Excellence in Compliance Testing

Certification Test Report

FCC ID: U4A-SCYPROX2
IC: 6982A-SCYPROX2

FCC Rule Part: 15.225
IC Specification: RSS-210

ACS Report Number: 09-0176-15C

Manufacturer: Assa Abloy, Inc.
Model: Bored/Exits, Mortise

Test Begin Date: July 9, 2009
Test End Date: July 10, 2009

Report Issue Date: July 23, 2009

FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612-0

This report is not be used to claim certification, approval, or endorsement by NVLAP, NIST or any government agency.

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1.0 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.

1.2 Product Description

The SARGENT Harmony series H2 mortise lock is designed to interface with existing Wiegand Electronic Access Control (EAC) panels. The reader requires 12 or 24VDC for power and is compatible with HID iCLASS® 13.56MHz technology. Harmony series technology is backed by SARGENT's Grade 1 hardware. The mortise lock monitors Request to Exit and door position monitoring all inside the lock body and is available in 12 or 24VDC.

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

Test Sample Serial Number(s):RD000034

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

Detailed photographs of the EUT are filed separately with this filing.

1.3 Test Methodology and Considerations

The HID iCLASS Reader/Writer family of products is designed to communicate with a transponder IC using an RF interface at distances up to 5". The transmitter/receiver antenna emits a 13.56MHz AC magnetic field. The field "powers up" a passive tag which is brought into the vicinity of the antenna. The tag, when powered, operates as a field disturbance device and either receives or returns a serial data stream.

The "door frame" test fixture was unavailable at the time of power line conducted emissions testing (part 15.207). Therefore the device was tested in a standalone condition in the same orientation as it was inside the test fixture. The electronics are electrically identical for the Bored/Exits and Mortise models, only the outside enclosures are different. See test setup photos for details.

The block diagram exhibit shows a 125 KHz expansion board. This is for a future device and will not be installed on the U4A-SCYPROX2.

2.0 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

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. In addition, ACS is compliant to ISO/IEC 17025 as certified by the National Institute of Standards and Technology under their National Voluntary Laboratory Accreditation Program. The following certification numbers have been issued in recognition of these accreditations and certifications:

FCC Registration Number: 894540
Industry Canada Lab Code: IC 4175A-1
VCCI Member Number: 1831

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

NVLAP Lab Code: 200612-0

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:

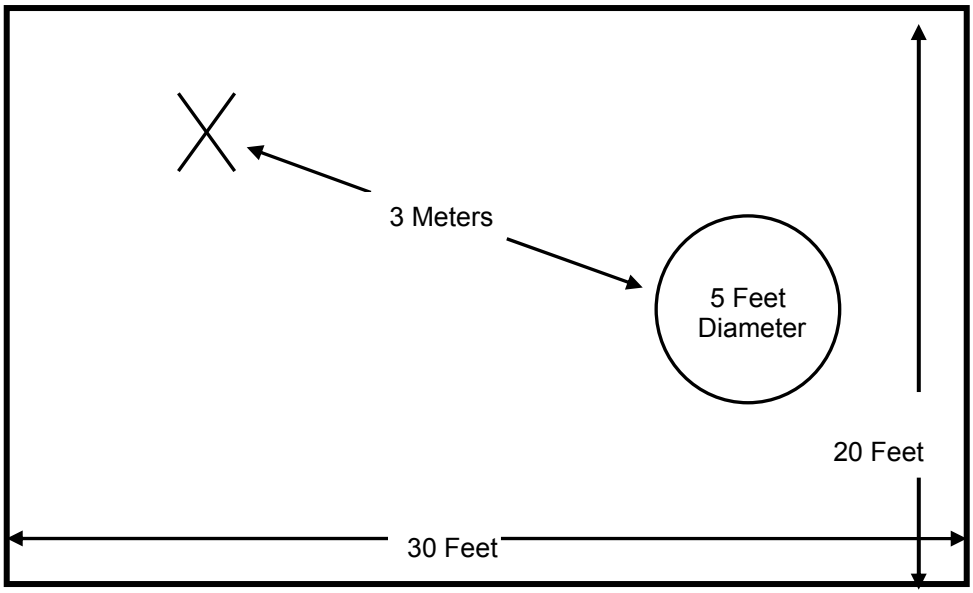

Figure 2.3-1: Semi-Anechoic Chamber Test Site

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:

