



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

CERTIFICATION TEST REPORT

FOR

Wireless Push Button

MODEL NUMBER: 6099B1500, 6099E1550

FCC ID: 2AAFT6099B1500

IC: 11144A-6099B1500

REPORT NUMBER: 10005005B

ISSUE DATE: September 23, 2013

Prepared for

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Morton Grove, IL 60053**

Prepared by

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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 Push Button

MODEL: 6099B1500, 6099E1550

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.

Approved & Released For UL CCS By:



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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:

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

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 that is AC 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	91.82

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a microstrip antenna, with a maximum gain of 1.51 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 – Push Button
Operates at 120VAC 60Hz

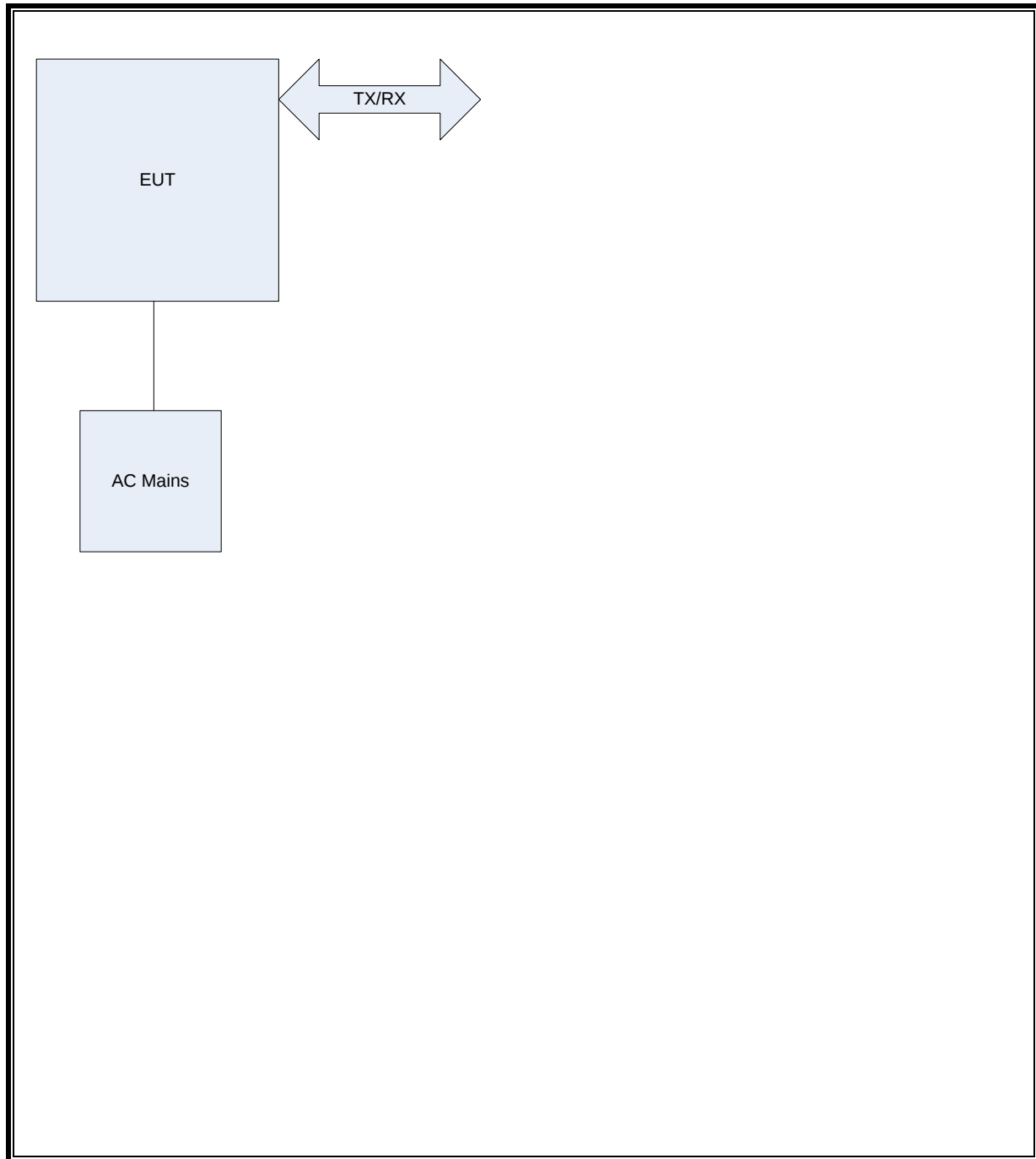
I/O CABLES

None, AC mains direct to EUT

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	-	-	-	-
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC4328	20121230	20131230
LISN	Solar	8602-50-TS-50-N	EMC4052	20130115	20140116
LISN	Solar	8602-50-TS-50-N	EMC4064	20130115	20140116

7. TEST RESULTS

7.1.1. 99%, 20dB BANDWIDTH

LIMITS

None; for reporting purposes only.

