



**FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8**

CERTIFICATION TEST REPORT

FOR

Wireless Mixing Valve

MODEL NUMBER: 6099B1750, 6099E1600

**FCC ID: 2AAFY6099B1750
IC: 11144A-6099B1750**

REPORT NUMBER: 10005005C

ISSUE DATE: September 23, 2013

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NVLAP Lab code: 100414-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	09/23/13	Initial Issue	M.Ferrer

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Fluid Handling
8200 N Austin
Morton Grove, IL 60053

EUT DESCRIPTION: Wireless Mixing Valve

MODEL: 6099B1750, 6099E1600

SERIAL NUMBER: 6

DATE TESTED: September 3, 2013 – September 13, 2013

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C Part 15.249	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex A2.9	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

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

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

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Tested By:



MICHAEL FERRER
WiSE Project Lead
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

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.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamplifier Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

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	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
RF Power	dB	Power Meter	0.45dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 915MHz transceiver and battery powered

The radio module is manufactured by Fluid Handling

The model #'s are the same electrically and are relabeled for the different manufacturer

5.2. MAXIMUM OUTPUT E-FIELD STRENGTH

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

Frequency Range (MHz)	Mode	Output PK E-field Strength (dBuV/m)
915	TX	91.78

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a microstrip antenna, with a maximum gain of 3.87 dBi.

5.4. WORST-CASE CONFIGURATION AND MODE

The EUT was set in worst axis as found in preliminary testing.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

