



Test Report issued under the responsibility of:

ITC ENGINEERING SERVICES, INC.

FCC Part 15.249 Test Report


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Testing Laboratory..... :	ITC Engineering Services, Inc.
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Test Specification Standard..... :	FCC Part 15.209; and, FCC Part 15.249
Test Procedure.....	Emissions
Judgment	Complies as Tested
Manufacturer Logo.....	
Manufacturer.....	S.R. Smith
Model/Type Reference.....	Wireless Controller Tx for use with: WPC-1, WPC-2, PT-6000, & WIR-TRAN
Input Voltage Rating.....	9Vdc

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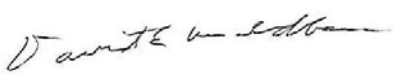
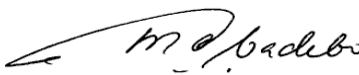
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1 DOCUMENTATION

1.1 General Information

Product	A 915MHz wireless remote controller for use with "Wiress Pool Controllers" models WPC-1, WPC-2, PT-6000, Wir-Tran	
Manufacturer's Name	S.R. Smith	
Manufacturer's Address	1017 SW Berg Parkway Canby, OR 97013 U.S.A.	
Phone	925-463-5520 x 9	
Contact and Email	Jonathan Quon	jquon@srsmith.com
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Job Log and Report Numbers	20141009-01	20141009-01-WPC-RF
Test Date(s)	December 3rd thru December 17th 2014	
Test Engineer	David Waldbeser	
Documentation	David Waldbeser	
Test Results	<input checked="" type="checkbox"/> Complies as Tested	<input type="checkbox"/> Does not Comply
Total Number of Pages	15	

PREPARED BY:	REVIEWED BY:
	
David Waldbeser	Michael Gbadebo, P.E.
Project Engineer	(California License # 11303) Chief Engineer

1.2 Summary of Test

ITC Engineering Services, Inc. as an independent testing laboratory, declares that the equipment specified above was tested to the requirements of:

1.2.1 Emissions Test Methods:

FCC Part 15.249

FCC Part 15.209

1.3 Declaration/Disclaimer

It is the manufacturer's responsibility to assure that additional production units of these models are manufactured with identical electrical and mechanical characteristics. This report is the confidential property of the client. As a mutual protection to our clients, the public, and ourselves, extracts from the test report shall not be reproduced except in full without ITC Engineering Service's written approval. The applicant/manufacturer shall not use this report to claim product endorsement by any US or International Government agency.

1.4 EUT Ports and Connectors

The EUT have none. The Repeater (Receiver) System have knockouts for conduit, through which wiring from the house breaker panel and to the pool pump motors and lights are run. The cable connecting repeater to main box also runs through a knockout into which a strain relief has been inserted.

1.5 EUT Description

The WPC Repeater systems are used to control swimming pool peripherals; e.g., pumps, cleaners and lights. The Wireless Controller (Transmitter) is used mainly for activating pool lighting, and secondary pumps. See Appendix A below for differences in the Systems.

The Transmitter 915 MHz carrier is gated on/off (ASK modulated) with control code stored in the embedded processor, and transmitted to a receiver housed in a small plastic dome and connected by a 10 ft. wire to the main WPC System containing the relays. S.R. Smith calls the receiver "Repeater." The transmitter is powered by a 9Vdc battery and the Repeater is powered by DC power from the WPC System. The Repeater demodulates the carrier & sends the recovered code by wire to what S.R. Smith calls the "Receiver" inside the WPC System. The receiver is a microprocessor with associated circuitry which decodes the received signal into the voltage, which in-turn switch on and off relays.

There is only one Repeater, used in each WPC system. Similarly, there is only one transmitter, differing only in the number of control codes for each WPC System model. The receivers differ only in the number of relays it switches. Therefore, only one transmitter, and one repeater-receiver combination was tested, to represent the various WPC systems.

1.6 List of Peripherals Used During Test

Description	Manufacturer	Model Name	Serial Number
100W incandescent light fixture	NA	NA	NA

1.7 General Test Remarks

The EUT and peripheral equipment were operated under the following conditions during testing:

WPC RF transmitter is designed for intermittent transmission, but will transmit continuously if the button is kept pressed. During testing a tie wrap and pencil was used to press the button down.

WPC-1 System was wired to 120 Vac mains and one of the wireless-controlled relays in the system, was wired to a light bulb load. The light bulb gave a visual indication that the system was working while not contributing to RF emissions.

<input type="checkbox"/>	Standby	<input type="checkbox"/>	Test Program (H - Pattern)
<input type="checkbox"/>	Test Program (Color Bar)	<input type="checkbox"/>	Test Program (Customer Specific)
<input type="checkbox"/>	TV/VCR Signal Input	<input type="checkbox"/>	Signal Generator Input
<input type="checkbox"/>	Continuous Audio Tone (1kHz)	<input type="checkbox"/>	Cycled Audio Tone (1kHz)
<input type="checkbox"/>	Printer/Parallel Function	<input type="checkbox"/>	Modem/Serial Function
<input type="checkbox"/>	Serpentine Program with I/O	<input type="checkbox"/>	Serpentine Program without I/O
<input type="checkbox"/>	Practice Operation	<input checked="" type="checkbox"/>	Normal Operating Mode
<input type="checkbox"/>	Essential Operation (Functional Safety)	<input type="checkbox"/>	Continuous Unmonitored Operation
<input checked="" type="checkbox"/>	Continuous Monitored Operation	<input type="checkbox"/>	Non-Continuous Operation

