Excellence in Compliance Testing

Certification Test Report

FCC ID: U4A-YRHCPZW0
IC: 6982A-YRHCPZW0

FCC Rule Part: 15.249
IC Radio Standards Specification: RSS-210

ACS Report Number: 12-0002.W04.1A

Manufacturer: Assa Abloy Inc.
Models: YRD220-ZW, YRD210-ZW, YRT210-ZW, YRT220-ZW

Test Begin Date: January 17, 2012
Test End Date: January 17, 2012

Report Issue Date: February 17, 2012

FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612-0

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Reviewed by:
Kirby Munroe
Director, Wireless Certifications
ACS, Inc.

This report contains 14 pages

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1 GENERAL

1.1 Purpose

The purpose of this report is to demonstrate compliance with Part 15 Subpart C of the FCC's Code of Federal Regulations and Industry Canada's Radio Standards Specification RSS-210 for a Class II Permissive Change.

The purpose of this Class II Permissive Change is to add four electrically identical model variants.

1.2 Product description

The Yale Real Living door locks contain a digital keypad for entering access codes that can unlock the door. The product also contains RF circuitry that allows lock operation via RF signals from an appropriate home automation system controller based on a Zwave module operating at 908.4 MHz. The locks are low powered and power is sourced from 4 AA batteries located inside the lock housings.

The original certified model is the YRDZW Touch Screen Deadbolt lock. This model is identical to model YRD220-ZW Touch Screen Deadbolt lock identified below. The change in model number is strictly to address product identification. No changes from the originally certified device where made.

The four additional models being included in the equipment authorization are described as follows:

Model Number	YRD220-ZW	Touch Screen Deadbolt (Equivalent to original YRDZW)
Model Number	YRD210-ZW	Push Button Deadbolt
Model Number	YRT210-ZW	Push Button Lever lock
Model Number	YRT220-ZW	Touch Screen Lever lock

All models are electrically identical with respect to the RF circuitry and differ only in user interface (pushbutton / touchscreen interface) and mechanical functionality (deadbolt / lever operation).

Technical Information:
Frequency of Operation: 908.4 MHz
Number of Channels: 1
Modulation Format: FSK
Antenna Type/Gain: Trace PCB antenna; -5.7dBi
Operating Voltage: 6Vdc (4-AA Batteries)

Manufacturer Information:
Assa Abloy Inc.
110 Sargent Dr.
New Haven, CT 06511

Test Sample Serial Number(s): YRD210-ZW-U5N15100097, YRT210-ZW-NA, YRT220-ZW-NA

Test Sample Condition: The test samples were provided in good working order with no visible defects.

1.3 Test Methodology and Considerations

Models YRD210-ZW, YRT210-ZW and YRT220-ZW were evaluated for radiated emissions to address variations in user interface and mechanical functionality. Model YRD220-ZW is equivalent to the model included in the original certification therefore evaluation was not required. The EUTs were tested in an orientation of typical installation.

2 TEST FACILITIES

2.1 Location

The radiated and conducted emissions test sites are located at the following address:

Advanced Compliance Solutions
5015 B.U. Bowman Drive
Buford, GA 30518
Phone: (770) 831-8048
Fax: (770) 831-8598

2.2 Laboratory Accreditations/Recognitions/Certifications

ACS is accredited to ISO/IEC 17025 by the National Institute of Standards and Technology under their National Voluntary Laboratory Accreditation Program (NVLAP), Lab Code 200612-0. Unless otherwise specified, all tests methods described within this report are covered under the ISO/IEC 17025 scope of accreditation.

The Semi-Anechoic Chamber Test Site, Open Area Test Site (OATS) and Conducted Emissions Site have been fully described, submitted to, and accepted by the FCC, Industry Canada and the Japanese Voluntary Control Council for Interference by information technology equipment.

