



Engineering and Testing for EMC and Safety Compliance



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### FCC Part 15.249 Certification Application Report

<b>Test Lab:</b> 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		<b>Applicant:</b> Industrial Commercial Scales, LLC Tel: 843-278-0342 2320 Air Park Road Fax: 843-278-0404 North Charleston, SC 29406 Contact: Jerry D. Meyer	
<b>FCC ID:</b>	XL5-ICS427-01B	<b>Test Report Date:</b>	August 28, 2009
<b>Platform:</b>	N/A	<b>RTL Work Order #:</b>	2009199
<b>Model:</b>	ICS427 Wireless Indicator Transceiver	<b>RTL Quote #:</b>	QRTL09-237A
<b>American National Standard Institute:</b>	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		
<b>FCC Classification:</b>	DXX – Part 15 Low Power Communication Device Transmitter		
<b>FCC Rule Part(s)/Guidance:</b>	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)		
<b>Digital Interface Information:</b>	N/A		
<b>Frequency Range (MHz)</b>	<b>Output Power (W)</b>	<b>Frequency Tolerance</b>	<b>Emission Designator</b>
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: August 28, 2009

Typed/Printed Name: Desmond A. Fraser

Position: President

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## **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 Indicator Transceiver, FCC ID: XL5-ICS427-01B.

## 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

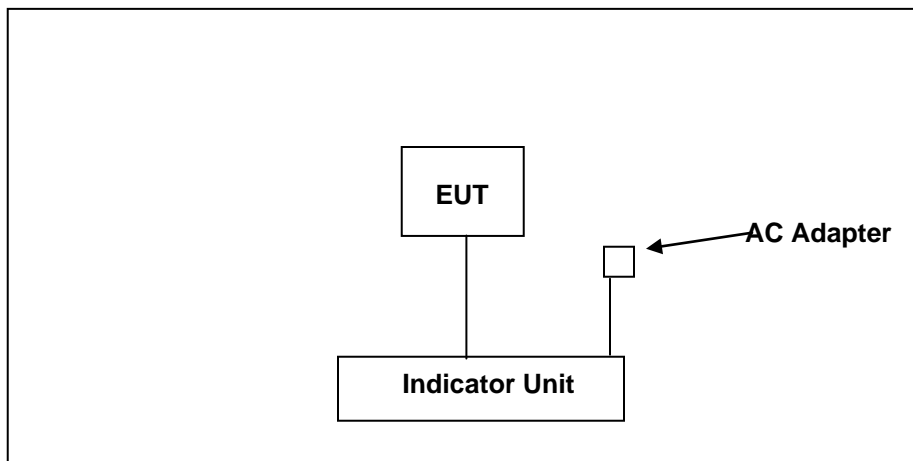
### 2.4 Test System Details

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 Indicator	Industrial Commercial Scales, LLC	ICS427 Wireless Indicator Transceiver	100109	XL5-ICS427-01B	N/A	19125
Control Unit	Remo	Tree	N/A	N/A	3m unshielded I/O	19097
AC Adapter	I.T.E.	MCDC09001 0UA2	0309	N/A	1.8m unshielded power	19098

