FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

Vigor Wireless Dongle

MODEL NUMBER: 1002

FCC ID: 2AES41002

REPORT NUMBER: 10723179A

ISSUE DATE: June 12, 2015

Prepared for
Valve Corporation
10900 NE 4th St.
Suite 500
Bellevue, WA 98004

Prepared by
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Northbrook, IL 60062
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NVLAP Lab code: 100414-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	06/12/15	Initial Issue	M.Ferrer

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Valve Corporation
10900 NE 4th St
Suite 500
Bellevue, WA 98004

EUT DESCRIPTION: Vigor Wireless Dongle

MODEL: 1002

SERIAL NUMBER: Prototype

DATE TESTED: April 28, 2015 – June 12, 2015

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass

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

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL 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 any government.

Approved & Released For
UL LLC By:

Bart Mucha
Staff Engineer
UL LLC

Tested By:

MICHAEL FERRER
Program Manager
UL LLC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 333 Pfingsten Road, Northbrook, IL 60062 USA.

UL NBK is accredited by NVLAP, Laboratory Code 100414-0. The full scope of accreditation can be viewed at http://ts.nist.gov/Standards/scopes/1004140.htm

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

Sample Calculations
Radiated Field Strength and Conducted Emissions data contained within this report is calculated on the following basis:
Field Strength (dBuV/m) = Meter Reading (dBuV) + AF (dB/m) - Gain (dB) + Cable Loss (dB)
Conducted Voltage (dBuV) = Meter Reading (dBuV) + Cable Loss (dB) + LISN IL (dB)
Conducted Current (dBuA) = Meter Reading (dBuV) + Cable Loss (dB) - Transducer Factor (dBohms)

4.3. MEASUREMENT UNCERTAINTY

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

Test	Range	Equipment	Uncertainty k=2
Radiated Emissions	30-200MHz	Bicon 10m Horz	4.27dB
Radiated Emissions	30-200MHz	Bicon 10m Vert	4.28dB
Radiated Emissions	200-1000MHz	LogP 10m Horz	3.33dB
Radiated Emissions	200-1000MHz	LogP 10m Vert	3.39dB
Radiated Emissions	30-200MHz	Bicon 3m Horz	3.30dB
Radiated Emissions	30-130MHz	Bicon 3m Vert	4.84dB
Radiated Emissions	130-200MHz	Bicon 3m Vert	4.94dB
Radiated Emissions	200-1000MHz	LogP 3m Horz	3.46dB
Radiated Emissions	200-1000MHz	LogP 3m Vert	4.98dB
Radiated Emissions	1-6GHz	Horn	5.02dB
Radiated Emissions	6-18GHz	Horn	5.34dB
Radiated Emissions	18-26GHz	Horn	6.60dB
Conducted Ant Port	30MHz-26GHz	Spectrum Analyzer	2.94

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a USB Dongle that communicates with a wireless controller. It contains a 2.4GHz transmitter.

5.2. MAXIMUM OUTPUT E-FIELD STRENGTH

The transmitter has a maximum output E-field as follows:

Frequency Range (MHz)	Mode	Output PK E-field Strength (dBuV/m)	Output AV E-field Strength (dBuV/m)
2402-2480	TX	100.99	88.76

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an attached PCB monopole Antenna, with a maximum gain of 2.15 dBi.

5.4. WORST-CASE CONFIGURATION AND MODE

The worst-case axis is X-axis. The EUT was programmed with a power table.

Channel	Power Setting
2	-18
3-4	-12
5-6	-6
7-76	0
77-78	-6
79-80	-12

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List		
Description	**Manufacturer**	**Model**
EUT	Valve	1002
Laptop	Lenovo	T420

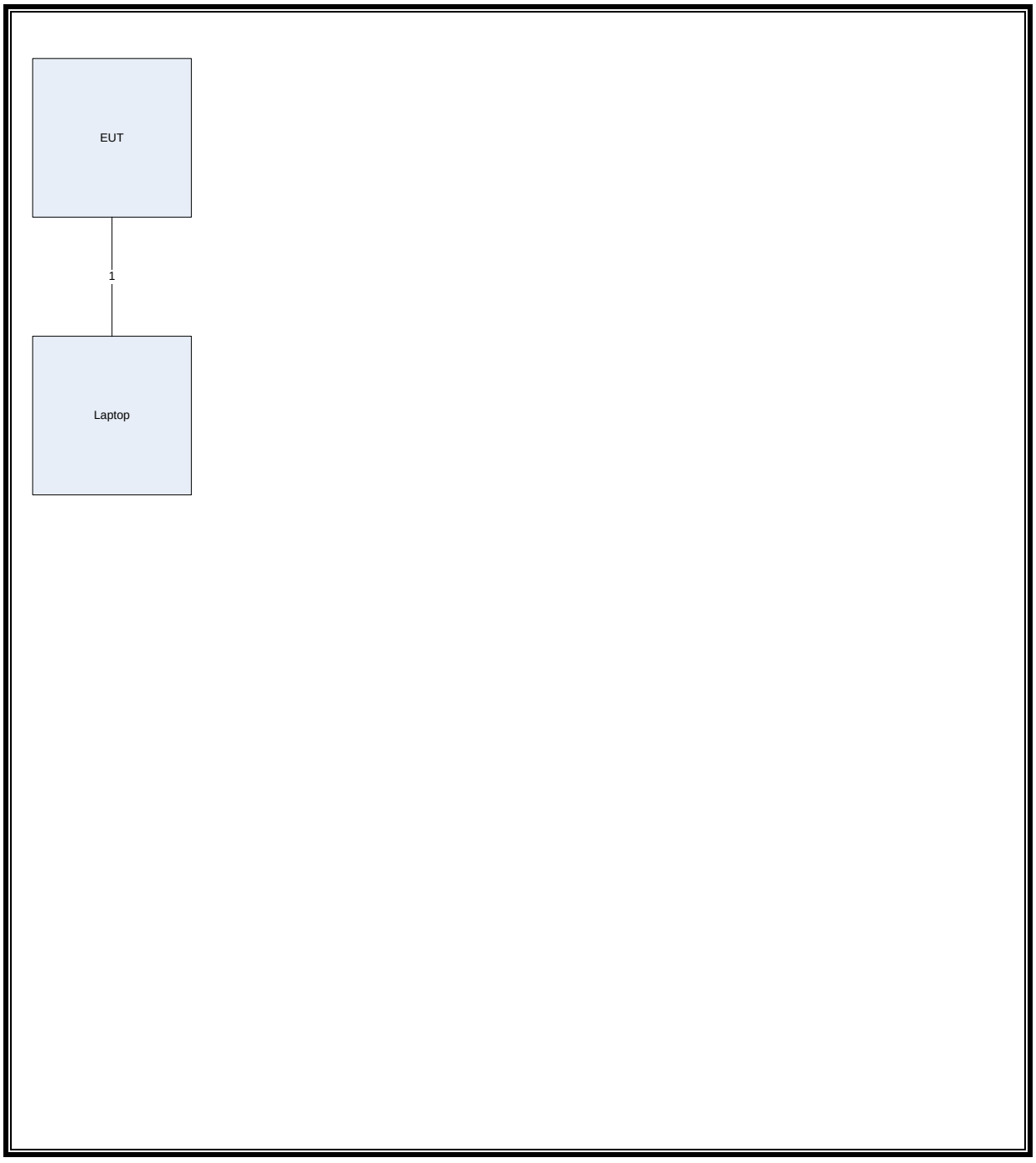
I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	USB	1	USB	IO	<3m	Only used for testing

TEST SETUP

The EUT is connected to a laptop with a USB extension cable. Extension cable used to isolate EUT from Laptop.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List					
Description	**Manufacturer**	**Model**	**T No.**	**Cal Date**	**Cal Due**
Radiated Software	UL	UL EMC	Ver 9.5, May 20, 2015		
Conducted Software	UL	UL EMC	Ver 9.5, Oct 24 2014		
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC4328	20141230	20151231
Bicon Antenna	Chase	VBA6106A	EMC4078	20140401	20150401
Log-P Antenna	Chase	UPA6109	EMC4313	20141119	20151130
Spectrum Analyzer	Rohde & Schwarz	ESU	EMC4323	20141216	20151231
Antenna Array	UL	BOMS	EMC4276	20141201	20151231
EMI Test Receiver	Agilent	N9030A	EMC4360	20141219	20151219
EMI Test Receiver	Rohde & Schwarz	ESR	EMC4377	20150401	20160430
LISN	Solar	8602-50-TS-50-N	EMC4052	20150109	20160109
LISN	Solar	8602-50-TS-50-N	EMC4064	20150109	20160109

7. TEST RESULTS

7.1.1. OCCUPIED BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

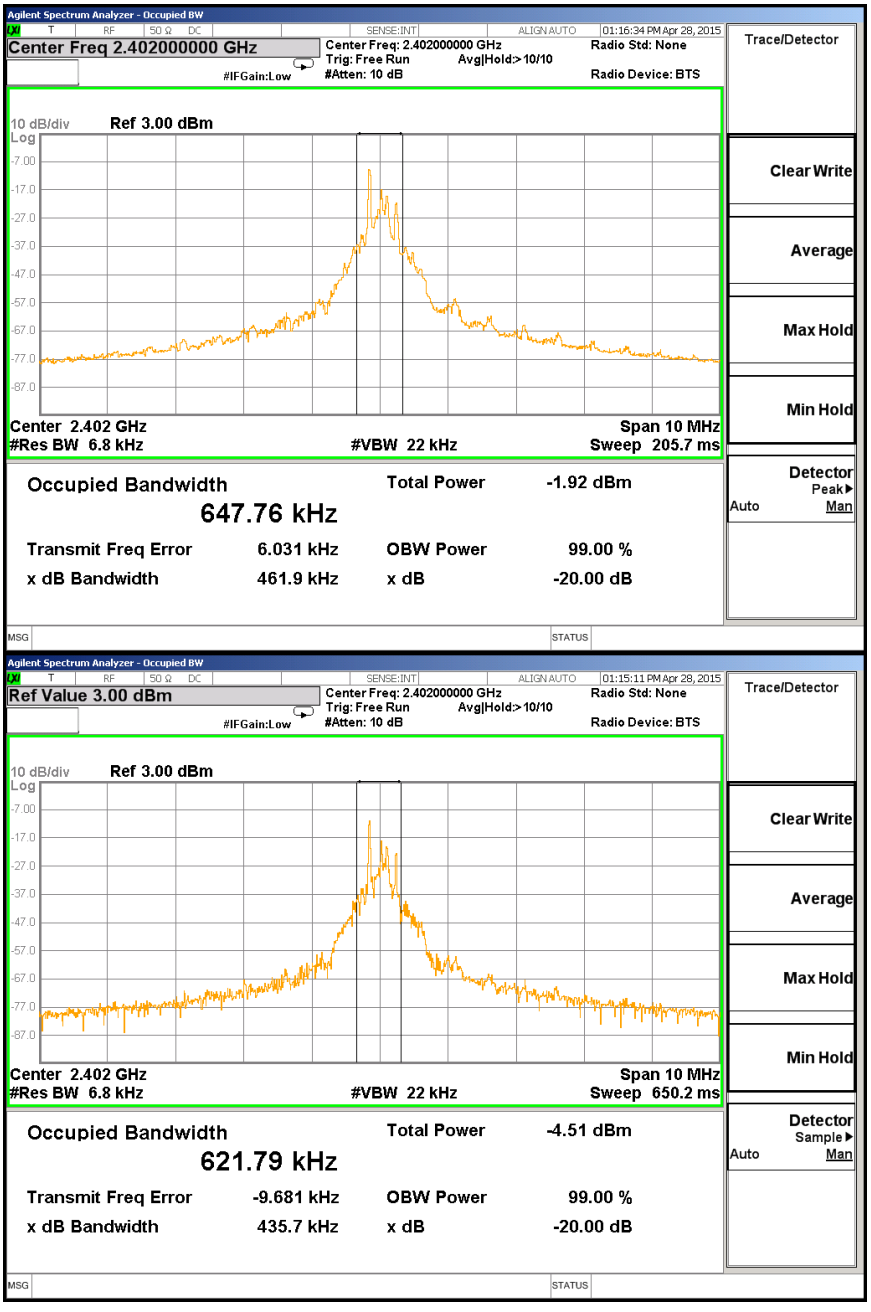
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 5% of the Occupied bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal bandwidth function is utilized.

