



# **CERTIFICATION TEST REPORT**

**Report Number. :** 12561382-E1V2

**Applicant :** Valve Corporation  
10400 NE 4<sup>th</sup> Street, Suite 1400  
Bellevue, WA 98004 U.S.A.

**Model :** 1006

**FCC ID :** 2AES41006

**IC :** 20207-1006

**EUT Description :** Valve Right Controller

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

**Date Of Issue:**

December 20, 2018

**Prepared by:**

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NVLAP Lab code: 200065-0

## REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	12/12/2018	Initial Issue	
V2	12/20/2018	Updated Section 6	KK

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** Valve Corporation  
10400 NE 4th Street, Suite 1400  
Bellevue, WA 98004 U.S.A.

**EUT DESCRIPTION:** Valve Right Controller

**MODEL:** 1006

**SERIAL NUMBER:** Conducted: 1880279  
Radiated: 1880280

**DATE TESTED:** OCTOBER 31, 2018 – NOVEMBER 9, 2018

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

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

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

Approved & Released For  
UL Verification Services Inc. By:

Reviewed By:



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PROJECT ENGINEER  
UL Verification Services Inc

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, KDB 558074 D01 v05, RSS-GEN Issue 5, and RSS-247 Issue 2.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street	47658 Kato Rd
<input checked="" type="checkbox"/> Chamber A (ISED:2324B-1)	<input type="checkbox"/> Chamber D (ISED:22541-1)	<input checked="" type="checkbox"/> Chamber I (ISED:2324A-5)
<input type="checkbox"/> Chamber B (ISED:2324B-2)	<input type="checkbox"/> Chamber E (ISED:22541-2)	<input type="checkbox"/> Chamber J (ISED:2324A-6)
<input type="checkbox"/> Chamber C (ISED:2324B-3)	<input type="checkbox"/> Chamber F (ISED:22541-3)	<input type="checkbox"/> Chamber K (ISED:2324A-1)
	<input type="checkbox"/> Chamber G (ISED:22541-4)	<input type="checkbox"/> Chamber L (ISED:2324A-3)
	<input type="checkbox"/> Chamber H (ISED:22541-5)	

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

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

### 4.2. SAMPLE CALCULATION

#### RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

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

#### MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

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

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

### 4.3. MEASUREMENT UNCERTAINTY

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

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

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



## 5. EQUIPMENT UNDER TEST

### 5.1. EUT DESCRIPTION

The EUT is a Valve Right Controller.

### 5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	Valve Protocol	4.76	2.99

### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band (GHz)	Antenna Peak Gain (dBi)
2.4	2.50

### 5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was VRC version: 1538763457.

The test radio version software used during testing was 1538760414.

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## **5.5. WORST-CASE CONFIGURATION AND MODE**

Radiated emissions below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Band edge and radiated emissions between 1GHz and 18GHz were performed with the EUT set to transmit at the highest power on low, middle and high channels.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

## 5.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Lenovo	TP00050C	PC0C3DUA	DoC
Laptop AC/DC Adapter	Lenovo	ADLX45DLC2A	8SSA10E75792UICZ641CLB1	DoC
Laptop	DELL	Inspiron15	B871412	DoC
Laptop AC/DC Adapter	DELL	HA65NS5-00	A065R039L	DoC

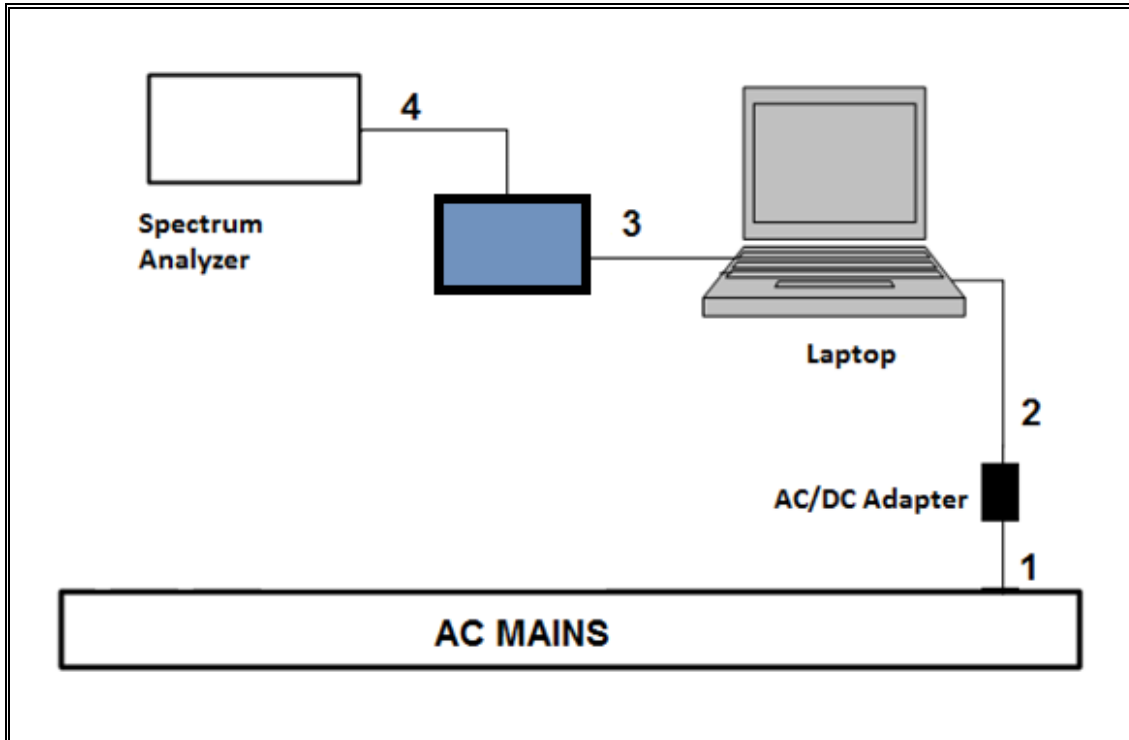
### I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Unshielded	1	AC Mains to AC/DC Adapter
2	DC	1	DC	Unshielded	1.5	AC/DC Adapter to Laptop
3	USB	1	USB	Shielded	1	Laptop to EUT
4	Antenna	1	SMA	Unshielded	0.08	To spectrum analyzer

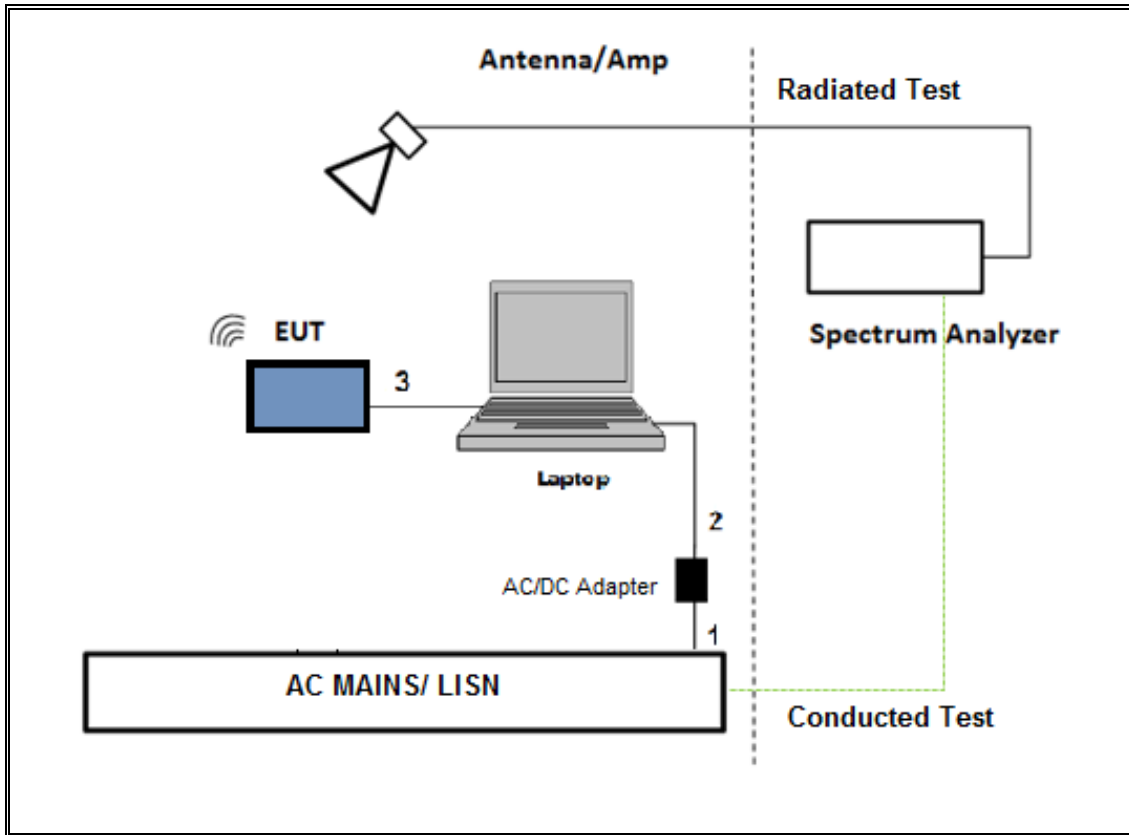
**TEST SETUP**

The EUT is connected to a test laptop during the tests. Test software exercised the EUT.

**SETUP DIAGRAM – CONDUCTED TEST**



**SETUP DIAGRAM - AC LINE CONDUCTED TEST AND RADIATED TEST**



## **6. MEASUREMENT METHOD**

On Time and Duty Cycle: ANSI C63.10-2013 Section 11.6.

6 dB BW: ANSI C63.10 Section 11.8.1. Option 1

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

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

Power Spectral Density: ANSI C63.10 Section 11.10.3 Method AVGPSD-1.

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

Radiated emissions restricted frequency bands: ANSI C63.10 Section 11.12.1.

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

Band-edge: ANSI C63.10 Subclause -11.13.3.4 Integration method -Trace averaging across ON and OFF times DC correction

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

## 7. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	ID Num	Cal Due	Last Cal
6 port rf switch, 1-18GHz	Pasternack	PE7159	171455	08/01/2019	08/01/2018
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences Corp.	JB3	T900	06/18/2019	06/18/2018
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T862	05/25/2019	05/25/2018
RF Amplifier, 1-18GHz	MITEQ	AFS42-00101800-25-S-42	171460	08/01/2019	08/01/2018
18-26.5 GHz Horn Antenna	Seavey Division	MWH-1826/B	T447	6/16/2019	6/16/2018
Pre-Amp 1-26.5 GHz	Agilent	8449B	T404	3/9/2019	3/9/2018
L.I.S.N.	FCC INC.	FCC LISN 50/250	T1310	06/15/2019	06/15/2018
L.I.S.N.	FCC INC.	FCC LISN 50/250	T24	03/06/2019	03/06/2018
EMI Receiver	Rohde & Schwarz	ESR	T1436	02/21/2019	02/21/2018
Antenna, Active Loop 9kHz-30MHz	Com-Power Corp.	AL-130R	PRE0165308	12/13/2018	12/13/2017
Power Meter, P-series single channel	Agilent (Keysight) Technologies	N1911A	T1269	04/05/2019	04/05/2018
Power Sensor, P-series, 50MHz to 18GHz, Wideband	Agilent (Keysight) Technologies	N1921A	T1225	04/10/2019	04/10/2018
PXA Spectrum Analyzer, 3Hz to 44GHz	Keysight	N9030A	T1113	12/21/2018	12/21/2017
PXA Spectrum Analyzer, 3Hz to 44GHz	Keysight	N9030A	T339	9/11/2019	9/11/2018
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (keysight) Technologies	N9030A	T1466	11/25/2018	11/25/2017
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	PRE0179367	04/25/2019	04/25/2018

Test Software List			
Description	Manufacturer	Model	Version
Radiated Software	UL	UL EMC	Rev 9.5, Jun 22, 2018
Antenna Port Software	UL	UL RF	Rev 8.9.1, Oct 18, 2018

## 8. ANTENNA PORT TEST RESULTS

### 8.1. ON TIME AND DUTY CYCLE

#### LIMITS

None; for reporting purposes only.