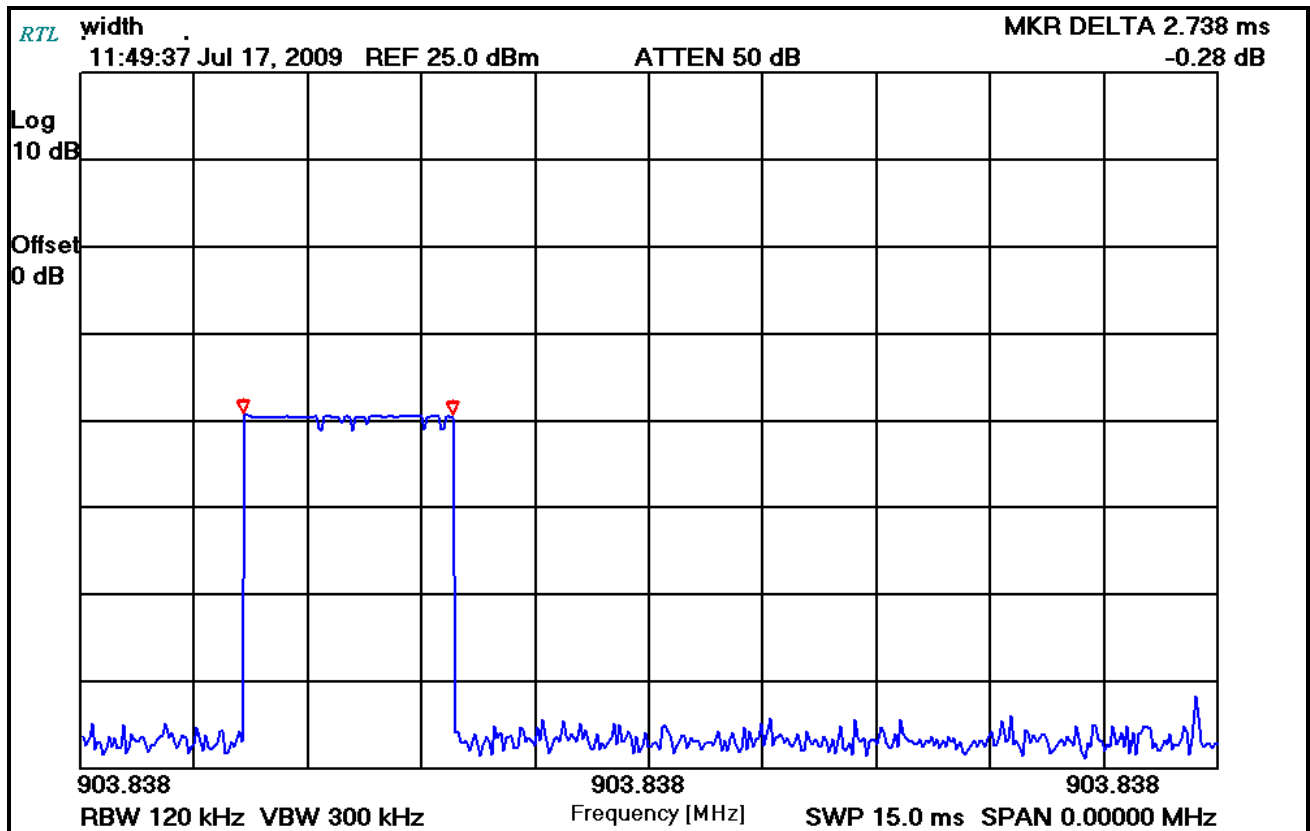
## 2.5 Configuration of Tested System



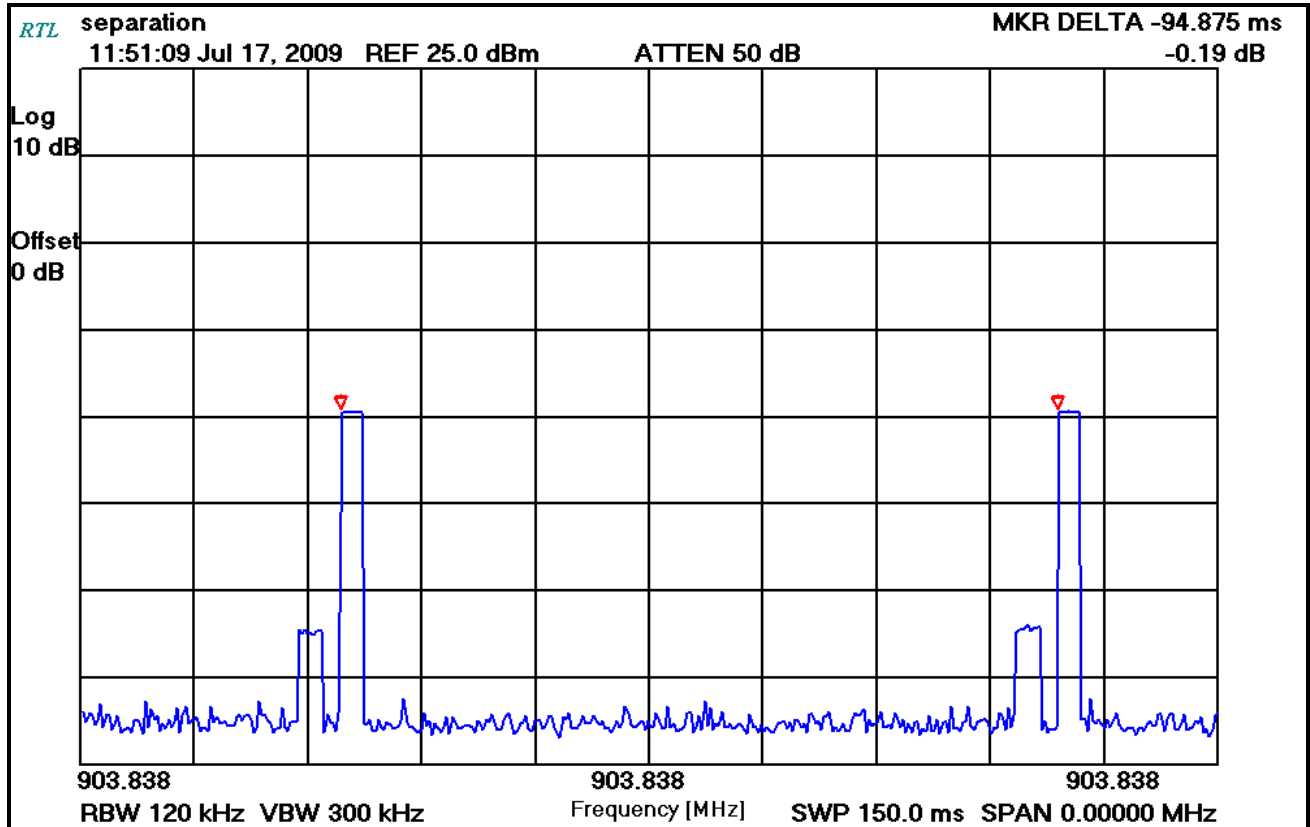
**Figure 2-1: Worst Case Configuration of System under Test**