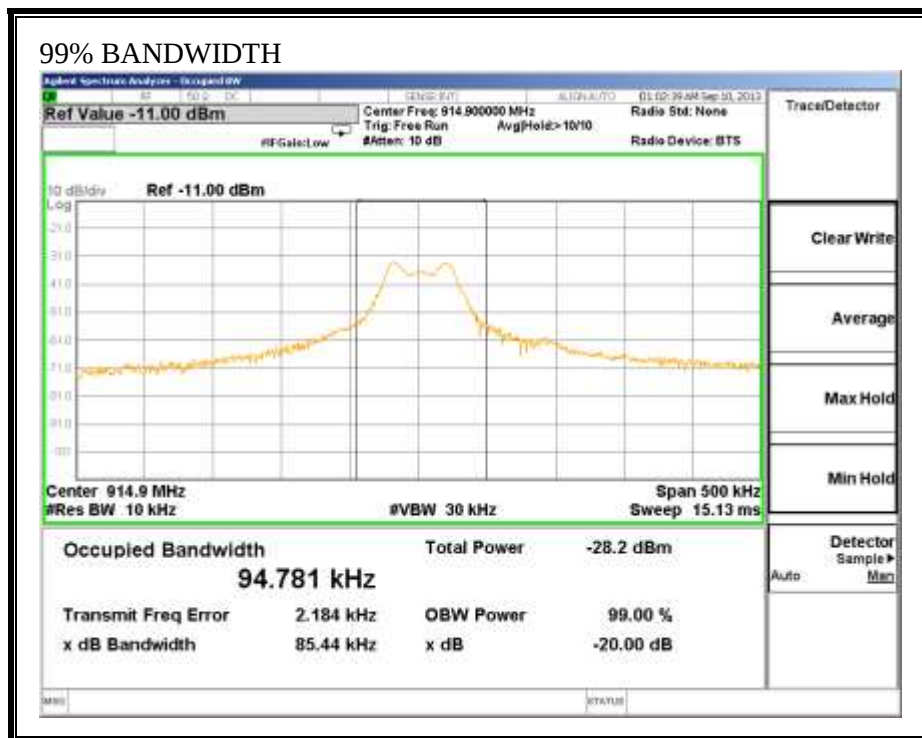
TEST PROCEDURE

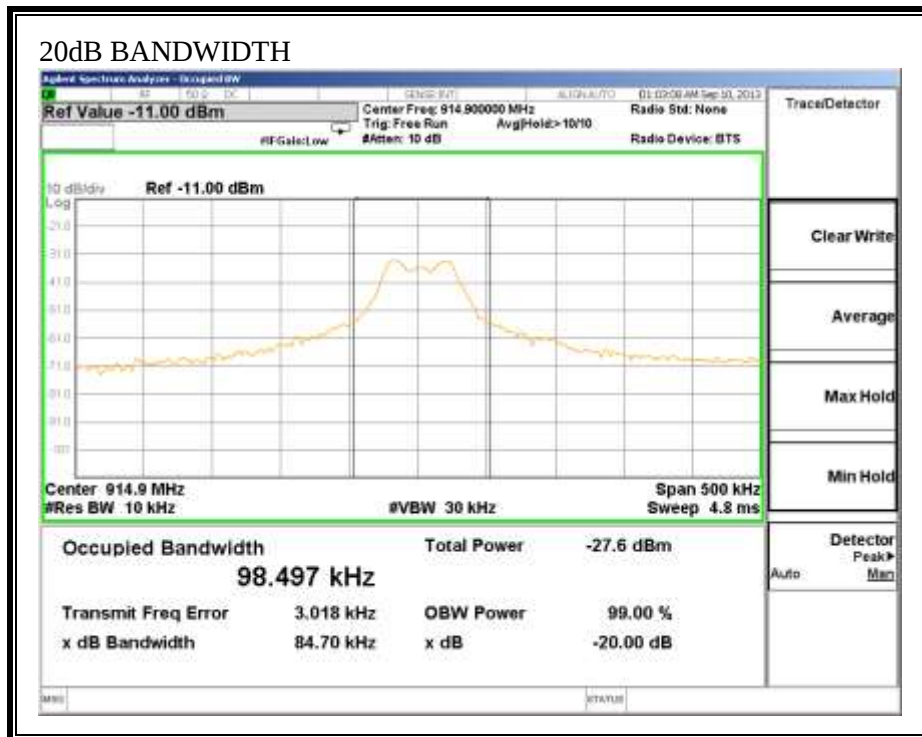
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Channel	Frequency (kHz)
99%	94.78
20dB	84.7