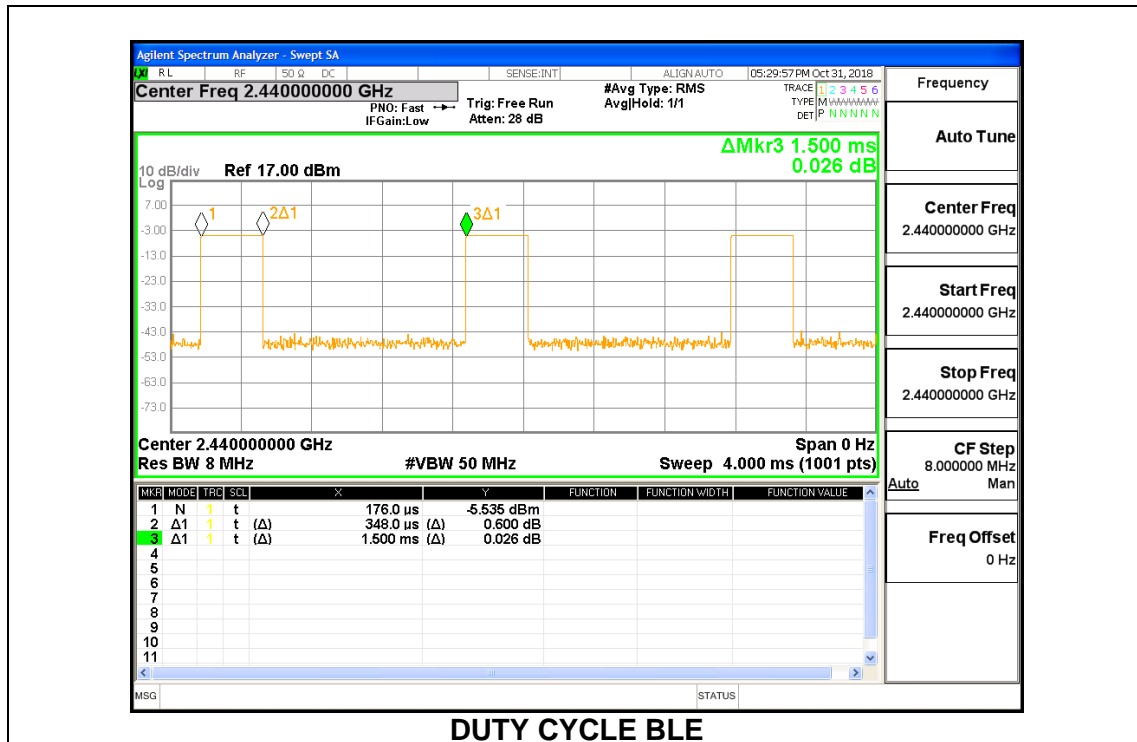
#### PROCEDURE

#### ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
<b>2.4GHz Band</b>						
Valve Protocol	0.348	1.500	0.232	23.20%	6.35	2.874



**DUTY CYCLE PLOTS**



**DUTY CYCLE BLE**

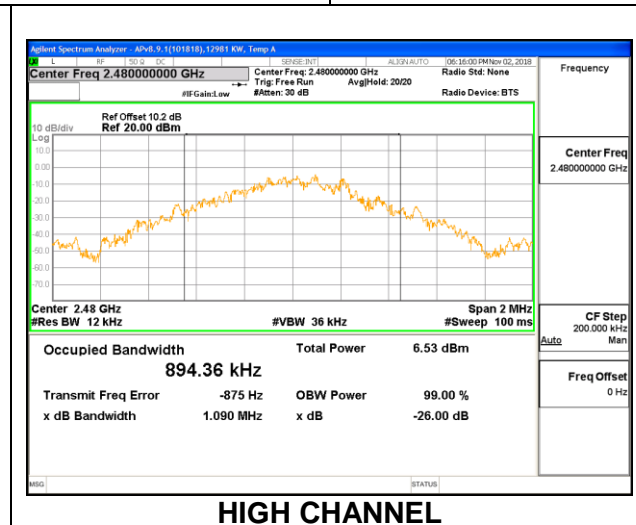
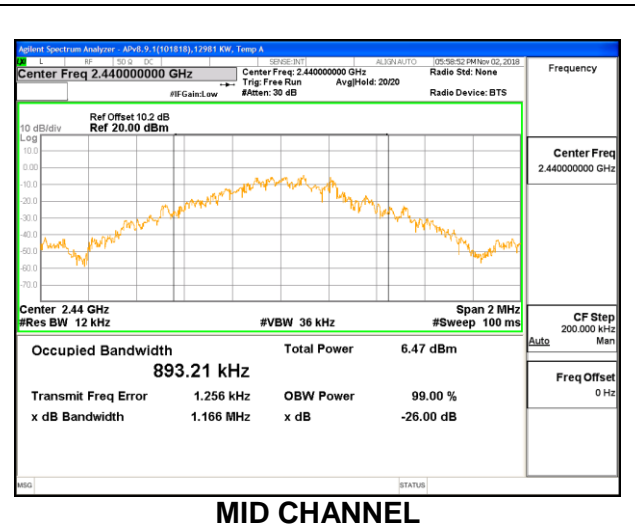
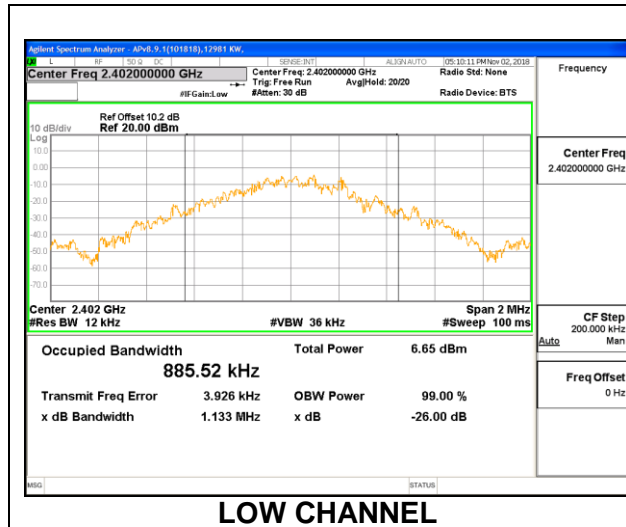
## **8.2. 99% BANDWIDTH**

### **LIMITS**

None; for reporting purposes only.

### **RESULTS**

Channel	Frequency (MHz)	99% Bandwidth (kHz)
Low	2402	885.52
Middle	2440	893.21
High	2480	894.36



### **8.3. 6 dB BANDWIDTH**

#### **LIMITS**

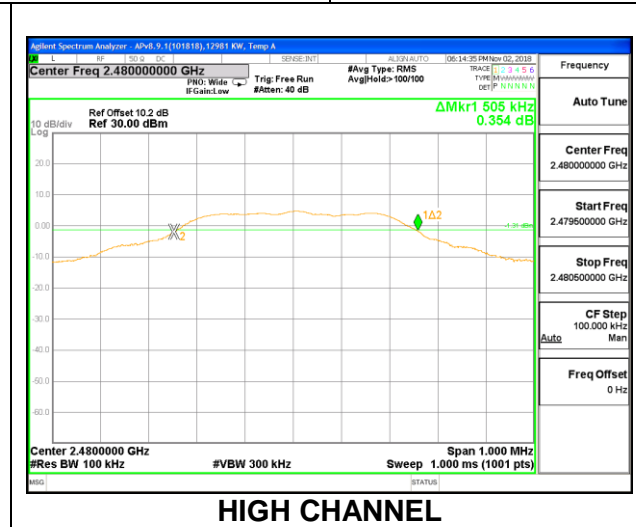
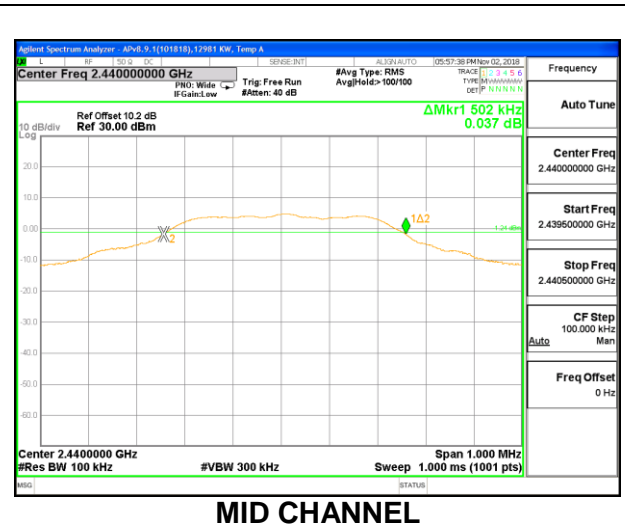
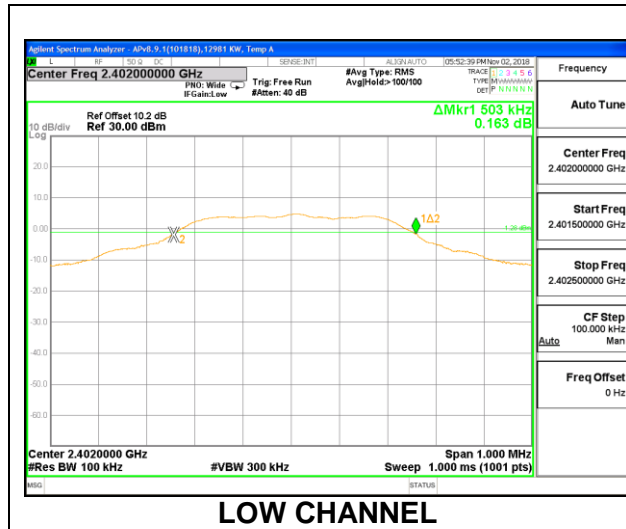
FCC §15.407 (e)

RSS-247 5.2 (a)

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

#### **RESULTS**

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.503	0.5
Middle	2440	0.502	0.5
High	2480	0.505	0.5



## **8.4. OUTPUT POWER**

### **LIMITS**

FCC §15.247 (b) (3)

RSS-247 5.4 (d)

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

### **TEST PROCEDURE**

The transmitter output is connected to a power meter. The cable assembly insertion was entered as an offset in the power meter to allow for a gated peak reading of power.

### **RESULTS**

<b>Tested By:</b>	12981 KW
<b>Date:</b>	11/2/2018

<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Peak Power Reading (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>
Low	2402	4.76	30	-25.240
Middle	2440	4.76	30	-25.240
High	2480	4.73	30	-25.270

## **8.5. AVERAGE POWER**

### **LIMITS**

None; for reporting purposes only.

### **TEST PROCEDURE**

The transmitter output is connected to a power meter. The cable assembly insertion loss was entered as an offset in the power meter to allow for a gated average reading of power.