EUT – Wireless Mixing Valve
Operates on 2 AA batteries

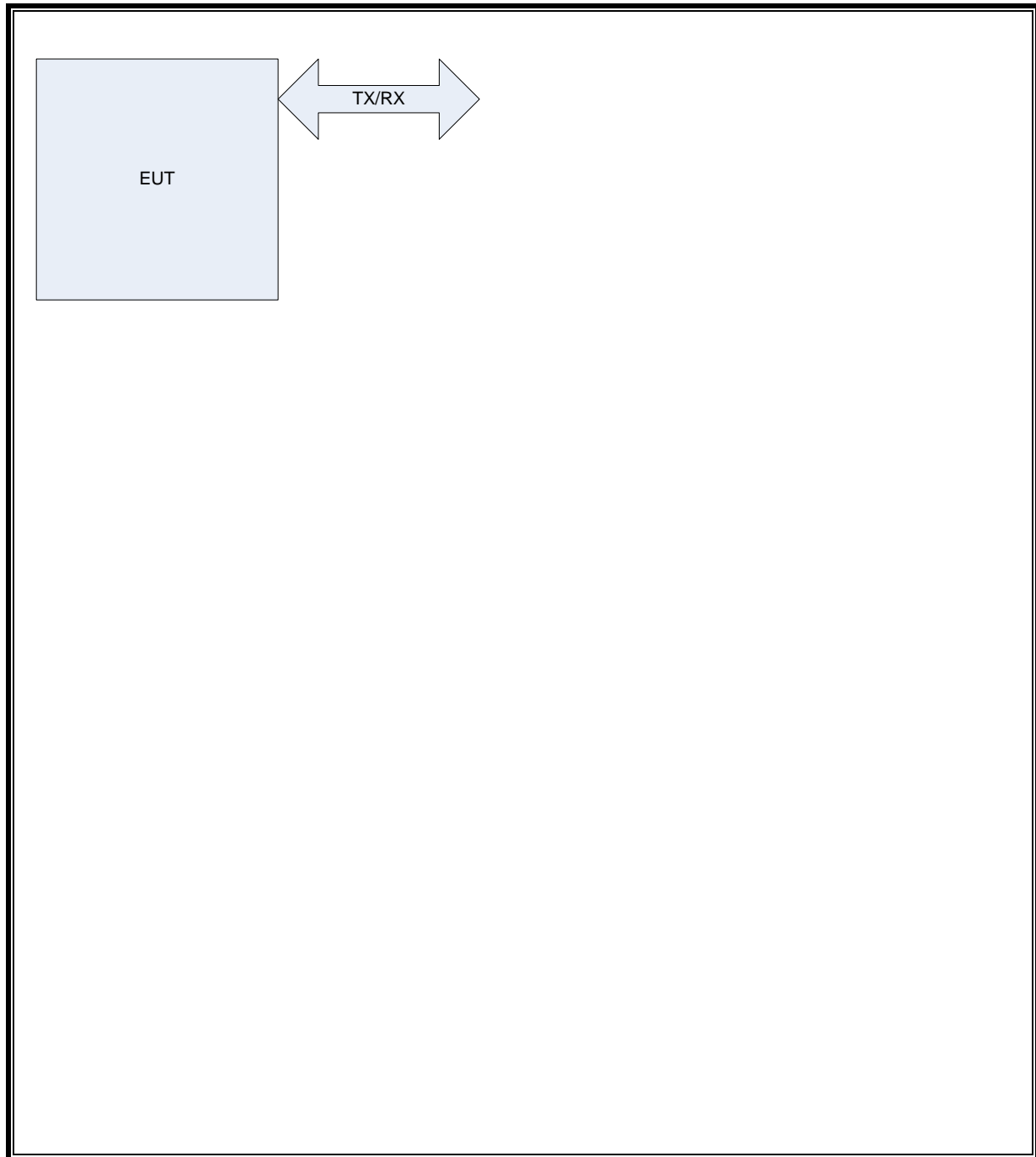
I/O CABLES

None

TEST SETUP

The EUT is programmed for continuous TX mode.

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	Asset	Cal Date	Cal Due
EMI Test Receiver	Rohde & Schwarz	ESU	EMC4323	20121227	20131231
Bicon Antenna	Chase	VBA6106A	EMC4078	20130213	20140228
Log-P Antenna	Chase	UPA6109	EMC4258	20121015	20131030
Spectrum Analyzer	Rhode & Schwarz	FSEK	EMC4182	20121226	20131231
Antenna Array	UL	BOMS	EMC4276	20111227	20131231
Spectrum Analyzer	Agilent	N9030A	EMC4360	20121226	20131226
Near Field Antenna	EMCO	-	-	-	-

7. TEST RESULTS

7.1.1. 99%, 20dB BANDWIDTH

LIMITS

None; for reporting purposes only.