1.7.1 The requirements according to the technical regulations are:

1) Maximum Peak Amplitude for Carrier Frequency: 93.98dB μ V/m.....	Measured: 82.55dB μ V/m
2) Maximum Average Amplitude for Harmonic Frequency: 53.98dB μ V/m.....	Measured: 41.21dB μ V/m
3) Minimum Peak Separation between Harmonic and Carrier: 20dB.....	>20dB
4) Maximum emission between other than harmonic and carrier: 50dB.....	>50dB
5) Frequency Stability over.....	0Hz deviation

1.7.2 Administrative and Environmental Details

Site Used:	10 Meter Semi-Anechoic Chamber
Test Date:	12/03/2014 thru 12/17/ 2014
Test Engineer:	David Waldbeser
Temperature	80 °F
Humidity:	36%
Test Voltage	9 VDC

1.7.3 Test Equipment

Equipment Description	Manufacturer	Model #	Serial Number	Calibration Due Date	Calibration Interval
EMC Analyzer	Hewlett-Packard	E7405A	US40240204	7/31/2015	1 year
Biconical Antenna (30-200 MHz)	EMCO	3104	3459	10/14/2015	1 year
Log Periodic Antenna (200-1000 MHz)	EMCO	3146	9510-4202	6/16/2015	1 year
Horn Antenna (1-18 GHz)	A.H. Systems	SAS-571	887	10/14/2015	1 year

1.8 Spurious and Carrier Radiated Emissions per 47CFR15.249 from Transmitter

1.8.1 Test Description

The EUT was placed on a wooden turntable 80 cm above the ground reference plane. The EUT was powered on with a new battery and placed in an operational mode. Radiated emissions were monitored from 30 MHz to 1GHz using antennas spaced 3 meters from the EUT. The emissions were also monitored from 800MHz to 10GHz using a horn antenna suitable for the frequency range. In addition, the EUT orientation was arranged in three orthogonal planes for maximum emissions detection. The antennas were placed in both horizontal and vertical polarizations. The EUT was rotated and the antennas were elevated from one to four meters while being monitored.

All test procedures and processes were performed per the requirements of ANSI C63.4:2009.