### **RESULTS**



<b>Tested By:</b>	12981 KW
<b>Date:</b>	11/2/2018

<b>Channel</b>	<b>Frequency (MHz)</b>	<b>AV power (dBm)</b>
Low	2402	4.65
Middle	2440	4.65
High	2480	4.63

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## **8.6. POWER SPECTRAL DENSITY**

### **LIMITS**

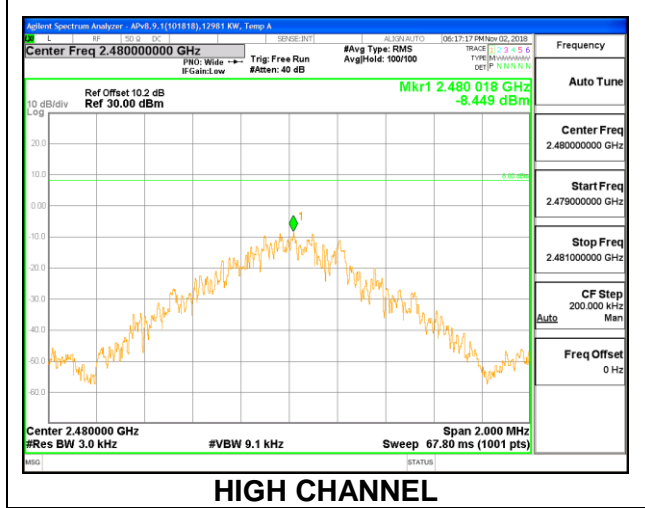
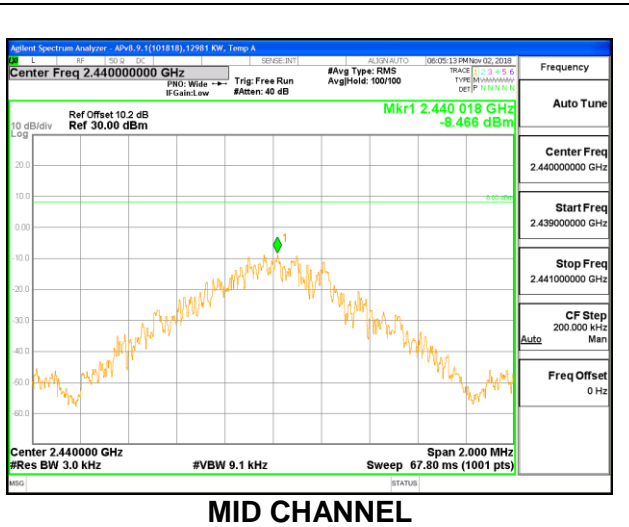
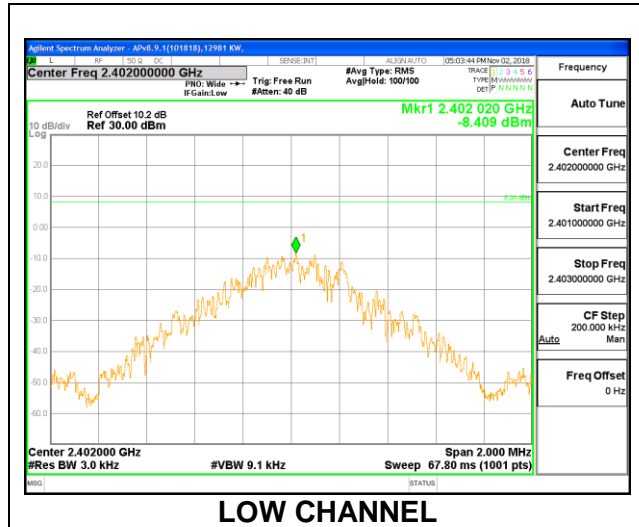
FCC §15.247 (e)

RSS-247 (5.2) (b)

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

### **RESULTS**

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)
Low	2402	-8.409	8	-16.409
Middle	2440	-8.466	8	-16.466
High	2480	-8.449	8	-16.449



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## **8.7. CONDUCTED SPURIOUS EMISSIONS**

### **LIMITS**

FCC §15.247 (d)

RSS-247 5.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

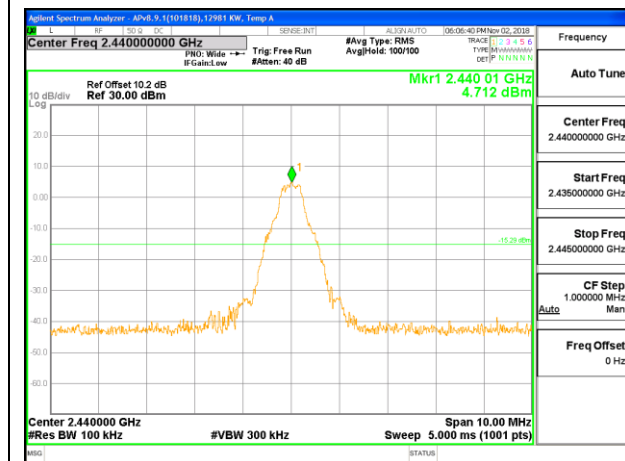
### **RESULTS**



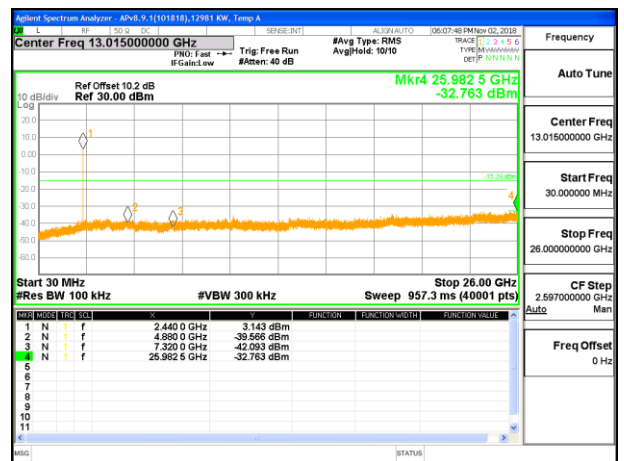
LOW CHANNEL BANDEDGE



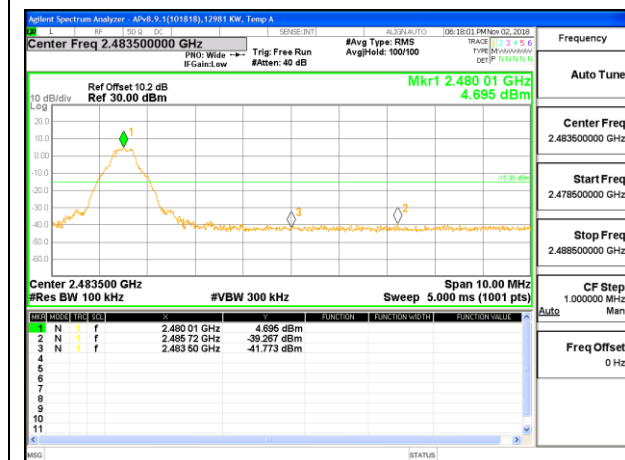
OUT-OF-BAND LOW CHANNEL



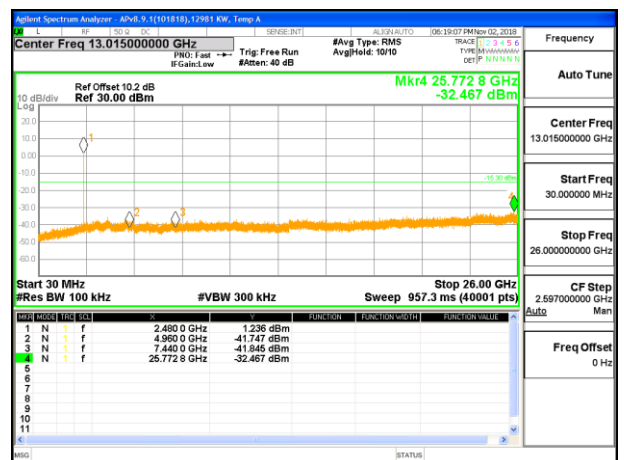
IN-BAND REFERENCE LEVEL



OUT-OF-BAND MID CHANNEL



HIGH CHANNEL BANDEDGE



OUT-OF-BAND HIGH CHANNEL

## 9. RADIATED TEST RESULTS

### 9.1. LIMITS AND PROCEDURE

#### LIMITS

FCC §15.205 and §15.209

RSS-GEN, Section 8.9 and 8.10.

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

#### TEST PROCEDURE

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

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

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

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

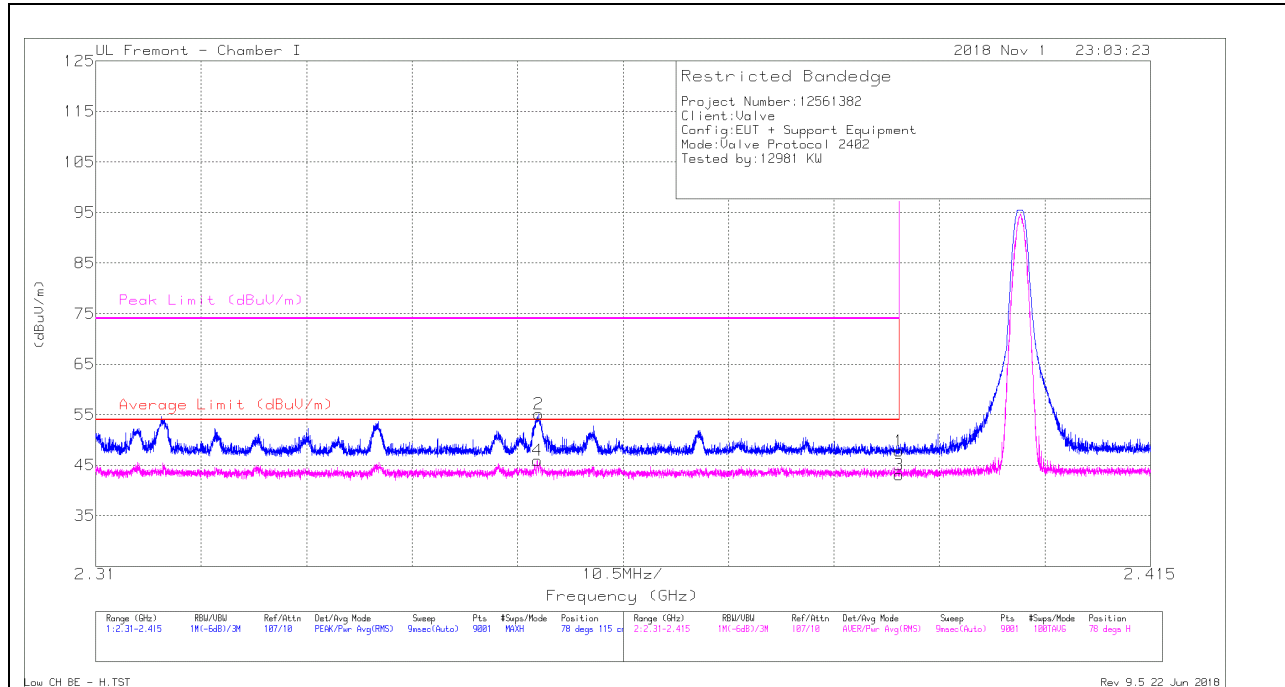
The spectrum from 1 GHz to 18 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band. Below 1GHz and above 18GHz emissions, the channel with the highest output power was tested.