RESULTS

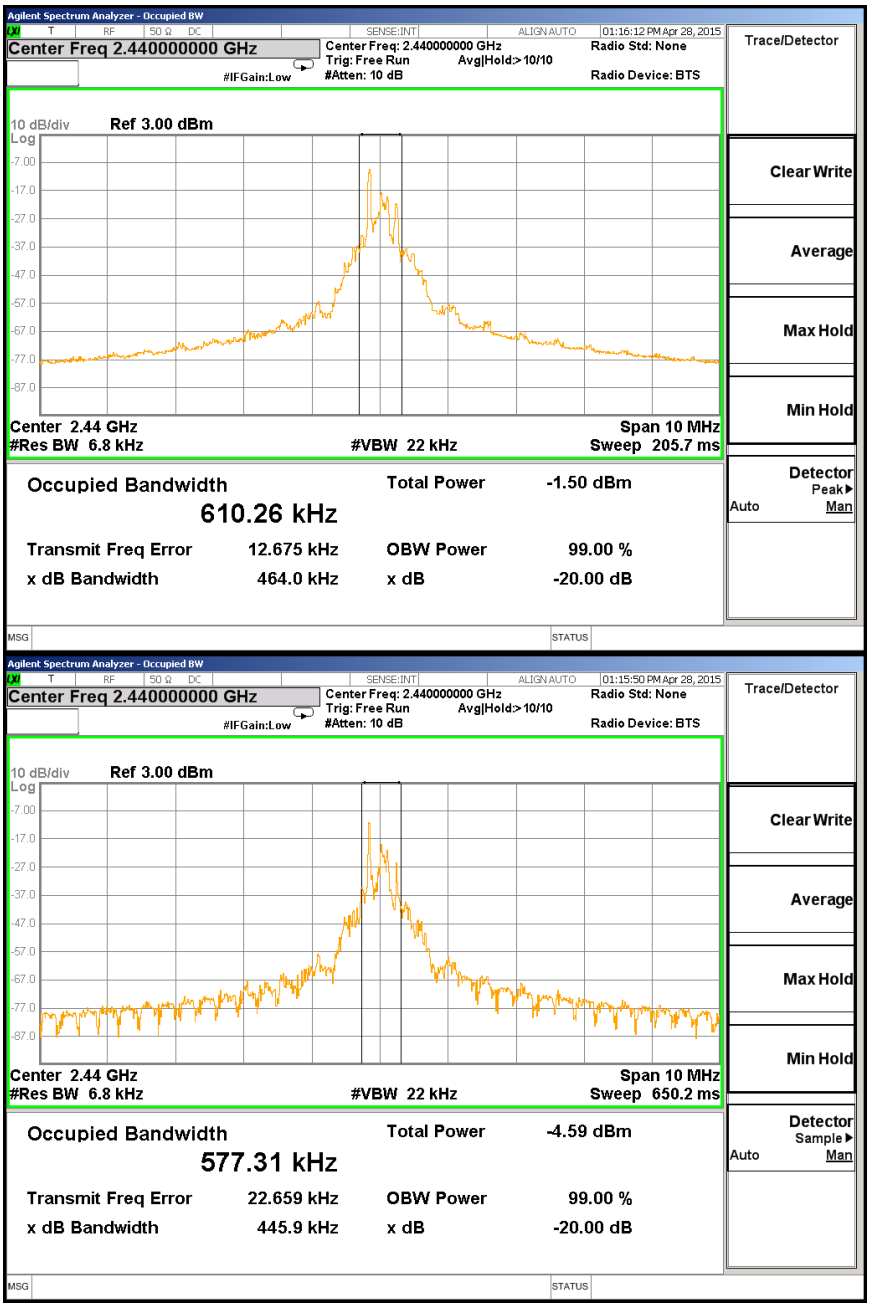
Channel	Frequency (MHz)	99% Bandwidth (MHz)	20dB Bandwidth (MHz)
Low	2402	0.622	0.462
Middle	2440	0.577	0.464
High	2480	0.555	0.465

99% BANDWIDTH

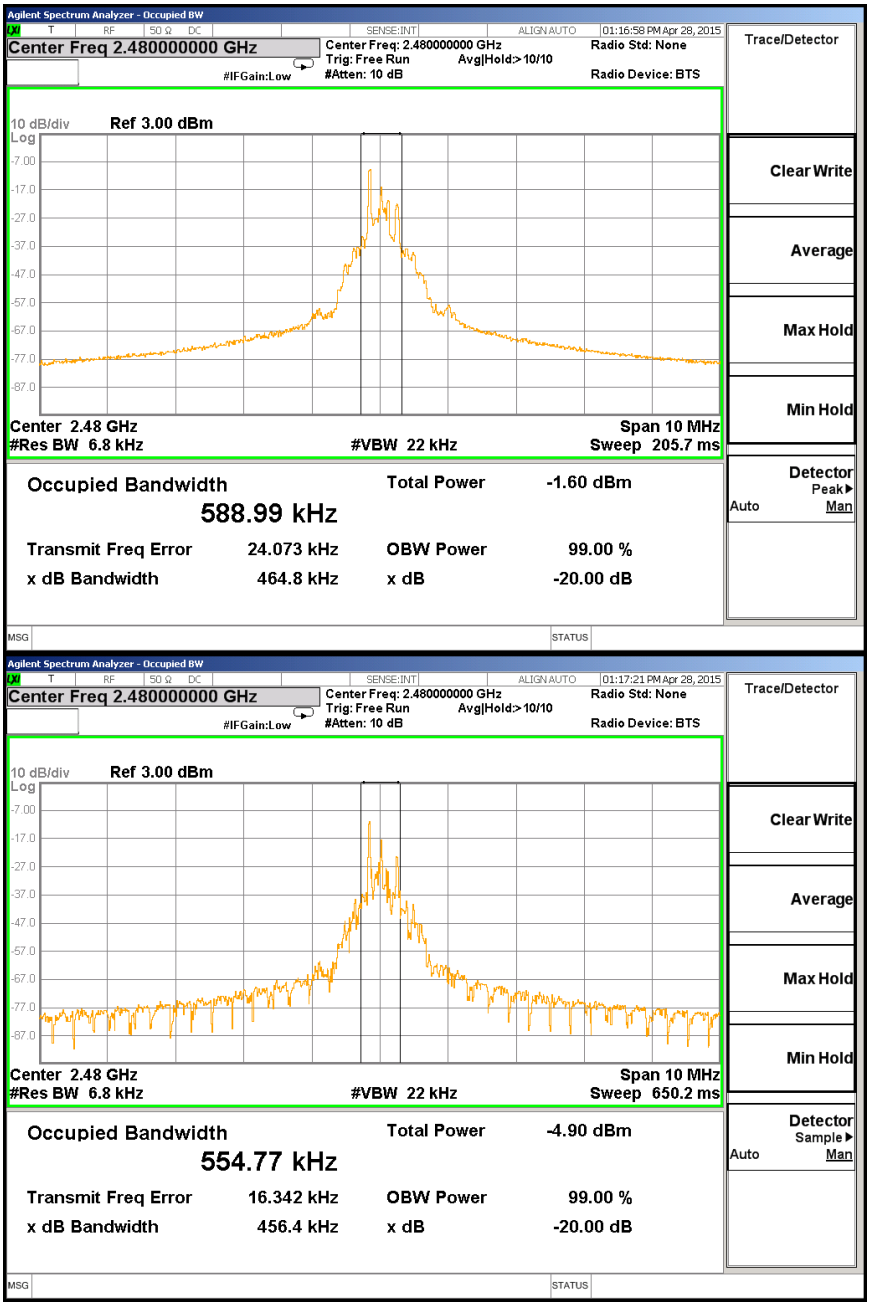
BANDWIDTH LOW CH



99% BANDWIDTH MID CH



99% BANDWIDTH HIGH CH



7.2. RADIATED EMISSIONS

LIMIT

IC RSS-210, A2.9
FCC 15.249

Operation within the bands 902–928 MHz, 2400–2483.5 MHz, 5725–5875 MHZ, and 24.0–24.25 GHz.
(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.