1.8.2 Test Data

A = Ambient

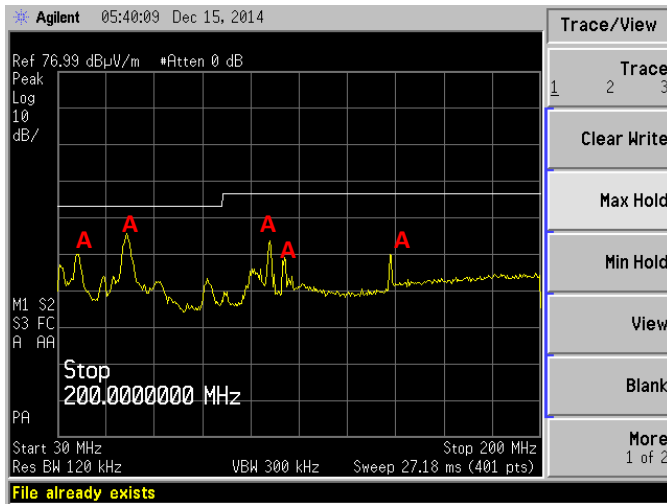


FIGURE 1: 30 – 200MHz Vertical

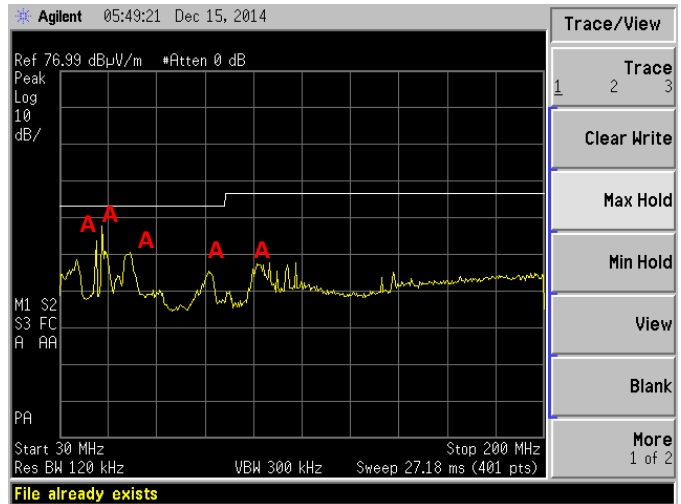


FIGURE 2: 30 – 200MHz Horizontal

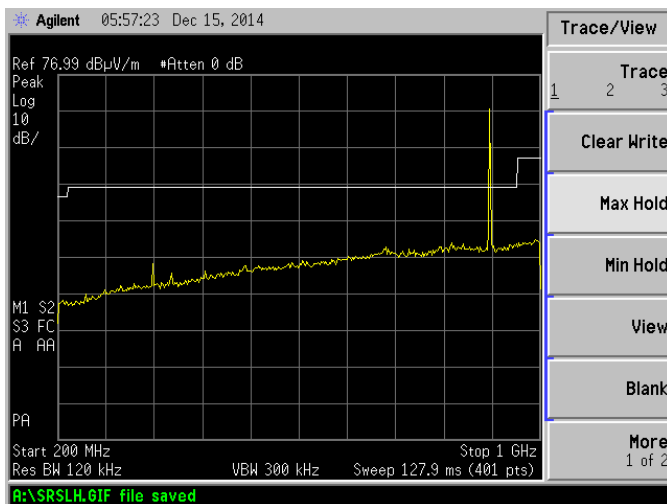


FIGURE 3: 200MHz – 1GHz Vertical

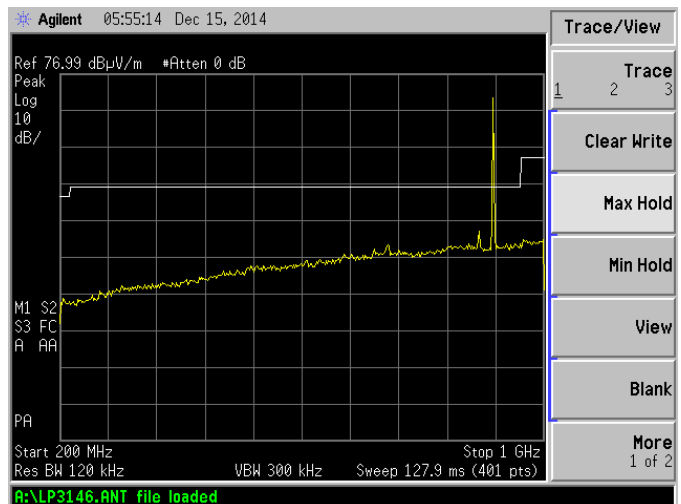


FIGURE 4: 200MHz – 1GHz Horizontal

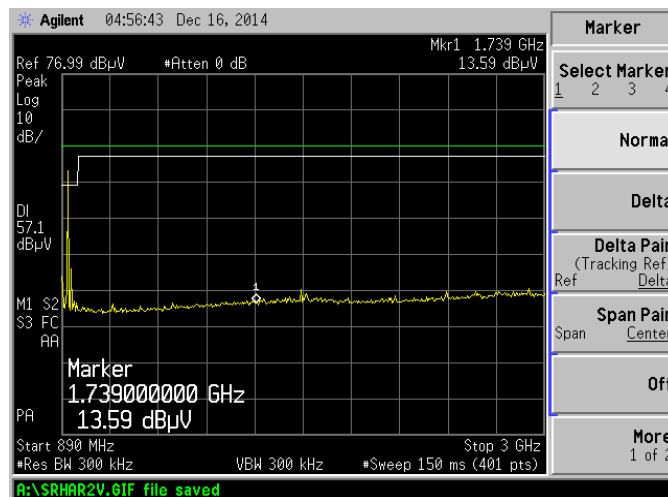


FIGURE 5: 890MHz – 3GHz Vertical

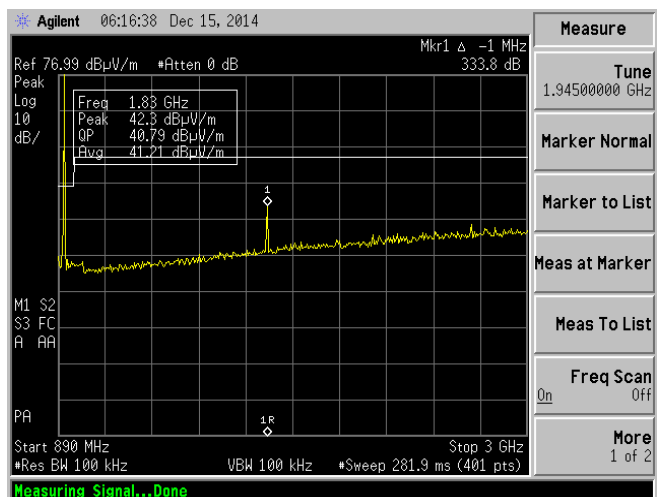


FIGURE 6: 890MHz – 3GHz Horizontal

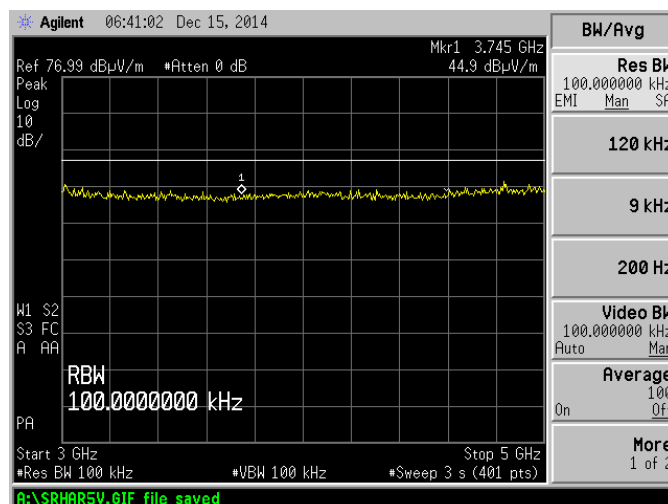


FIGURE 7: 3GHz – 5GHz Vertical

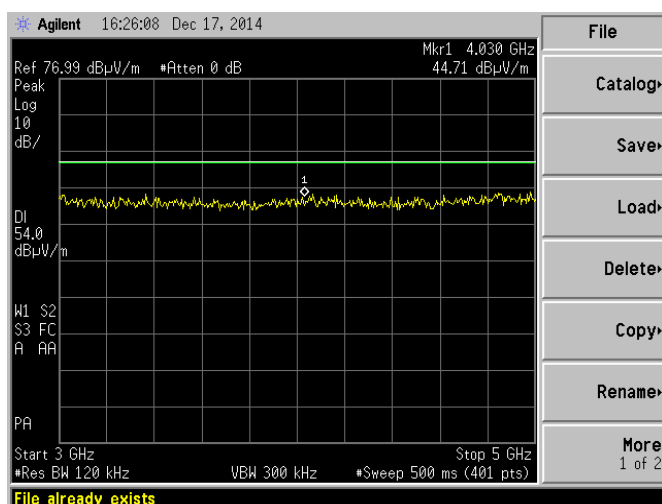


FIGURE 8: 3GHz – 5GHz Horizontal

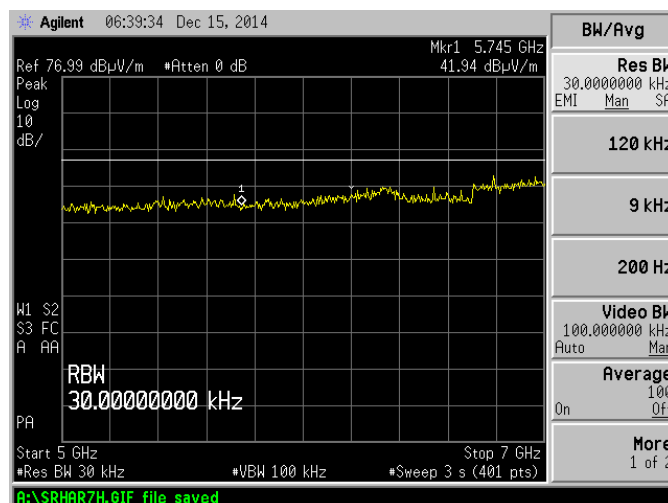