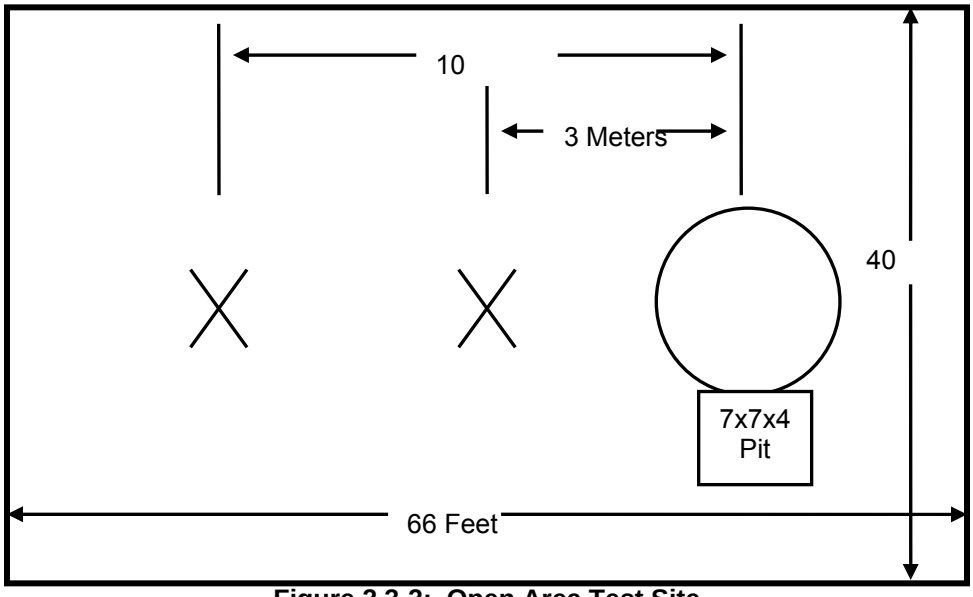

Figure 2.3-2: Open Area Test Site

2.4 Conducted Emissions Test Site Description

The AC mains conducted EMI site is located in the main EMC lab. It consists of an 8' x 8' solid aluminum horizontal group reference plane (GRP) bonded every 3" to an 8' X 8' vertical ground plane.

The site is of sufficient size to test table top and floor standing equipment in accordance with section 6.1.4 of ANSI C63.4.

A diagram of the room is shown below in figure 4.1.3-1:

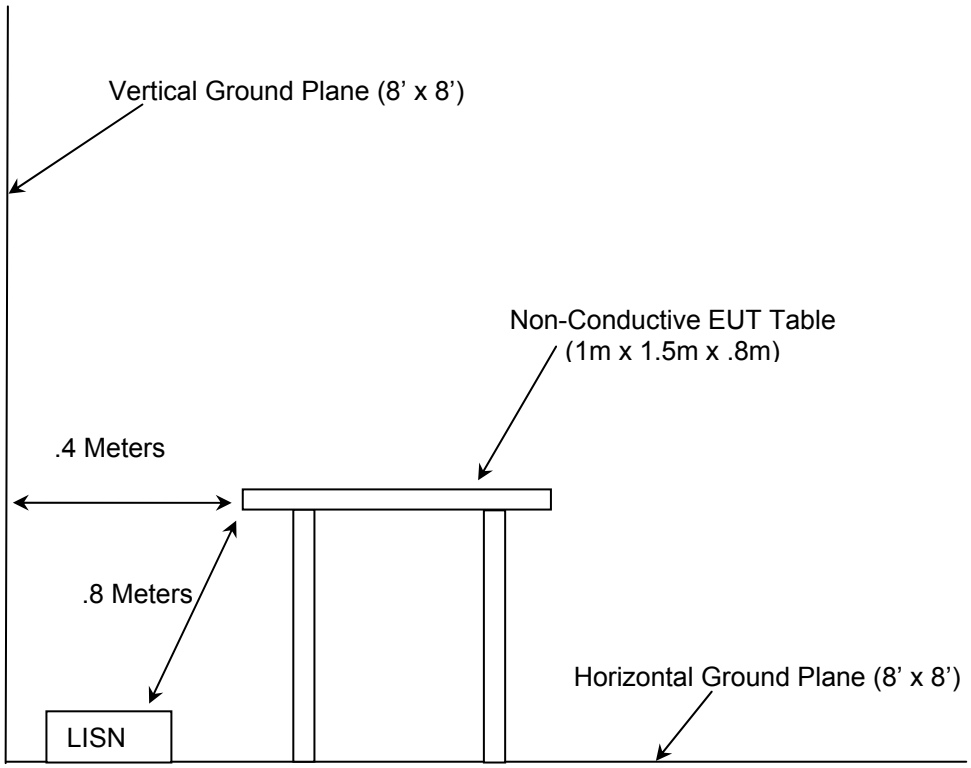

Figure 2.4-1: AC Mains Conducted EMI Site

3.0 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, 2009
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2009
- Industry Canada Radio Standards Specification: RSS-210 - Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Issue 7 June 2007
- Industry Canada Radio Standards Specification: RSS-GEN – General Requirements and Information for the Certification of Radiocommunication Equipment, Issue2, June 2007.

