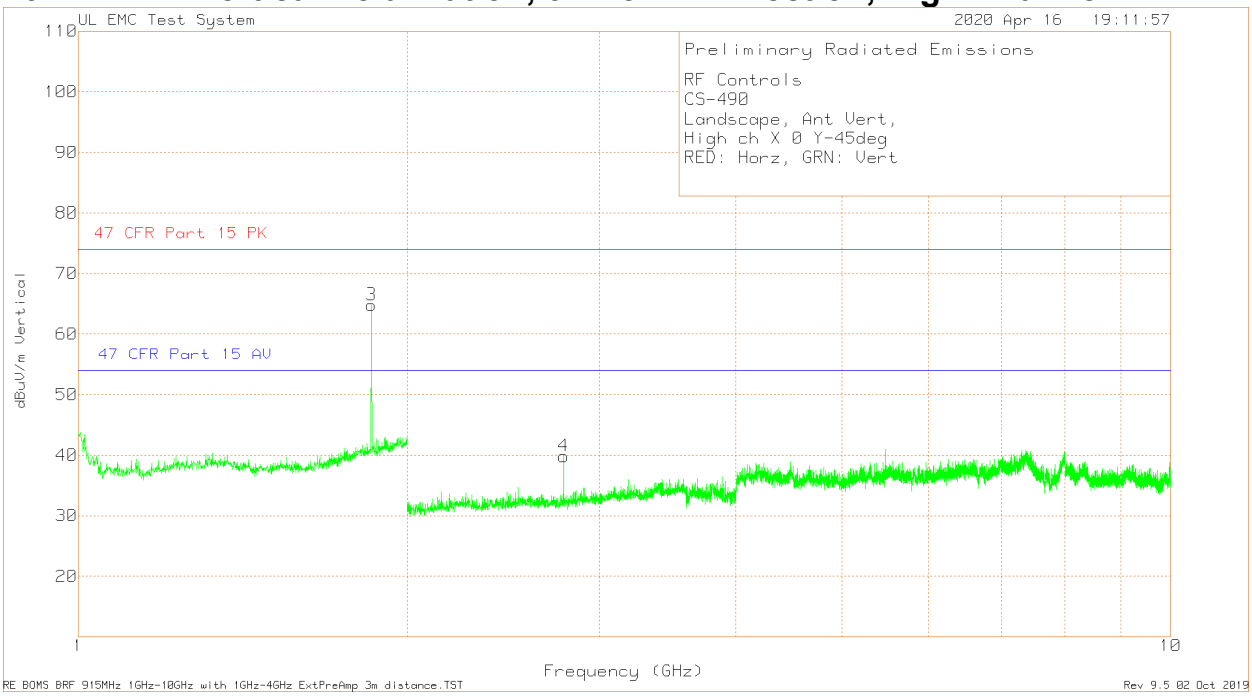


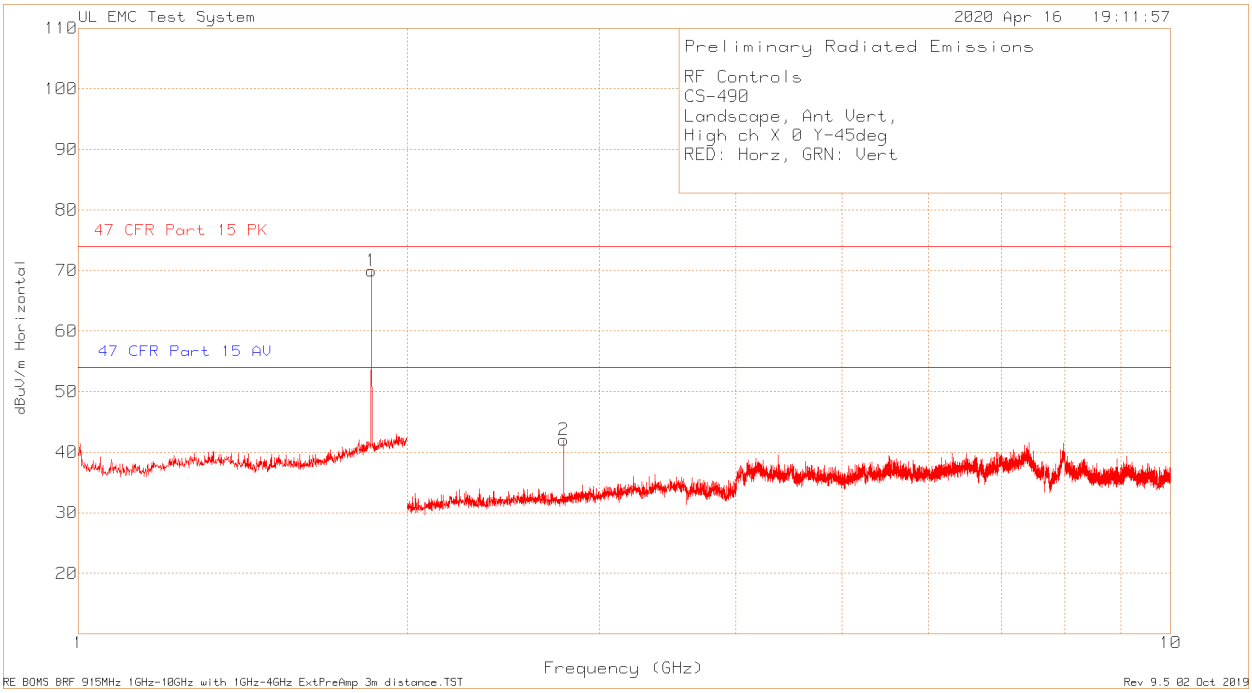
RF Controls
CS-490
Landscape, Ant Vert,
Mid ch X 0 Y-45deg
RED: Horz, GRN: Vert
Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.831	88.18	Pk	30.7	0.4	-53.18	66.1	-	-	-	-	0-360	184	H
2	2.746	72.64	Pk	22.1	-	-50.58	44.16	74	-29.84	54	-9.84	0-360	184	H
3	1.831	80.11	Pk	30.7	0.4	-53.18	58.03	-	-	-	-	0-360	184	V
4	2.746	70.76	Pk	22.1	-	-50.58	42.28	74	-31.72	54	-11.72	0-360	184	V

Pk - Peak detector

10.1.27. Vertical Polarization, 0° -45° TX Direction, High Channel





RF Controls
CS-490
Landscape, Ant Vert,
High ch X 0 Y-45deg
RED: Horz, GRN: Vert
Trace MArkers

Marker No.	Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	BRF Factor dB	Gain/Loss (dB)	Corrected Reading dBuV/m	Limit 47 CFR Part 15.209 PK dBuV/m	Margin (dB)	Limit 47 CFR Part 15.209 AV dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	1.855	92	Pk	31	0.4	-53.44	69.96	-	-	-	-	0-360	184	H
2	2.782	70.16	Pk	22.2	-	-50.35	42.01	74	-31.99	54	-11.99	0-360	184	H
3	1.855	86.85	Pk	31	0.4	-53.44	64.81	-	-	-	-	0-360	184	V
4	2.782	67.98	Pk	22.2	-	-50.35	39.83	74	-34.17	54	-14.17	0-360	184	V