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.

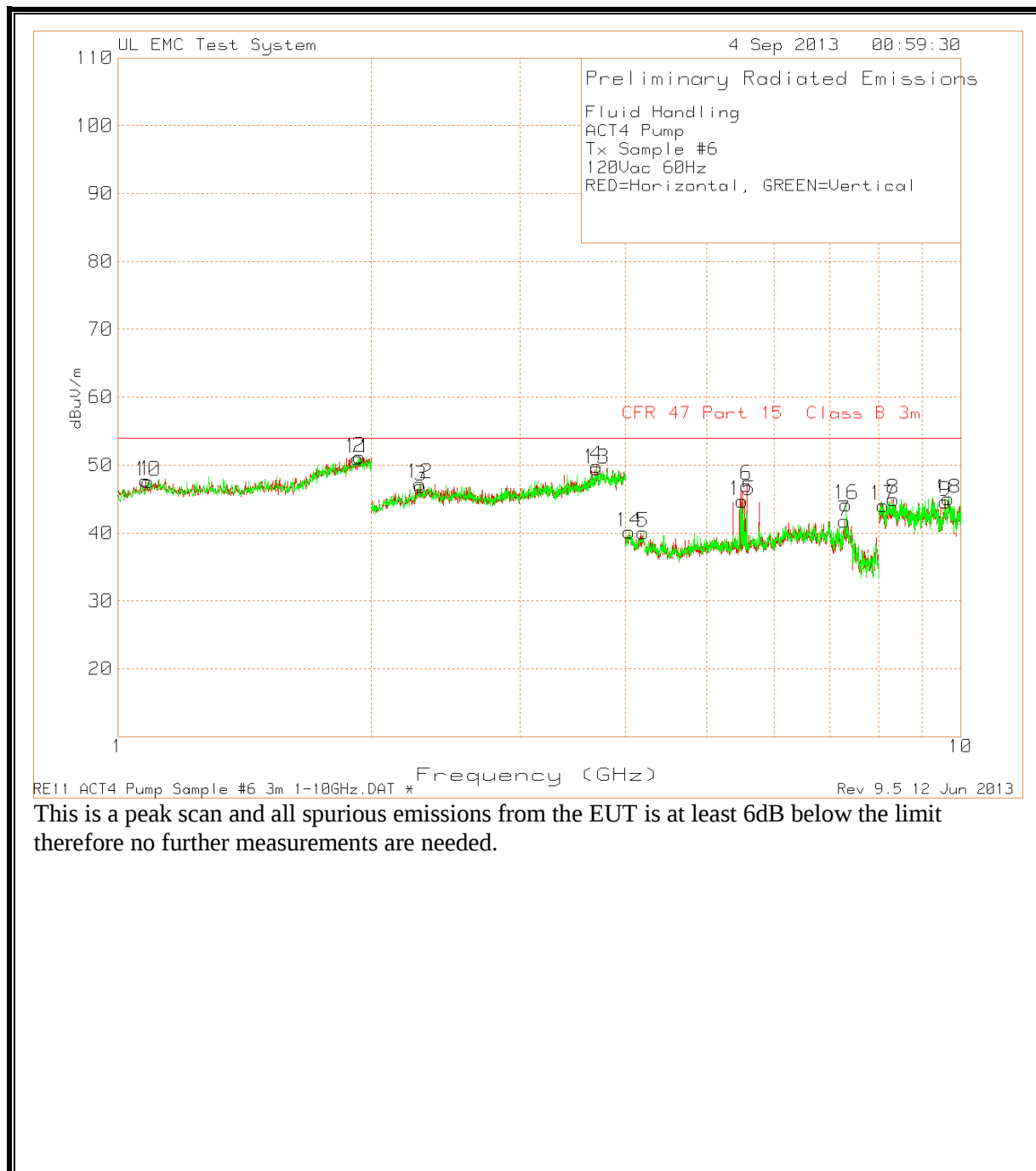
Frequency (MHz)	Field strength (microvolts/meter)	Measure- ment dis- tance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100 **	3
88–216	150 **	3
216–960	200 **	3
Above 960	500	3

