RHEIN TECH LABORATORIES, INC.

Engineering Solutions & Electromagnetic Compatibility Services

FCC Part 15.231 Test Data

EUT: 433.9 MHz Micro Door Window Sensor

for

Resolution Engineering, Inc.
1402 Heggen Street
Hudson, WI 54016
Contact: Jake Peterson

Testing Conducted By
Rhein Tech Laboratories, Inc.
360 Herndon Parkway, Suite 1400
Herndon, VA 20170

RTL Test Engineer: Jon Wilson

RTL Project/Report Number: 2014074

April 21, 2014

These tests are accredited and meet the requirements of ISO/IEC 17025 as verified by ANSI-ASQ National Accreditation Board/ACLASS. Refer to certificate and scope of accreditation AT-1445.

Testing Represented in Report

The data and limits presented in this report are for radiated emissions per 15.231(b)(2) which references 15.35(b), and peak limiting for restricted bands per 15.209(e), which again references 15.35(b)(2), as procured by Resolution Engineering. No average data is presented in this report. Data is also presented for spurious, non-harmonic radiated emissions per 15.209. The Equipment Under Test (EUT) was the **433.9 MHz Micro Door Window Sensor (RTL Bar Code 21425)**.

15.231 Radiated Emissions Test Data – FCC Limits/ 3m Distance

Emission Frequency (MHz)	Test Detector	Antenna Polarity (H/V)	Analyzer Reading (dBuV)	Site Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pass/ Fail
433.920	Peak	V	74.8	18.1	92.9	100.8	-7.9	Pass
867.840	Peak	H	67.2	-2.8	64.5	80.8	-16.4	Pass
1301.763	Peak	H	57.1	2.4	59.5	74.0	-14.5	Pass
1735.688	Peak	H	71.4	5.2	76.6	80.8	-4.2	Pass
2169.590	Peak	H	62.3	-10.8	51.5	80.8	-29.3	Pass
2603.510	Peak	V	48.3	-9.4	38.9	80.8	-41.9	Pass
3037.430	Peak	H	44.5	-8.7	35.8	80.8	-45.0	Pass
3471.350	Peak	H	37.4	-6.8	30.6	80.8	-50.2	Pass
3905.270	Peak	H	52.2	-6.0	46.2	74.0	-27.8	Pass
4339.190	Peak	V	48.3	-1.0	47.3	74.0	-26.7	Pass

***** *IC restricted band*

All spurious emissions in the applicable frequency range were investigated, only harmonic emissions were present as noted above

Test Procedure

Radiated fundamental and spurious emissions were tested at three meters. The EUT was tested in the three orthogonal planes with the receive antenna in both polarities. The emissions were maximized per ANSI C63.4:2003 8.3.1.2; that is, the measurement antenna height was varied between 1 and 4 m, and the EUT was rotated through 360° on a rotating turntable until the maximum emissions were found. Both horizontal and vertical measurement antenna polarizations were used. A resolution bandwidth of 100 kHz was used for frequencies less than 1000 MHz, and a resolution bandwidth of 1 MHz was used for frequencies greater than or equal to 1000 MHz. The video bandwidth was set to a value at least three times greater than the resolution bandwidth.

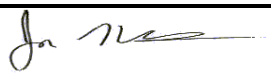
EUT Disposition

The EUT was adapted to continuously transmit for testing purposes.

Radiated Emissions Test Equipment

Part	Manufacturer	Model	Serial Number	RTL Bar Code	Calibration Due Date
Amplifier (20 MHz-2 GHz)	Rhein Tech Laboratories, Inc.	PR-1040	900905	900905	8/20/14
Spectrum Analyzer (10 Hz-26.5 GHz)	Agilent	EXA N9010	MY51250846	901583	4/16/15
Bilog Periodic Antenna (25 MHz-2000 MHz)	ARA	LPB-2520	1037	900724	4/19/15
Amplifier (1 GHz–26.5 GHz)	Hewlett Packard	8449B OPT H02	3008A00505	900932	8/10/2014
Horn Antenna (2.0-4.0 GHz)	EMCO	3161-02	9804-1044	900772	4/20/15
Emissions Testing Software	Rhein Tech Laboratories, Inc.	Automated Emission Tester	Rev. 14.0.2	N/A	N/A