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

## 9.2. TRANSMITTER ABOVE 1 GHz

### BANDEDGE (LOW CHANNEL)

### HORIZONTAL RESULT



### Trace Markers

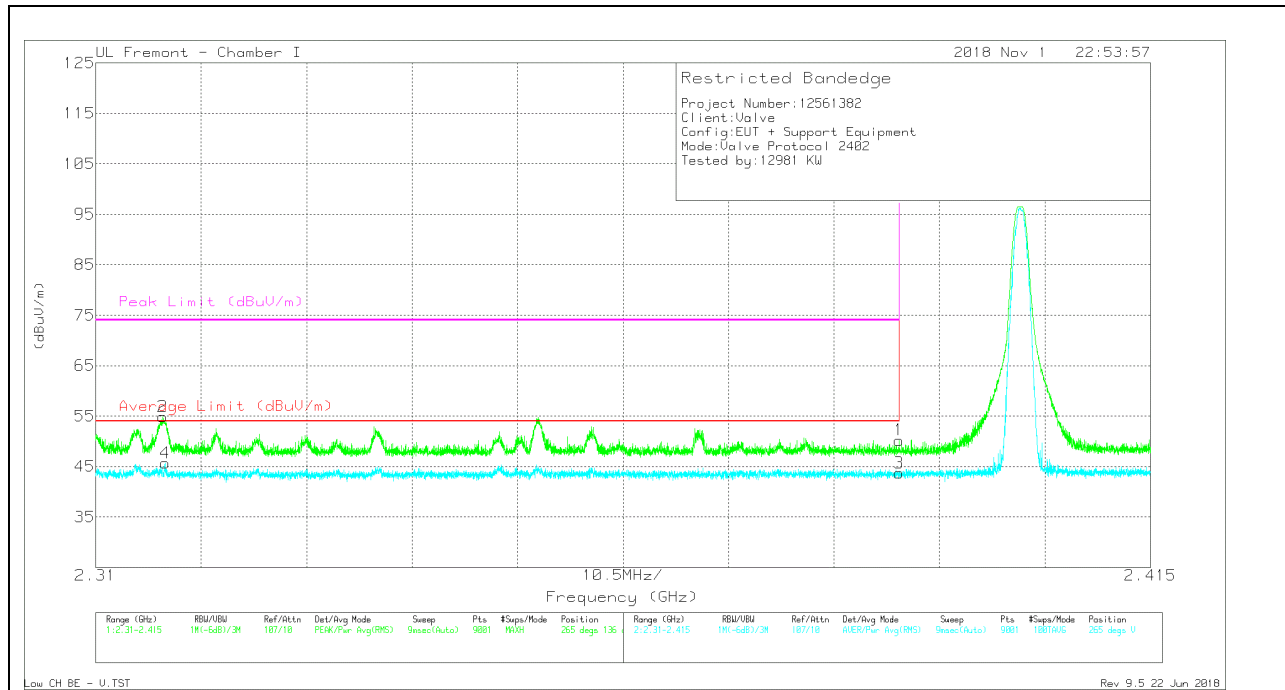
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cb/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	37.57	Pk	31.8	-21.6	0	47.77	-	-	74	-26.23	78	115	H
2	* 2.354	45.06	Pk	31.6	-21.5	0	55.16	-	-	74	-18.84	78	115	H
3	* 2.39	26.55	RMS	31.8	-21.6	6.35	43.1	54	-10.9	-	-	78	115	H
4	* 2.354	29.46	RMS	31.6	-21.5	6.35	45.91	54	-8.09	-	-	78	115	H

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

Pk - Peak detector

RMS - RMS detection

### VERTICAL RESULT



### Trace Markers

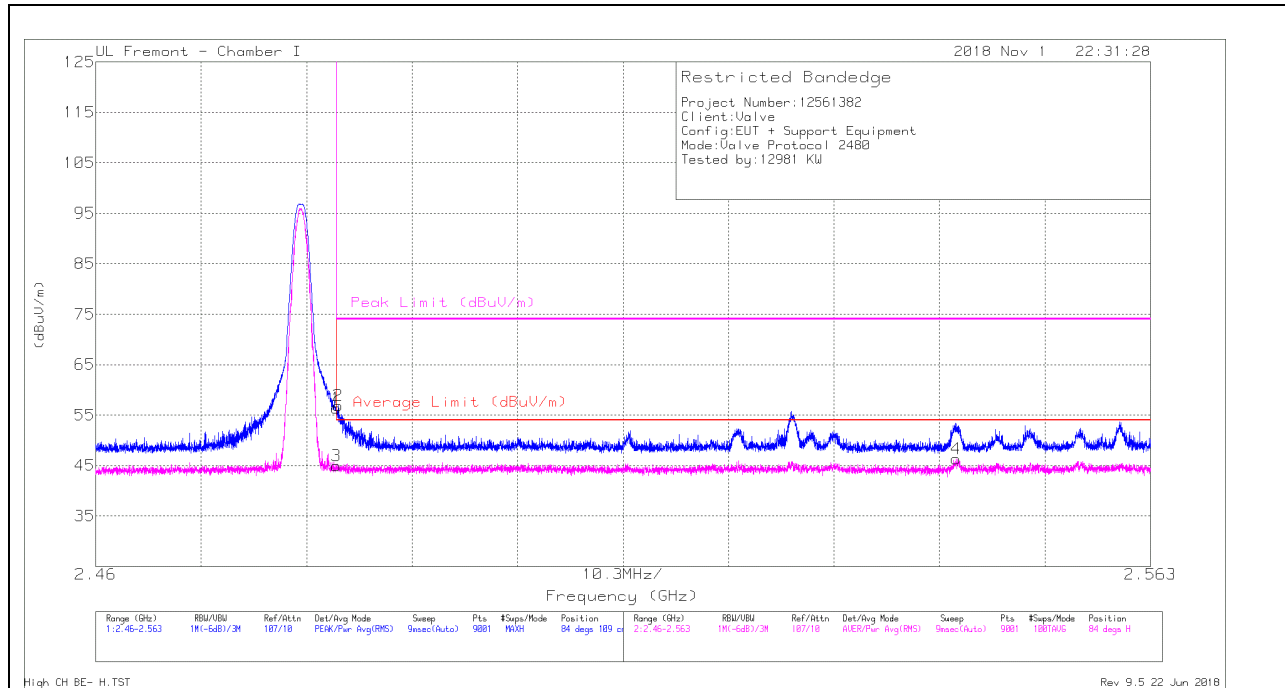
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cb/Fitr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.39	40.03	Pk	31.8	-21.6	0	50.23	-	-	74	-23.77	265	136	V
2	* 2.317	44.74	Pk	31.6	-21.4	0	54.94	-	-	74	-19.06	265	136	V
3	* 2.39	27.16	RMS	31.8	-21.6	6.35	43.71	54	-10.29	-	-	265	136	V
4	* 2.317	29.15	RMS	31.6	-21.4	6.35	45.7	54	-8.3	-	-	265	136	V

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



### BANDEDGE (HIGH CHANNEL)

### HORIZONTAL RESULT



#### Trace Markers

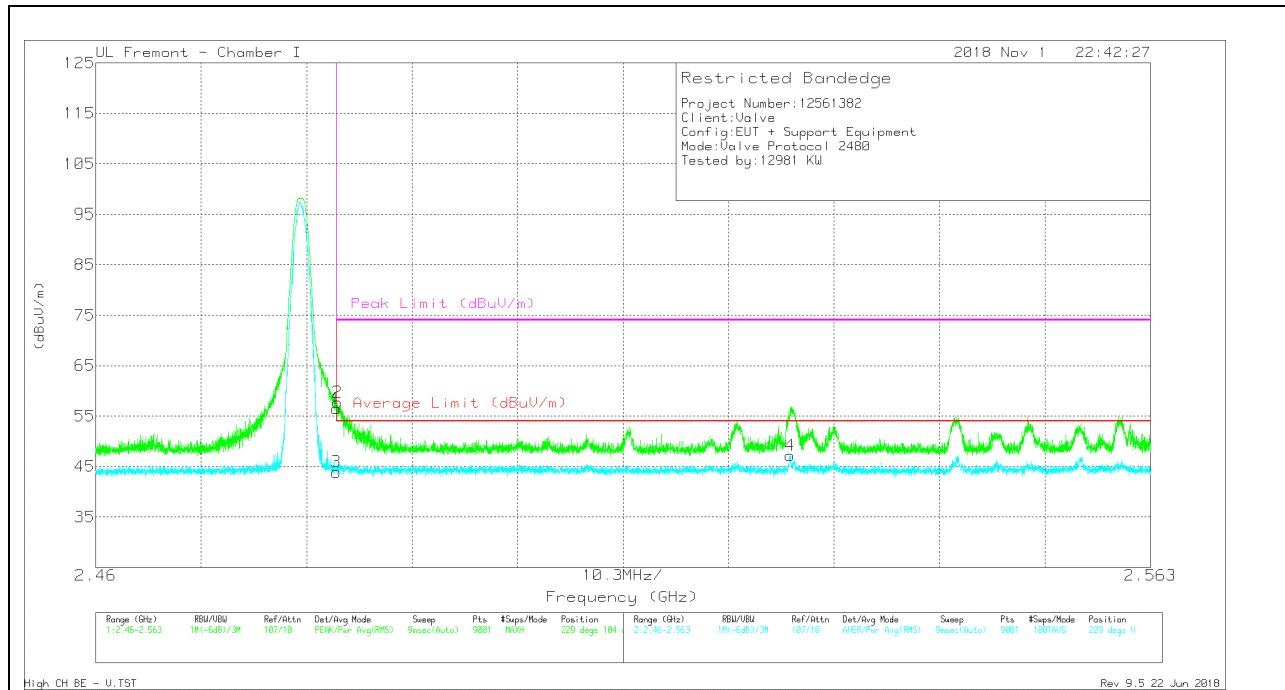
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cb/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	45.72	Pk	32.4	-21.7	0	56.42	-	-	74	-17.58	84	109	H
2	* 2.484	46.19	Pk	32.4	-21.7	0	56.89	-	-	74	-17.11	84	109	H
3	* 2.484	27.87	RMS	32.4	-21.7	6.35	44.92	54	-9.08	-	-	84	109	H
4	2.544	29.33	RMS	32.4	-21.8	6.35	46.28	54	-7.72	-	-	84	109	H

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

Pk - Peak detector

RMS - RMS detection

### VERTICAL RESULT



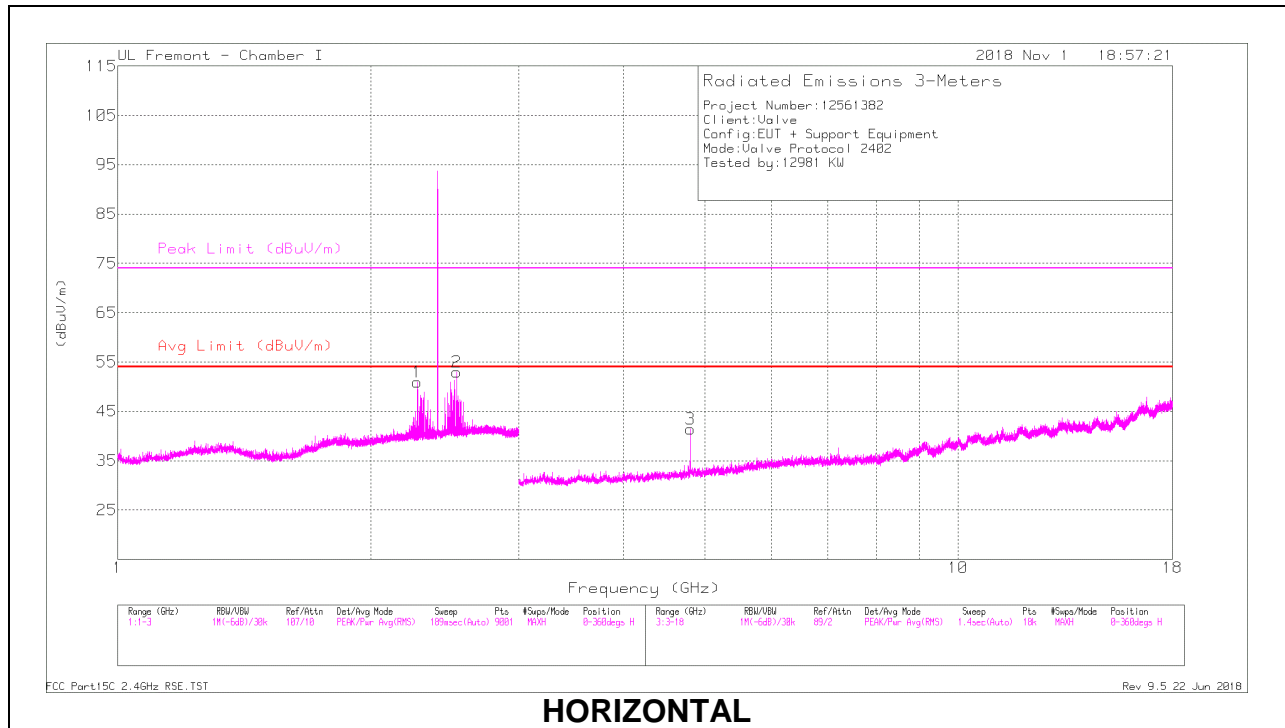
### Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cb/Fitr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.484	45.77	Pk	32.4	-21.7	0	56.47	-	-	74	-17.53	229	104	V
2	* 2.484	47.08	Pk	32.4	-21.7	0	57.78	-	-	74	-16.22	229	104	V
3	* 2.484	26.85	RMS	32.4	-21.7	6.35	43.9	54	-10.1	-	-	229	104	V
4	2.528	30.15	RMS	32.4	-21.7	6.35	47.2	54	-6.8	-	-	229	104	V