** 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 Repeater											
Tx Sample #6											
120Vac60Hz											
Test	Meter		UPA6109	3 meter	Corrected	CFR 47					
Frequency	Reading		SN1060	with LogP	Reading	Part 15					
	(dBuV)	Detector	EMC4258	Emissions	dB(uVolts/	Class B 3m	Margin	Azimuth	Height	Polarity	Notes
			3M	Ca (dB)	meter)	(dBuV/m)	(dB)	[Deps]	[cm]		
914.88141	57.28	QP	23.1	10	90.38	94	-3.62	0	165	Horz	1
914.88141	53.44	QP	23.1	10	86.54	94	-7.46	52	120	Vert	1
914.88141	56.75	QP	23.1	10	89.85	94	-4.15	305	128	Vert	2
914.88141	55.01	QP	23.1	10	88.11	94	-5.89	2	171	Horz	2
914.88141	58.72	QP	23.1	10	91.82	94	-2.18	235	174	Horz	3
914.88141	53.18	QP	23.1	10	86.28	94	-7.72	319	115	Vert	3
Notes:											
1 - Y-Axis (Plug sideways, Longside Up)											
2 - X-Axis (Plug/Longside sideways)											
3 - Z-Axis (Plug Face Down)											
QP - Quasi-Peak detector											

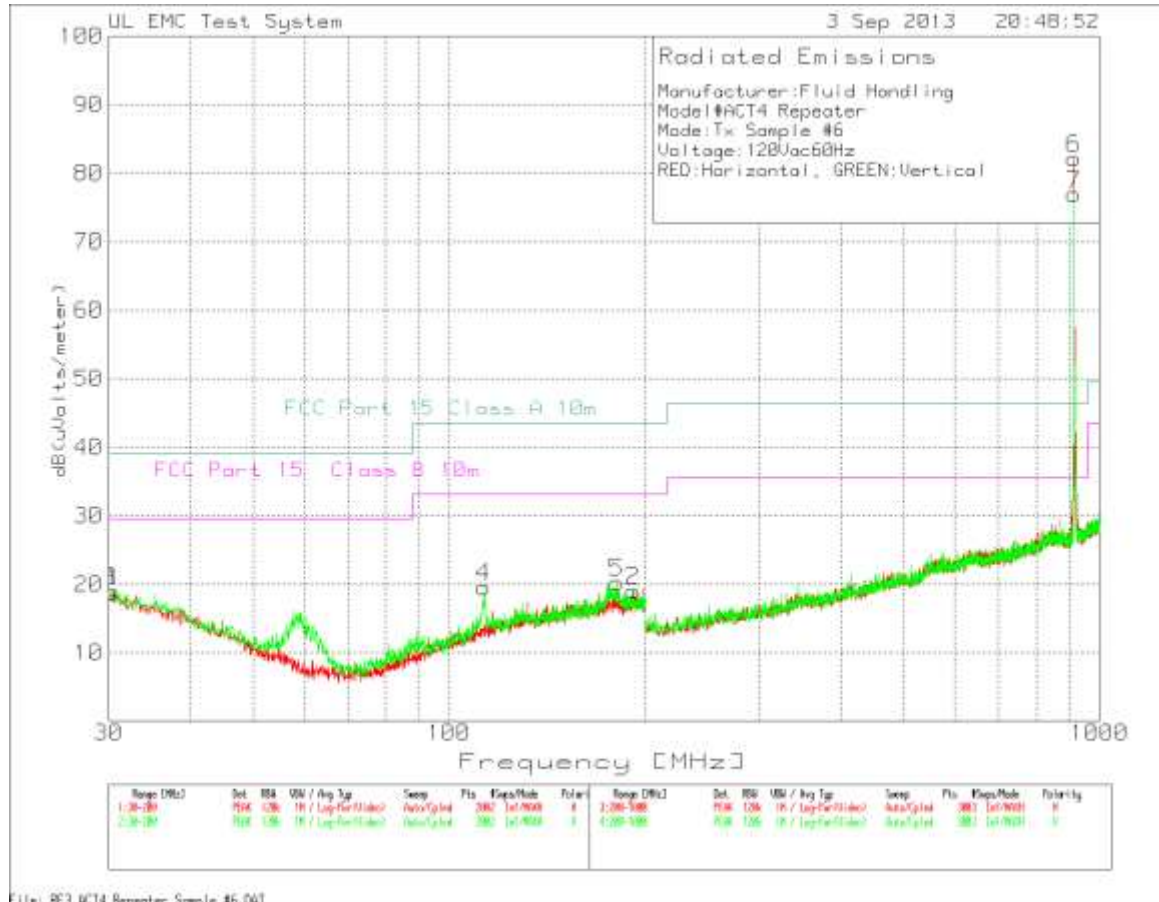
7.2.1. HARMONICS AND SPURIOUS EMISSIONS ABOVE 1GHZ