Test Personnel:

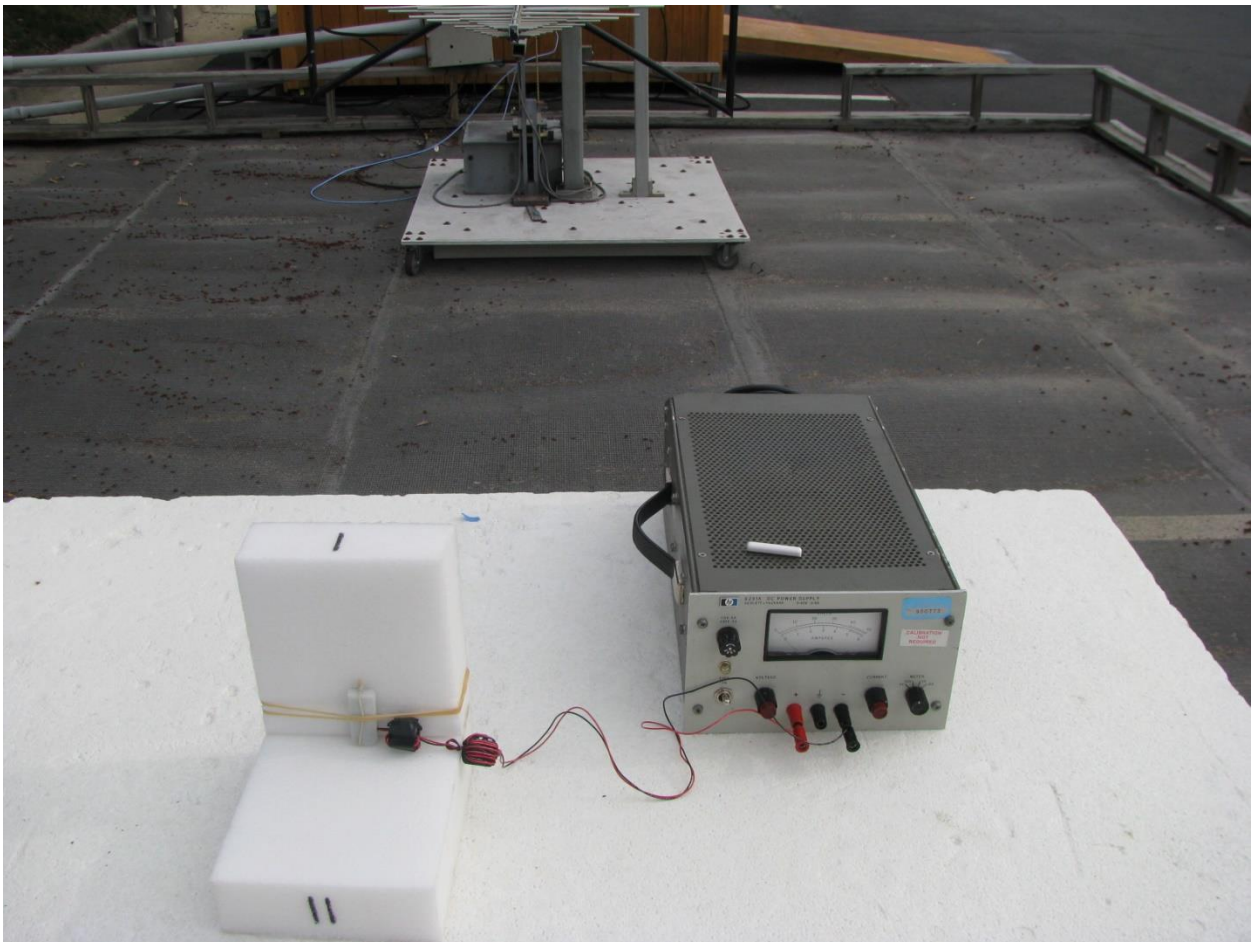
Jon Wilson		April 18, 2014
Test Engineer	Signature	Date of Test