### 3 Duty Cycle

Plot 3-1: Duty Cycle - Pulse Width



Plot 3-2: **Duty Cycle - Pulse Separation**



Duty Cycle Calculation (dB)	
$20 \cdot \log(2.738/94.875)$	-30.8



#### 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 30.8 dB	Site Correction Factor (dBm)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Result
903.848	108.8	78.0	-9.8	68.2	94.0	-25.8	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**

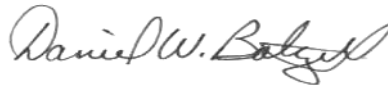
Frequency (MHz)	Peak Analyzer Reading (dBuV)	Average (dBuV) Peak minus Duty Cycle 30.8 dB	Site Correction Factor (dBm)	Average Level Corrected (dBuV/m)	Average Limit (dBuV/m)	Average Margin (dB)	Result
1807.675	74.5	43.7	2.9	46.6	54.0	-7.4	Pass
2711.523	56.0	25.2	-0.3	24.9	54.0	-29.1	Pass
3615.371	61.3	30.5	-2.4	28.1	54.0	-25.9	Pass
4519.219	72.6	41.8	3.3	45.1	54.0	-8.9	Pass
5423.068	56.1	25.3	7.4	32.7	54.0	-21.3	Pass
6326.916	52.3	21.5	5.9	27.4	54.0	-26.6	Pass
7230.764	53.6	22.8	5.8	28.6	54.0	-25.4	Pass
8134.613	52.5	21.7	7.6	29.3	54.0	-24.7	Pass
9038.461	48.6	17.8	12.3	30.1	54.0	-23.9	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  
 Test Engineer