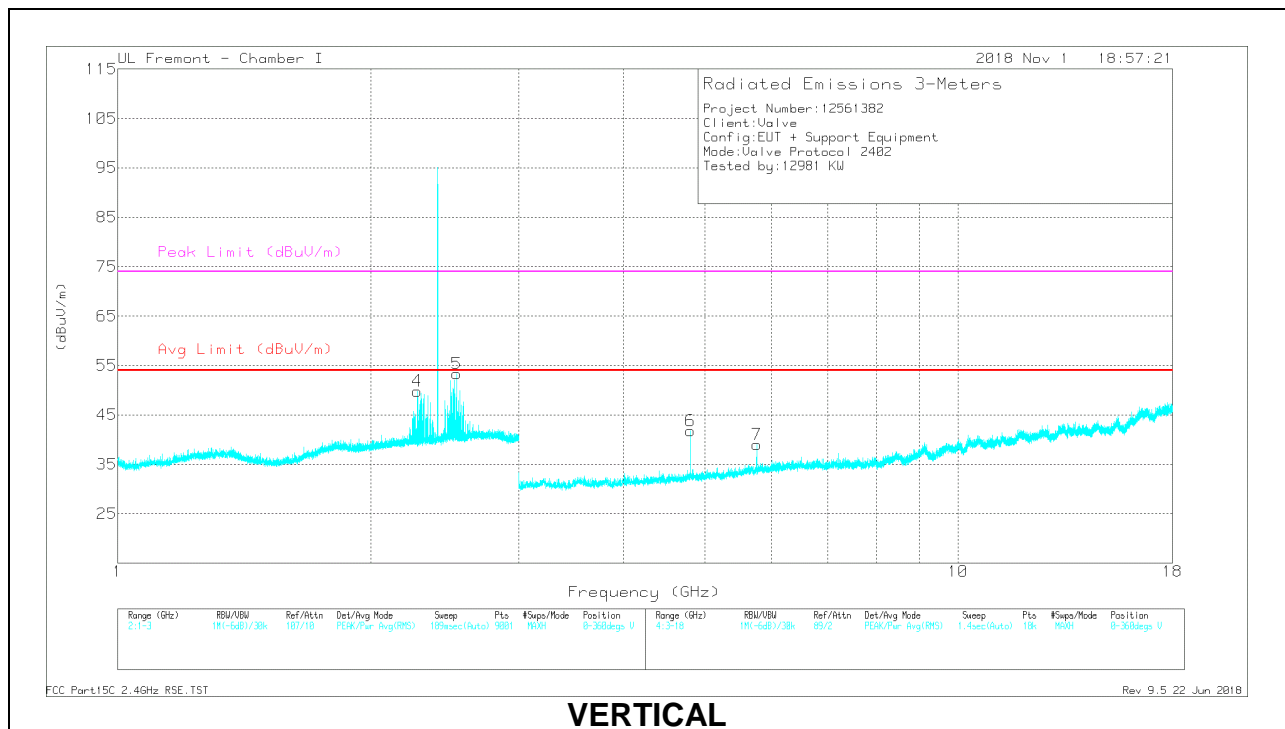
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band  
 Pk - Peak detector  
 RMS - RMS detection

**HARMONICS AND SPURIOUS EMISSIONS**

**LOW CHANNEL RESULTS**



**HORIZONTAL**



**VERTICAL**

**RADIATED EMISSIONS**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.274	42.34	PK2	31.3	-21.5	0	52.14	-	-	74	-21.86	82	151	H
	* 2.274	28.22	MAv1	31.3	-21.5	6.35	44.37	54	-9.63	-	-	82	151	H
2	2.53	42.26	Pk	32.4	-21.7	0	52.96	-	-	-	-	0-360	101	H
4	* 2.274	43.18	PK2	31.3	-21.5	0	52.98	-	-	74	-21.02	211	224	V
	* 2.274	28	MAv1	31.3	-21.5	6.35	44.15	54	-9.85	-	-	211	224	V
5	2.53	42.68	Pk	32.4	-21.7	0	53.38	-	-	-	-	0-360	100	V
3	* 4.803	38.9	PK2	34.3	-27.9	0	45.3	-	-	74	-28.7	57	363	H
	* 4.804	27.45	MAv1	34.3	-28	6.35	40.1	54	-13.9	-	-	57	363	H
6	* 4.805	32.71	PK2	34.2	-28.1	0	38.81	-	-	74	-35.19	57	100	V
	* 4.804	25.17	MAv1	34.2	-28	6.35	37.72	54	-16.28	-	-	57	100	V
7	5.76	31.18	Pk	35.1	-27.3	0	38.98	-	-	-	-	0-360	100	V

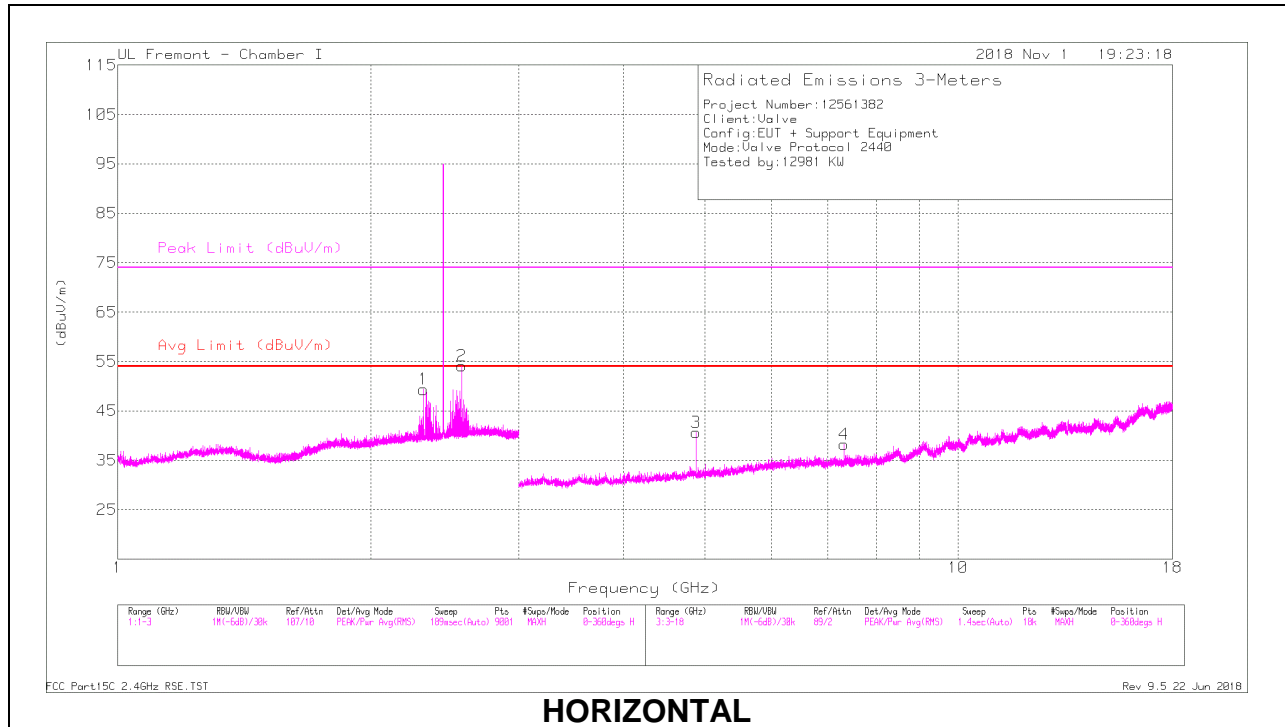
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

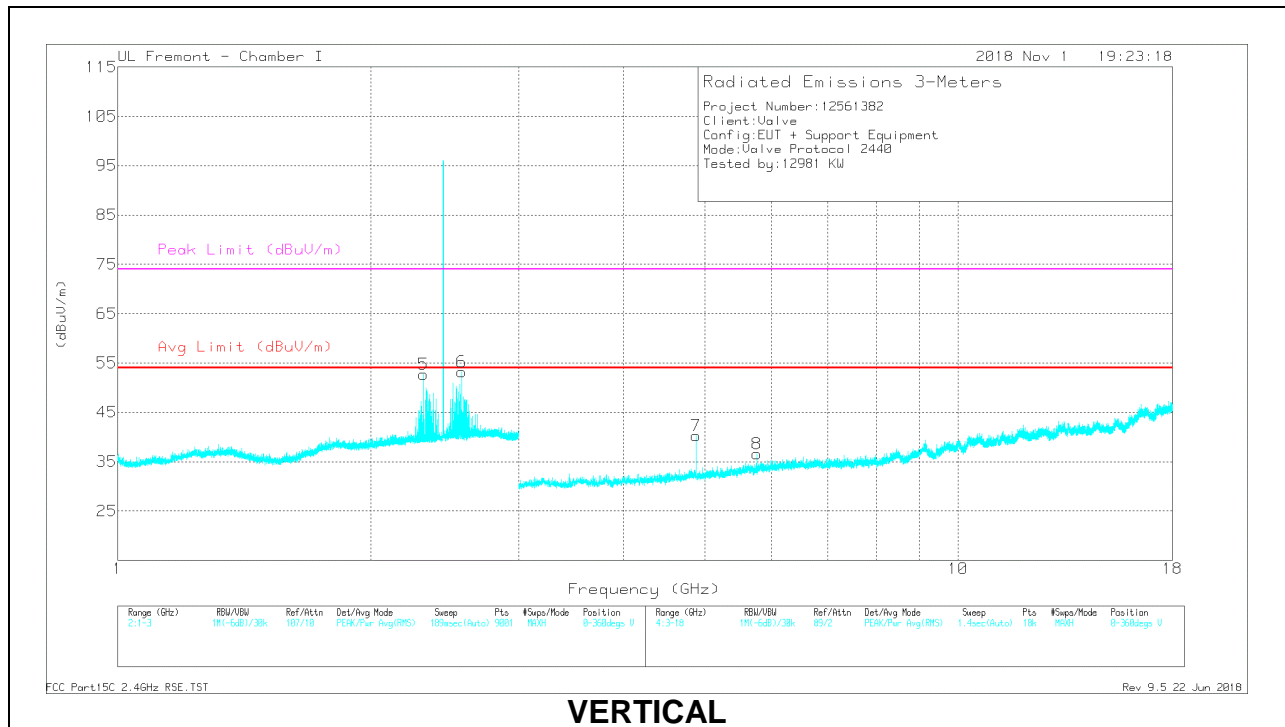
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

### MID CHANNEL RESULTS



**HORIZONTAL**



**VERTICAL**

**RADIATED EMISSIONS**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.312	44.79	PK2	31.5	-21.5	0	54.79	-	-	74	-19.21	165	173	H
	* 2.312	29.77	MAv1	31.5	-21.5	6.35	46.12	54	-7.88	-	-	165	173	H
2	2.568	43.44	Pk	32.4	-21.7	0	54.14	-	-	-	-	0-360	100	H
5	* 2.312	46.32	PK2	31.5	-21.5	0	56.32	-	-	74	-17.68	197	250	V
	* 2.312	29.46	MAv1	31.5	-21.5	6.35	45.81	54	-8.19	-	-	197	250	V
6	2.568	42.47	Pk	32.4	-21.7	0	53.17	-	-	-	-	0-360	100	V
3	* 4.88	39.58	PK2	34.1	-28.8	0	44.88	-	-	74	-29.12	62	147	H
	* 4.88	27.67	MAv1	34.1	-28.8	6.35	39.32	54	-14.68	-	-	62	147	H
4	* 7.321	34.88	PK2	35.6	-26	0	44.48	-	-	74	-29.52	179	261	H
	* 7.32	24.18	MAv1	35.6	-26	6.35	40.13	54	-13.87	-	-	179	261	H
7	* 4.88	39.33	PK2	34.2	-28.8	0	44.73	-	-	74	-29.27	117	247	V
	* 4.88	39.58	PK2	34.1	-28.8	0	44.88	-	-	74	-29.12	62	147	H
8	5.76	28.79	Pk	35.1	-27.3	0	36.59	-	-	-	-	0-360	100	V