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

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

RESULTS

C63.4 sect. 4.2.2(e) Average voltage measurements using spectrum analyzer reduced video bandwidth

PK: RBW 1MHz, VBW 1MHz
AV: RBW 1MHz, VBW 10Hz

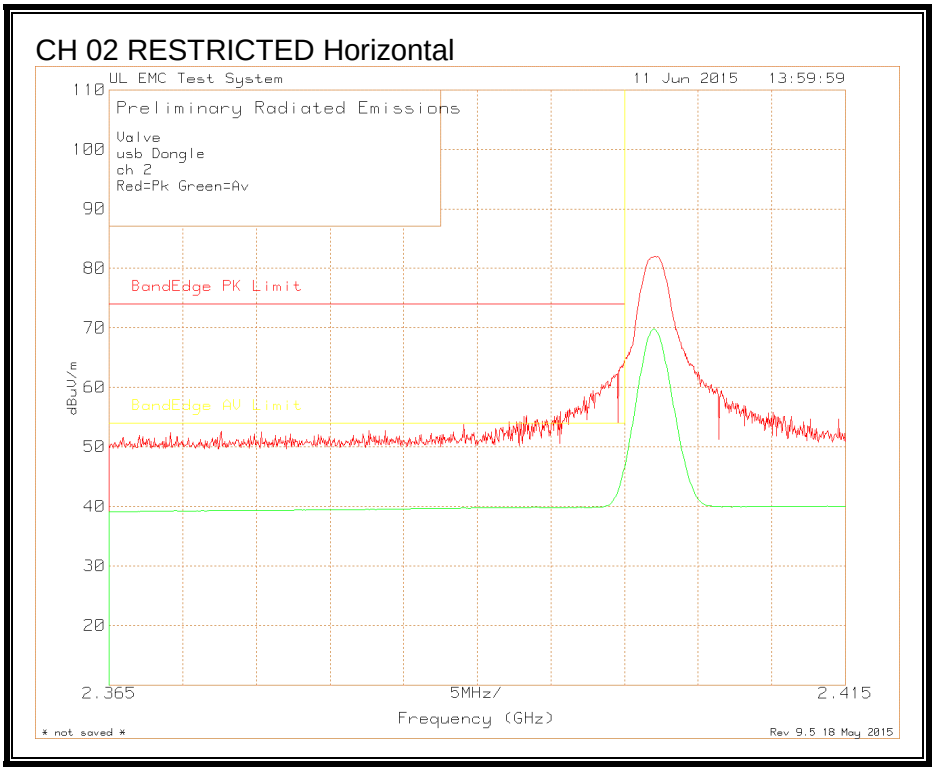
7.2.1. FUNDAMENTAL FREQUENCY RADIATED EMISSION

Valve
usb Dongle

Test Frequency (GHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Gain/Loss (dB)	Corrected Reading dBuV/m	47 CFR Part 15 PK	Margin (dB)	47 CFR Part 15 AV	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2.4401	74.51	Pk	21.9	4.58	100.99	114	-13.01	-	-	245	114	H
2.44	62.28	Av	21.9	4.58	88.76	114	-25.24	94	-5.24	245	114	H
2.4401	72.77	Pk	21.9	4.58	99.25	114	-14.75	-	-	240	100	V
2.44	60.52	Av	21.9	4.58	87	114	-27	94	-7	240	100	V
2.402	53.17	Pk	21.8	4.58	79.55	114	-34.45	-	-	240	119	V
2.402	41.1	Av	21.8	4.58	67.48	114	-46.52	94	-26.52	240	119	V
2.402	55.56	Pk	21.8	4.58	81.94	114	-32.06	-	-	245	131	H
2.402	43.46	Av	21.8	4.58	69.84	114	-44.16	94	-24.16	245	131	H
2.4801	62.74	Pk	22	4.36	89.1	114	-24.9	-	-	292	100	H
2.48	50.6	Av	22	4.36	76.96	114	-37.04	94	-17.04	292	100	H
2.48	63.33	Pk	22	4.36	89.69	114	-24.31	-	-	293	100	V
2.48	51.11	Av	22	4.36	77.47	114	-36.53	94	-16.53	293	100	V

7.2.2. TRANSMITTER RESTRICTED BAND EDGES

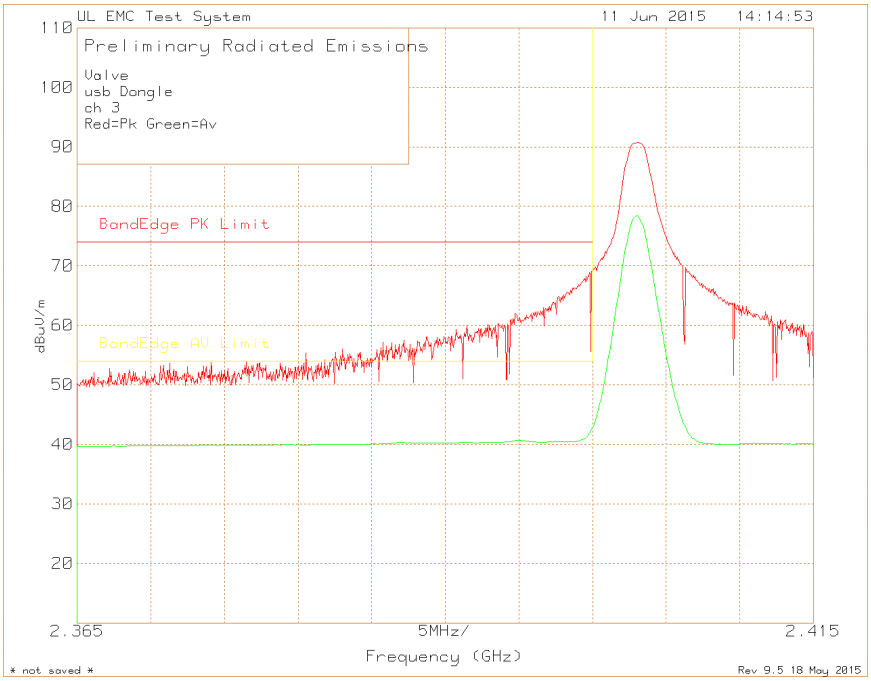
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



Valve
usb Dongle
ch 2
Red=Pk Green=Av

Marker No.	Test Frequency (GHz)	Meter Reading(dBuV)	Detector	Antenna Gain dB/m	Gain/Loss (dB)	Corrected Reading dBuV/m	BandEdge PK Limit	Margin (dB)	BandEdge AV Limit	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.3934	28.79	Pk	21.8	4.7	55.29	74	-18.71	-	-	243	118	H
2	2.4	38.28	Pk	21.8	4.61	64.69	74	-9.31	-	-	243	118	H
3	2.4021	55.61	Pk	21.8	4.58	81.99	-	-	-	-	243	118	H
4	2.394	13.36	AV	21.8	4.69	39.85	74	-34.15	54	-14.15	243	118	H
5	2.4	20.2	AV	21.8	4.61	46.61	74	-27.39	54	-7.39	243	118	H
6	2.4021	43.43	AV	21.8	4.58	69.81	-	-	-	-	243	118	H

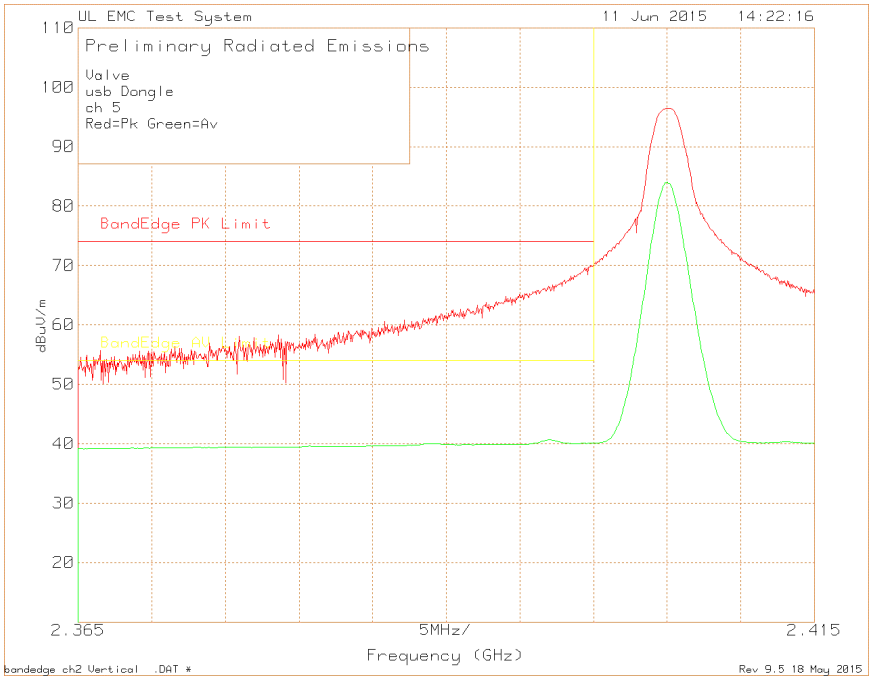
CH 03 RESTRICTED Horizontal



Valve
usb Dongle
ch 3
Red=Pk Green=Av

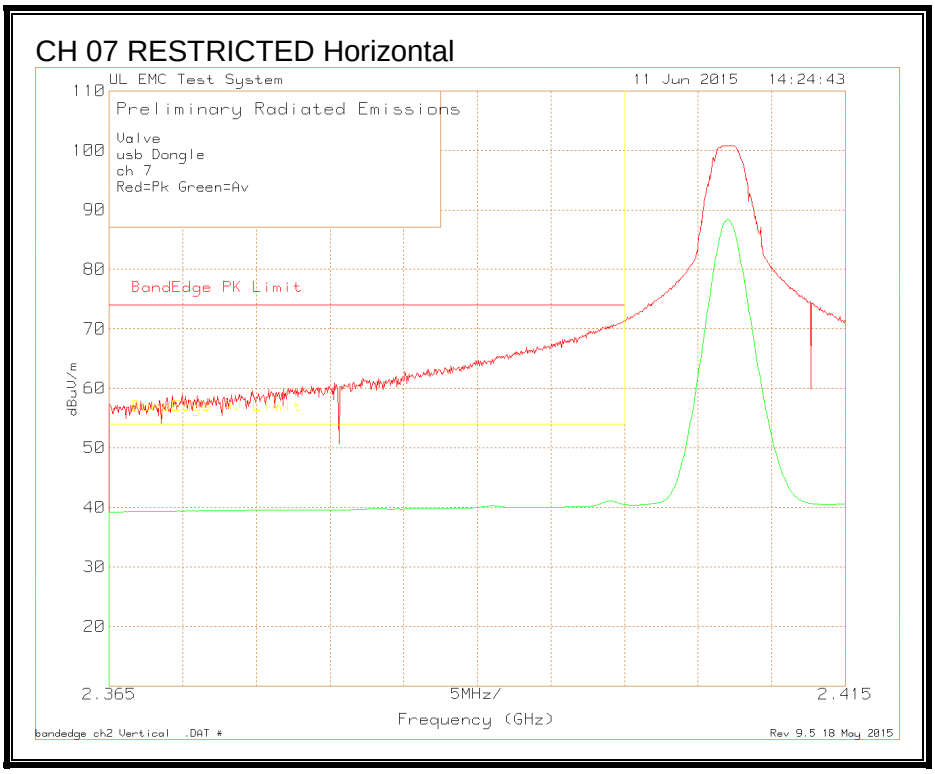
Marker No.	Test Frequency (GHz)	Meter Reading(dBuV)	Detector	Antenna Factor dB/m	Gain/Loss (dB)	Corrected Reading dBuV/m	BandEdge PK Limit	Margin (dB)	BandEdge AV Limit	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.3948	35.51	Pk	21.8	4.68	61.99	74	-12.01	-	-	243	118	H
2	2.3998	41.8	Pk	21.8	4.61	68.21	74	-5.79	-	-	243	118	H
3	2.4	42.72	Pk	21.8	4.61	69.13	74	-4.87	-	-	243	118	H
4	2.4032	64.34	Pk	21.8	4.58	90.72	-	-	-	-	243	118	H
5	2.3949	14.18	AV	21.8	4.68	40.66	74	-33.34	54	-13.34	243	118	H
6	2.4	16.45	AV	21.8	4.61	42.86	74	-31.14	54	-11.14	243	118	H
7	2.403	52.11	AV	21.8	4.58	78.49	-	-	-	-	243	118	H