4.0 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

Equipment Calibration Information					
ACS#	**Mfg.**	**Eq. type**	**Model**	**S/N**	**Cal. Due**
1	Rohde & Schwarz	Spectrum Analyzers	ESMI - Display	833771/007	09-19-2009
2	Rohde & Schwarz	Spectrum Analyzers	ESMI-Receiver	839587/003	09-19-2009
324	ACS	Cables	324	Conducted EMI Cable	07-28-2009 (See Note1)
25	Chase	Antennas	CBL6111	1043	08-22-2009
78	EMCO	Antennas	6502	9104-2608	01-20-2010
140	Thermotron	Environmental Chamber	SM-16C	19639	08-30-2009
152	EMCO	LISN	Feb-25	9111-1905	03-25-2010
22	Agilent	Amplifiers	8449B	3008A00526	10-22-2009
167	ACS	Cables	Chamber EMI Cable Set	167	02-06-2010 (See Note1)
168	Hewlett Packard	Attenuators	11947A	44829	02-10-2010 (See Note2)
283	Rohde & Schwarz	Spectrum Analyzers	FSP40	1000033	09-19-2009
321	Hewlett Packard	Amplifiers	HPC 8447D	1937A02809	10-08-2009
30	Spectrum Technologies	Antennas	DRH-0118	970102	05-08-2010
338	Hewlett Packard	Amplifiers	8449B	3008A01111	10-22-2009
291	Florida RF Cables	Cables	SMRE-200W-12.0-SMRE	None	11-24-2009 (See Note1)
292	Florida RF Cables	Cables	SMR-290AW-480.0-SMR	None	11-24-2009 (See Note1)
343	Florida RF Cables	Cables	SMRE-200W-12.0-SMRE	N/A	11-24-2009 (See Note1)

Note1: Items characterized on an annual cycle. The date shown indicates the next characterization due date.
Note2: Items verified on an annual cycle. The date shown indicates the next verification due date.

5.0 SUPPORT EQUIPMENT

Table 5-0: Support Equipment

Item #	Manufacturer	Equipment Type	Model Number	Serial Number
1	Assa Abloy	EUT	Bored/Exits, Mortise	RD000034
2	Assa Abloy	Weigand Tester w/ Wiring Harness	WT1	760-20500
3	Assa Abloy	Door Frame Test Fixture	N/A	N/A
4	PHC	Switching Adapter	SYS1308-2424-W2	G080503077594

6.0 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

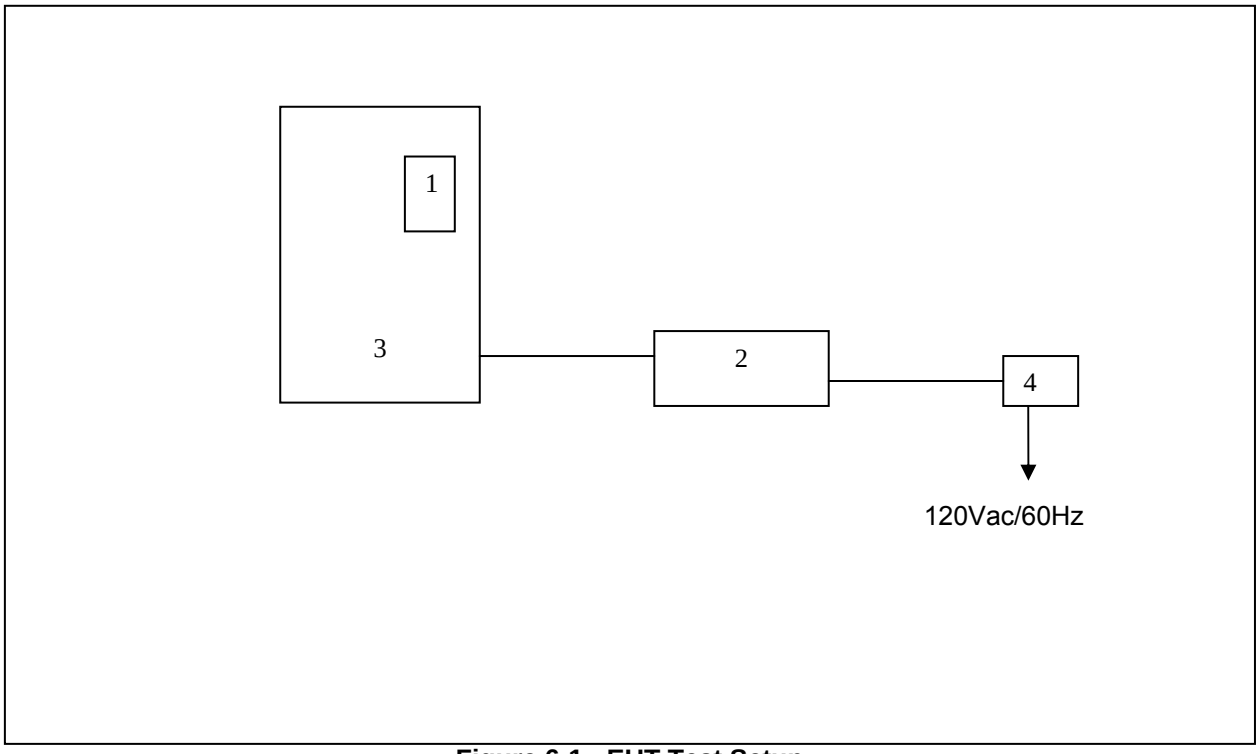

Figure 6-1: EUT Test Setup

See Test Setup photographs for additional detail.