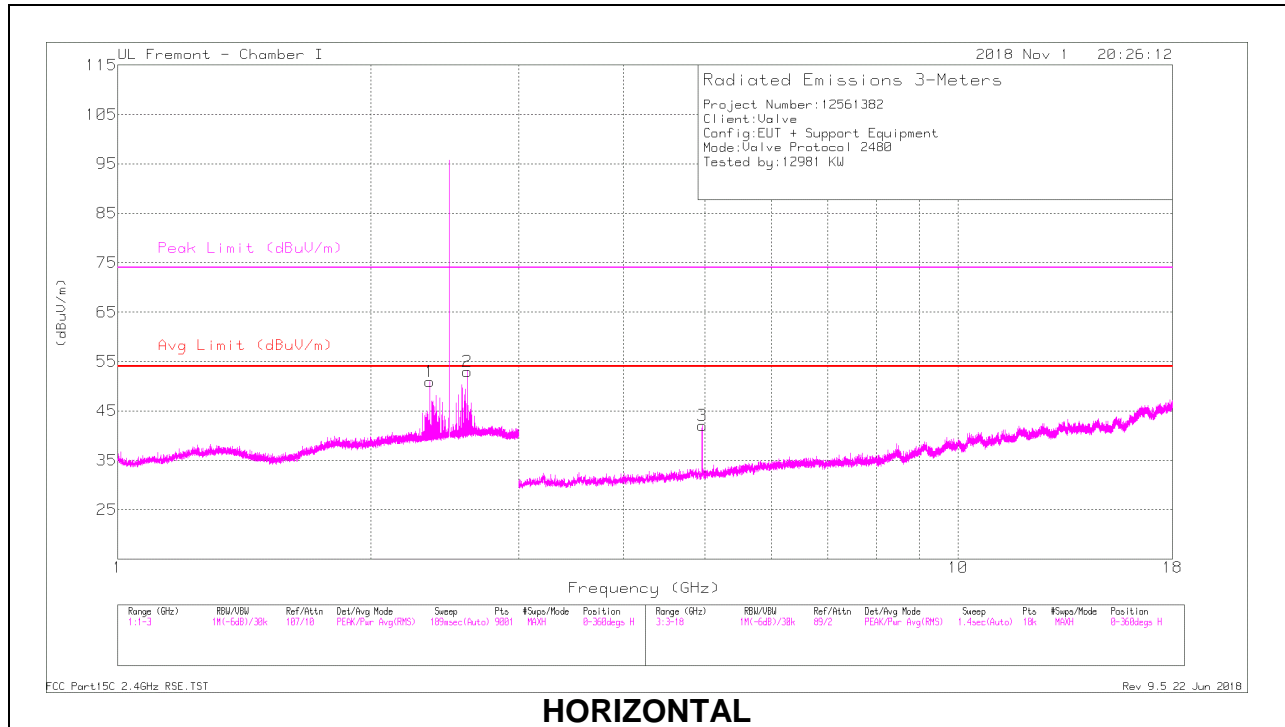
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

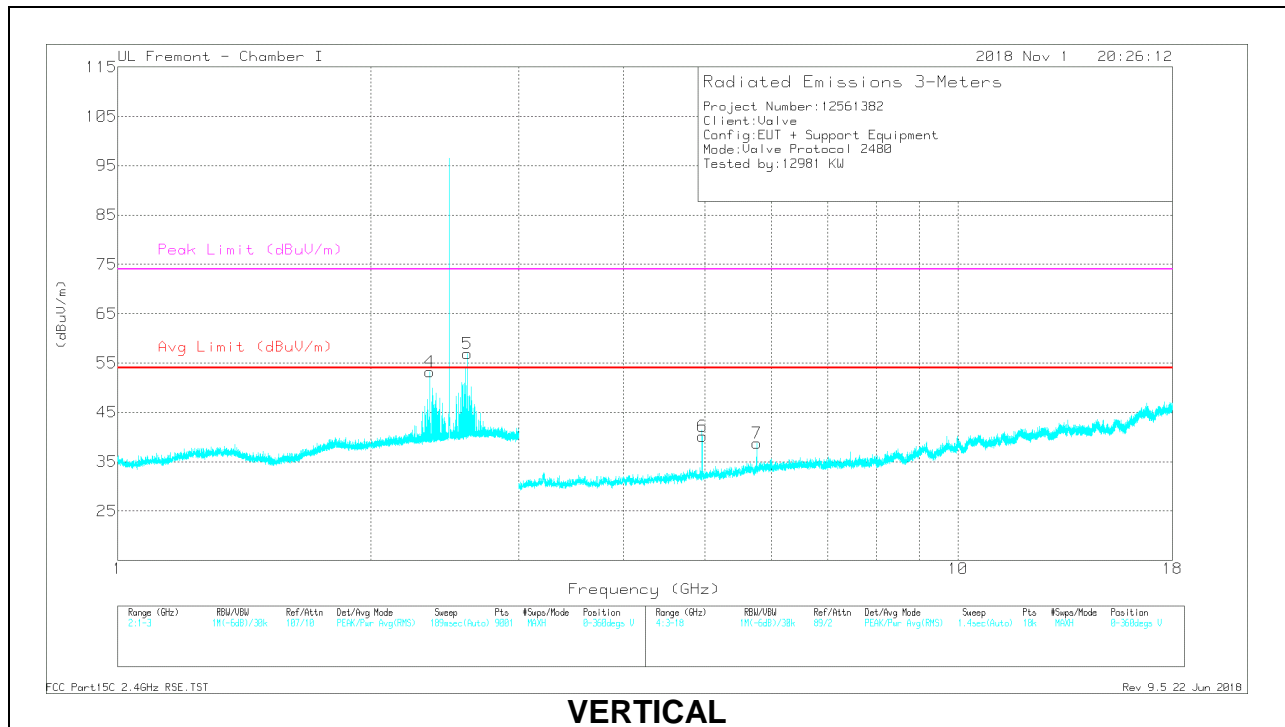
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average

### HIGH CHANNEL RESULTS



**HORIZONTAL**



**VERTICAL**

**RADIATED EMISSIONS**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl/Filtr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.352	46.8	PK2	31.6	-21.5	0	56.9	-	-	74	-17.1	83	114	H
	* 2.352	28.68	MAv1	31.6	-21.5	6.35	45.13	54	-8.87	-	-	83	114	H
2	2.608	42.08	Pk	32.5	-21.6	0	52.98	-	-	-	-	0-360	100	H
4	* 2.352	43.58	PK2	31.6	-21.5	0	53.68	-	-	74	-20.32	238	101	V
	* 2.352	27.71	MAv1	31.6	-21.5	6.35	44.16	54	-9.84	-	-	238	101	V
5	2.608	45.96	Pk	32.5	-21.6	0	56.86	-	-	-	-	0-360	198	V
3	* 4.96	38.87	PK2	34.2	-29	0	44.07	-	-	74	-29.93	59	249	H
	* 4.96	28.98	MAv1	34.2	-29	6.35	40.53	54	-13.47	-	-	59	249	H
6	* 4.96	40.59	PK2	34.2	-29	0	45.79	-	-	74	-28.21	256	113	V
	* 4.96	29.22	MAv1	34.2	-29	6.35	40.77	54	-13.23	-	-	256	113	V
7	5.759	30.89	Pk	35.1	-27.3	0	38.69	-	-	-	-	0-360	100	V

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

Pk - Peak detector

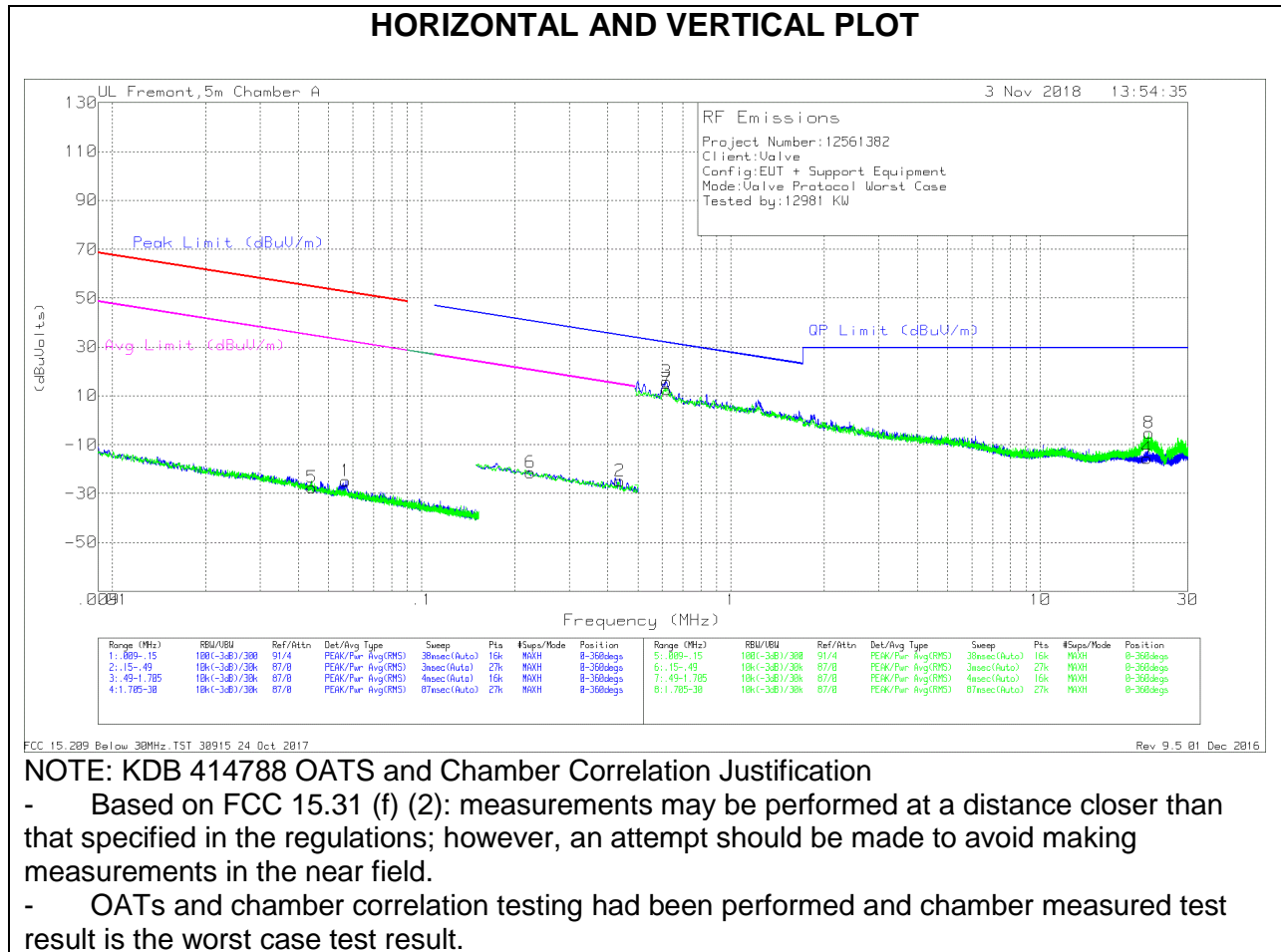
PK2 - KDB558074 Method: Maximum Peak

MAv1 - KDB558074 Option 1 Maximum RMS Average



### 9.3. Worst Case Below 30 MHz

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



**Below 30 MHz Data**

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 300m	Corrected Reading (dBuVolts)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
5	.04418	37.85	Pk	14.6	.1	-80	-27.45	54.68	-82.13	34.68	-62.13	0-360
1	.05682	40.64	Pk	14.4	.1	-80	-24.86	52.5	-77.36	32.5	-57.36	0-360
6	.22489	44.49	Pk	13.9	.1	-80	-21.51	40.58	-62.09	20.58	-42.09	0-360
2	.43848	41.25	Pk	13.9	.1	-80	-24.75	34.77	-59.52	14.77	-39.52	0-360