FCC Registration Number: 511277
Industry Canada Lab Code: 4175A-1
VCCI Member Number: 1831

- VCCI OATS Registration Number R-1526
- VCCI Conducted Emissions Site Registration Number: C-1608

2.3 Radiated Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site

The Semi-Anechoic Chamber Test Site consists of a 20' x 30' x 18' shielded enclosure. The chamber is lined with Toyo Ferrite Grid Absorber, model number FFG-1000. The ferrite tile grid is 101 x 101 x 19mm thick and weighs approximately 550 grams. These tiles are mounted on steel panels and installed directly on the inner walls of the chamber.

The turntable is 150cm in diameter and is located 160cm from the back wall of the chamber. The chamber is grounded via 1 - 8' copper ground rod, installed at the center of the back wall, it is bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is all steel, flush mounted table installed in an all steel frame. The table is remotely operated from inside the control room located 25' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Behind the turntable is a 3' x 6' x 4' deep shielded pit used for support equipment if necessary. The pit is equipped with 1 - 4" PVC chases from the turntable to the pit that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit.

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3-1 below:

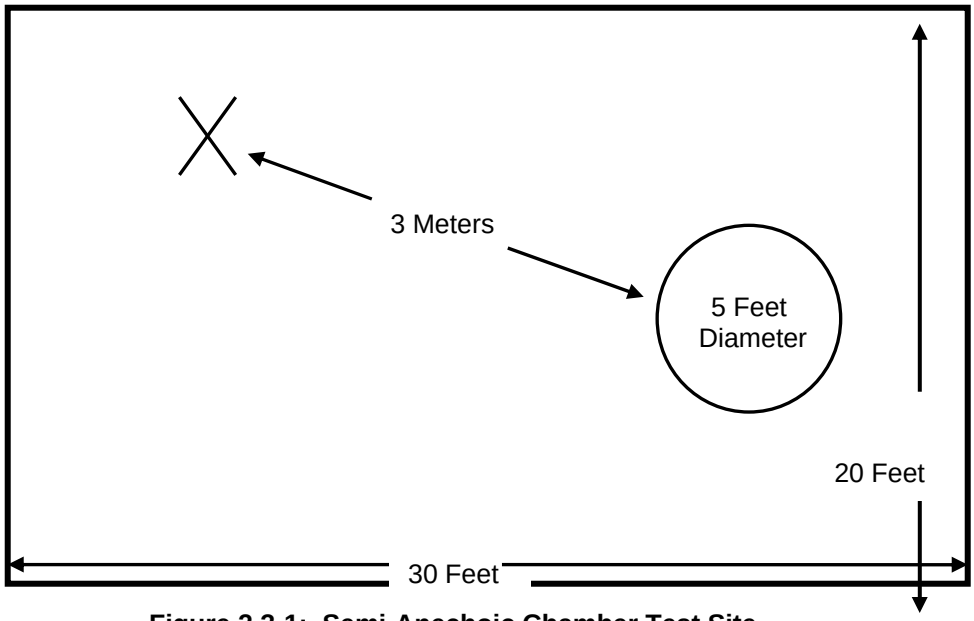


Figure 2.3-1: Semi-Anechoic Chamber Test Site

2.3.2 Open Area Tests Site (OATS)

The open area test site consists of a 40’ x 66’ concrete pad covered with a perforated electro-plated galvanized sheet metal. The perforations in the sheet metal are 1/8” holes that are staggered every 3/16”. The individual sheets are placed to overlap each other by 1/4” and are riveted together to provide a continuous seam. Rivets are spaced every 3” in a 3 x 20 meter perimeter around the antenna mast and EUT area. Rivets in the remaining area are spaced as necessary to properly secure the ground plane and maintain the electrical continuity.

The entire ground plane extends 12’ beyond the turntable edge and 16’ beyond the antenna mast when set to a 10 meter measurement distance. The ground plane is grounded via 4 - 8’ copper ground rods, each installed at a corner of the ground plane and bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is an all aluminum 10’ flush mounted table installed in an all aluminum frame. The table is remotely operated from inside the control room located 40’ from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Adjacent to the turntable is a 7’ x 7’ square and 4’ deep concrete pit used for support equipment if necessary. The pit is equipped with 5 - 4” PVC chases from the pit to the control room that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit. The pit is covered with 2 sheets of 1/4" diamond style re-enforced steel sheets. The sheets are painted to match the perforated steel ground plane; however the underside edges have been masked off to maintain the electrical continuity of the ground plane. All reflecting objects are located outside of the ellipse defined in ANSI C63.4.