FCC/IC Cross Reference

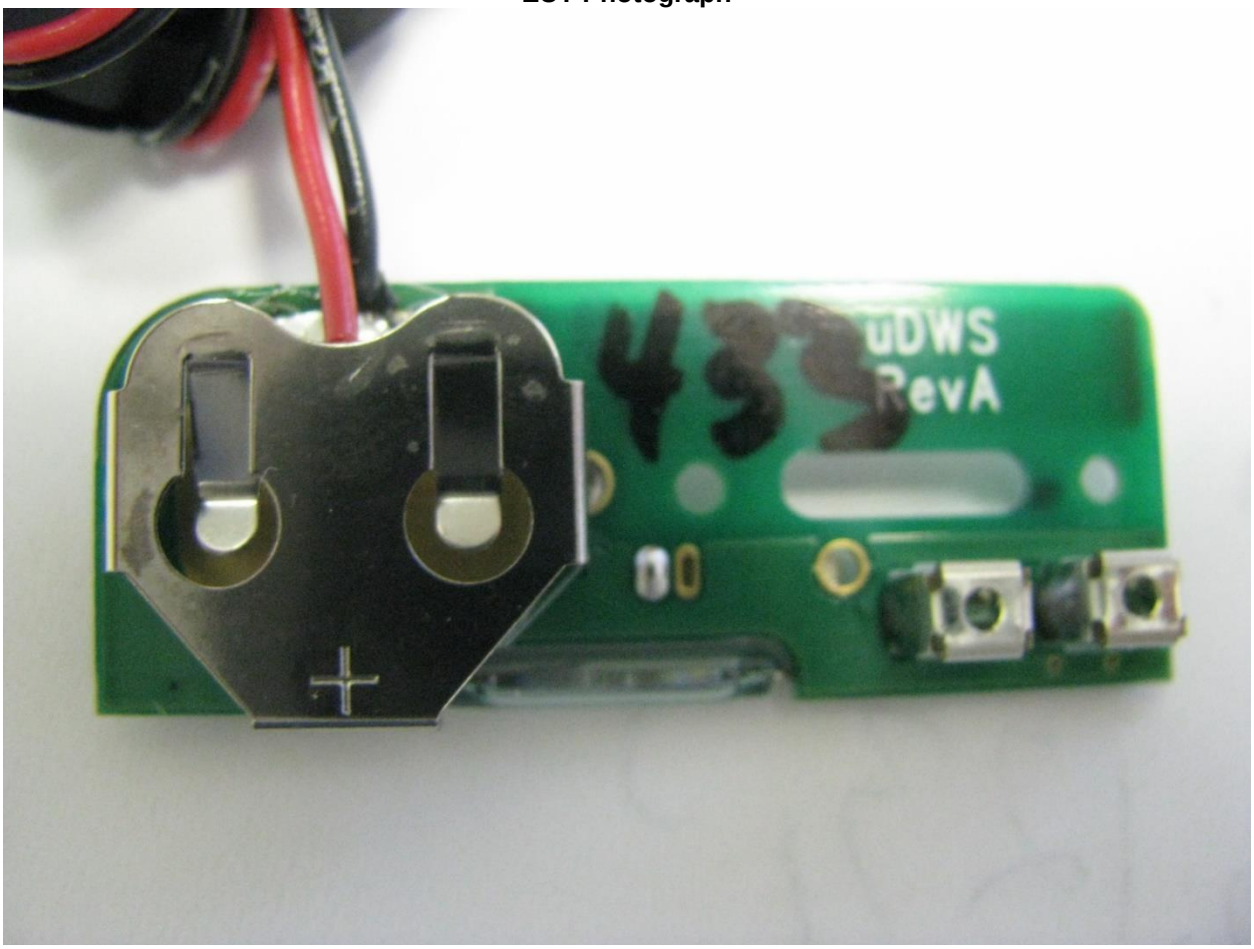
FCC 15.231(b)(2)	RSS-210 Issue 8 A1.1
FCC 15.35(b)	RSS-Gen Issue 3 7.2.3
FCC 15.205	RSS-Gen Issue 3 7.2.2
FCC 15.209	RSS-Gen Issue 3 7.2.5