Signature

July 16-17, 2009  
 Dates of Tests

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

### 5.1 Test Procedure

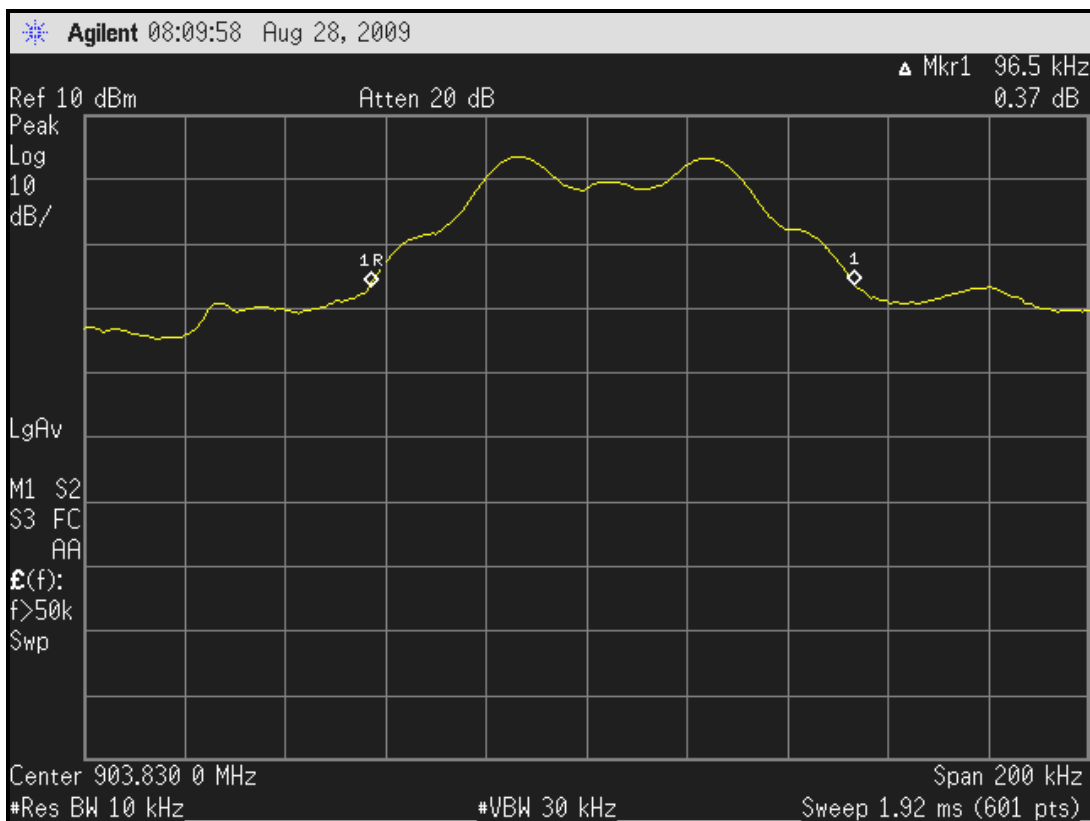
The 20 dB bandwidth was measured using a 50 ohm spectrum analyzer with the resolution bandwidth set at 10 kHz (1% of span), and the video bandwidth set at 30 kHz. The spectrum analyzer's display markers were set to -20 dB using max hold until the spectrum was filled and a plot taken.

### 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



Rhein Tech Laboratories, Inc.  
360 Herndon Parkway  
Suite 1400  
Herndon, VA 20170  
<http://www.rheintech.com>

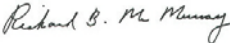
Client: Industrial Commercial Scales, LLC  
Model: ICS427 Wireless Indicator Transceiver  
Standard: FCC 15.249  
FCC ID: XL5-ICS427-01B  
Report #: 2009199

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:**

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Richard B. McMurray Test Engineer	 Signature	August 28, 2009 Date Of Test
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## 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 (dB $\mu$ V)		
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
0.157	Pk	33.6	0.2	33.8	65.6	-31.8	55.6	-21.8	Pass
0.203	Pk	32.6	0.2	32.8	63.5	-30.7	53.5	-20.7	Pass
0.527	Pk	26.7	0.4	27.1	56.0	-28.9	46.0	-18.9	Pass
0.878	Pk	27.1	0.5	27.6	56.0	-28.4	46.0	-18.4	Pass
22.220	Pk	32.3	3.2	35.5	60.0	-24.5	50.0	-14.5	Pass
28.940	Pk	32.4	3.4	35.8	60.0	-24.2	50.0	-14.2	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
0.151	Pk	34.9	0.2	35.1	65.9	-30.8	55.9	-20.8	Pass
0.204	Pk	32.1	0.2	32.3	63.4	-31.1	53.4	-21.1	Pass
0.551	Pk	28.6	0.4	29.0	56.0	-27.0	46.0	-17.0	Pass
0.733	Pk	28.3	0.4	28.7	56.0	-27.3	46.0	-17.3	Pass
22.220	Pk	32.7	3.2	35.9	60.0	-24.1	50.0	-14.1	Pass
29.440	Pk	33.4	3.5	36.9	60.0	-23.1	50.0	-13.1	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  
 Test Engineer



Signature

July 17, 2009  
 Date Of Test

Rhein Tech Laboratories, Inc.  
360 Herndon Parkway  
Suite 1400  
Herndon, VA 20170  
<http://www.rheintech.com>

Client: Industrial Commercial Scales, LLC  
Model: ICS427 Wireless Indicator Transceiver  
Standard: FCC 15.249  
FCC ID: XL5-ICS427-01B  
Report #: 2009199

## **7 Conclusion**

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