FCC Part 15.249
Certification Application Report

Test Lab:	Applicant:
Rhein Tech Laboratories, Inc. Tel: 703-689-0368 360 Herndon Parkway Fax: 703-689-2056 Suite 1400 http://www.rheintech.com Herndon, VA 20170 EMail: atcbinfo@rheintech.com	Industrial Commercial Scales, LLC Tel: 843-278-0342 2320 Air Park Road Fax: 843-278-0404 North Charleston, SC 29406 Contact: Jerry D. Meyer

FCC ID:	XL5-ICS427-01A	**Test Report Date:**	July 17, 2009
Platform:	N/A	**RTL Work Order #:**	2009200
Model:	ICS427 Wireless Loadcell Transceiver	**RTL Quote #:**	QRTL09-237A
American National Standard Institute:	ANSI C63.4-2003: Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz		
FCC Classification:	DXX – Part 15 Low Power Communication Device Transmitter		
FCC Rule Part(s)/Guidance:	Part 15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz, and 24.0-24.25 GHz (10-01-08)		
Digital Interface Information:	N/A		

Frequency Range (MHz)	Output Power (W)	Frequency Tolerance	Emission Designator
903.848	N/A	N/A	N/A

I, the undersigned, hereby declare that the equipment tested and referenced in this report conforms to the identified standard(s) as described in this test report. No modifications were made to the equipment during testing in order to achieve compliance with these standards. Furthermore, there was no deviation from, additions to, or exclusions from, the applicable parts of FCC Part 2, FCC Part 15, and ANSI C63.4.

Signature: _____ Date: July 17, 2009

Typed/Printed Name: Desmond A. Fraser Position: President

Table of Contents

1 General Information 4
1.1 Scope 4
1.2 Modifications 4
1.3 Test Facility 4
1.4 Related Submittal(s)/Grant(s) 4
2 Test Information 5
2.1 Test Justification 5
2.2 Exercising the EUT 5
2.3 Test Result Summary 5
2.4 Test System Details 5
2.5 Configuration of Tested System 6
3 Duty Cycle 7
4 Radiated Emissions – FCC 15.249 9
4.1 Radiated Emissions Test Procedure 9
4.2 Radiated Emission Test Data 9
5 In-Band Emission Requirement – FCC 15.215(c) 11
5.1 Test Procedure 11
5.2 FCC 15.215(c) Requirement 11
5.3 Test Data 11
6 Conducted AC Emissions – FCC 15.207 13
6.1 Site and Test Description 13
6.2 Test Limits 13
6.3 Conducted Emissions Test Data 14
7 Conclusion 15

Figure Index

Figure 2-1: Worst Case Configuration of System under Test 6
Figure 3-1: Duty Cycle - Pulse Width 7
Figure 3-2: Duty Cycle - Pulse Separation 8

Table Index

Table 2-1: Test Result Summary with FCC Rules and Regulations 5
Table 2-2: Equipment under Test (EUT) 5
Table 4-1: Radiated Emissions Fundamental Emissions 9
Table 4-2: Spurious/Harmonics 9
Table 4-3: Radiated Emissions/Fundamental Emissions Test Equipment 10
Table 5-2: 20 dB Bandwidth Test Equipment 12
Table 6-1: Conducted Emissions Test Data - Neutral Side – Line 1 14
Table 6-2: Conducted Emissions Test Data – Hot Side – Line 2 14
Table 6-3: Conducted Emissions Test Equipment 14

Appendix Index

Appendix A: FCC Part 1.1307, 1.1310, 2.1091, 2.1093: RF Exposure 16
Appendix B: Agency Authorization Letter 17
Appendix C: FCC Confidentiality Request Letter 18
Appendix D: Label and Label Location 19
Appendix E: Technical Operational Description 20
Appendix F: Schematics 21
Appendix G: Block Diagram 22
Appendix H: User Manual 23
Appendix I: Test Photographs 24
Appendix J: External Photographs 28
Appendix K: Internal Photographs 32