FIGURE 9: 5GHz – 7GHz Vertical

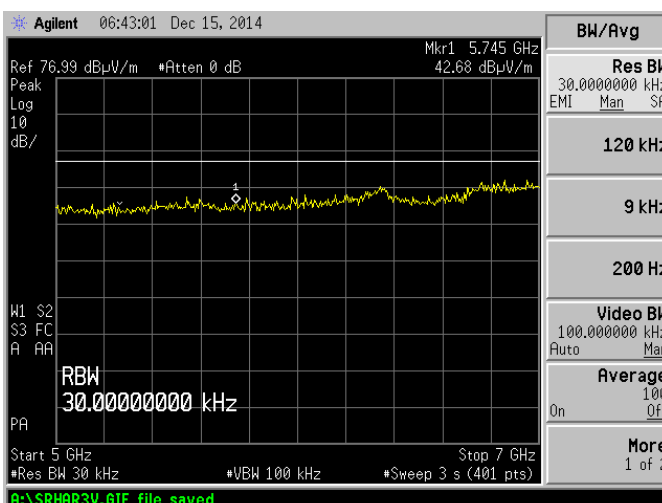


FIGURE 10: 5GHz – 7GHz Horizontal

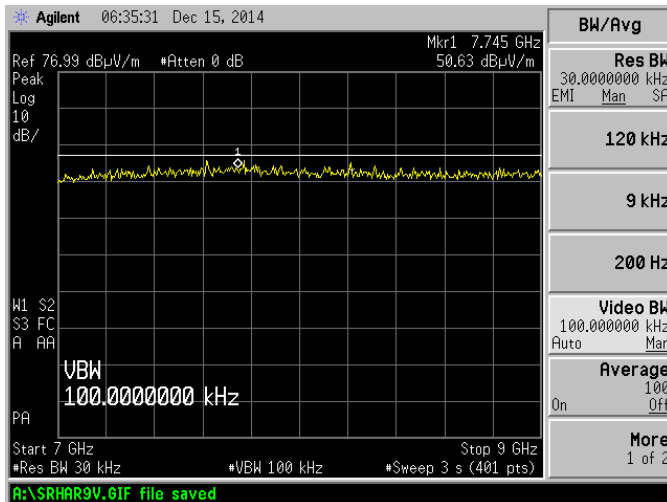


FIGURE 11: 7 – 9GHz Vertical

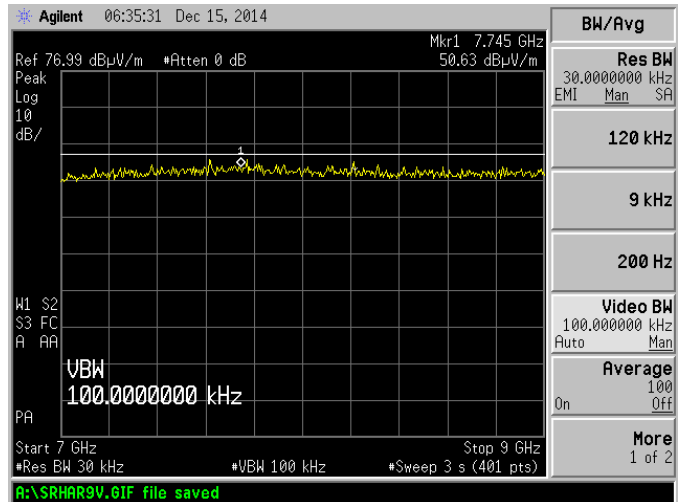


FIGURE 12: 7 – 9GHz Horizontal

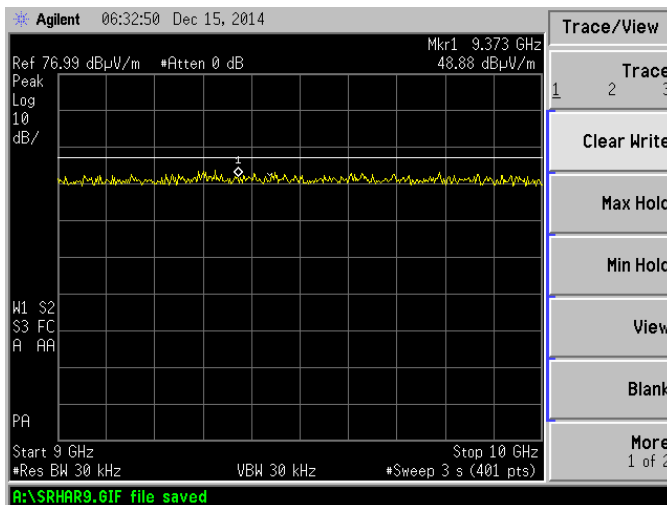


FIGURE 13: 9 – 10GHz Vertical

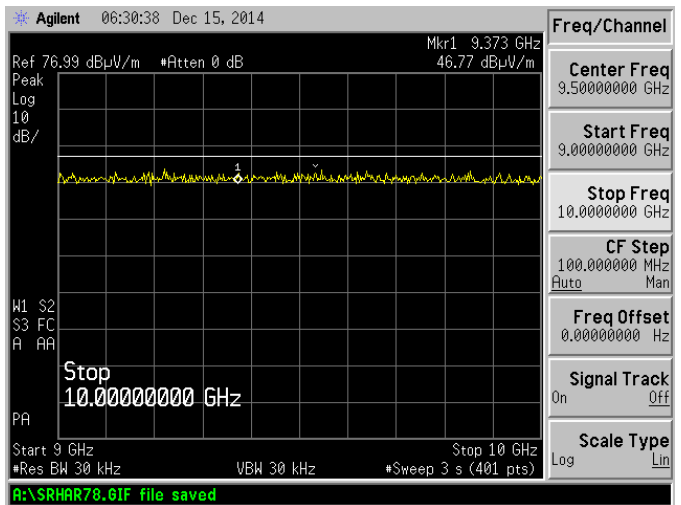


FIGURE 14: 9 – 10GHz Horizontal

Maximum Harmonic Level

Frequency	Amplitude	Polarization
1.83Ghz	41.29dBμV	Horizontal

1.8.3 Test Setup Photos

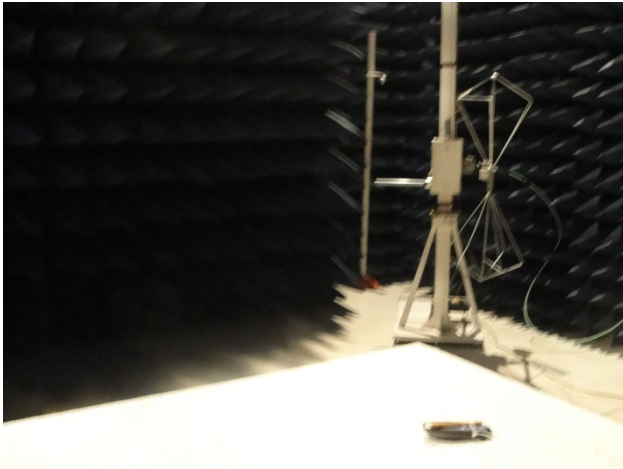


FIGURE 15: Radiated Emissions Setup, 30-200 MHz

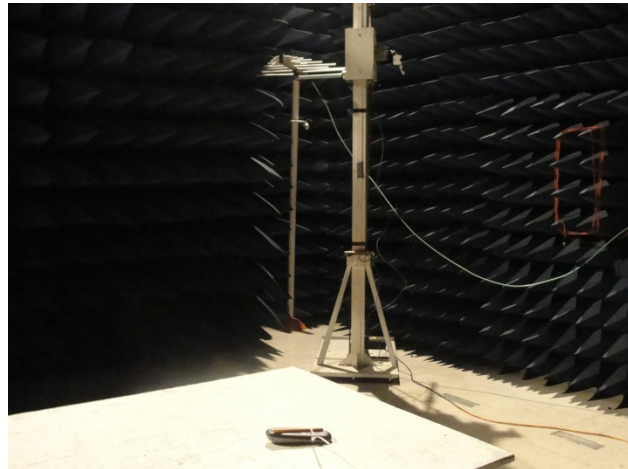


FIGURE 16: Radiated Emissions Setup, 200-1000 MHz