A diagram of the Open Area Test Site is shown in Figure 2.3-2 below:

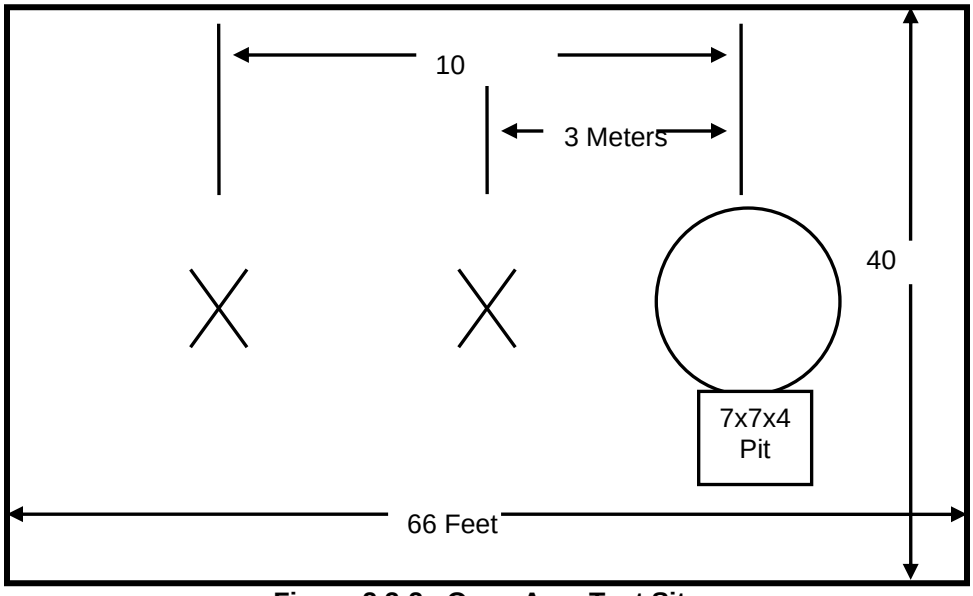


Figure 2.3-2: Open Area Test Site

3 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ANSI C63.4-2003: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9KHz to 40GHz
- US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2011
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2011
- Industry Canada Radio Standards Specification: RSS-210 - Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Issue 8, December 2010
- Industry Canada Radio Standards Specification: RSS-GEN – General Requirements and Information for the Certification of Radiocommunication Equipment, Issue 3, December 2010.

4 LIST OF TEST EQUIPMENT

The calibration interval of test equipment is annually or the manufacturer's recommendations. Where the calibration interval deviates from the annual cycle based on the instrument manufacturer's recommendations, it shall be stated below.