CH 05 RESTRICTED Horizontal



Valve
usb Dongle
ch 5
Red=Pk Green=Av

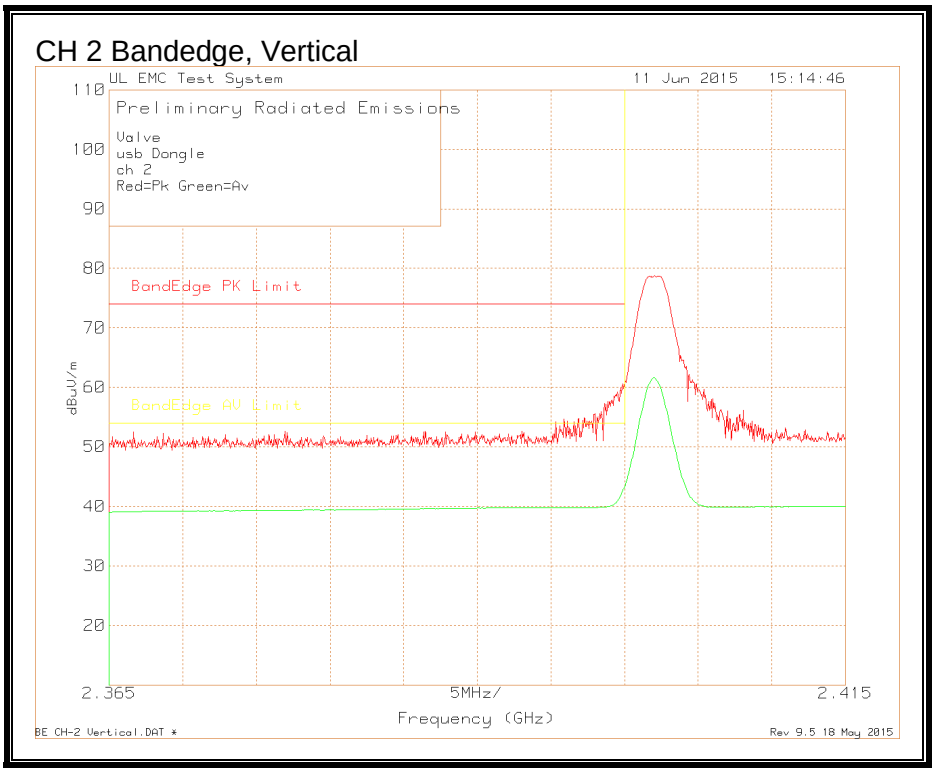
Marker No.	Test Frequency (GHz)	Meter Reading(dBuV)	Detector	Antenna Factor dB/m	Gain/Loss (dB)	Corrected Reading dBuV/m	BandEdge PK Limit	Margin (dB)	BandEdge AV Limit	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.3941	38.36	Pk	21.8	4.69	64.85	74	-9.15	-	-	243	118	H
2	2.4	43.75	Pk	21.8	4.61	70.16	74	-3.84	-	-	243	118	H
3	2.4052	70.05	Pk	21.8	4.58	96.43	-	-	-	-	243	118	H
4	2.397	14.21	AV	21.8	4.65	40.66	74	-33.34	54	-13.34	243	118	H
5	2.4	13.67	AV	21.8	4.61	40.08	74	-33.92	54	-13.92	243	118	H
6	2.405	57.7	AV	21.8	4.58	84.08	-	-	-	-	243	118	H



Valve
usb Dongle
ch 7
Red=Pk Green=Av

Marker No.	Test Frequency (GHz)	Meter Reading(dBuV)	Detector	Antenna Factor dB/m	Gain/Loss (dB)	Corrected Reading dBuV/m	BandEdge PK Limit	Margin (dB)	BandEdge AV Limit	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.3985	43.79	Pk	21.8	4.63	70.22	74	-3.78	-	-	243	118	H
2	2.4	45.06	Pk	21.8	4.61	71.47	74	-2.53	-	-	243	118	H
3	2.4074	74.38	Pk	21.8	4.58	100.76	-	-	-	-	243	118	H
4	2.399	14.67	AV	21.8	4.62	41.09	74	-32.91	54	-12.91	243	118	H
5	2.4	14.05	AV	21.8	4.61	40.46	74	-33.54	54	-13.54	243	118	H
6	2.4071	62.05	AV	21.8	4.58	88.43	-	-	-	-	243	118	H

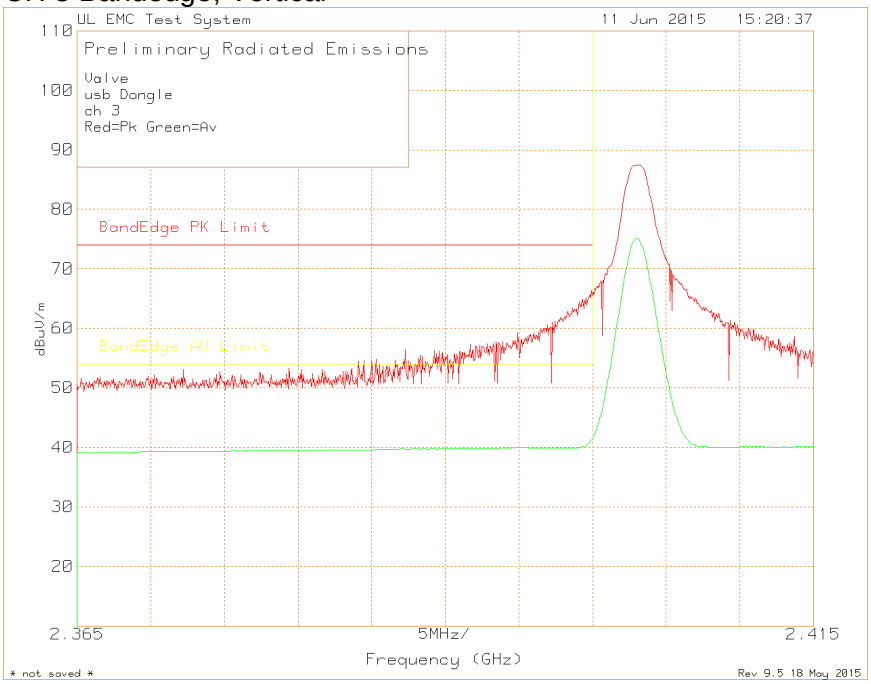
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



Valve
usb Dongle
ch 2
Red=Pk Green=Av

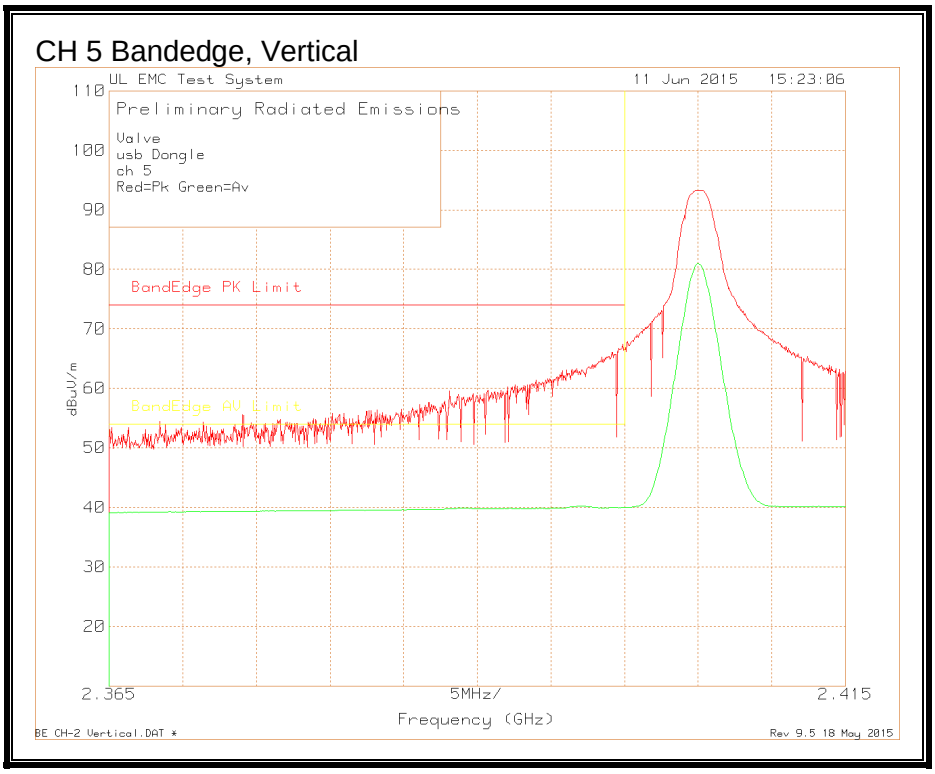
Marker No.	Test Frequency (GHz)	Meter Reading(dBuV)	Detector	Antenna Factor dB/m	Gain/Loss (dB)	Corrected Reading dBuV/m	BandEdge PK Limit	Margin (dB)	BandEdge AV Limit	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.3959	28.23	Pk	21.8	4.66	54.69	74	-19.31	-	-	240	158	V
2	2.4	34.34	Pk	21.8	4.61	60.75	74	-13.25	-	-	240	158	V
3	2.4021	52.4	Pk	21.8	4.58	78.78	-	-	-	-	240	158	V
4	2.3959	13.34	AV	21.8	4.66	39.8	74	-34.2	54	-14.2	240	158	V
5	2.4	16.84	AV	21.8	4.61	43.25	74	-30.75	54	-10.75	240	158	V
6	2.402	35.18	AV	21.8	4.58	61.56	-	-	-	-	240	158	V