7.0 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

Antenna is a loop antenna etched onto the PCB board thus satisfying the requirement of 15.203.

7.2 Power Line Conducted Emissions – FCC CFR 47 Part 15.207

7.2.1 Test Methodology

ANSI C63.4 sections 6 and 7 were the guiding documents for this evaluation. Conducted emissions were performed from 150kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 9kHz and the video bandwidth set to 30kHz. The calculation for the conducted emissions is as follows:

Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss
Margin = Applicable Limit - Corrected Reading

7.2.2 Test Results

Results of the test are shown below in and Table 7.2-1 to 7.2-2 and Figures 7.2-1 to 7.2-2.

Table 7.2-1: Conducted EMI Results – Line 1

Frequency (MHz)	Level (dBuV)	Transducer (dB)	Limit (dBuV)	Margin (dB)	Line	PE	Detector
0.336	40.5	10	59	18.8	L1	FLO	QP
0.552	29.9	10	56	26.2	L1	FLO	QP
1.056	29.5	10	56	26.5	L1	FLO	QP
1.374	30	10	56	26	L1	FLO	QP
4.734	30.3	10	56	25.7	L1	FLO	QP
20.682	33.9	9.6	60	26.1	L1	FLO	QP
28.182	32.8	9.3	60	27.2	L1	FLO	QP
29.214	36.4	9.2	60	23.6	L1	FLO	QP
29.736	41.8	9.2	60	18.2	L1	FLO	QP
29.994	44.3	9.2	60	15.7	L1	FLO	QP
0.336	39.5	10	49	9.8	L1	FLO	AVG
0.594	27.8	10	46	18.2	L1	FLO	AVG
1.014	29.8	10	46	16.2	L1	FLO	AVG
1.332	29.2	10	46	16.8	L1	FLO	AVG
4.776	27.4	10	46	18.6	L1	FLO	AVG
20.682	28.8	9.6	50	21.2	L1	FLO	AVG
28.182	27.4	9.3	50	22.6	L1	FLO	AVG
29.292	26.8	9.2	50	23.2	L1	FLO	AVG
29.736	35.5	9.2	50	14.5	L1	FLO	AVG
29.994	37.4	9.2	50	12.6	L1	FLO	AVG

Table 7.2-2: Conducted EMI Results – Line 2

Frequency (MHz)	Level (dBuV)	Transducer (dB)	Limit (dBuV)	Margin (dB)	Line	PE	Detector
0.336	40.5	10	59	18.8	L2	FLO	QP
1.014	31.4	10	56	24.6	L2	FLO	QP
1.416	31.9	10	56	24.1	L2	FLO	QP
4.128	26.3	9.9	56	29.7	L2	FLO	QP
13.56	57	9.9	60	3	L2	FLO	QP
20.946	35.7	9.4	60	24.3	L2	FLO	QP
29.22	38.1	9.2	60	21.9	L2	FLO	QP
29.478	40.1	9.2	60	19.9	L2	FLO	QP
29.994	44.2	9.2	60	15.8	L2	FLO	QP
0.36	36.8	10	49	11.9	L2	FLO	AVG
1.05	18.6	10	46	27.4	L2	FLO	AVG
1.374	30.1	10	46	15.9	L2	FLO	AVG
4.146	17	9.9	46	29	L2	FLO	AVG
13.554	27.5	9.9	50	22.5	L2	FLO	AVG
21.204	29.5	9.3	50	20.5	L2	FLO	AVG
29.22	31.7	9.2	50	18.3	L2	FLO	AVG
29.478	33.6	9.2	50	16.4	L2	FLO	AVG
29.994	37.4	9.2	50	12.6	L2	FLO	AVG