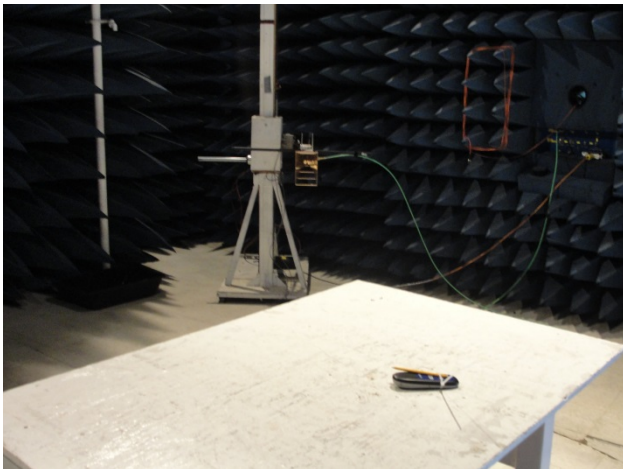


FIGURE 17: Radiated Emissions Setup, 1GHz - 10GHz



FIGURE 18: Close Up of Transmitter in Chamber



FIGURE 19: Transmitter in Chamber



FIGURE 20: Closeup Photo

1.9 Operating Frequency per 47CFR15.249c

1.9.1 Test Description

The EUT was placed on a wooden turntable 80 cm above the ground reference plane. The EUT was powered on with a new battery and placed in continuous operational mode. Using a log periodic antenna in both horizontal and vertical polarizations at 3m from the EUT, the E field of the 915 MHz fundamental was maximized by rotating the EUT 360° and varying antenna height between 1 and 4 meters. Occupied bandwidth was then measured.