CH 3 Bandedge, Vertical



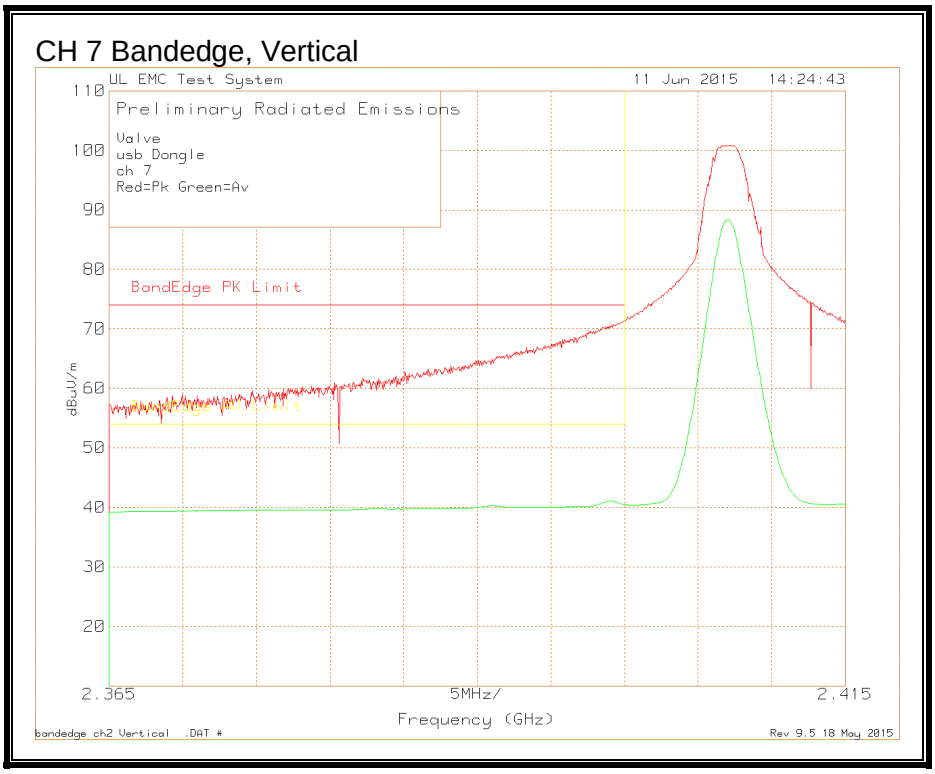
Valve
usb Dongle
ch 3
Red=Pk Green=Av

Test Frequency (GHz)	Meter Reading(dBuV)	Detector	Antenna Factor dB/m	Corrected Reading dBuV/m	BandEdge PK Limit	Margin (dB)	BandEdge AV Limit	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2.4032	65.68	PK	21.8	87.48	-	-	-	-	240	158	V
2.4	43.37	PK	21.8	65.17	74	-8.83	-	-	240	158	V
2.4	44.56	PK	21.8	66.36	74	-7.64	-	-	240	158	V
2.403	53.4	AV	21.8	75.2	-	-	-	-	240	158	V
2.4	19.66	AV	21.8	41.46	74	-32.54	54	-12.54	240	158	V
2.4	19.49	AV	21.8	41.29	74	-32.71	54	-12.71	240	158	V



Valve
usb Dongle
ch 5
Red=Pk Green=Av

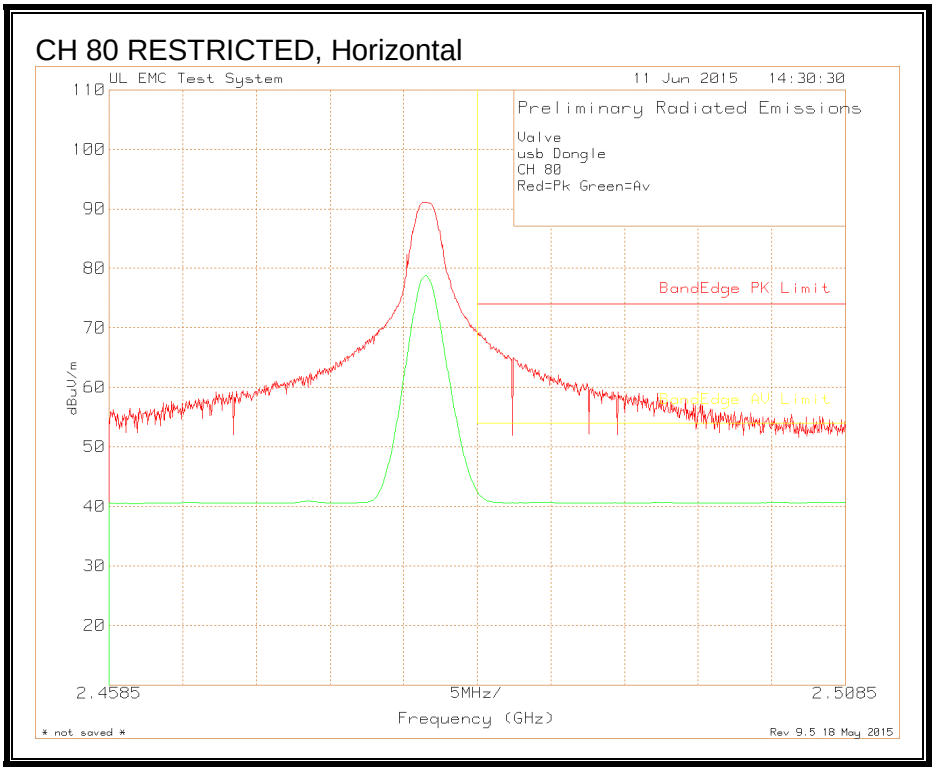
Marker No.	Test Frequency (GHz)	Meter Reading(dBuV)	Detector	Antenna Factor dB/m	Gain/Loss (dB)	Corrected Reading dBuV/m	BandEdge PK Limit	Margin (dB)	BandEdge AV Limit	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.3992	39.66	Pk	21.8	4.62	66.08	74	-7.92	-	-	240	158	V
2	2.4	40.17	Pk	21.8	4.61	66.58	74	-7.42	-	-	240	158	V
3	2.4051	66.91	Pk	21.8	4.58	93.29	-	-	-	-	240	158	V
4	2.397	13.81	AV	21.8	4.65	40.26	74	-33.74	54	-13.74	240	158	V
5	2.4	13.58	AV	21.8	4.61	39.99	74	-34.01	54	-14.01	240	158	V
6	2.405	54.6	AV	21.8	4.58	80.98	-	-	-	-	240	158	V



Valve
usb Dongle
ch 7
Red=Pk Green=Av

Marker No.	Test Frequency (GHz)	Meter Reading(dBuV)	Detector	Antenna Factor dB/m	Gain/Loss (dB)	Corrected Reading dBuV/m	BandEdge PK Limit	Margin (dB)	BandEdge AV Limit	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.3985	40.43	Pk	21.8	4.63	66.86	74	-7.14	-	-	240	158	V
2	2.4	41.87	Pk	21.8	4.61	68.28	74	-5.72	-	-	240	158	V
3	2.4072	71.2	Pk	21.8	4.58	97.58	-	-	-	-	240	158	V
4	2.399	14.13	AV	21.8	4.62	40.55	74	-33.45	54	-13.45	240	158	V
5	2.4	13.77	AV	21.8	4.61	40.18	74	-33.82	54	-13.82	240	158	V
6	2.407	58.88	AV	21.8	4.58	85.26	-	-	-	-	240	158	V

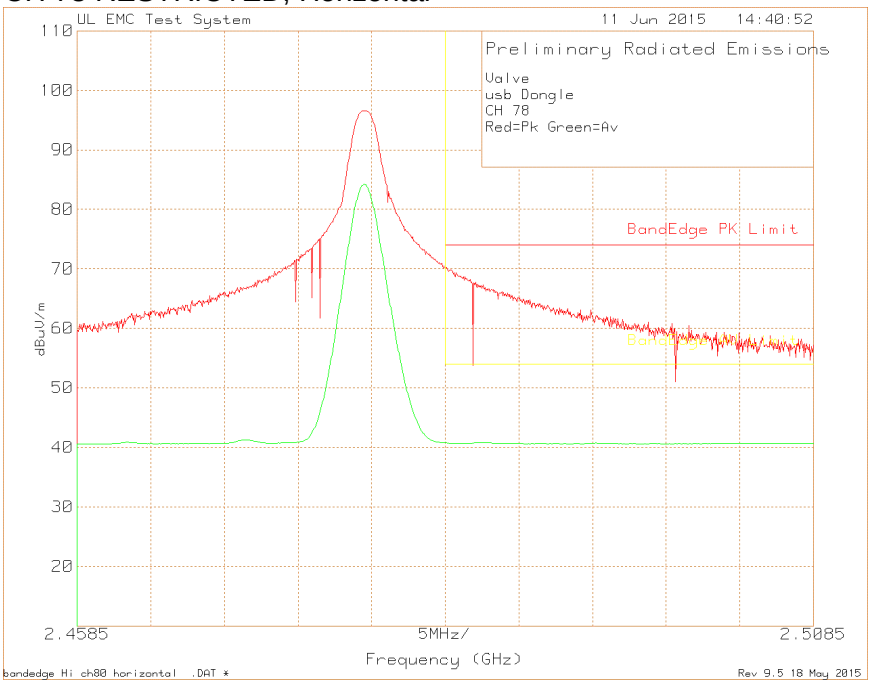
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



Valve
usb Dongle
CH 80
Red=Hor Green=Vert

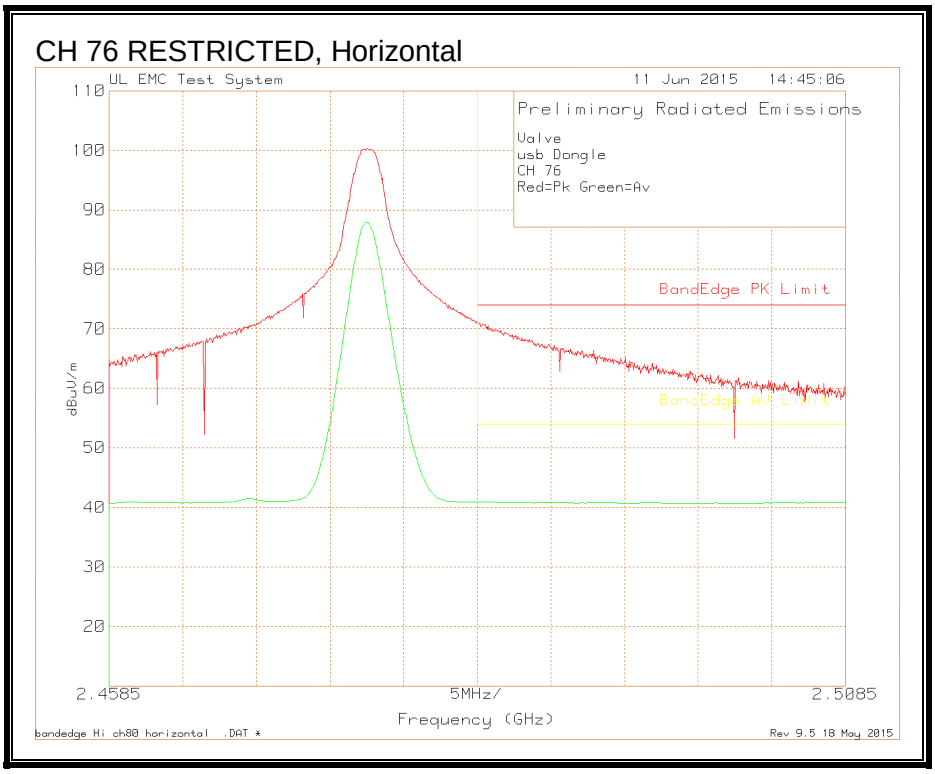
Marker No.	Test Frequency (GHz)	Meter Reading(dBuV)	Detector	Antenna Factor dB/m	Gain/Loss (dB)	Corrected Reading dBuV/m	BandEdge PK Limit	Margin (dB)	BandEdge AV Limit	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.48	64.76	Pk	22	4.36	91.12	-	-	-	-	243	118	H
2	2.4835	42.85	Pk	22.1	4.37	69.32	74	-4.68	-	-	243	118	H
3	2.4846	40.42	Pk	22.1	4.37	66.89	74	-7.11	-	-	243	118	H
4	2.48	52.45	AV	22	4.36	78.81	-	-	-	-	243	118	H
5	2.4835	16.02	AV	22.1	4.37	42.49	74	-31.51	54	-11.51	243	118	H
6	2.4883	14.21	AV	22.1	4.38	40.69	74	-33.31	54	-13.31	243	118	H