Table 4-1: Test Equipment

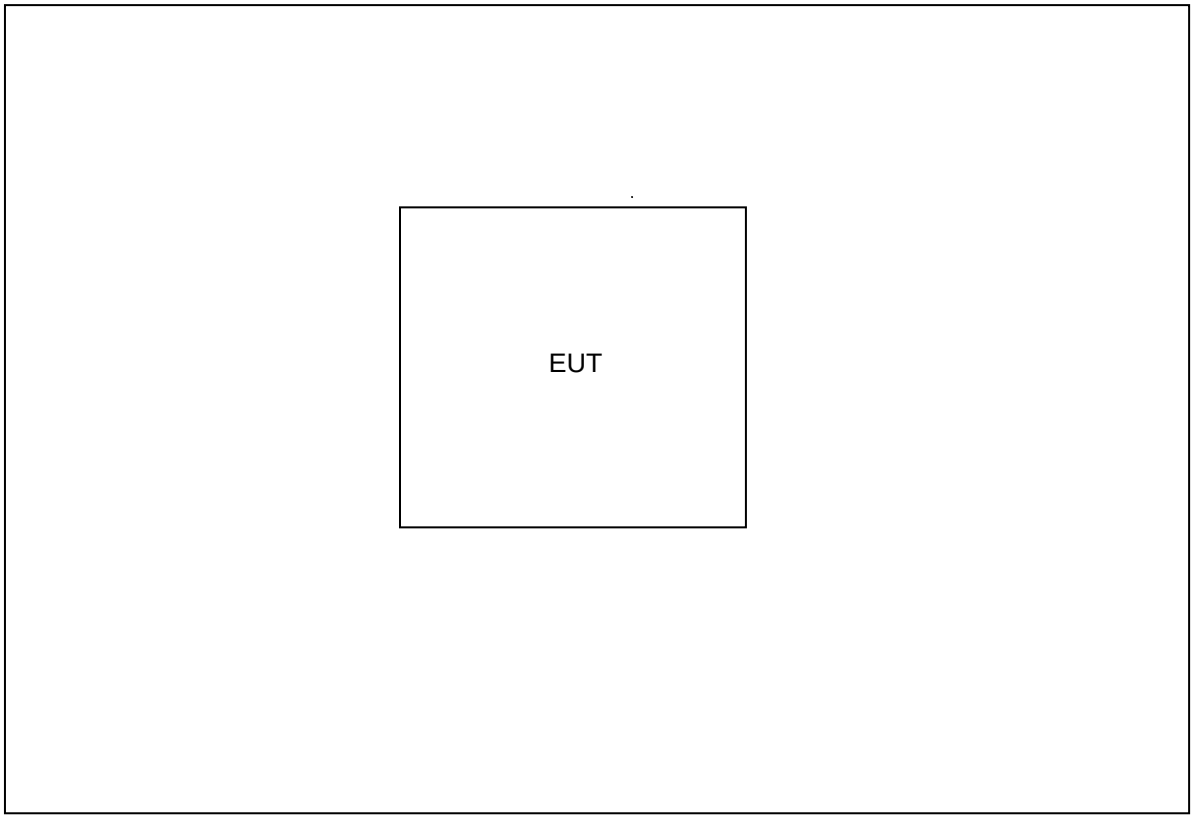
AssetID	Manufacturer	Model #	Equipment Type	Serial #	Last Calibration Date	Calibration Due Date
1	Rohde & Schwarz	ESMI - Display	Spectrum Analyzers	833771/007	9/23/2010	9/23/2012
2	Rohde & Schwarz	ESMI-Receiver	Spectrum Analyzers	839587/003	9/23/2010	9/23/2012
30	Spectrum Technologies	DRH-0118	Antennas	970102	4/27/2011	4/27/2013
40	EMCO	3104	Antennas	3211	2/11/2011	2/11/2013
73	Agilent	8447D	Amplifiers	2727A05624	9/30/2011	9/30/2012
167	ACS	Chamber EMI Cable Set	Cable Set	167	1/26/2011	1/26/2012
291	Florida RF Cables	SMRE-200W-12.0-SMRE	Cables	None	12/2/2011	12/2/2012
292	Florida RF Cables	SMR-290AW-480.0-SMR	Cables	None	4/11/2011	4/11/2012
331	Microwave Circuits	H1G513G1	Filters	31417	7/11/2011	7/11/2012
338	Hewlett Packard	8449B	Amplifiers	3008A01111	3/24/2011	3/24/2012
412	Electro Metrics	LPA-25	Antennas	1241	7/28/2010	7/28/2012
422	Florida RF	SMS-200AW-72.0-SMR	Cables	805	12/2/2011	12/2/2012

5 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Item	Equipment Type	Manufacturer	Model Number	Serial Number
The EUT is stand alone battery operated therefore no support equipment was utilized.				

6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM



7 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document.

7.1 Antenna Requirement – FCC: Section 15.203

The EUT utilizes a Trace PCB antenna which cannot be removed without permanently damaging the device thus satisfying Part 15.203. The gain on the antenna is -5.7dBi.

7.2 Power Line Conducted Emissions – FCC: Section 15.207 IC: RSS-Gen 7.2.4

7.2.1 Measurement Procedure

The EUT is a battery operated device therefore AC power line conducted emissions is not applicable.