Pk - Peak detector

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

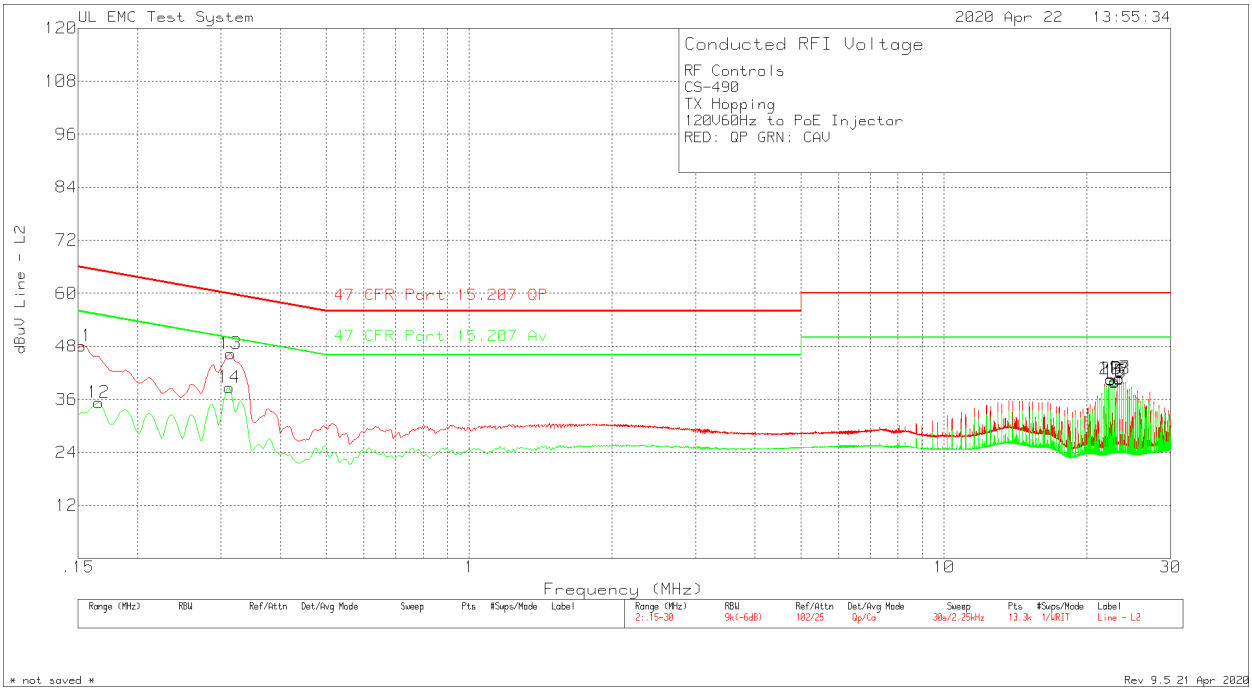
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

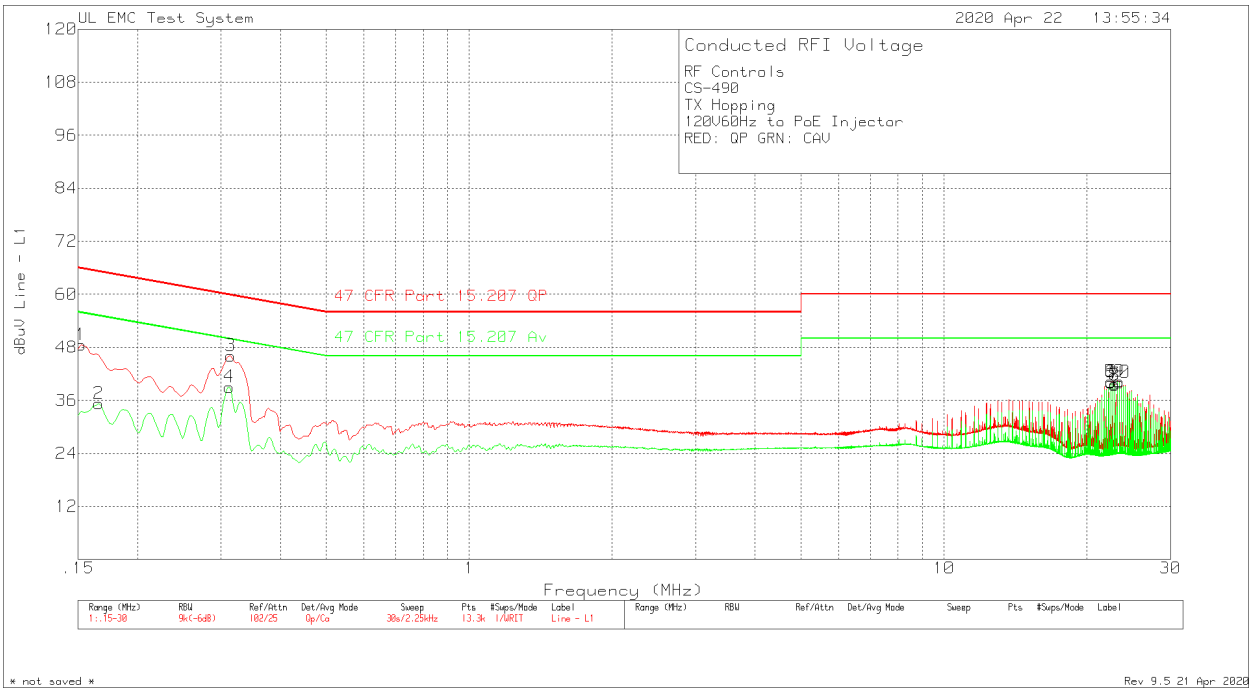
The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