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 Repeater
Mode: Tx Sample #6
Voltage: 120Vac 60Hz
RED: Horizontal, GREEN: Vertical

Trace Markers										
No.	Test	Meter	Transducer	Gain/Loss	Corrected	Limit:1	2	3	4	
	Frequency	Reading	Factor	Factor	Reading	dB (uVolts/meter)				
	[MHz]		[dB]	[dB]						
=====										
Bicon Horizontal 30 - 200MHz -----										
1	30.5097	31.45dBuV PK	17.6	-30.1	18.95	-	-	39.08	29.55	-
		Height:400 Horz		Margin [dB]		-	-	-20.13	-10.6	-
2	192.099	32.07dBuV PK	15.9	-28.9	19.07	-	-	43.52	33.07	-
		Height:249 Horz		Margin [dB]		-	-	-24.45	-14	-
Bicon Vertical 30 - 200MHz -----										
3	30.1699	31.36dBuV PK	17.7	-30.1	18.96	-	-	39.08	29.55	-
		Height:400 Vert		Margin [dB]		-	-	-20.12	-10.59	-
4	113.1734	36.81dBuV PK	12.6	-29.8	19.61	-	-	43.52	33.07	-
		Height:99 Vert		Margin [dB]		-	-	-23.91	-13.46	-
5	181.0545	33.63dBuV PK	15.8	-29.2	20.23	-	-	43.52	33.07	-
		Height:249 Vert		Margin [dB]		-	-	-23.29	-12.84	-
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										

8. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

§15.207 (a)
IC RSS-GEN, Section 7.2.2

Frequency of emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50
* Decreases with the logarithm of the frequency.		

TEST PROCEDURE

ANSI C63.4

RESULTS

No non-compliance noted:

6 WORST EMISSIONS

Manufacturer:Fluid Handling
Model#Repeater
Mode:TX
Voltage:120V 60Hz
Red:Line Green:Neutral

Trace Markers										
No.	Test Frequency [MHz]	Meter Reading	Transducer Factor [dB]	Gain/Loss Factor [dB]	Corrected Reading (dB(uVolts))	Limit:1	2	3	4	
=====										
Line - L1 1 - 30MHz -----										
1	1.60122	29.45dBuV PK	.1	10.6	40.15	-	-	56	46	-
				Margin [dB]		-	-	-15.85	-5.85	-
2	3.2057	29.2dBuV PK	.1	10.6	39.9	-	-	56	46	-
				Margin [dB]		-	-	-16.1	-6.1	-
3	4.80654	29.55dBuV PK	.1	10.7	40.35	-	-	56	46	-
				Margin [dB]		-	-	-15.65	-5.65	-
Line - L2 .15 - 1MHz -----										
4	.61736	40.14dBuV PK	.1	10.6	50.84	-	-	56	46	-
				Margin [dB]		-	-	-5.16	4.84	-
5	.61736	29.44dBuV PK	.1	10.6	40.14	-	-	56	46	-
				Margin [dB]		-	-	-15.86	-5.86	-
Line - L2 1 - 30MHz -----										
6	1.60122	32.25dBuV PK	.1	10.6	42.95	-	-	56	46	-
				Margin [dB]		-	-	-13.05	-3.05	-
7	3.2057	31.61dBuV PK	.1	10.6	42.31	-	-	56	46	-
				Margin [dB]		-	-	-13.69	-3.69	-
8	4.80654	34.09dBuV PK	.1	10.7	44.89	-	-	56	46	-
				Margin [dB]		-	-	-11.11	-1.11	-
9	6.40739	31.4dBuV PK	.1	10.9	42.4	-	-	60	50	-
				Margin [dB]		-	-	-17.6	-7.6	-