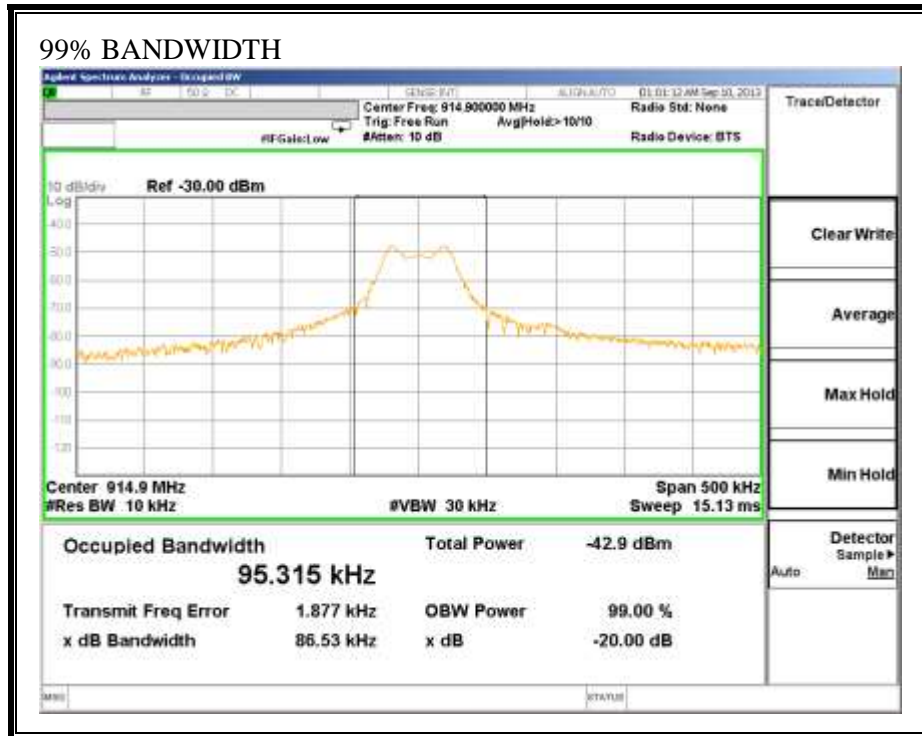
TEST PROCEDURE

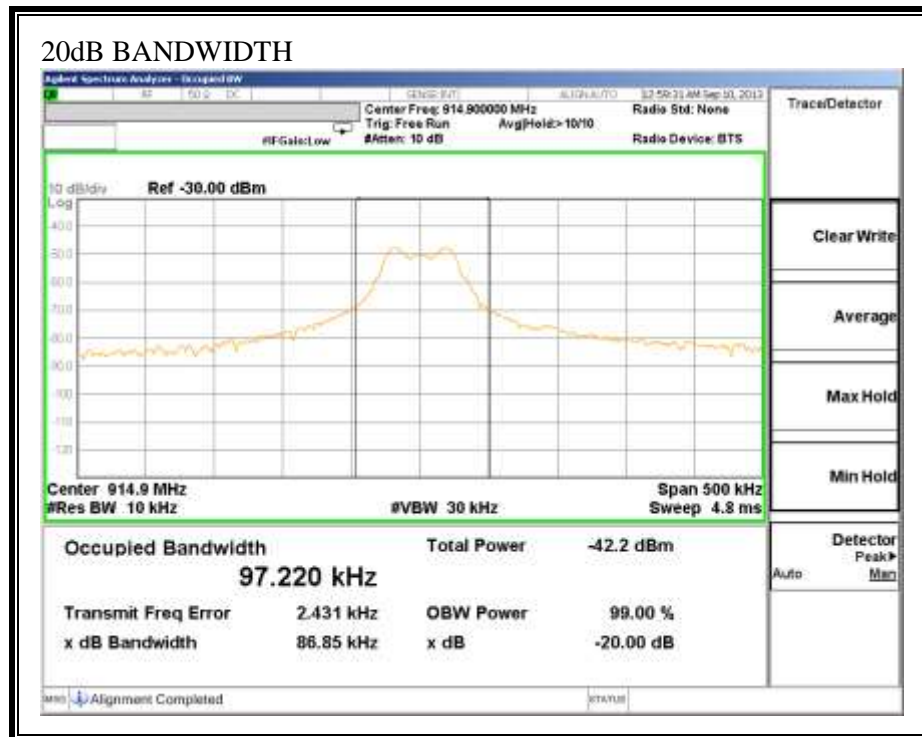
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency (kHz)
99%	95.31
20dB	86.85

99% BANDWIDTH





7.2. RADIATED EMISSIONS

TEST PROCEDURE

ANSI C63.4