7.3 Fundamental Field Strength – FCC: Section 15.249(a) IC: RSS-210 A2.9(a)

7.3.1 Measurement Procedure

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For fundamentals below 1GHz, quasi-peak measurements were made using a resolution bandwidth (RBW) of 120 kHz and a video bandwidth (VBW) of 300 kHz. For fundamentals above 1GHz, peak and average measurements were made using a resolution bandwidth (RBW) of 1 MHz and a video bandwidth (VBW) of 3 MHz.

7.3.2 Measurement Results

Results are shown below in Tables 7.3.2-1 – 7.3.2-3.

Table 7.3.2-1: Fundamental Field Strength – YRT220-ZW

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
908.4	---------	81.52	H	0.19	---------	81.71	--------	94.0	---------	12.3
908.4	---------	79.34	V	0.19	---------	79.53	--------	94.0	---------	14.5

Table 7.3.2-2: Fundamental Field Strength – YRT210-ZW

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
908.4	---------	82.67	H	0.19	---------	82.86	--------	94.0	---------	11.1
908.4	---------	78.57	V	0.19	---------	78.76	--------	94.0	---------	15.2

Table 7.3.2-3: Fundamental Field Strength – YRD210-ZW

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
908.4	---------	79.37	H	0.19	---------	79.56	--------	94.0	---------	14.4
908.4	---------	82.25	V	0.19	---------	82.44	--------	94.0	---------	11.5

7.4 Radiated Spurious Emissions - FCC: Section 15.249(a)(d)(e); IC:RSS-210 A2.9(a)(b)

7.4.1 Measurement Procedure

Radiated emissions tests were made over the frequency range of 30MHz to 10 GHz, 10 times the highest fundamental frequency.

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 120 kHz and a video bandwidth VBW of 300 kHz. For frequencies above 1000MHz, peak and average measurements were made with RBW and VBW of 1 MHz and 3 MHz respectively.

All out of band emissions were evaluated, including any emissions at or near the band-edge.

7.4.2 Measurement Results

Radiated spurious emissions found in the band of 30MHz to 10GHz are reported in the tables 7.4.2-1 to 7.4.2-3 below.

Table 7.4.2-1: Radiated Spurious Emissions Tabulated Data – YRT220-ZW

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
1816.792	50.15	42.19	H	-7.70	42.45	34.49	74.0	54.0	31.5	19.5
1816.792	48.18	39.07	V	-7.70	40.48	31.37	74.0	54.0	33.5	22.6

Table 7.4.3-2: Radiated Spurious Emissions Tabulated Data – YRT210-ZW

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
1816.792	50.27	43.06	H	-7.70	42.57	35.36	74.0	54.0	31.4	18.6
1816.792	48.11	38.31	V	-7.70	40.41	30.61	74.0	54.0	33.6	23.4

Table 7.4.3-3: Radiated Spurious Emissions Tabulated Data – YRD210-ZW

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
1816.792	51.72	43.03	H	-7.70	44.02	35.33	74.0	54.0	30.0	18.7
1816.792	50.14	42.42	V	-7.70	42.44	34.72	74.0	54.0	31.6	19.3
2725.188	48.16	38.59	V	-4.05	44.11	34.54	74.0	54.0	29.9	19.5

7.4.3 Sample Calculation:

$R_C = R_U + CF_T$

Where:

CF_T	=	Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)
R_U	=	Uncorrected Reading
R_C	=	Corrected Level
AF	=	Antenna Factor
CA	=	Cable Attenuation
AG	=	Amplifier Gain
DC	=	Duty Cycle Correction Factor

Example Calculation: Peak
Corrected Level: 51.72 - 7.70 = 44.02dBuV
Margin: 74dBuV – 44.02dBuV = 30.0dB

Example Calculation: Average
Corrected Level: 43.03 - 7.70 - 0 = 35.33dBuV
Margin: 54dBuV – 35.33dBuV = 18.7dB

8 CONCLUSION

In the opinion of ACS, Inc. models YRD220-ZW, YRD210-ZW, YRT210-ZW and YRT220-ZW, manufactured by Assa Abloy meet the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-210.

END REPORT