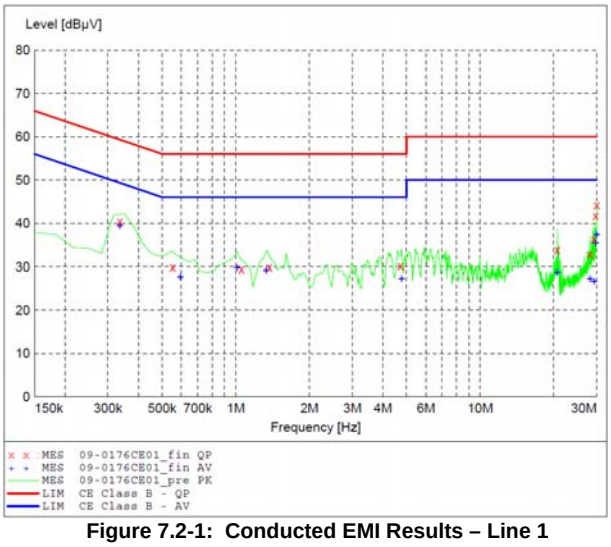

Figure 7.2-1: Conducted EMI Results – Line 1

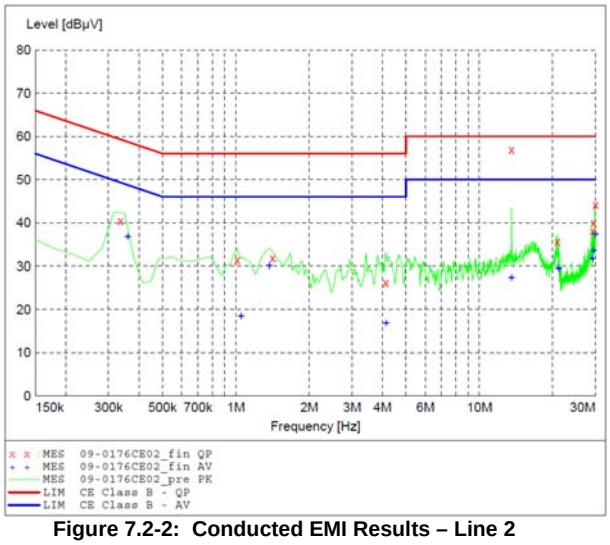

Figure 7.2-2: Conducted EMI Results – Line 2

7.3 Radiated Emissions – Intentional Radiation

7.3.1 In-Band Emissions Limitations – FCC CFR 47 Part 15.225(a),(b),(c)

7.3.1.1 Test Methodology

Measurements below 30MHz were performed in a semi-anechoic chamber with a 3 meter separation distance between the EUT and measurement antenna. The EUT was rotated 360º and the loop antenna rotated about the vertical axis to maximize each emission. The magnetic loop receiving antenna was positioned with its center 1 meter above the ground.

The spectrum analyzer's resolution and video bandwidths were set to 9 kHz and 30 kHz respectively. A peak detector was used which shows worst case. The measurements were corrected by a distance correction factor, antenna correction factors, and cable loss for comparison to the limits. Sample correction factors and calculations can be found section 7.3.2.2 and 7.3.2.4.

7.3.1.2 Test Results

Compliance with the emissions levels are shown in figure 7.3.1-1 and 7.3.1-2 below.