11.1.1. AC Power Line





RF Controls
CS-490
TX Hopping
120V60Hz to PoE Injector
RED: QP GRN: CAV

Trace Markers

No.	Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading dBuV	Limit:1	2
Line 1							
1	.15225	33.81dBuV Qp	0	14.7	48.51	65.88	55.88
					Margin (dB)	-17.37	-7.37
2	.16575	22.6dBuV Ca	0	12.7	35.3	65.17	55.17
					Margin (dB)	-29.87	-19.87
3	.31425	35.31dBuV Qp	0	10.8	46.11	59.86	49.86
					Margin (dB)	-13.75	-3.75
4	.312	28.23dBuV Ca	0	10.8	39.03	59.92	49.92
					Margin (dB)	-20.89	-10.89
5	22.43625	28.74dBuV Qp	0	11.5	40.24	60	50
					Margin (dB)	-19.76	-9.76
6	22.43625	28.57dBuV Ca	0	11.5	40.07	60	50
					Margin (dB)	-19.93	-9.93
7	22.90875	28.23dBuV Qp	0	11.5	39.73	60	50
					Margin (dB)	-20.27	-10.27
8	22.90875	27.94dBuV Ca	0	11.5	39.44	60	50
					Margin (dB)	-20.56	-10.56
9	23.38125	28.81dBuV Qp	0	11.5	40.31	60	50
					Margin (dB)	-19.69	-9.69
10	23.38125	28.55dBuV Ca	0	11.5	40.05	60	50
					Margin (dB)	-19.95	-9.95
Neutral							
11	.15225	33.31dBuV Qp	.1	14.7	48.11	65.88	55.88
					Margin (dB)	-17.77	-7.77
12	.16575	22.58dBuV Ca	0	12.7	35.28	65.17	55.17
					Margin (dB)	-29.89	-19.89
13	.31425	35.51dBuV Qp	0	10.8	46.31	59.86	49.86
					Margin (dB)	-13.55	-3.55
14	.312	27.88dBuV Ca	0	10.8	38.68	59.92	49.92
					Margin (dB)	-21.24	-11.24
15	22.90875	28.62dBuV Qp	0	11.5	40.12	60	50
					Margin (dB)	-19.88	-9.88
16	22.90875	28.39dBuV Ca	0	11.5	39.89	60	50
					Margin (dB)	-20.11	-10.11
17	23.38125	29.33dBuV Qp	0	11.5	40.83	60	50
					Margin (dB)	-19.17	-9.17
18	23.38125	29.07dBuV Ca	0	11.5	40.57	60	50
					Margin (dB)	-19.43	-9.43
19	22.43625	29.15dBuV Qp	0	11.5	40.65	60	50
					Margin (dB)	-19.35	-9.35
20	22.43625	29.02dBuV Ca	0	11.5	40.52	60	50
					Margin (dB)	-19.48	-9.48