LIMIT 1: NONE
LIMIT 2: NONE
LIMIT 3: CISPR 22/11 Group 1 Class B QP
LIMIT 4: CISPR 22/11 Group 1 Class B AV

PK - Peak detector

Manufacturer: Fluid Handling
Model# Repeater
Mode: TX
Voltage: 120V 60Hz
Red: Line Green: Neutral

Quais-peak Data										
Test	Meter	Transducer	Gain/Loss	Corrected	Limit:1	2	3	4	5	
Frequency	Reading	Factor	Factor	Reading (dB(uVolts))						
[MHz]		[dB]	[dB]							
=====										
=====										
Line - L1 1 - 30MHz										
1.6021	28.95dBuV QP .1		10.6	39.65	-	-	56	46	-	-
			Margin (dB):		-	-	-16.35	-6.35	-	-
3.2042	26.8dBuV QP .1		10.6	37.5	-	-	56	46	-	-
			Margin (dB):		-	-	-18.5	-8.5	-	-
4.80643	27.48dBuV QP .1		10.7	38.28	-	-	56	46	-	-
			Margin (dB):		-	-	-17.72	-7.72	-	-
Line - L2 .15 - 1MHz										
.61806	26.96dBuV QP .1		10.6	37.66	-	-	56	46	-	-
			Margin (dB):		-	-	-18.34	-8.34	-	-
Line - L2 1 - 30MHz										
1.60227	31.09dBuV QP .1		10.6	41.79	-	-	56	46	-	-
			Margin (dB):		-	-	-14.21	-4.21	-	-
3.20475	29.52dBuV QP .1		10.6	40.22	-	-	56	46	-	-
			Margin (dB):		-	-	-15.78	-5.78	-	-
4.80733	31.17dBuV QP .1		10.7	41.97	-	-	56	46	-	-
			Margin (dB):		-	-	-14.03	-4.03	-	-
6.41089	29.79dBuV QP .1		10.9	40.79	-	-	60	50	-	-
			Margin (dB):		-	-	-19.21	-9.21	-	-

NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).

QP - Quasi-Peak detector

LIMIT 1: NONE
LIMIT 2: NONE
LIMIT 3: CISPR 22/11 Group 1 Class B QP
LIMIT 4: CISPR 22/11 Group 1 Class B AV

Manufacturer: Fluid Handling
Model# Repeater
Mode: TX
Voltage: 120V 60Hz
Red: Line Green: Neutral