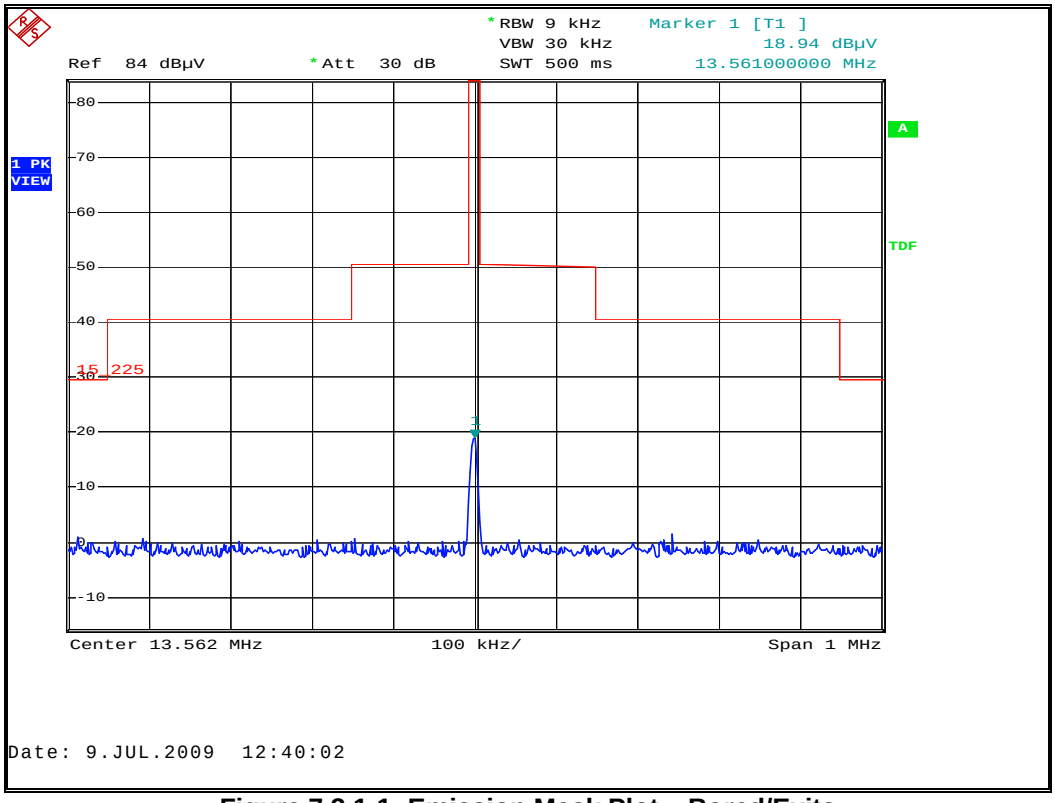

Figure 7.3.1-1: Emission Mask Plot – Bored/Exits

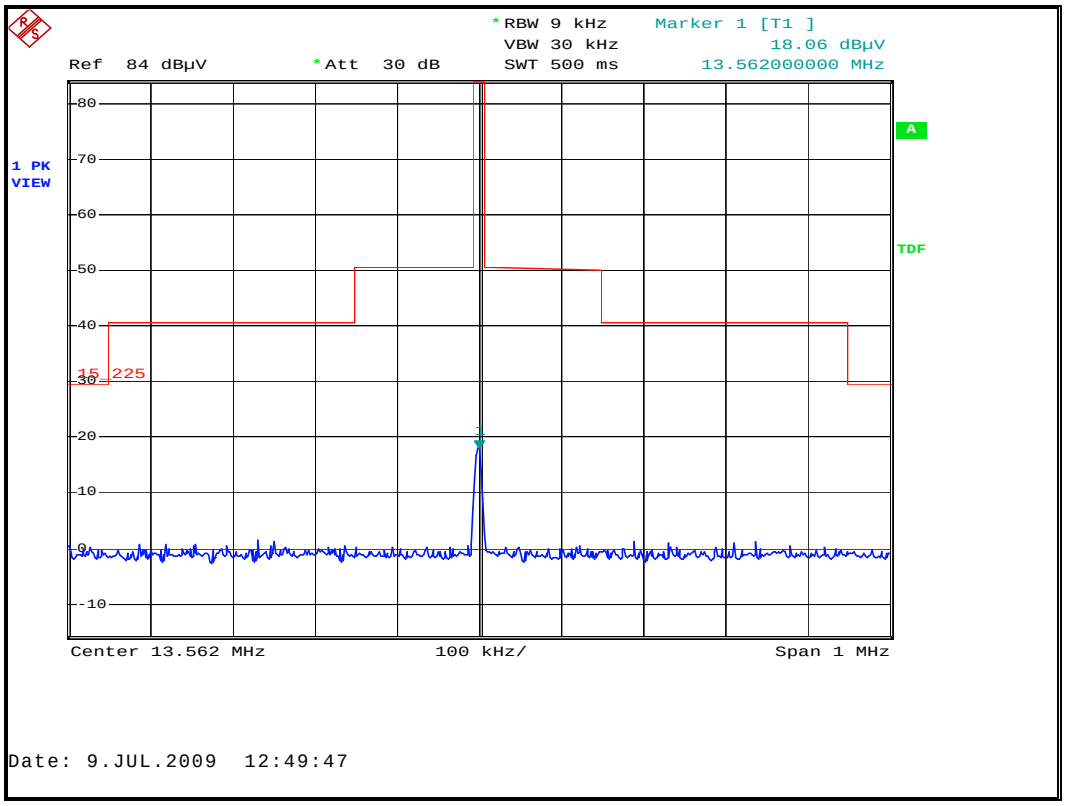

Figure 7.3.1-2: Emission Mask Plot – Mortise

7.3.2 Out-of-Band Emission Limitations – FCC CFR 47 Part 15.225(d) / 15.209

7.3.2.1 Test Methodology

Section 15.33(a)(4) specifies, if the intentional radiator contains a digital device, regardless of whether this digital device controls the functions of the intentional radiator or the digital device is used for additional control or function purposes other than to enable the operation of the intentional radiator, the frequency range shall be investigated up to frequency specified in 15.33(b)(1) for unintentional radiators. The upper frequency range for the digital device is 1000MHz which greater than the 10th harmonic of the fundamental frequency. The upper frequency range measured was 1000MHz.

Measurements below 30MHz were performed in a semi-anechoic chamber with a 3 meter separation distance between the EUT and measurement antenna. The EUT was rotated 360º and the loop antenna rotated about the vertical axis to maximize each emission. The magnetic loop receiving antenna was positioned with its center 1 meter above the ground.

For measurements in the frequency bands 9-90 kHz and 110-490 kHz, an average detector was used. When average measurements are specified, the peak emissions were also compared to a limit corresponding to 20 dB above the maximum permitted average limit according to Part 15.35. All other emissions were measured using a Quasi-peak detector. The final measurements were then corrected by a distance correction factor, antenna correction factors, and cable loss for comparison to the limits.

Measurements above 30MHz were performed in a semi-anechoic chamber with a 3 meter separation distance between the EUT and measurement antenna. 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.

The spectrum analyzer's resolution bandwidth was set to equal to or greater than 100 Hz from 9 kHz to 150 kHz, 9 kHz from 150 kHz to 30 MHz, 120 kHz from 30 MHz to 1000 MHz, and 1 MHz from 1 GHz to 40 GHz.

7.3.2.2 Distance Correction for Measurements Below 30 MHz – Part 15.31

Radiated measurements were performed at a distance closer than 30m as required according to Part 15.209. Therefore a correction factor was applied to account for propagation loss at the specified distance. The propagation loss was determined by using the square of an inverse linear distance extrapolation factor (40dB/decade) according to 15.31. A sample calculation of the distance correction factor is shown below for limits expressed at a 30m measurement distance.

Distance correction factor (30m Specified Test Distance) = 40*Log (Test Distance/30)
= 40*Log (3/30)
= - 40 dB

7.3.2.3 Test Results

Radiated spurious emissions found are reported in Tables 7.3.2-1.