Maximum field strength measured for the 915MHz fundamental frequency of the WPC transmitter was 82.55 dBμV/m at 3 m, measured with a peak detector.

1.9.2 Administrative and Environmental Details

Site Used:	Anechoic Chamber (3 meter Antenna distance)
Test Date:	12/03/2014
Temperature	80 °F
Humidity:	36%
Test Voltage	9 VDC

1.9.3 Test Data

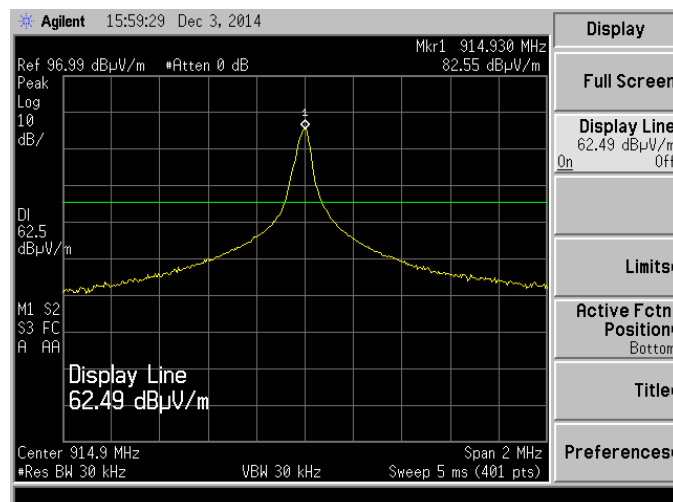


FIGURE 21: Transmitter Fundamental, Peak Data
Horizontal Polarization

Limit: 93.98dBμV @ 3m Antenna Distance

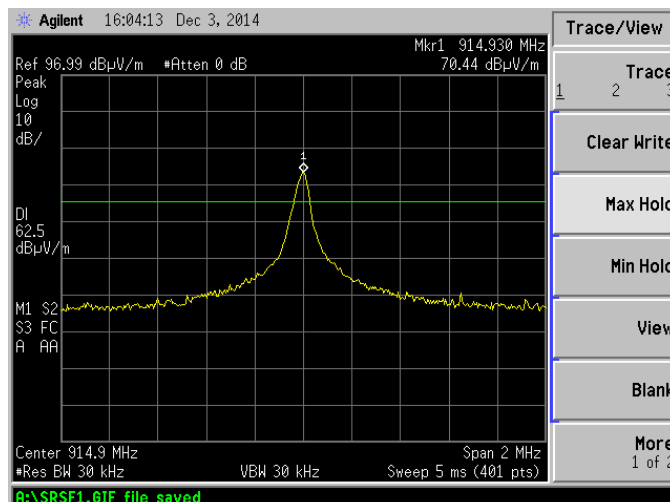


FIGURE 22: Transmitter Fundamental, Peak Data
Vertical Polarization

Limit: 93.98dBμV @ 3m Antenna Distance

Maximum Transmit Power

Frequency	Amplitude	Limit
1.83Ghz	82.55dBμV	93.98dBμV
1.83Ghz	70.44dBμV	93.98dBμV

2 EUT Technical Specification

Manufacturer	S.R. Smith		
General Description	Wireless Pool Controllers (WPC) Transmitter & Receivers		
EUT Type:	Wireless Pool Controller Transmitter & Repeater System		Models: See Appendix A below
	Repeater System Dimensions:	13" x 7-1/2" x 4-5/8" 16-5/8" x 14-3/8" x 5" 13-1/2" x 10-1/2" x 9-1/2" 10" x 7" x 4-1/8" 3-1/2" x 1-7/8" 6-1/2" x 2-1/2" x 1"	WPC-1 WPC-2 PT 6000 WIR TRAN Repeater (Receiver) Transmitter
	System Rated Voltage	120V/60 Hz & 240V/60 Hz	WPC Repeater System
	Transmitter Voltage	9 VDC	WPC Transmitter
Cable Type	Power Cable	None provided by Manufacturer.	
	Signal Cable	Length 10 ft.	Shielded <input type="checkbox"/> Unshielded <input checked="" type="checkbox"/>