Photograph Index

Photograph 1: ID Label Sample 19
Photograph 2: ID Label Location 19
Photograph 3: Radiated Testing – Front View 24
Photograph 4: Radiated Testing – Back View 25
Photograph 5: Conducted AC Testing – Front View 26
Photograph 6: Conducted AC Testing – Back View 27
Photograph 7: Front View 28
Photograph 8: Right Side View 29
Photograph 9: Left Side View 30
Photograph 10: Antenna 31
Photograph 11: Top of PCB 32
Photograph 12: Bottom of PCB 33
Photograph 13: Battery 34

1 General Information

1.1 Scope

FCC Rules Part 15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz, and 24.0-24.25 GHz.

1.2 Modifications

N/A

1.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located at Rhein Tech Laboratories (RTL), 360 Herndon Parkway, Suite 1400, Herndon, Virginia 20170. This site has been fully described in a report and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing (ANSI C63.4 2003).

1.4 Related Submittal(s)/Grant(s)

This is an original certification application for Industrial Commercial Scales, LLC, Model ICS427 Wireless Loadcell Transceiver, FCC ID: XL5-ICS427-01A.

2 Test Information

2.1 Test Justification

The EUT was tested in all three orthogonal planes in order to determine worst-case emissions. The single channel of operation was tested and investigated from 9 kHz to 10 GHz. The test results relate only to the item that was tested.

2.2 Exercising the EUT

The EUT transmitted for extended bursts to facilitate testing. There were no deviations from the test standard(s) and/or methods.

2.3 Test Result Summary

Table 2-1: Test Result Summary with FCC Rules and Regulations

Standard	Test	Pass/Fail or N/A
FCC 15.249(a)	Radiated Emissions	Pass
FCC 15.207	AC Line Conducted Emissions	Pass

2.4 Test System Details

The test sample was received on May 21, 2009. The FCC Identifiers for all equipment, plus descriptions of all cables used in the tested system, are shown in the table below.

Table 2-2: Equipment under Test (EUT)

Part	Manufacturer	Model	S/N	FCC ID	Cable Description	RTL Bar Code
Loadcell Transceiver	Industrial Commercial Scales, LLC	ICS427 Wireless Loadcell Transceiver	100109	XL5-ICS427-01A	N/A	19126
AC Adapter	Bothhand Enterprise Inc.	M1-10S05	R0002370 5932	N/A	1.8m unshielded power	19099
Variable Power Resistor	GSE Scale Systems	249170	N/A	N/A	0.75m unshielded I/O	19100