CH 78 RESTRICTED, Horizontal



Valve
usb Dongle
CH 78
Red=Hor Green=Vert

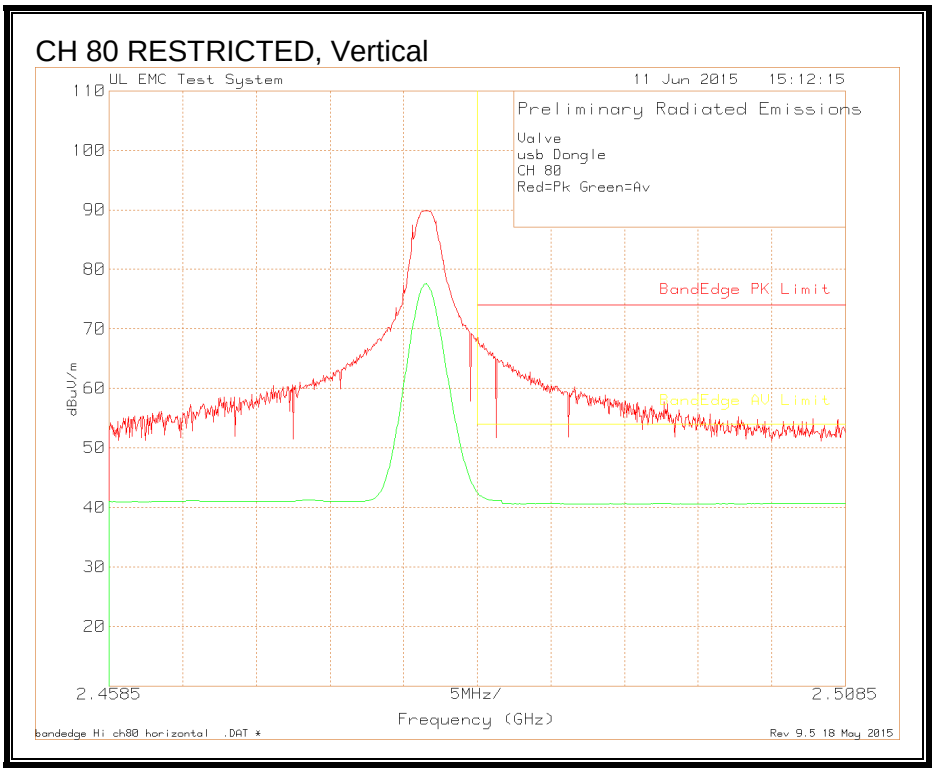
Marker No.	Test Frequency (GHz)	Meter Reading(dBuV)	Detector	Antenna Factor dB/m	Gain/Loss (dB)	Corrected Reading dBuV/m	BandEdge PK Limit	Margin (dB)	BandEdge AV Limit	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.4782	70.13	Pk	22	4.36	96.49	-	-	-	-	243	118	H
2	2.4835	43.7	Pk	22.1	4.37	70.17	74	-3.83	-	-	243	118	H
3	2.485	41.81	Pk	22.1	4.37	68.28	74	-5.72	-	-	243	118	H
4	2.478	57.85	AV	22	4.36	84.21	-	-	-	-	243	118	H
5	2.4835	14.28	AV	22.1	4.37	40.75	74	-33.25	54	-13.25	243	118	H
6	2.485	14.2	AV	22.1	4.37	40.67	74	-33.33	54	-13.33	243	118	H



Valve
usb Dongle
CH 76
Red=Hor Green=Vert

Marker No.	Test Frequency (GHz)	Meter Reading(dBuV)	Detector	EMCO3161-02 S/N 99061052 3m UL	Gain/Loss (dB)	Corrected Reading dBuV/m	BandEdge PK Limit	Margin (dB)	BandEdge AV Limit	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.4761	73.89	Pk	22	4.37	100.26	-	-	-	-	243	118	H
2	2.4835	44.6	Pk	22.1	4.37	71.07	74	-2.93	-	-	243	118	H
3	2.4856	42.76	Pk	22.1	4.37	69.23	74	-4.77	-	-	243	118	H
4	2.476	61.6	AV	22	4.37	87.97	-	-	-	-	243	118	H
5	2.4835	14.48	AV	22.1	4.37	40.95	74	-33.05	54	-13.05	243	118	H
6	2.4886	14.3	AV	22.1	4.38	40.78	74	-33.22	54	-13.22	243	118	H

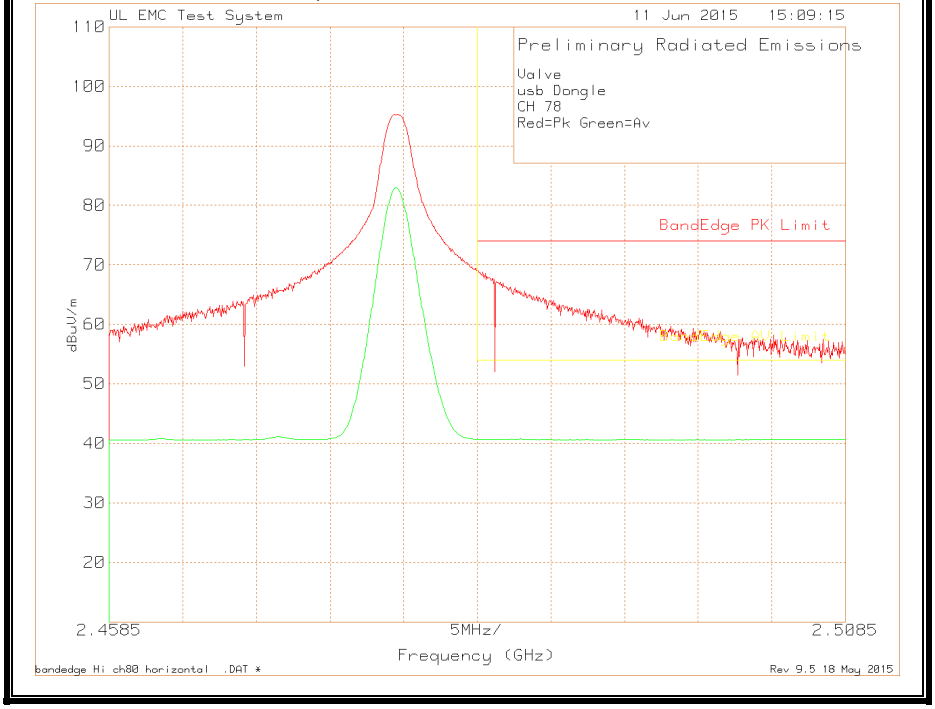
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



Valve
usb Dongle
CH 80
Red=Pk Green=Av

Test Frequency (GHz)	Meter Reading(dBuV)	Detector	Antenna Factor dB/m	Corrected Reading dBuV/m	BandEdge PK Limit	Margin (dB)	BandEdge AV Limit	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
2.4799	67.86	PK	22	89.86	-	-	-	-	240	158	V
2.4835	45.63	PK	22.1	67.73	74	-6.27	-	-	240	158	V
2.4836	46.5	PK	22.1	68.6	74	-5.4	-	-	240	158	V
2.4801	55.6	AV	22	77.6	-	-	-	-	240	158	V
2.4835	20.41	AV	22.1	42.51	74	-31.49	54	-11.49	240	158	V
2.4836	20.27	AV	22.1	42.37	74	-31.63	54	-11.63	240	158	V

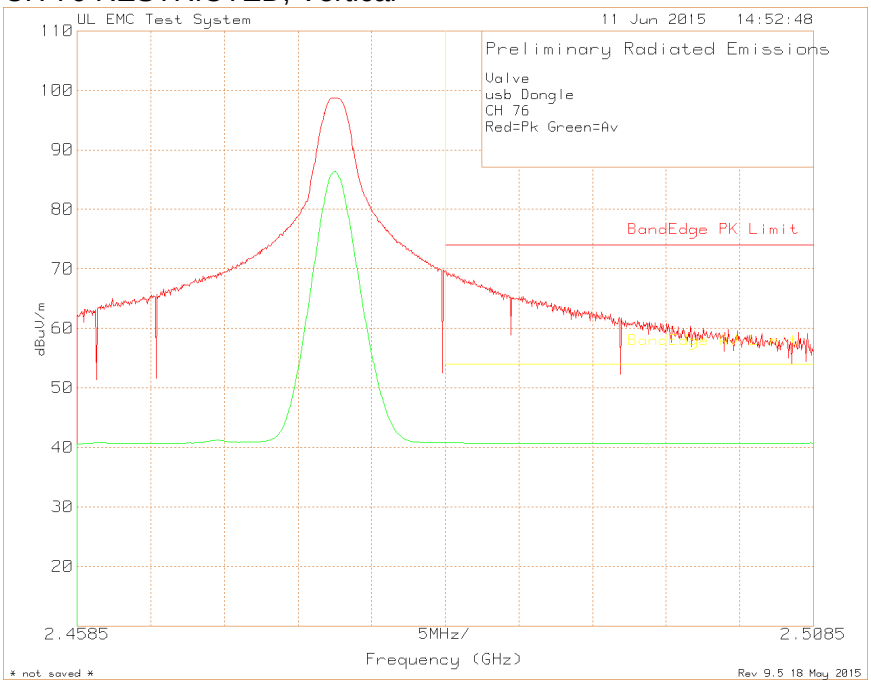
CH 78 RESTRICTED, Vertical



Valve
usb Dongle
CH 78
Red=Pk Green=Av

Marker No.	Test Frequency (GHz)	Meter Reading(dBuV)	Detector	Antenna Factor dB/m	Gain/Loss (dB)	Corrected Reading dBuV/m	BandEdge PK Limit	Margin (dB)	BandEdge AV Limit	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.4781	68.9	Pk	22	4.36	95.26	-	-	-	-	240	158	V
2	2.4835	42.55	Pk	22.1	4.37	69.02	74	-4.98	-	-	240	158	V
3	2.4861	39.69	Pk	22.1	4.37	66.16	74	-7.84	-	-	240	158	V
4	2.478	56.61	AV	22	4.36	82.97	-	-	-	-	240	158	V
5	2.4835	14.23	AV	22.1	4.37	40.7	74	-33.3	54	-13.3	240	158	V
6	2.4859	14.27	AV	22.1	4.37	40.74	74	-33.26	54	-13.26	240	158	V