Table 7.3.2-1: Radiated Spurious Emissions – Bored/Exits

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
27.12	---------	26.94	---------	10.01	---------	36.96	--------	69.5	---------	32.54
54.2		49.16	V	-18.51	---------	30.65	--------	40.0	---------	9.35
65		44.23	V	-20.30	---------	23.93	--------	40.0	---------	16.07
95		50.53	V	-14.50	---------	36.03	--------	43.5	---------	7.47
122		52.56	V	-12.40	---------	40.16	--------	43.5	---------	3.34
596.91		33.82	V	-3.93	---------	29.89	--------	46.0	---------	16.11
842.64		20.56	H	0.75	---------	21.31	--------	46.0	---------	24.69

Note: Spurious emissions associated with the transmitter that are not reported in the table above are below the noise floor of the measurement system.

Table 7.3.2-1: Radiated Spurious Emissions - Mortise

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
27.12	---------	28.15	---------	10.01	---------	38.17	--------	69.5	---------	31.33
54.2		49.16	V	-18.51	---------	30.65	--------	40.0	---------	9.35
65		44.23	V	-20.30	---------	23.93	--------	40.0	---------	16.07
95		50.53	V	-14.50	---------	36.03	--------	43.5	---------	7.47
122		52.56	V	-12.40	---------	40.16	--------	43.5	---------	3.34
596.91		33.82	V	-3.93	---------	29.89	--------	46.0	---------	16.11
842.64		20.56	H	0.75	---------	21.31	--------	46.0	---------	24.69

Note: Spurious emissions associated with the transmitter that are not reported in the table above are below the noise floor of the measurement system.

7.3.2.4 Sample Calculation:
Example Calculation – Average/Quasi-Peak Limit < 30MHz

Limit (dBuV/m) = 20*log(30) - Distance Correction Factor (Section 7.3.2.2)
Limit (dBuV/m) = 29.5 + 40
Limit (dBuV/m) = 69.5

$R_C = R_U + CF_T$

Where:
CF_T = Total Correction Factor (AF+CA+AG)
R_U = Uncorrected Reading
R_C = Corrected Level
AF = Antenna Factor
CA = Cable Attenuation
AG = Amplifier Gain

Corrected Level: 26.94 + 10.01 = 36.96dBuV
Margin: 69.5dBuV – 36.96dBuV = 32.54dB

7.4 99% Occupied Bandwidth

7.4.1 Test Methodology

The spectrum analyzer span was set to 2 to 3 times the estimated bandwidth of the emission. The RBW was to ≥ 1% of the estimated bandwidth. The trace was set to max hold with a peak detector active. The measurement function of the analyzer was utilized to determine the 99% occupied bandwidth.

7.4.2 Test Results

The 99% OBW was measured to be 15.16 kHz. A plot is shown below in Figure 7.4-1.