2.5 Configuration of Tested System

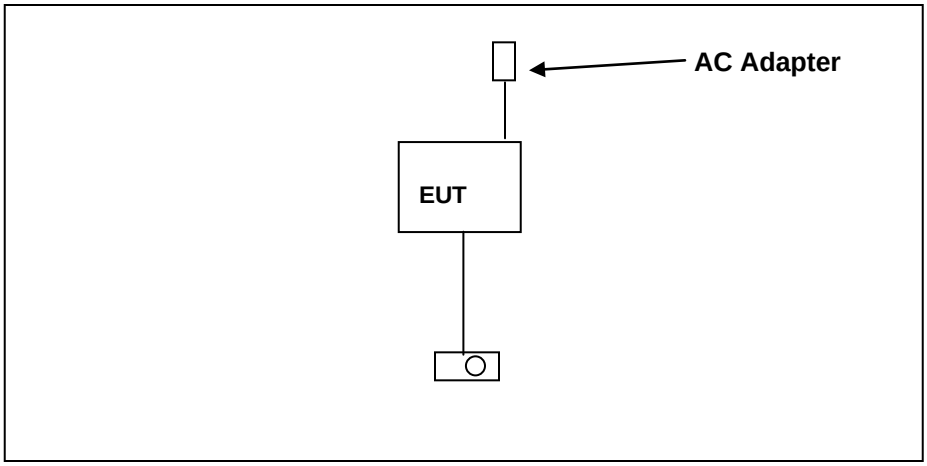


Figure 2-1: Worst Case Configuration of System under Test

3 Duty Cycle

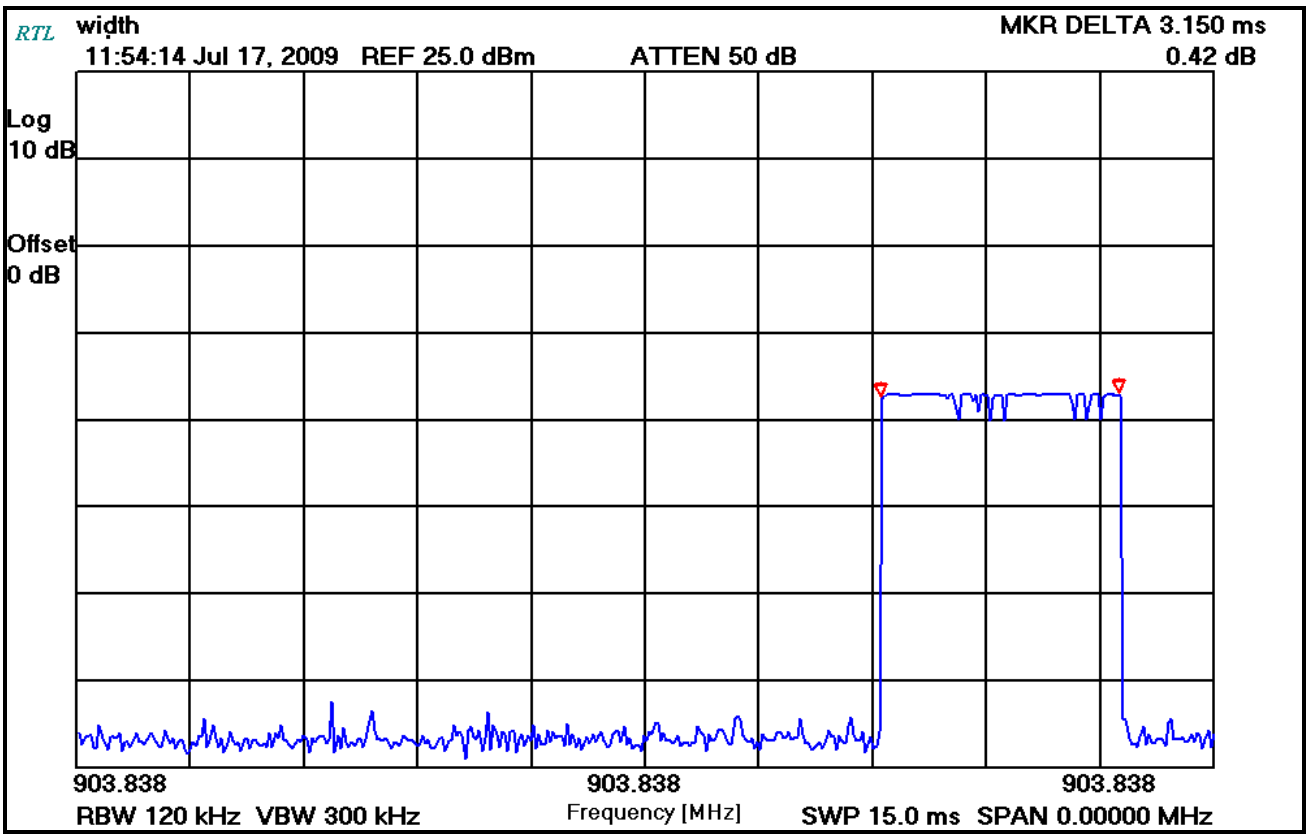


Figure 3-1: Duty Cycle - Pulse Width

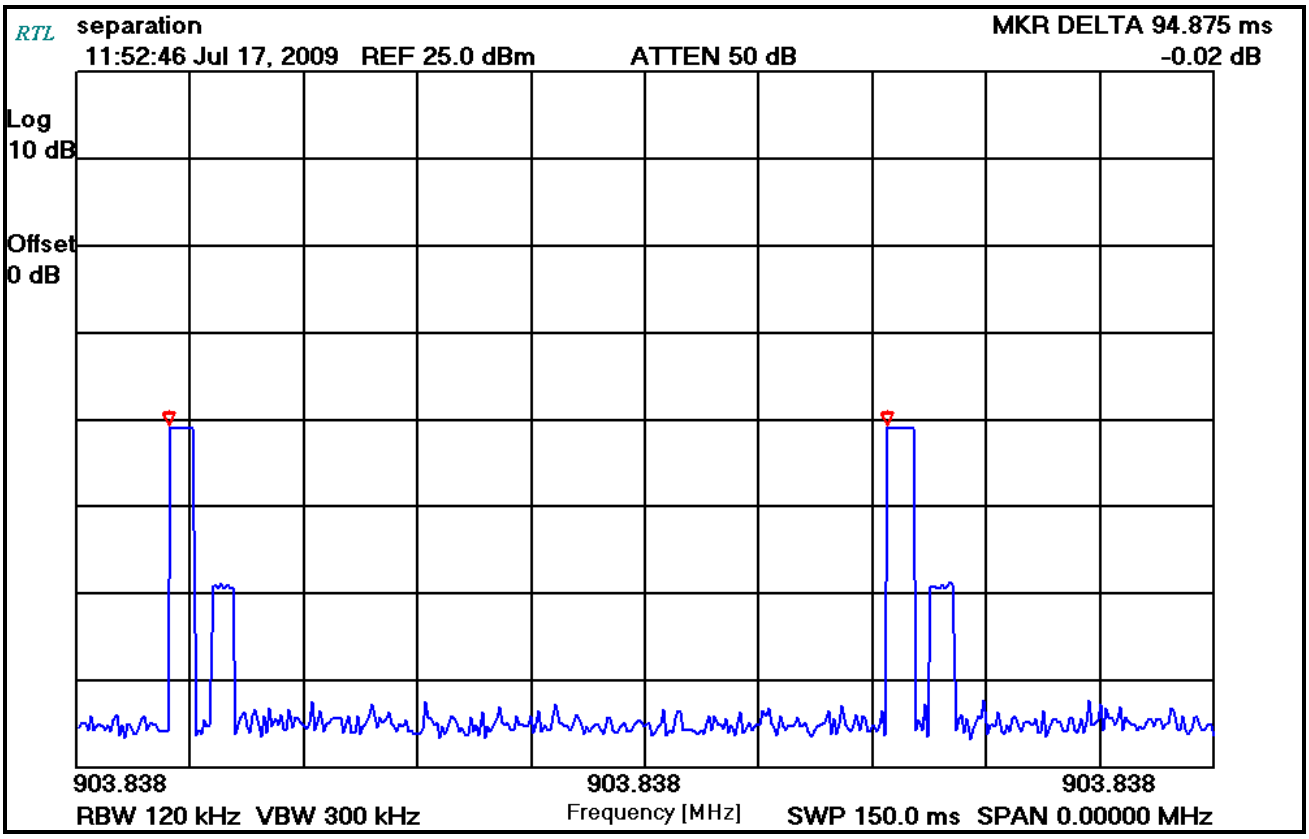


Figure 3-2: Duty Cycle - Pulse Separation

Duty Cycle Calculation (dB)	
20*log(3.15/94.875)	-29.6

4 Radiated Emissions – FCC 15.249

4.1 Radiated Emissions Test Procedure

Radiated Emissions of the fundamentals were tested at three meters, and meet the quasi-peak limit of 50 mV/m. The EUT was tested in all three orthogonal planes; the worst case emissions are shown. Peak measurements were taken and are corrected with the duty cycle and compared to the limit.