CH 76 RESTRICTED, Vertical

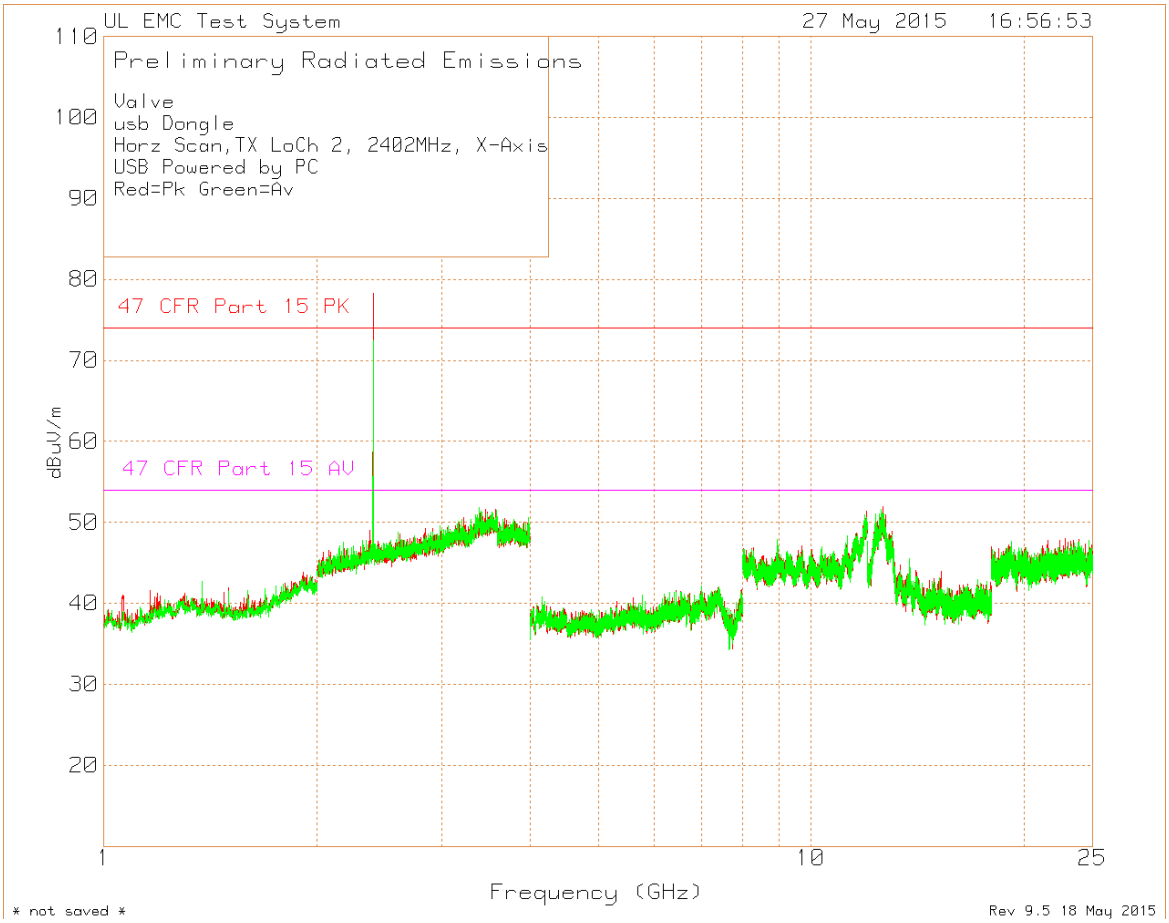


Valve
usb Dongle
CH 76
Red=Pk Green=Av

Marker No.	Test Frequency (GHz)	Meter Reading(dBuV)	Detector	Antenna Factor dB/m	Gain/Loss (dB)	Corrected Reading dBuV/m	BandEdge PK Limit	Margin (dB)	BandEdge AV Limit	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	2.4761	72.32	Pk	22	4.37	98.69	-	-	-	-	240	158	V
2	2.4835	42.92	Pk	22.1	4.37	69.39	74	-4.61	-	-	240	158	V
3	2.4841	42.62	Pk	22.1	4.37	69.09	74	-4.91	-	-	240	158	V
4	2.4761	60.02	AV	22	4.37	86.39	-	-	-	-	240	158	V
5	2.4835	14.31	AV	22.1	4.37	40.78	74	-33.22	54	-13.22	240	158	V
6	2.4869	14.19	AV	22.1	4.38	40.67	74	-33.33	54	-13.33	240	158	V

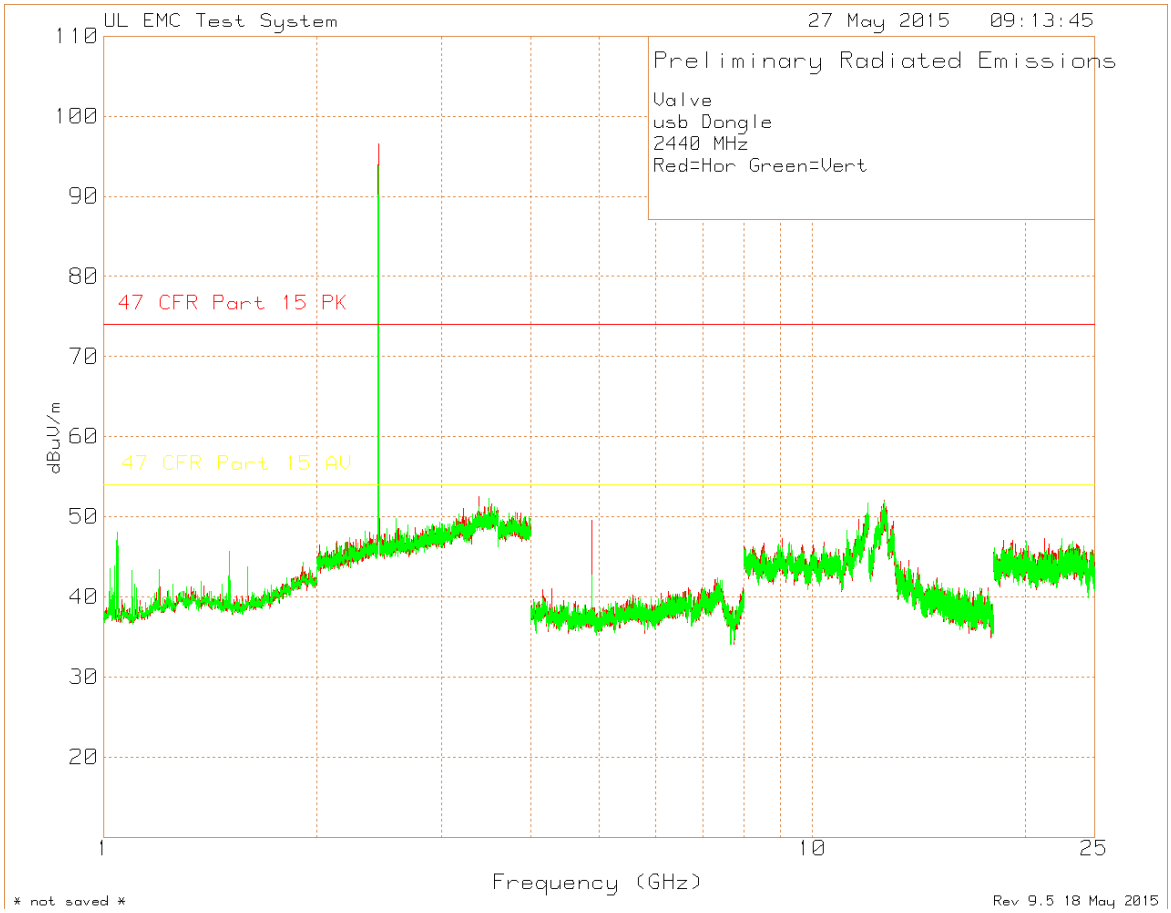
7.2.3. HARMONICS AND SPURIOUS EMISSIONS ABOVE 1GHz

CH 02



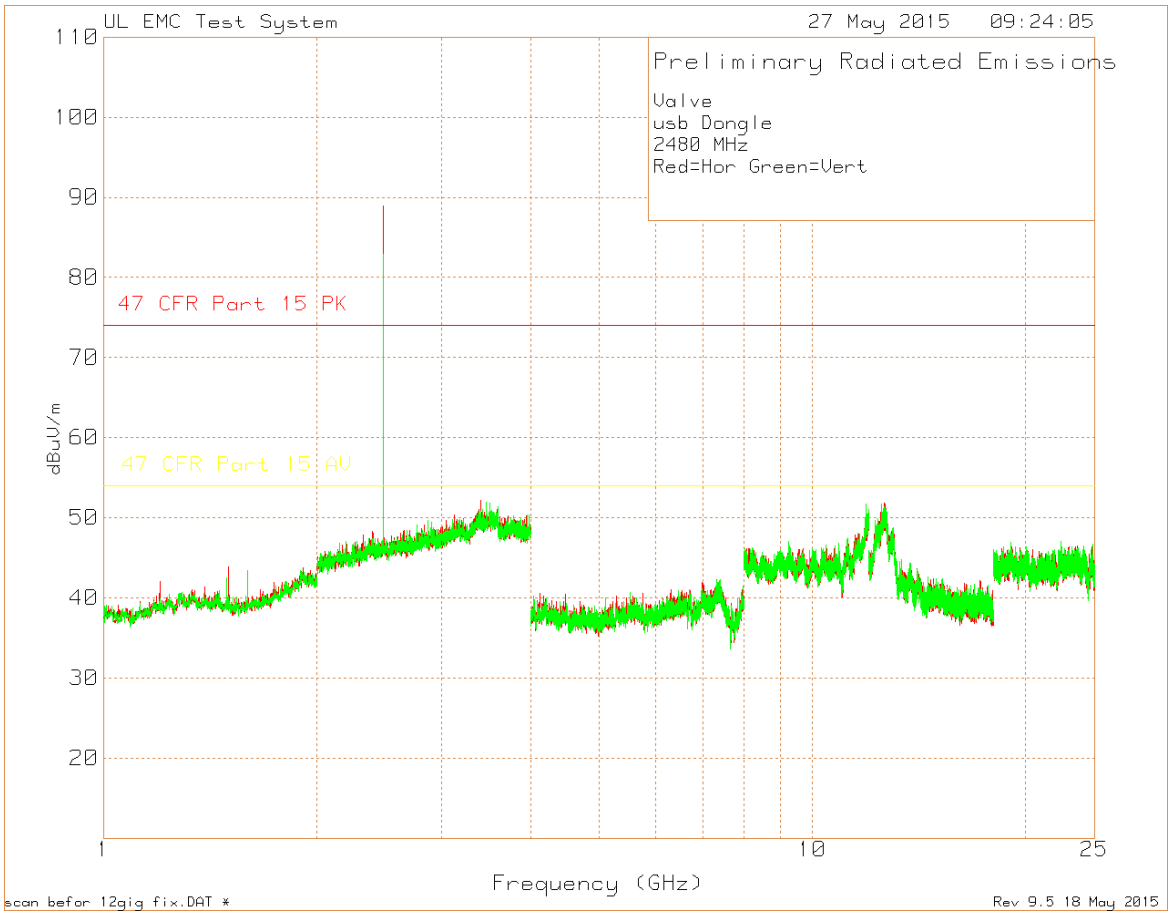
During prescan, no Emissions found within 5dB of the limit, therefore no further measurements needed.