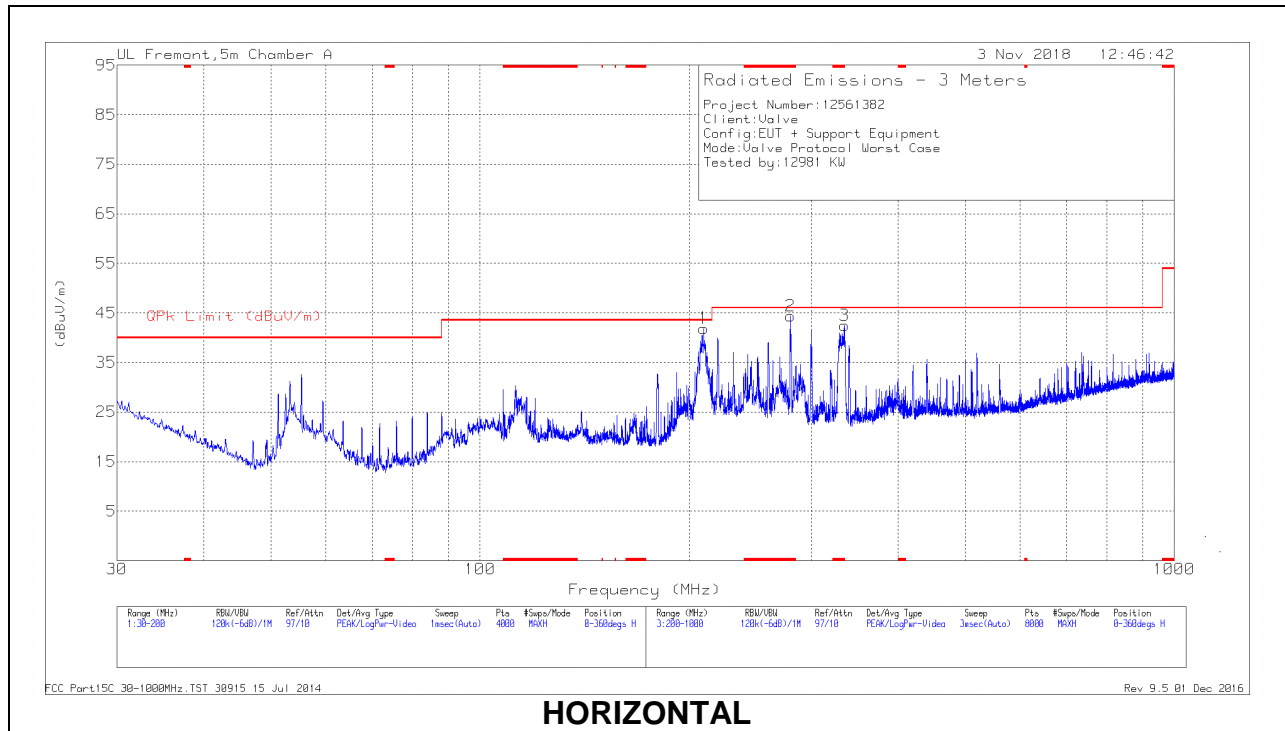
Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	Loop Antenna (dB/m)	Cbl (dB)	Dist Corr 30m	Corrected Reading (dBuVolts)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	.61787	41.64	Pk	14	.1	-40	15.74	31.79	-16.05	0-360
7	.61973	38.56	Pk	14	.1	-40	12.66	31.77	-19.11	0-360
4	22.12214	9.67	Pk	14.1	.7	-40	-15.53	29.5	-45.03	0-360
8	22.44073	20.17	Pk	14	.7	-40	-5.13	29.5	-34.63	0-360

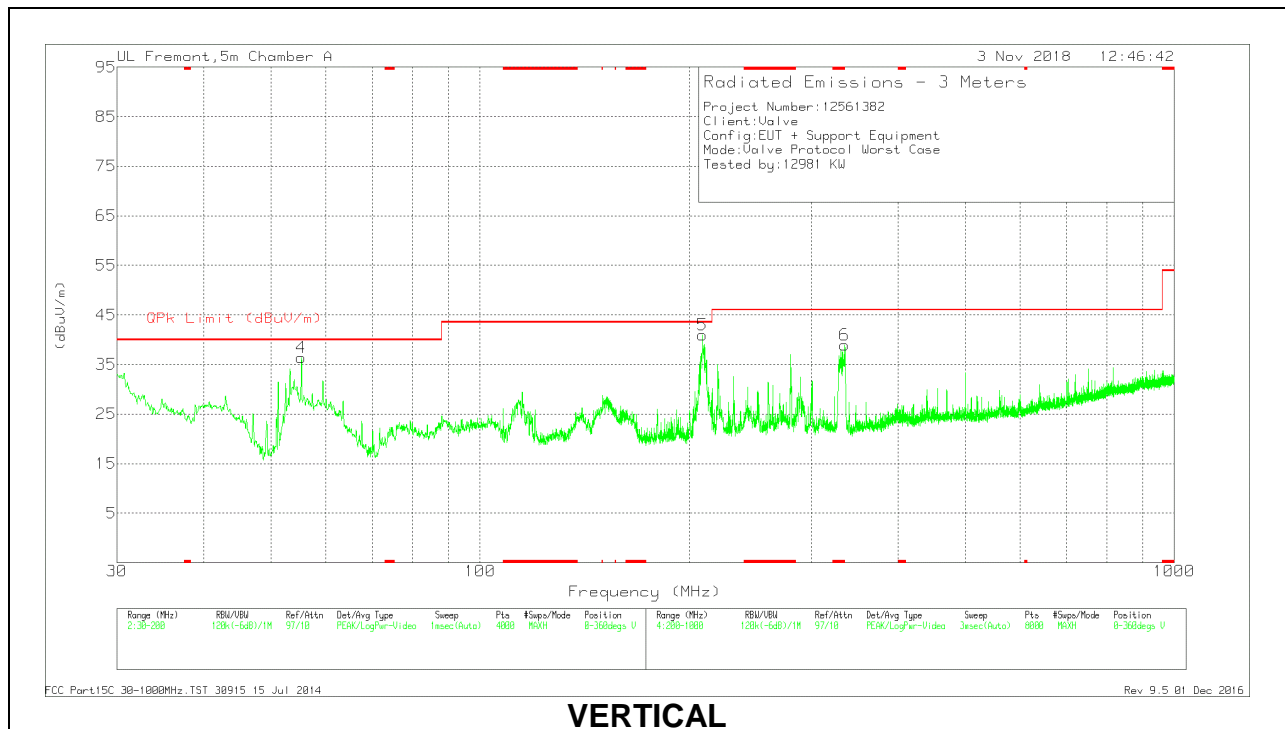
Pk - Peak detector

### 9.4. Worst Case Below 1 GHz

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



**HORIZONTAL**



**VERTICAL**

**Below 1GHz Data**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AFT900 (dB/m)	Amp/Cbl (dB/m)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 279.9285	53.58	Pk	17.3	-24.4	46.48	46.02	.46	80	114	H
	* 279.9285	44.7	Qp	17.3	-24.4	37.6	46.02	-8.42	80	114	H
3	* 335.1822	48.01	Pk	17.9	-24.4	41.51	46.02	-4.51	189	255	H
	* 335.1822	38.18	Qp	17.9	-24.4	31.68	46.02	-14.34	189	255	H
6	* 334.9482	48.47	Pk	17.9	-24.4	41.97	46.02	-4.05	273	145	V
	* 334.9482	39.13	Qp	17.9	-24.4	32.63	46.02	-13.39	273	145	V
4	55.2954	52.81	Pk	11.1	-26.9	37.01	40	-2.99	155	101	V
	55.2954	51.15	Qp	11.1	-26.9	35.35	40	-4.65	155	101	V
5	209.1633	51.32	Pk	14.4	-25	40.72	43.52	-2.8	157	153	V
	209.1633	40.24	Qp	14.4	-25	29.64	43.52	-13.88	157	153	V
1	209.9567	55.62	Pk	14.4	-25	45.02	43.52	1.5	125	164	H
	209.9567	46.91	Qp	14.4	-25	36.31	43.52	-7.21	125	164	H

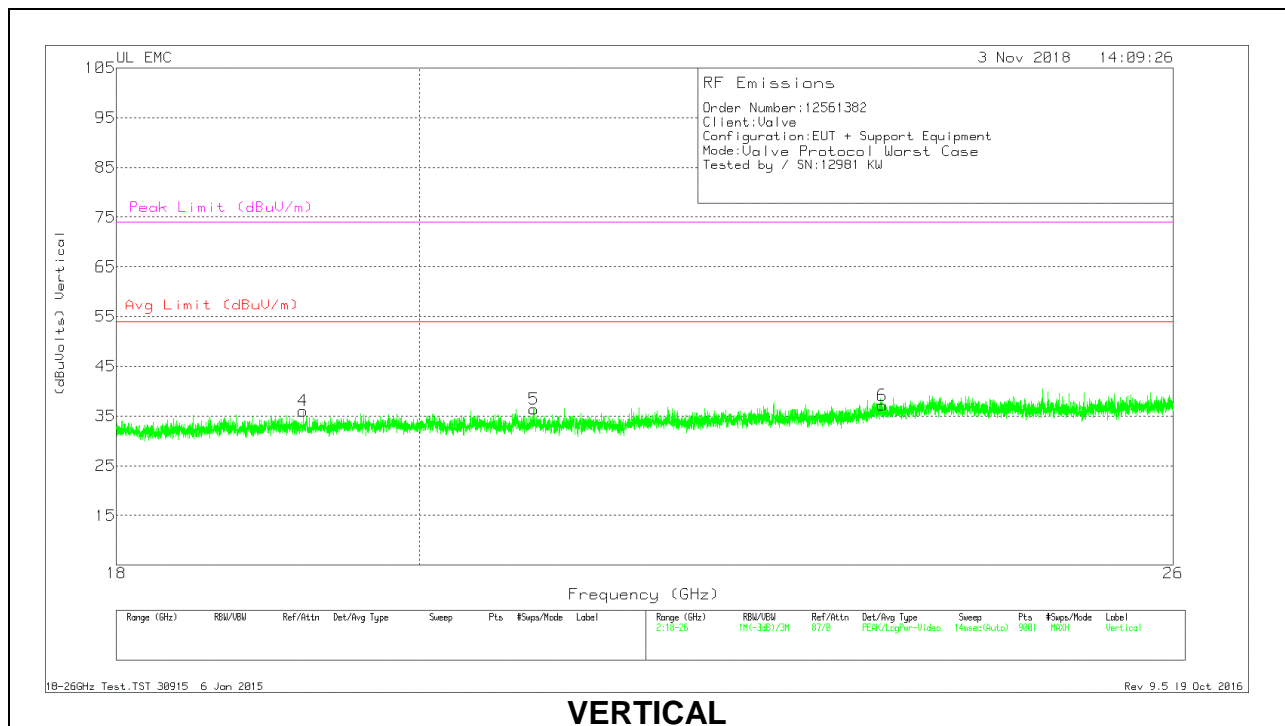
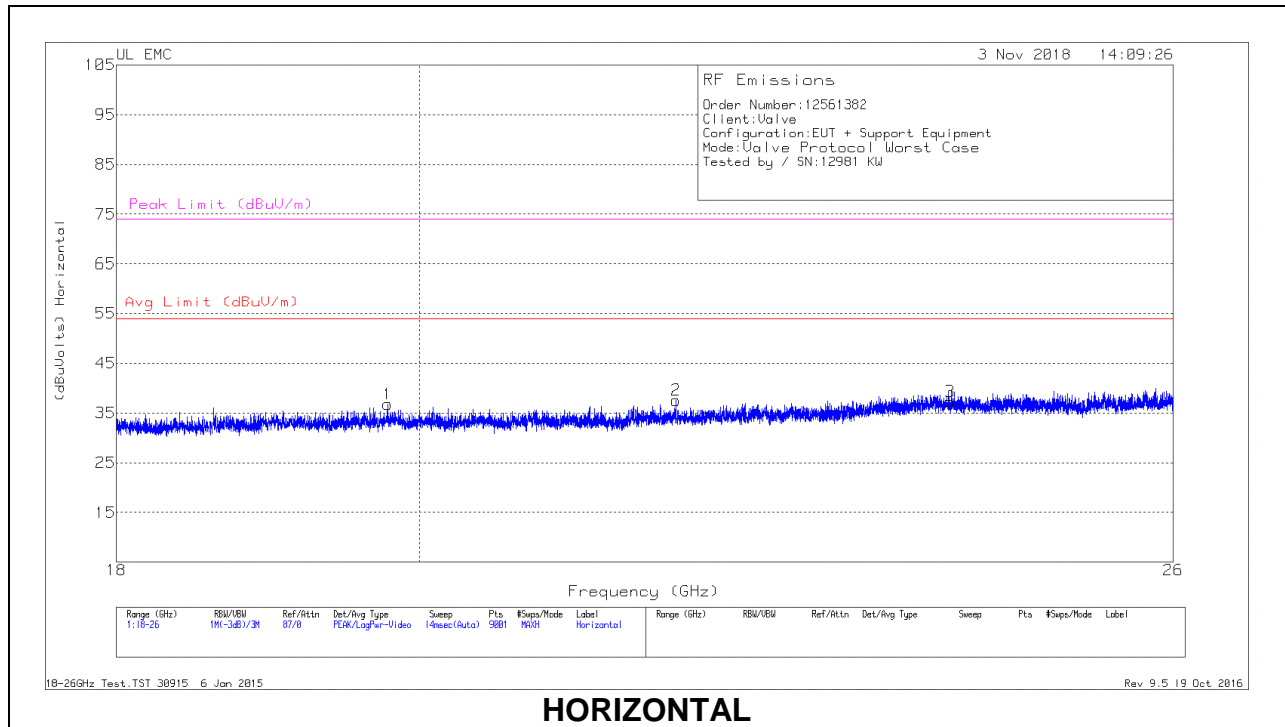
\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