4.2 Radiated Emission Test Data

Table 4-1: Radiated Emissions Fundamental Emissions

Frequency (MHz)	Peak Analyzer Level (dBuV)	Average (dBuV) Peak minus Duty Cycle 29.6 dB	Site Correction Factor (dBm)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Result
903.848	108.4	78.8	-9.8	69.0	94.0	-25.0	Pass

Radiated emissions of the harmonics were tested at three meters, and meet the requirements of 500 microvolts/ meter in average mode, and 20 dB higher in peak mode, per 15.249(e). The EUT was tested in all three orthogonal planes.

Table 4-2: Spurious/Harmonics

Frequency (MHz)	Peak Analyzer Reading (dBuV)	Average (dBuV) Peak minus Duty Cycle 29.6 dB	Site Correction Factor (dBm)	Average Level Corrected (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)	Result
1807.675	72.3	42.7	2.9	45.6	54.0	-8.4	Pass
2711.523	57.9	28.3	-0.3	28.0	54.0	-26.0	Pass
3615.371	63.1	33.5	-2.4	31.1	54.0	-22.9	Pass
4519.219	72.4	42.8	3.3	46.1	54.0	-7.9	Pass
5423.068	54.7	25.1	7.4	32.5	54.0	-21.5	Pass
6326.916	51.5	21.9	5.9	27.8	54.0	-26.2	Pass
7230.764	57.9	28.3	5.8	34.1	54.0	-19.9	Pass
8134.613	52.2	22.6	7.6	30.2	54.0	-23.8	Pass
9038.461	50.3	20.7	12.3	33.0	54.0	-21.0	Pass

Table 4-3: Radiated Emissions/Fundamental Emissions Test Equipment

RTL Asset	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900791	Chase	CBL6111B	Bilog Antenna (30 MHz – 2000 MHz)	N/A	12/12/10
901365	MITEQ	JS4-00102600-41-5P	Amplifier, 0.1-26 GHz, 30dB gain	N/A	3/4/10
900772	EMCO	3161-02	Horn Antenna (2 - 4 GHz)	9804-1044	6/14/10
900323	EMCO	3160-07	Horn Antenna (8.2 - 12.4 GHz)	9605-1054	6/14/10
900321	EMCO	3161-03	Horn Antenna (4.0 - 8.2 GHz)	9508-1020	6/14/10
901215	Hewlett Packard	8596EM	Spectrum Analyzer (9 kHz - 12.8 GHz)	3826A00144	10/23/09
901516	Insulated Wire, Inc.	KPS-1503-2400-KPS	RF cable, 20'	NA	10/17/09
901517	Insulated Wire Inc.	KPS-1503-360-KPS	RF cable 36"	NA	10/17/09
900878	Rhein Tech Laboratories, Inc.	AM3-1197-0005	3 meter antenna mast, polarizing	Outdoor Range 1	Not Required
901242	Rhein Tech Laboratories, Inc.	WRT-000-0003	Wood rotating table	N/A	Not Required

Test Personnel:

Daniel Baltzell		July 16-17, 2009
Test Engineer	Signature	Dates of Tests

5 In-Band Emission Requirement – FCC 15.215(c)

5.1 Test Procedure

The 20 dB bandwidth was measured using a 50 ohm spectrum analyzer with the resolution bandwidth set at 10 kHz (1% of span), and the video bandwidth set at 30 kHz. The spectrum analyzer's display markers were set to -20 dB using max hold until the spectrum was filled and a plot taken.