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:

Limit is 3m

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.

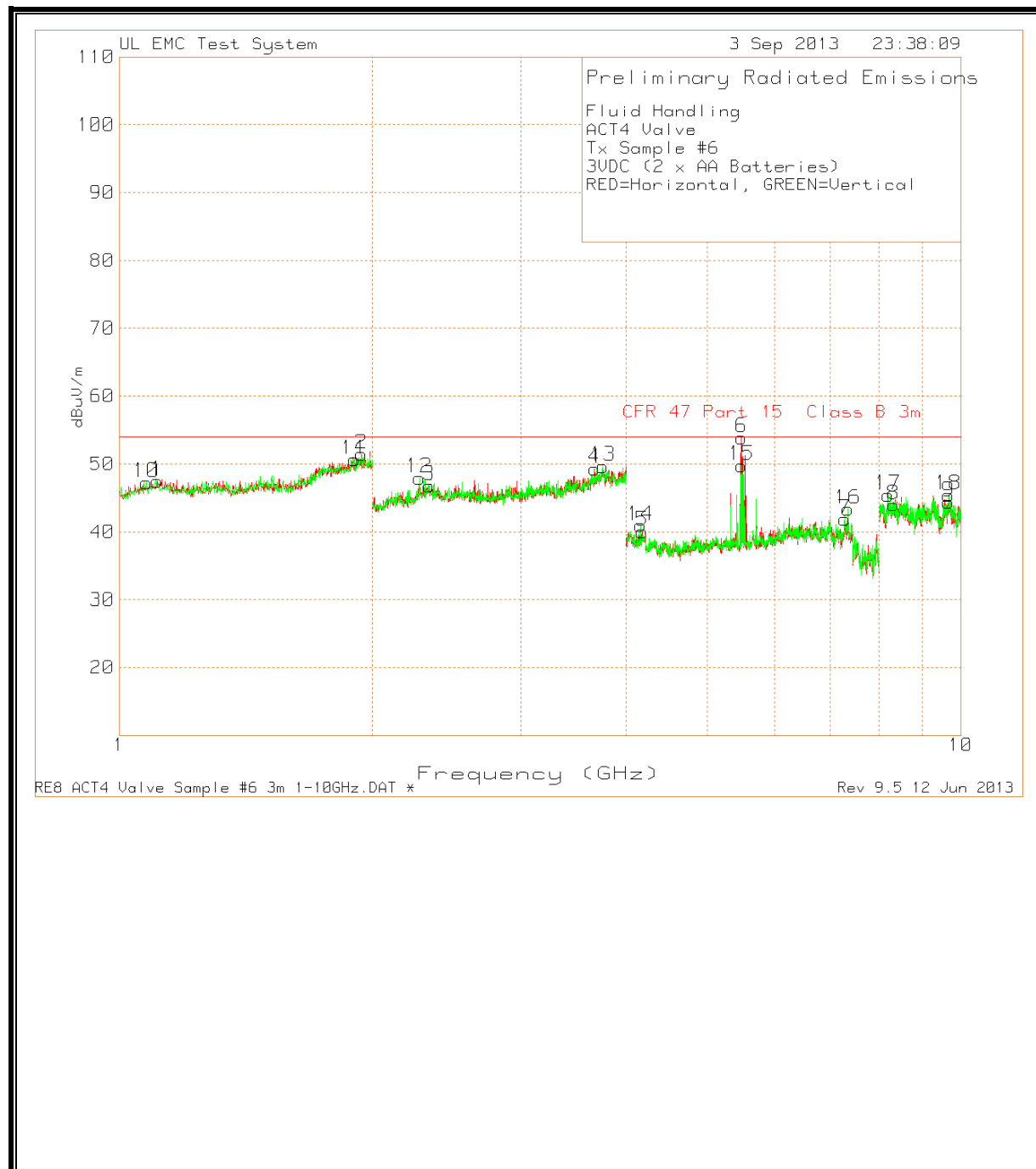
Frequency (MHz)	Field strength (microvolts/meter)	Measure- ment dis- tance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