Pk - Peak detector

Qp - Quasi-Peak detector

### 9.5. Worst Case 18-26 GHz

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



**18 – 26GHz DATA**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T447 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	19.781	38.27	Pk	32.7	-24.7	-9.5	36.77	54	-17.23	74	-37.23
2	21.869	38.54	Pk	33.2	-24.7	-9.5	37.54	54	-16.46	74	-36.46
3	24.056	36.87	Pk	34.3	-24.4	-9.5	37.27	54	-16.73	74	-36.73
4	19.208	37.82	Pk	32.7	-25	-9.5	36.02	54	-17.98	74	-37.98
5	20.813	38.19	Pk	33	-25.3	-9.5	36.39	54	-17.61	74	-37.61
6	23.495	37.02	Pk	34.1	-24.5	-9.5	37.12	54	-16.88	74	-36.88

Pk - Peak detector

## 10. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

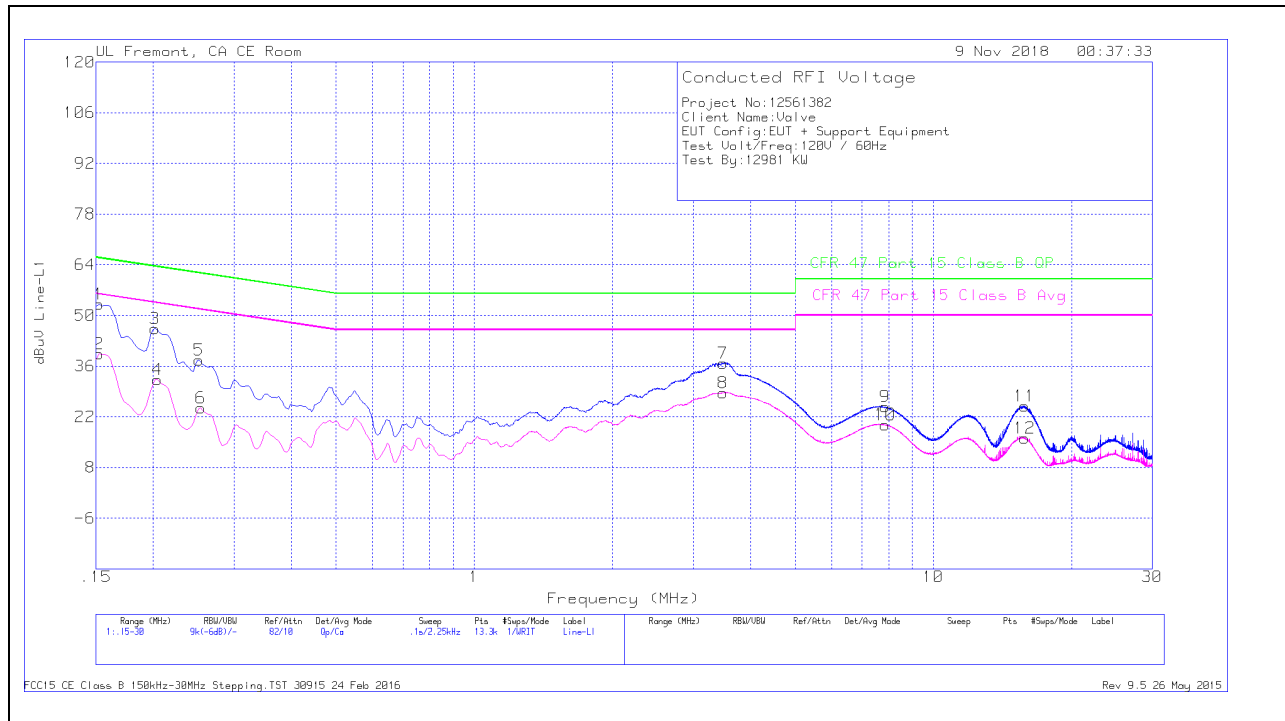
Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

### RESULTS

### 10.1.1. AC Power Line Norm

### LINE 1 RESULTS



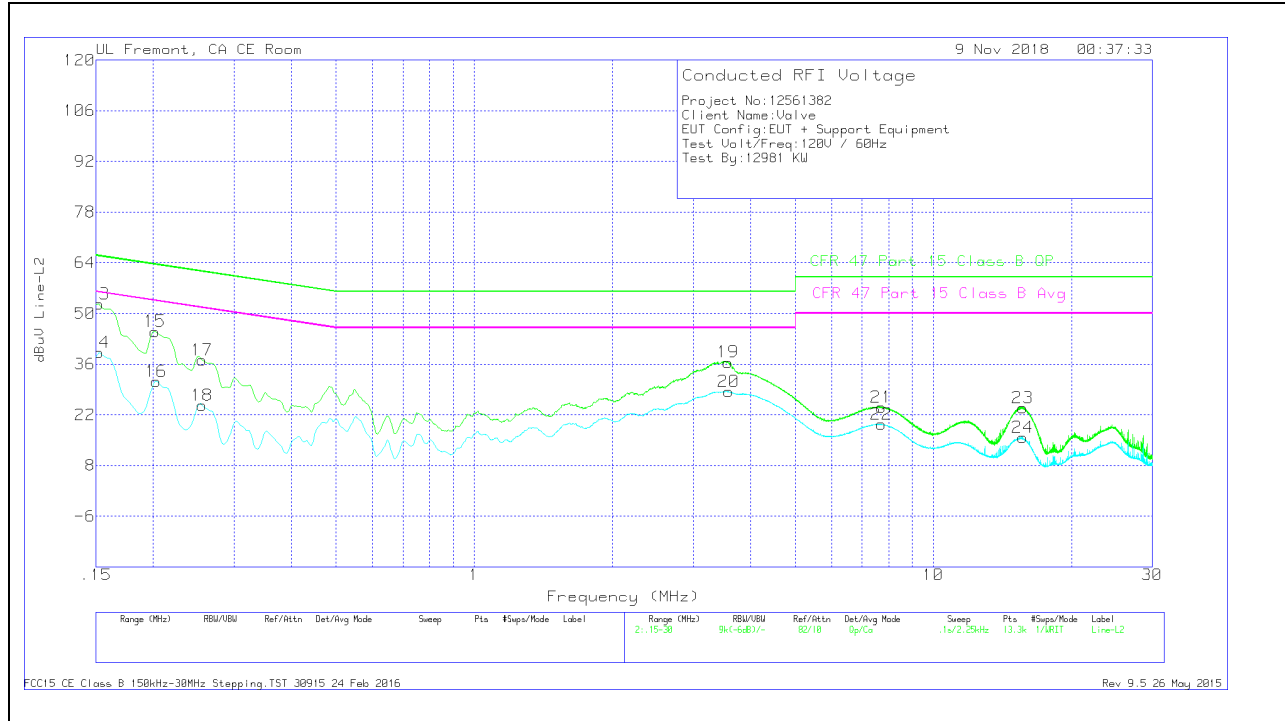
#### Trace Markers

Range 1: Line-L1 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L1	LC Cables C1&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
1	.15225	42.95	Qp	.1	0	10.1	53.15	65.88	-12.73	-	-
2	.15225	29.25	Ca	.1	0	10.1	39.45	-	-	55.88	-16.43
3	.20175	36.25	Qp	0	0	10.1	46.35	63.54	-17.19	-	-
4	.204	22.19	Ca	0	0	10.1	32.29	-	-	53.45	-21.16
5	.25125	27.59	Qp	0	0	10.1	37.69	61.72	-24.03	-	-
6	.2535	14.27	Ca	0	0	10.1	24.37	-	-	51.64	-27.27
7	3.48225	26.65	Qp	0	.1	10.1	36.85	56	-19.15	-	-
8	3.48	18.44	Ca	0	.1	10.1	28.64	-	-	46	-17.36
9	7.85175	14.37	Qp	0	.2	10.2	24.77	60	-35.23	-	-
10	7.854	9.44	Ca	0	.2	10.2	19.84	-	-	50	-30.16
11	15.80775	14.2	Qp	.1	.3	10.3	24.9	60	-35.1	-	-
12	15.8055	5.37	Ca	.1	.3	10.3	16.07	-	-	50	-33.93

Qp - Quasi-Peak detector  
 Ca - CISPR average detection



### LINE 2 RESULTS



#### Trace Markers

Range 2: Line-L2 .15 - 30MHz											
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN L2	LC Cables C2&C3	Limiter (dB)	Corrected Reading dBuV	CFR 47 Part 15 Class B QP	QP Margin (dB)	CFR 47 Part 15 Class B Avg	Av(CISPR) Margin (dB)
13	.15225	42.39	Qp	.1	0	10.1	52.59	65.88	-13.29	-	-
14	.15225	28.95	Ca	.1	0	10.1	39.15	-	-	55.88	-16.73
15	.20175	34.94	Qp	0	0	10.1	45.04	63.54	-18.5	-	-
16	.20288	21.14	Ca	0	0	10.1	31.24	-	-	53.49	-22.25
17	.25575	27	Qp	0	0	10.1	37.1	61.57	-24.47	-	-
18	.25575	14.56	Ca	0	0	10.1	24.66	-	-	51.57	-26.91
19	3.5745	26.33	Qp	0	.1	10.1	36.53	56	-19.47	-	-
20	3.579	18.22	Ca	0	.1	10.1	28.42	-	-	46	-17.58
21	7.71	13.7	Qp	0	.2	10.2	24.1	60	-35.9	-	-
22	7.71	8.93	Ca	0	.2	10.2	19.33	-	-	50	-30.67
23	15.66375	13.25	Qp	.1	.3	10.3	23.95	60	-36.05	-	-
24	15.6525	5.04	Ca	.1	.3	10.3	15.74	-	-	50	-34.26

Qp - Quasi-Peak detector  
 Ca - CISPR average detection