LIMIT 1: 47 CFR Part 15.207 QP
LIMIT 2: 47 CFR Part 15.207 Av

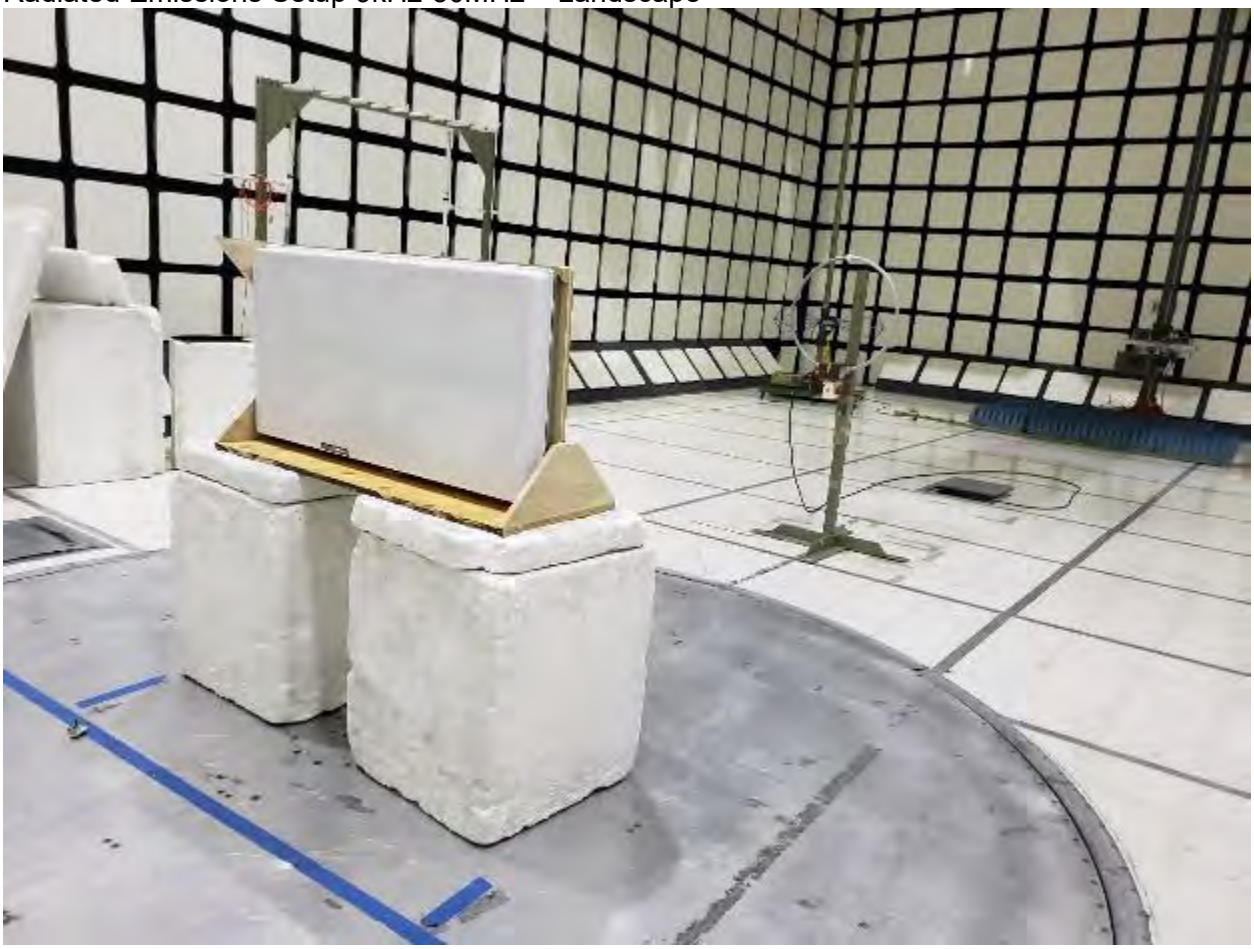
Qp - Quasi-Peak detector
Ca - CISPR Average detection

UL LLC
333 Pfingsten Road, Northbrook, IL 60062; USA TEL:(847) 272-8800

12. SETUP PHOTOS

Line Conducted Emissions Setup

Radiated Emissions Setup 9kHz-30MHz – Landscape



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Radiated Emissions Setup 9kHz-30MHz – Portrait

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Radiated Spurious Emissions Setup 30MHz-1GHz – Landscape

Radiated Spurious Emissions Setup 30MHz-1GHz - Portrait

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Radiated Spurious Emissions Setup – above 1GHz – Landscape