** 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

Fluid Handling											
ACT4 Valve											
Tx Sample #6											
3VDC (2 x AA Batteries)											
Test	Meter Reading		UPA6109 SN1060 EMC4258 3M	3 meter with LogP Emission s Ca (dB)	Corrected Reading dB(uVolts/ meter)	CFR 47 Part 15 Class B 3m (dBuV/m)	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity	Notes
Frequency	(dBuV)	Detector	(dB/m)								
914.88141	47.33	QP	23.1	10	80.43	94	-13.57	298	176	Vert	3
914.88141	56.15	QP	23.1	10	89.25	94	-4.75	354	168	Horz	3
914.88141	58.18	QP	23.6	10	91.78	94	-2.22	91	157	Horz	2
914.88141	47.09	QP	23.6	10	80.69	94	-13.31	177	175	Vert	2
914.918269	57.39	QP	23.6	10	90.99	94	-3.01	184	117	Vert	1
914.918269	44.61	QP	23.6	10	78.21	94	-15.79	249	284	Horz	1
Notes:											
1 - Y-Axis											
2 - X-Axis											
3 - Z-Axis											
QP - Quasi-Peak detector											

7.2.1. HARMONICS AND SPURIOUS EMISSIONS ABOVE 1GHZ

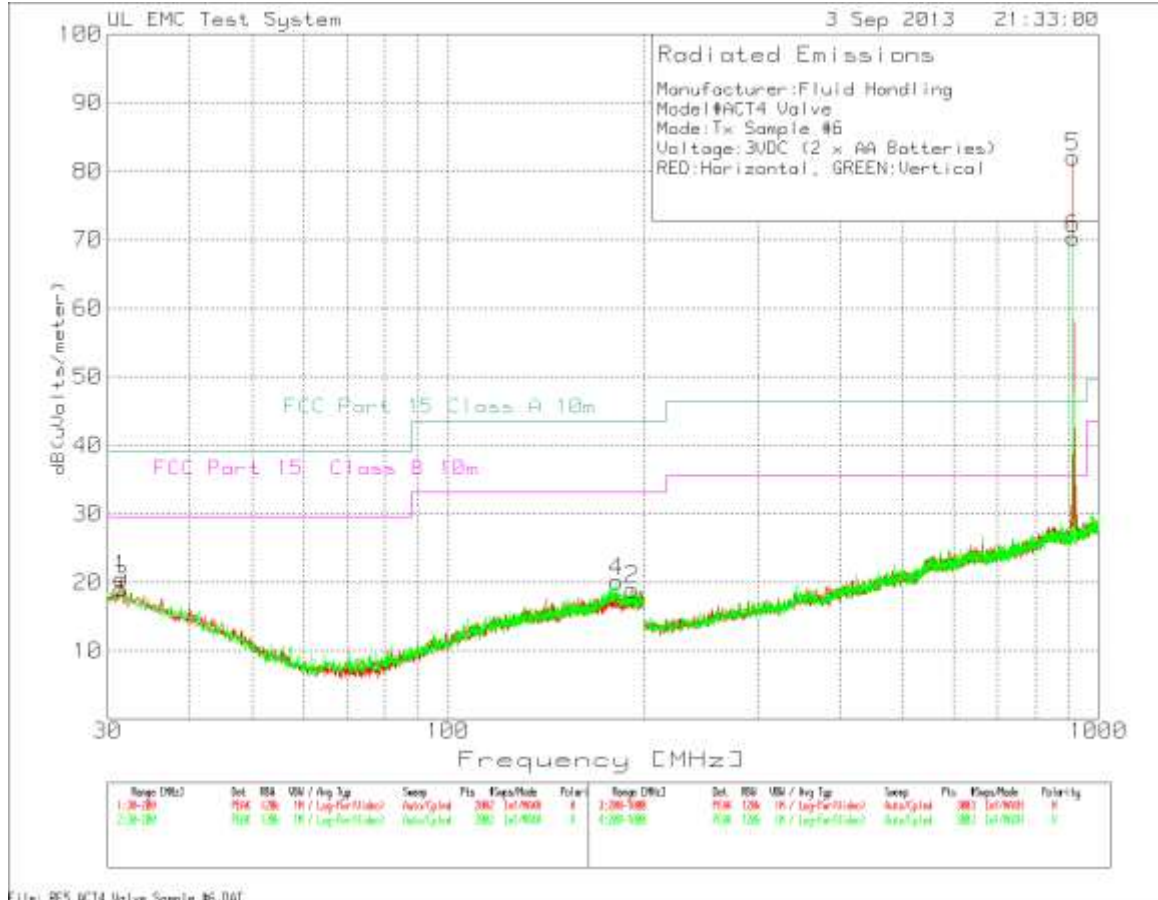


Fluid Handling										
ACT4 Valve										
Tx Sample #6										
3VDC (2 x AA Batteries)										
RED=Horizontal, GREEN=Vertical										
Radiated Emission Data										
Test	Meter		EMCO			CFR 47				
Frequency	Reading		3161-03	BOMS	Corrected	Part 15				
(GHz)	(dBuV)	Detector	S/N	Factor	Reading	Class B	Margin	Azimuth	Height	Polarity
			99051041	(dB)	dBuV/m	3m	(dB)	[Degs]	[cm]	
5.4896	76.92	PK	28.1	-50.32	54.7	73.97	-19.27	342	100	H
5.4893	72.03	LnAv	28.1	-50.32	49.81	53.97	-4.16	342	100	H
5.4893	76.11	PK	28.1	-50.33	53.88	73.97	-20.09	36	119	V
5.4893	71.24	LnAv	28.1	-50.32	49.02	53.97	-4.95	36	119	V
PK - Peak detector										
LnAv - Linear Average detector										

7.2.2. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (HORIZONTAL)

PLOT



Limits were extrapolated from 3m to 10m

Manufacturer:Fluid Handling
Model#ACT4 Valve
Mode:Tx Sample #6
Voltage:3VDC (2 x AA Batteries)
RED:Horizontal, GREEN:Vertical

Trace Markers											
Test	Meter	Transducer	Gain/Loss	Corrected	Limit:1	2	3	4			
No.	Frequency	Reading	Factor	Factor	Reading	dB (uVolts/meter)					
	[MHz]		[dB]	[dB]							
=====											
Bicon Horizontal 30 - 200MHz -----											
1	31.4443	33.4dBuV PK	17.2	-30.1	20.5	-	-	39.08	29.55	-	
		Height:400 Horz		Margin [dB]		-	-	-18.58	-9.05	-	
2	192.099	31.87dBuV PK	15.9	-28.9	18.87	-	-	43.52	33.07	-	
		Height:250 Horz		Margin [dB]		-	-	-24.65	-14.2	-	
Bicon Vertical 30 - 200MHz -----											
3	31.4443	31.92dBuV PK	17.2	-30.1	19.02	-	-	39.08	29.55	-	
		Height:99 Vert		Margin [dB]		-	-	-20.06	-10.53	-	
4	181.904	33.45dBuV PK	15.9	-29.2	20.15	-	-	43.52	33.07	-	
		Height:99 Vert		Margin [dB]		-	-	-23.37	-12.92	-	
LIMIT 1: NONE											
LIMIT 2: NONE											
LIMIT 3: FCC Part 15 Class A 10m											
LIMIT 4: FCC Part 15 Class B 10m											

PK - Peak detector