5.2 FCC 15.215(c) Requirement

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

5.3 Test Data

Plot 5-1: 20 dB Bandwidth

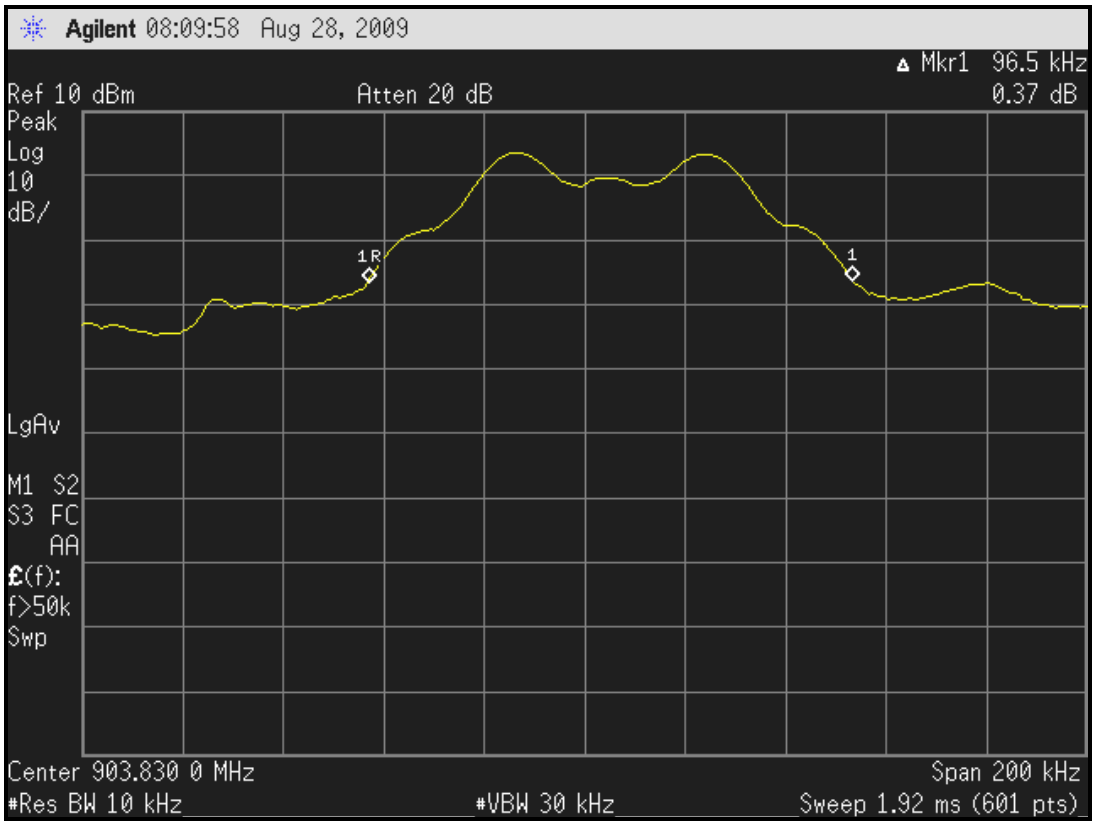


Table 5-1: 20 dB Bandwidth Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
901413	Agilent Technologies	E4448A	Spectrum Analyzer	US44020346	7/31/10

Test Personnel:

Richard B. McMurray	Richard B. McMurray	August 28, 2009
Test Engineer	Signature	Date Of Test

6 Conducted AC Emissions – FCC 15.207

6.1 Site and Test Description

The power line conducted emissions measurements were performed in a Series 81 type shielded enclosure manufactured by Rayproof. The EUT was assembled on a wooden table 80 centimeters high. Power was fed to the EUT through a 50-ohm/50 microhenry Line Impedance Stabilization Network (LISN). The EUT LISN was fed power through an A.C. filter box on the outside of the shielded enclosure. The filter box and EUT LISN housing are bonded to the ground plane of the shielded enclosure. A second LISN, the peripheral LISN, provides isolation for the EUT test peripherals. This peripheral LISN was also fed A.C. power. A metal power outlet box, which is bonded to the ground plane and electrically connected to the peripheral LISN, powers the EUT host peripherals.