2.1.1 EUT Photos



FIGURE 23: 2-Channel WPC Transmitter, Front and Rear



FIGURE 24: 2-Channel WPC Transmitter, Rear and Front of PCB

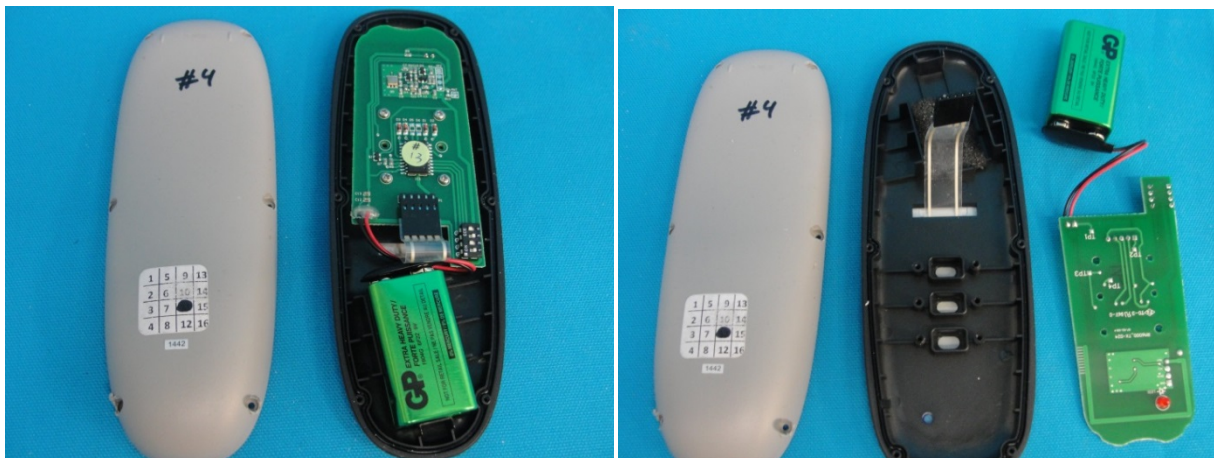

FIGURE 25: 1-Channel WPC Transmitter, Front and Back

FIGURE 26: 1-Channel WPC Transmitter, Internals

FIGURE 27: WPC-2 Repeater and Relay Controller

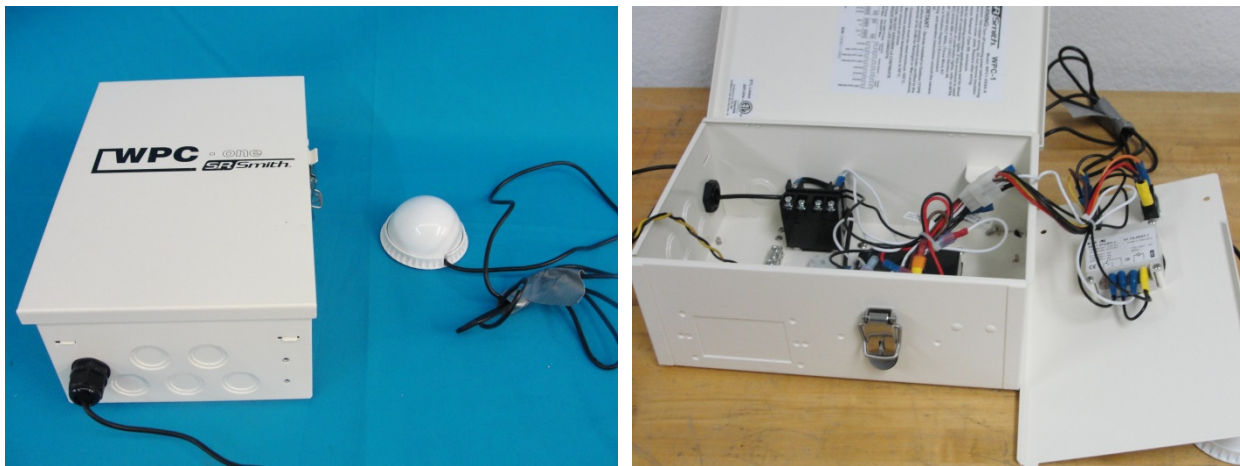


FIGURE 28: WPC-3 Timers and Remote Control Switches



FIGURE 29: WIR-TRAN Timer and Remote Control Switch

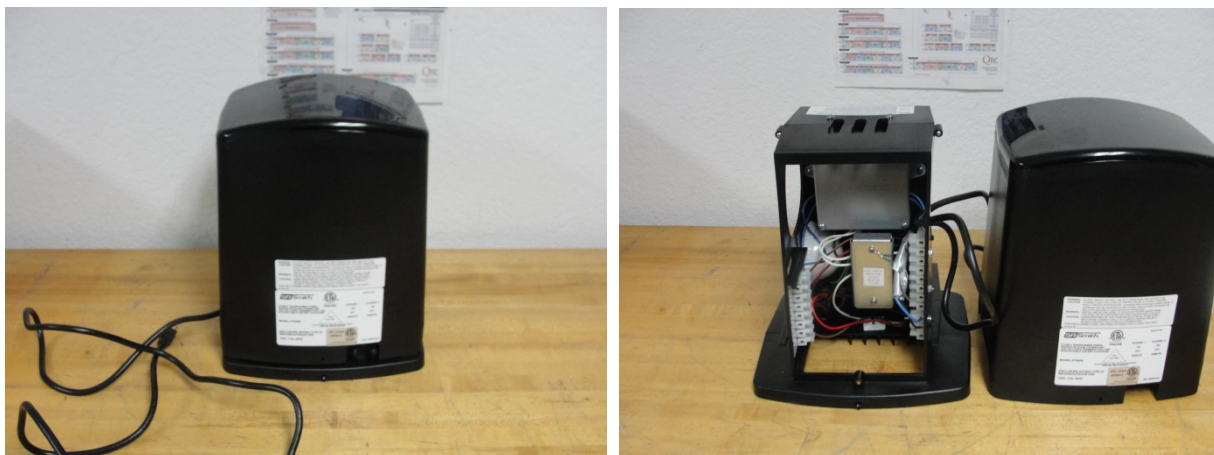


FIGURE 30: PT-6000 Timer and Remote Control Switch

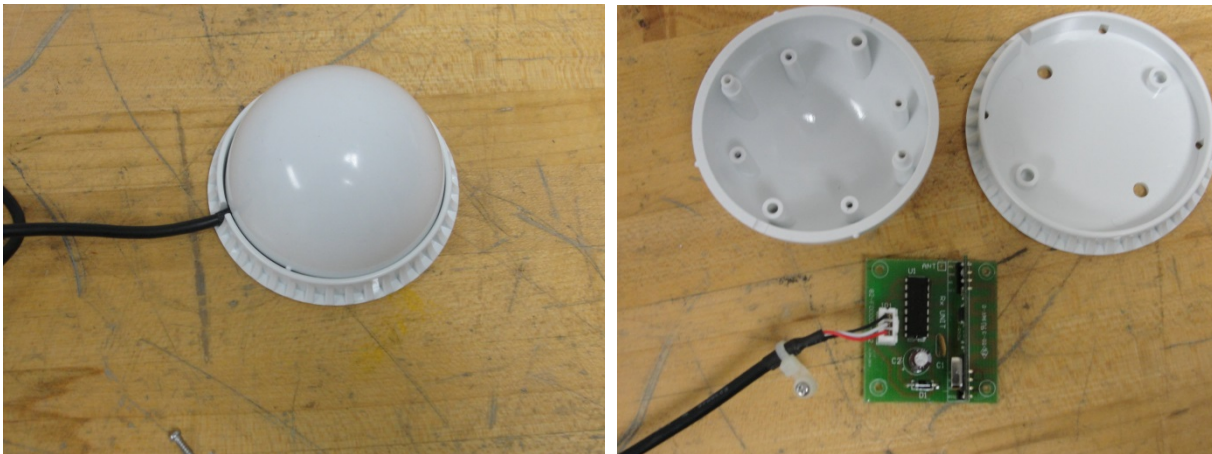


FIGURE 31: REAPEATER (RECEIVER) External and Internal View

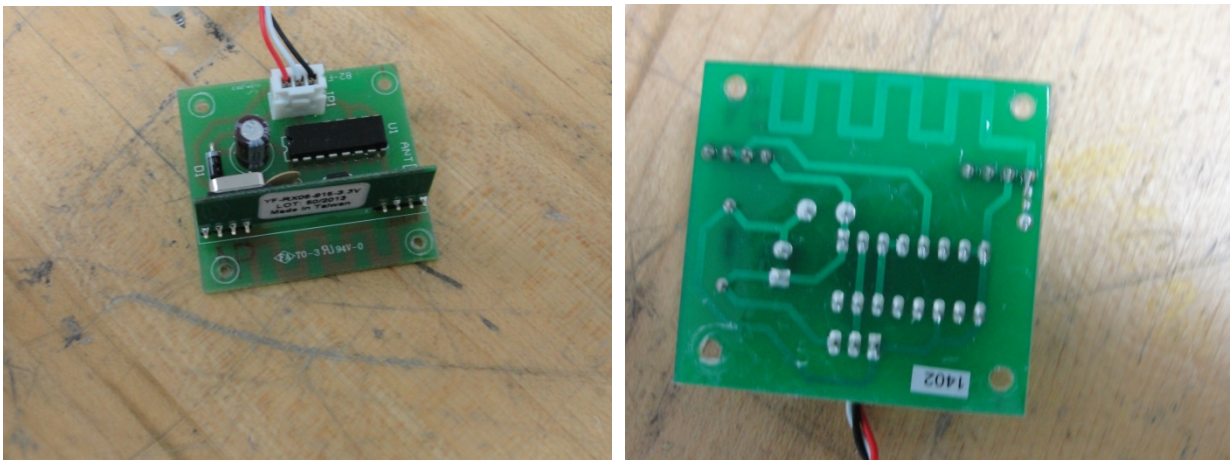


FIGURE 32: REAPEATER (RECEIVER) PCB View

2.2 Modification Letter

To Whom It May Concern:

The EUT described in this report, wireless pool Controller Transmitter was tested to the requirements of Part 15.249. The Receiver system was tested to the requirements of Part 15.209

For further information, please contact the manufacturer at:

S.R. Smith
1017 SW Berg Parkway
Canby, OR 97013 U.S.A.

**APPENDIX A**

Product Table for Use with FCC ID# 2ABMM-WPCPT6WIR				
WPC System	Basic Description	Differences	WPC Transmitter	WPC System Label
WPC-1 System	Control panel for pool pump using time clock and two, switched 110VAC lighting circuits. The lighting circuits are controlled by either the 915 MHz RF remote or on-board manual switches. Two channel configuration.		2 Control Buttons & 1 Power Button	94-15253-xx
WPC-2 System	Similar to WPC-1	Larger panel to include a 100A load center.	2 Control Buttons & 1 Power Button	94-15253-xx
PT-6000 System	Similar to WPC-1 except "Tower" style enclosure. Also contains two 30W Transformers.	No pool pump control.	2 Control Buttons & 1 Power Button	94-15253-xx
WIR-Tran System	Similar to WPC-1 except controls one switched 110VAC lighting circuit with one 12VAC transformer. One channel configuration.	Smaller enclosure system.	1 Power Button	94-15253-xx

Key: -xx refers to the variations of the WPC System shell and label