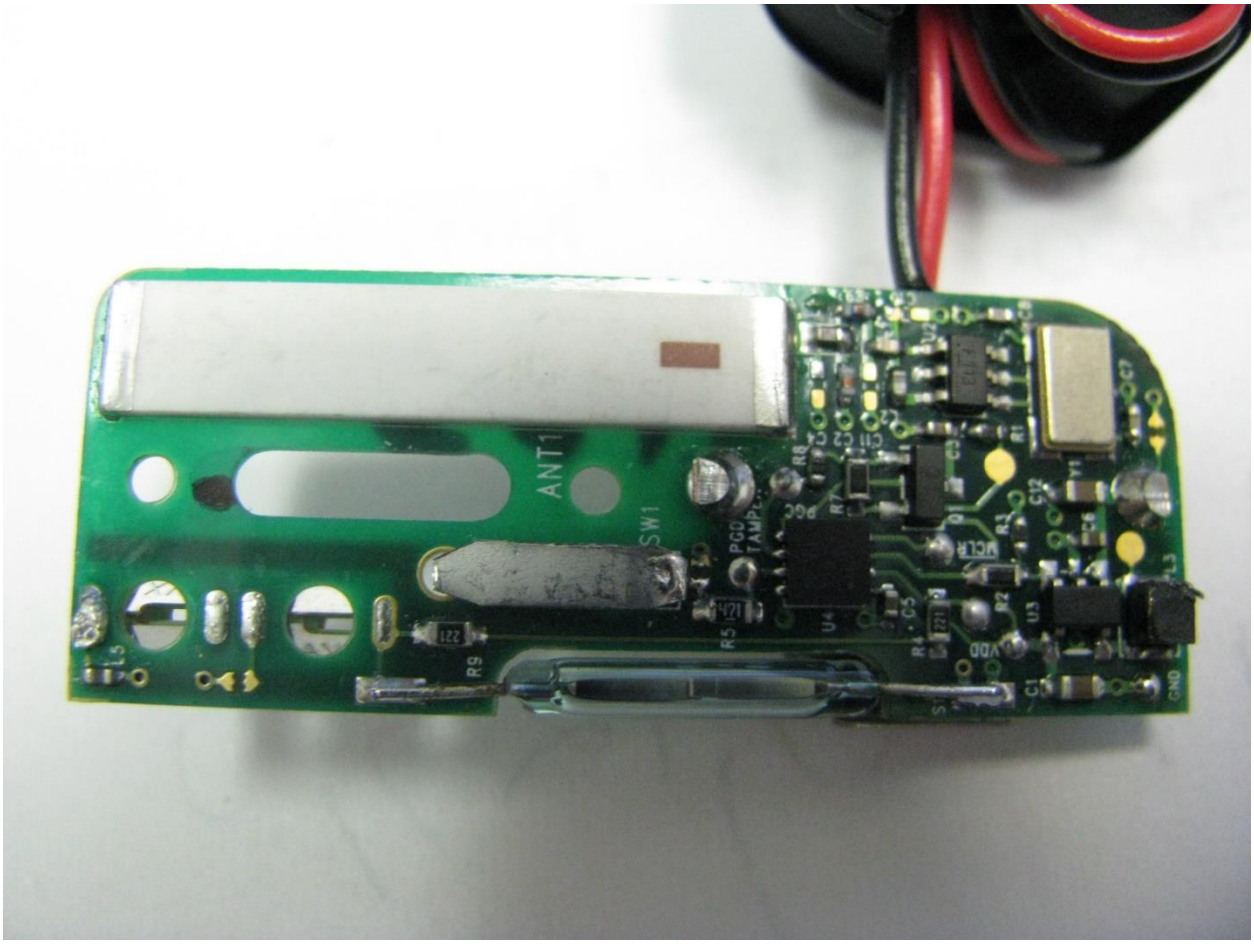
Test Configuration Photograph

Radiated Emissions



EUT Photograph




ANT1
SW1
R9
R5
U4
U3
VDD
GND