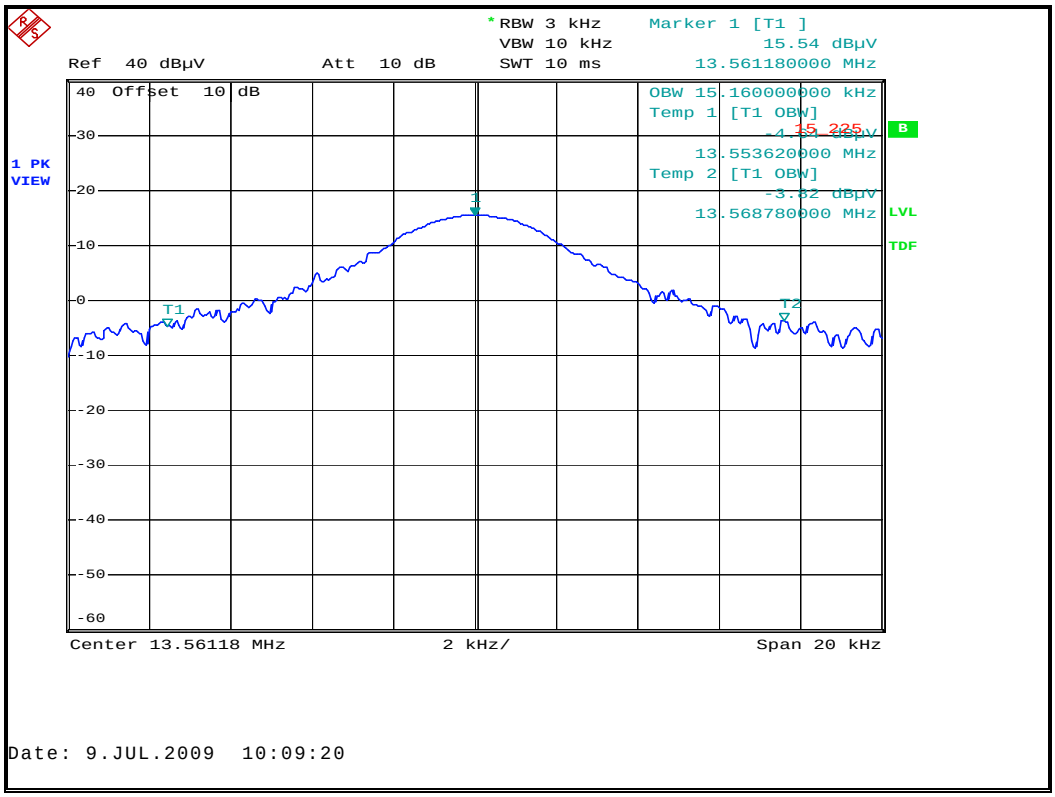

Figure 7.4-1: 99% Bandwidth

7.5 Frequency Stability – FCC CFR 47 Part 15.225

7.5.1 Test Methodology

The equipment under test is placed inside an environmental chamber. The RF output is coupled to the input of the measurement equipment via a near field probe.

Frequency measurements were made at the extremes of the of temperature range -20º C to +50º C and at intervals of 10º C at normal supply voltage. A period of time sufficient to stabilize all components of the equipment was allowed at each frequency measurement. At a temperature 20º C the supply voltage was varied from 85% to 115% from the normal. The maximum variation of frequency was recorded.

The limit from rule part 15.225 is 0.01% or 100ppm.

7.5.2 Test Results
Results of the test are shown below in Figure 7.5-1.

Frequency Stability

Frequency (MHz): 13.561374
Deviation Limit (PPM): 100 ppm (0.01%)

Temperature	Frequency	Frequency Error	Voltage	Voltage
C	MHz	(PPM)	(%)	(VDC)
-20 C	**13.561470**	**7.079**	100%	12.00
-10 C	**13.561410**	**2.655**	100%	12.00
0 C	**13.561408**	**2.507**	100%	12.00
10 C	**13.561380**	**0.442**	100%	12.00
20 C	**13.561374**	**0.000**	100%	12.00
30 C	**13.561360**	**-1.032**	100%	12.00
40 C	**13.561305**	**-5.088**	100%	12.00
50 C	**13.561225**	**-10.987**	100%	12.00
20 C	**13.561396**	**1.622**	85%	10.20
20 C	**13.561408**	**2.507**	100%	13.80

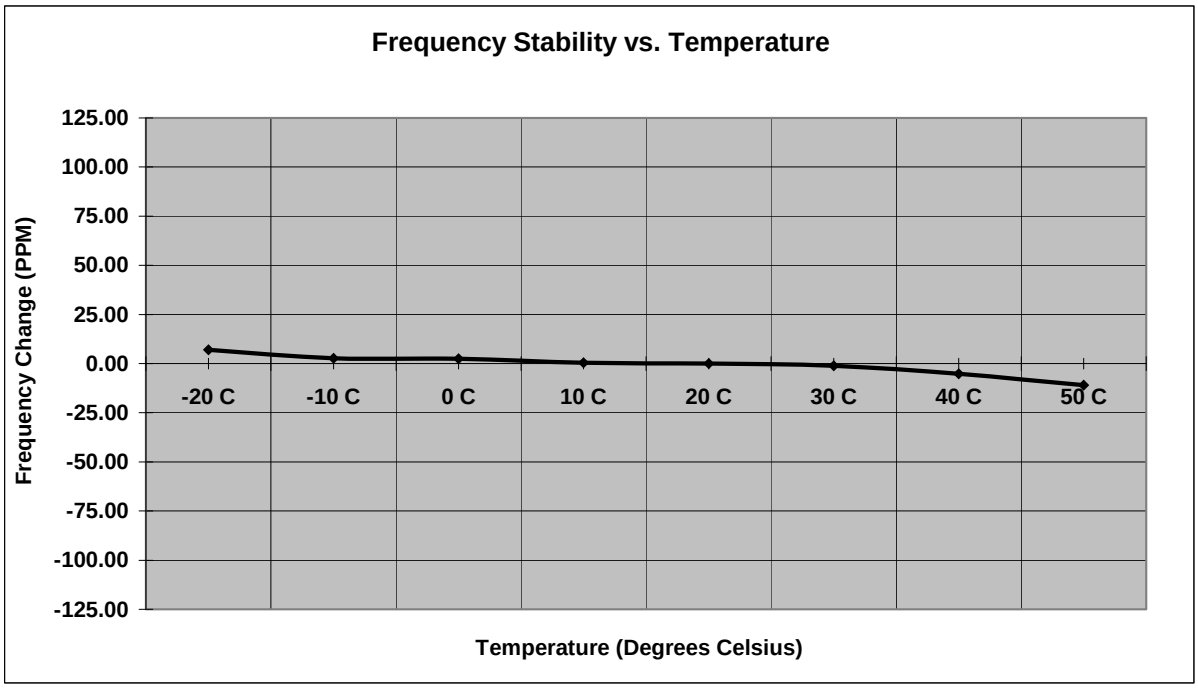

Figure 7.5-1: Frequency Stability

8.0 CONCLUSION
In the opinion of ACS, Inc. the Harmony H2 Series Lock models Bored/Exits and Mortise manufactured by Assa Abloy, Inc. meet the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-210.

END REPORT