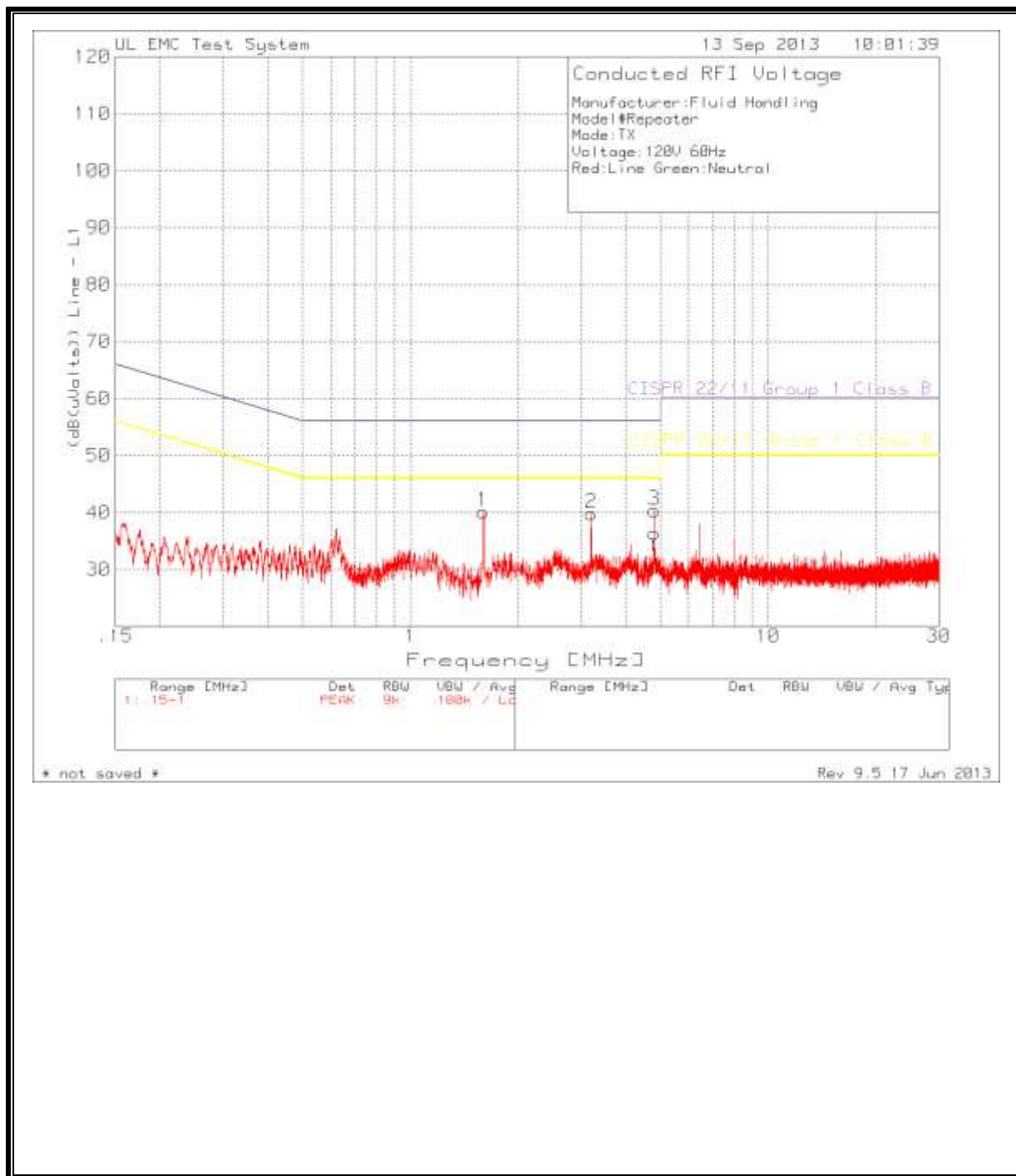
Average Data										
Test	Meter	Transducer	Gain/Loss	Corrected	Limit:1	2	3	4	5	
Frequency	Reading	Factor	Factor	Reading (dB(uVolts))						
[MHz]		[dB]	[dB]							
=====										
=====										
Line - L1 1 - 30MHz										
1.6021	28.11dBuV Av .1		10.6	38.81	-	-	56	46	-	-
			Margin (dB):		-	-	-17.19	-7.19	-	-
3.2042	25.36dBuV Av .1		10.6	36.06	-	-	56	46	-	-
			Margin (dB):		-	-	-19.94	-9.94	-	-
4.80643	26.03dBuV Av .1		10.7	36.83	-	-	56	46	-	-
			Margin (dB):		-	-	-19.17	-9.17	-	-
Line - L2 .15 - 1MHz										
.61806	25.71dBuV Av .1		10.6	36.41	-	-	56	46	-	-
			Margin (dB):		-	-	-19.59	-9.59	-	-
Line - L2 1 - 30MHz										
1.60227	30.1dBuV Av .1		10.6	40.8	-	-	56	46	-	-
			Margin (dB):		-	-	-15.2	-5.2	-	-
3.20475	28.01dBuV Av .1		10.6	38.71	-	-	56	46	-	-
			Margin (dB):		-	-	-17.29	-7.29	-	-
4.80733	29.76dBuV Av .1		10.7	40.56	-	-	56	46	-	-
			Margin (dB):		-	-	-15.44	-5.44	-	-
6.41089	28.48dBuV Av .1		10.9	39.48	-	-	60	50	-	-
			Margin (dB):		-	-	-20.52	-10.52	-	-

NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).

Av - average detection

LIMIT 1: NONE
LIMIT 2: NONE
LIMIT 3: CISPR 22/11 Group 1 Class B QP
LIMIT 4: CISPR 22/11 Group 1 Class B AV

LINE 1 RESULTS



LINE 2 RESULTS