The spectrum analyzer was connected to the AC line through an isolation transformer. The 50-ohm output of the EUT LISN was connected to the spectrum analyzer input through a Solar 100 kHz high-pass filter. The filter is used to prevent overload of the spectrum analyzer from noise below 100 kHz. Conducted emission levels were measured on each current-carrying line with the spectrum analyzer operating in the CISPR quasi-peak mode (or peak mode if applicable).

The analyzer's 6 dB bandwidth was set to 9 kHz. Video filter less than 10 times the resolution bandwidth is not used. Average measurements are performed in linear mode using a 10 kHz resolution bandwidth, a 1 Hz video bandwidth, and by increasing the sweep time in order to obtain a calibrated measurement. The emission spectrum was scanned from 150 kHz to 30 MHz. The highest emission amplitudes relative to the appropriate limits were measured and have been recorded.

6.2 Test Limits

Line-Conducted Emissions		
	Limit (dBµV)	
Frequency (MHz)	Quasi-Peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5.00	56	46
5.00 to 30.00	60	50

6.3 Conducted Emissions Test Data

Table 6-1: Conducted Emissions Test Data - Neutral Side – Line 1

Temperature: 77.2F Humidity: 32%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)	Pass/ Fail
0.152	Av	39.4	0.2	39.6			55.9	-16.3	Pass
0.152	Qp	64.2	0.2	64.4	65.9	-1.5			Pass
0.204	Av	45.2	0.2	45.4			53.4	-8.0	Pass
0.204	Qp	62.3	0.2	62.5	63.4	-0.9			Pass
0.253	Av	47.8	0.2	48.0			51.7	-3.7	Pass
0.253	Qp	59.2	0.2	59.4	61.7	-2.3			Pass
0.308	Qp	43.0	0.4	43.4	60.0	-16.6			Pass
0.512	Qp	32.9	0.4	33.3	56.0	-22.7			Pass
0.560	Qp	40.2	0.4	40.6	56.0	-15.4			Pass
2.140	Pk	37.2	1.0	38.2			46.0	-7.8	Pass
16.220	Pk	25.6	2.8	28.4			50.0	-21.6	Pass

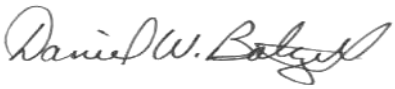
Table 6-2: Conducted Emissions Test Data – Hot Side – Line 2

Temperature: 77.2F Humidity: 32%									
Emission Frequency (MHz)	Test Detector	Analyzer Reading (dBuV)	Site Correction Factor (dB)	Emission Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)	AV Limit (dBuV)	AV Margin (dBuV)	Pass/ Fail
0.205	Qp	50.4	0.2	50.6	63.4	-12.8			Pass
0.254	Qp	48.4	0.2	48.6	61.6	-13.0			Pass
0.254	Av	42.5	0.2	42.7			51.6	-8.9	Pass
0.459	Qp	45.8	0.3	46.1	56.7	-10.6			Pass
1.320	Qp	30.9	0.7	31.6	56.0	-24.4			Pass
2.250	Pk	37.7	1.1	38.8			46.0	-7.2	Pass
7.710	Pk	29.4	2.0	31.4			50.0	-18.6	Pass

Table 6-3: Conducted Emissions Test Equipment

RTL Asset #	Manufacturer	Model	Part Type	Serial Number	Calibration Date
900970	Hewlett Packard	85662A	Spectrum Analyzer Display	2542A11239	9/8/09
900339	Hewlett Packard	85650A	Quasi-Peak Adapter (30 Hz - 1 GHz)	2521A00743	9/11/09
901083	AFJ International	LS16/110VAC	16A LISN	16010020080	10/23/09

Test Personnel:



Daniel Baltzell		July 17, 2009
Test Engineer	Signature	Date Of Test

7 Conclusion

The data in this measurement report shows that the Industrial Commercial Scales, LLC, Model ICS427 Wireless Loadcell Transceiver; FCC ID: XL5-ICS427-01A, complies with all the applicable requirements of Parts 2 and 15 of the FCC Rules and Regulations.