Radiated Spurious Emissions Setup – above 1GHz - Portrait

Antenna Port Measurements - Analyzer Setup

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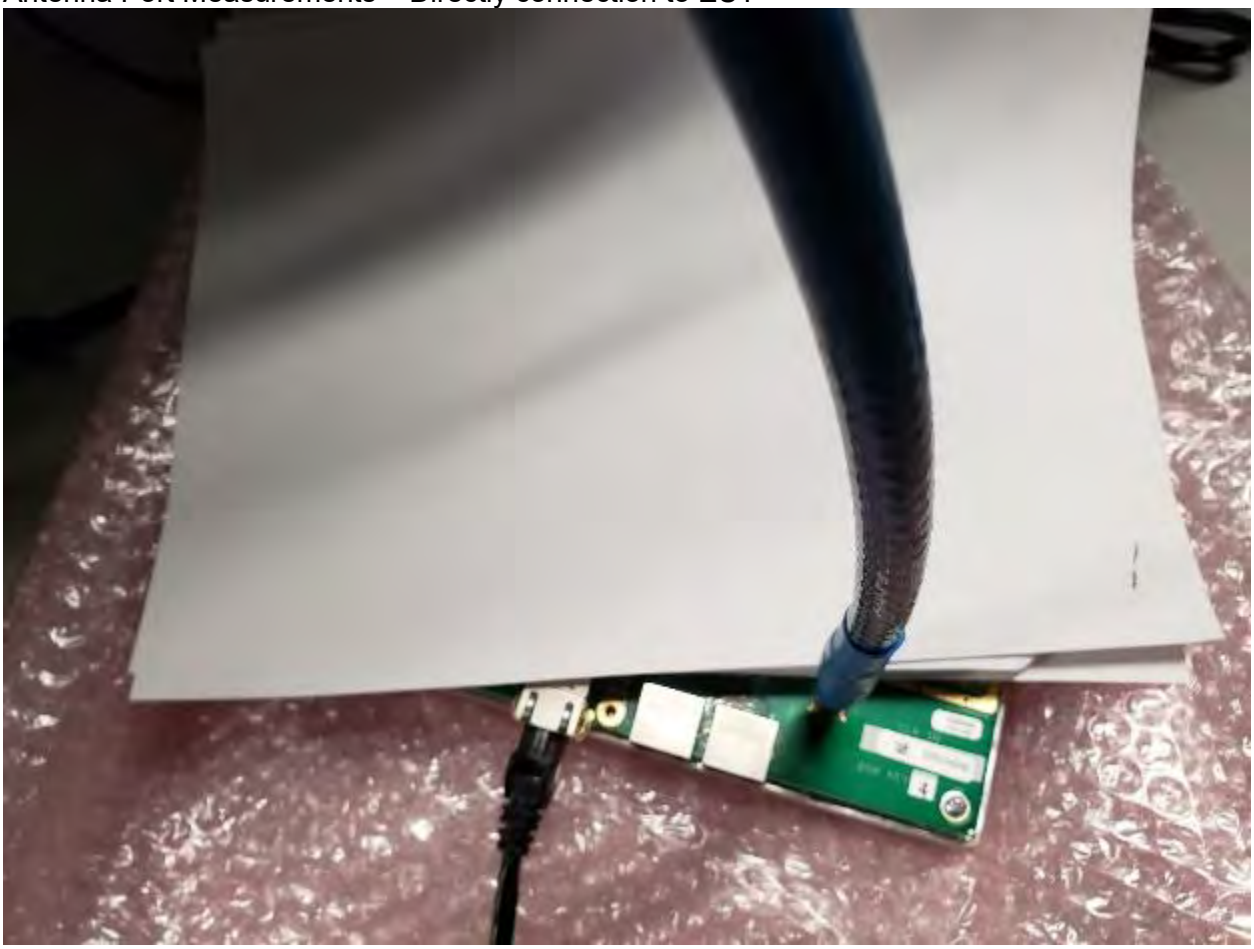
Antenna Port Measurements – Directly connection to EUT



END OF TEST REPORT