CH 40



During prescan, no Emissions found within 5dB of the limit, therefore no further measurements needed.

CH 80

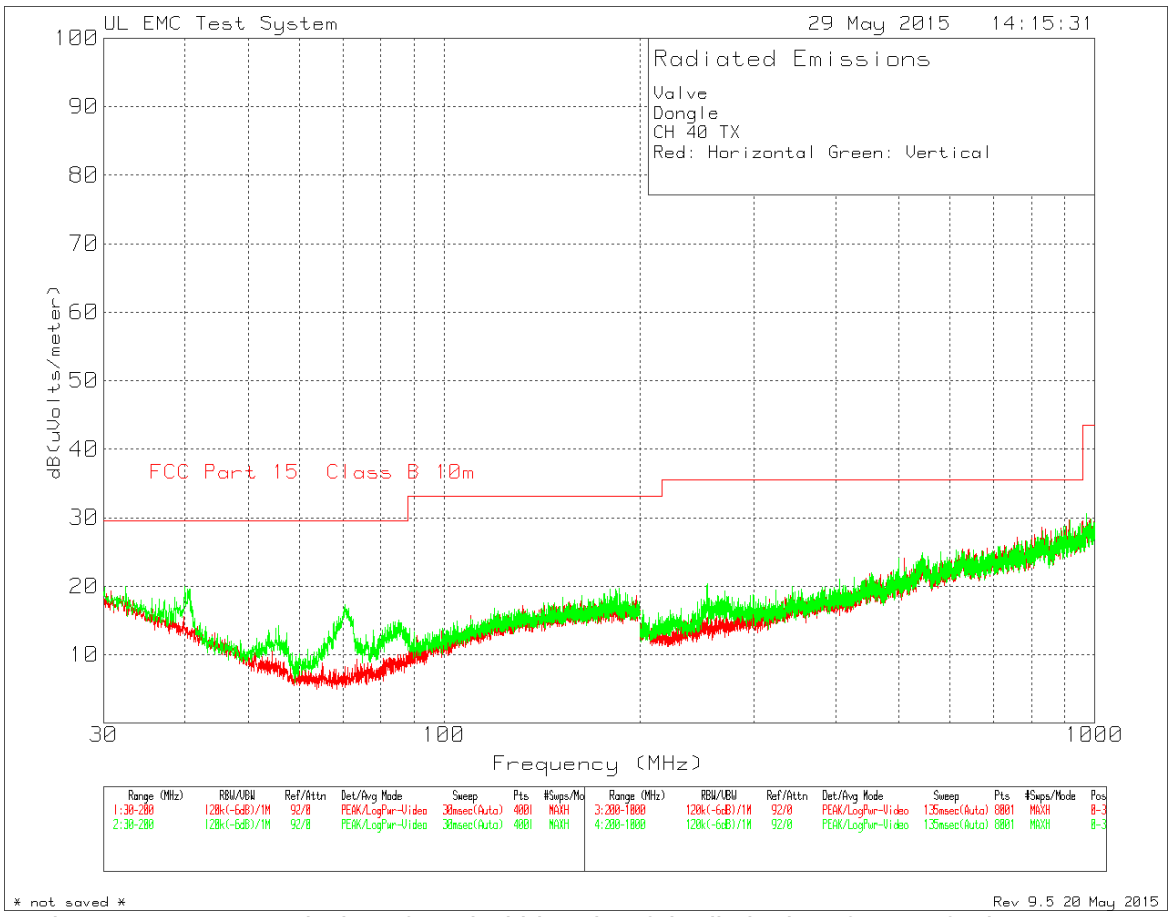


During prescan, no Emissions found within 5dB of the limit, therefore no further measurements needed.

7.2.4. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz

PLOT



During Prescan, no emissions found within 5dB of the limit, therefore no further measurements needed.

8. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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 C63.4.

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

6 WORST EMISSIONS

Manufacturer:Valve
Model#Dongle
Mode:TX CH 40
Voltage:120V 60Hz
QP=Red CaV=Grn

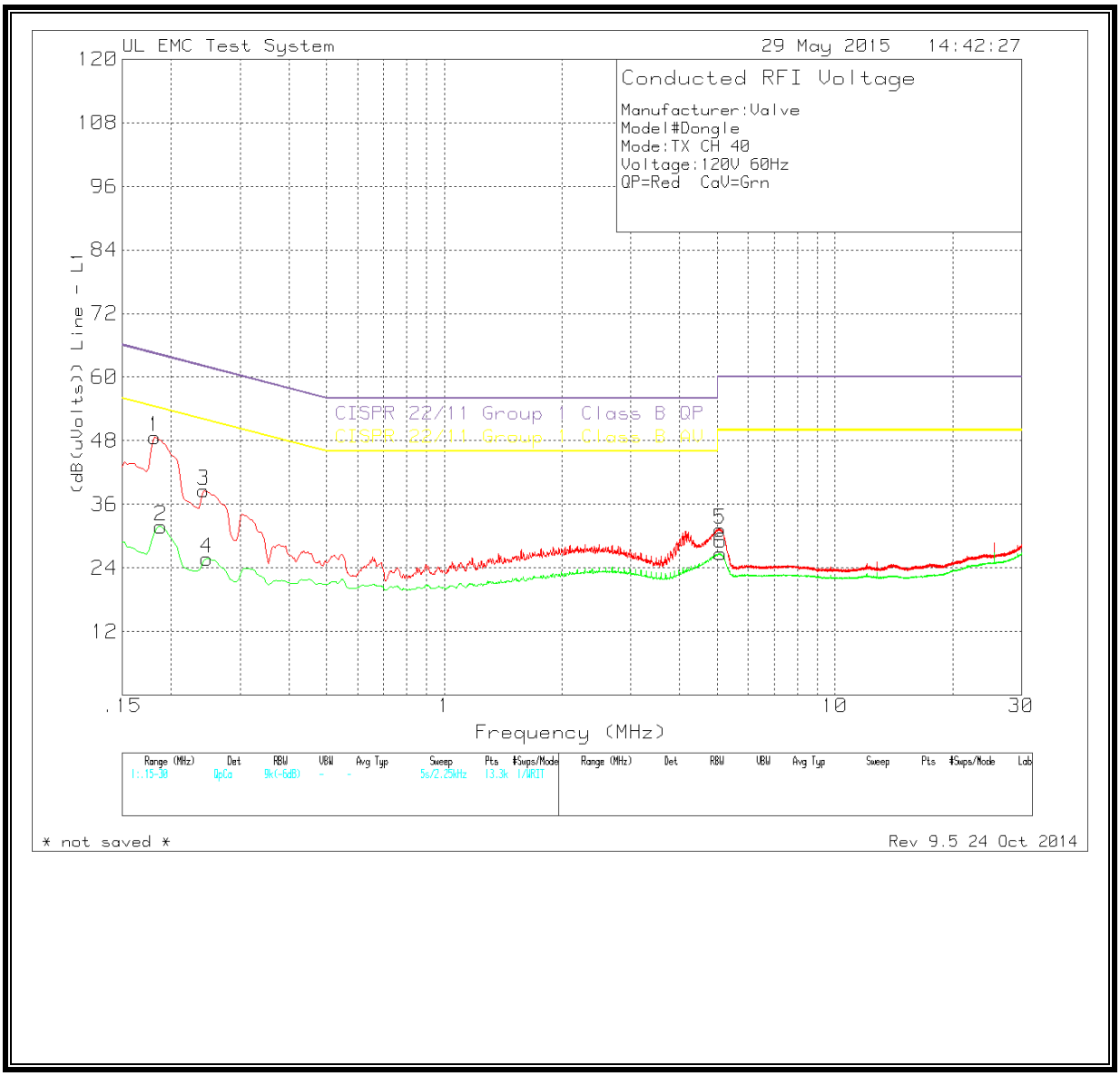
Trace Markers

No.	Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dB(uVolts))	Limit:1	2	3	4	5	6
Line - L1 .15 - 30MHz											
1	.1815	36.67dBuV Qp	.1	11.9	48.67	-	-	64.42	-	-	-
					Margin (dB)	-	-	-15.75	-	-	-
2	.18825	20.04dBuV Ca	.1	11.7	31.84	-	-	-	54.11	-	-
					Margin (dB)	-	-	-	-22.27	-	-
3	.24225	27.23dBuV Qp	.1	11.3	38.63	-	-	62.02	-	-	-
					Margin (dB)	-	-	-23.39	-	-	-
4	.24675	14.48dBuV Ca	.1	11.2	25.78	-	-	-	51.87	-	-
					Margin (dB)	-	-	-	-26.09	-	-
5	5.0865	20.44dBuV Qp	.1	10.7	31.24	-	-	60	-	-	-
					Margin (dB)	-	-	-28.76	-	-	-
6	5.091	15.93dBuV Ca	.1	10.7	26.73	-	-	-	50	-	-
					Margin (dB)	-	-	-	-23.27	-	-
Line - L2 .15 - 30MHz											
7	.1815	36.36dBuV Qp	.1	12	48.46	-	-	64.42	-	-	-
					Margin (dB)	-	-	-15.96	-	-	-
8	.186	19.66dBuV Ca	.1	11.8	31.56	-	-	-	54.21	-	-
					Margin (dB)	-	-	-	-22.65	-	-
9	.24225	28.74dBuV Qp	.1	11.4	40.24	-	-	62.02	-	-	-
					Margin (dB)	-	-	-21.78	-	-	-
10	.24675	14.04dBuV Ca	.1	11.3	25.44	-	-	-	51.87	-	-
					Margin (dB)	-	-	-	-26.43	-	-
11	5.127	22.19dBuV Qp	.1	10.9	33.19	-	-	60	-	-	-
					Margin (dB)	-	-	-26.81	-	-	-
12	5.12475	17.68dBuV Ca	.1	10.9	28.68	-	-	-	50	-	-
					Margin (dB)	-	-	-	-21.32	-	-

LIMIT 3: CISPR 22/11 Group 1 Class B QP
LIMIT 4: CISPR 22/11 Group 1 Class B AV

Qp - Quasi-Peak detector
Ca - CISPR Average detection

LINE 1 RESULTS



LINE 2 RESULTS