Excellence in Compliance Testing

Certification Test Report

FCC ID: U4A-SCYICLS2
IC: 6982A-SCYICLS2

FCC Rule Part: 15.225
IC Specification: RSS-210

ACS Report Number: 11-0071.W06.11.A

Manufacturer: Assa Abloy, Inc.
Models:
P1-IM/IKM, TCPIP-M819/M820, P2-IM/IKM, TCPWI-M819/M820

Test Begin Date: March 10, 2011
Test End Date: March 14, 2011

Report Issue Date: March 28, 2011

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 22 pages

TABLE OF CONTENTS

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.

1.2 Product Description

The Sargent Passport P Series and Corbin-Russwin Access 700 Series are microprocessor controlled networked locks. There are models for either Wi-Fi 802.11b/g or POE 802.3af (Power Over Ethernet) networks. The devices may be powered by six AA batteries, external low power 9VDC or a POE switch. The locks are linked to a network controlled authorization system that grants or limits access to any type of door. Access may be granted by using either 13.56 MHz iCLASS card reader, magnetic card swipe and/or keypad. Trims and finishes are identical among the various technology offerings.

The controller electronics are identical on all models, with the exception of an additional PD interface board on the POE models. The product variants are listed below.

Sargent Passport P Series Variants:
Wi-Fi Model:

- P2-IM/IKM; iCLASS (13.56 MHz) reader with magnetic card swipe only or iCLASS (13.56 MHz) reader with magnetic card swipe and keypad. Configuration option for external 9VDC power

POE Model:

- P1-IM/IKM; iCLASS (13.56 MHz) reader with magnetic card swipe only or iCLASS (13.56 MHz) reader with magnetic card swipe and keypad.

Corbin-Russwin Access 700 Series Variants:
Wi-Fi Model:

- TCPWI-M819/M820; iCLASS (13.56 MHz) reader with magnetic card swipe only or iCLASS (13.56 MHz) reader with magnetic card swipe and keypad. Configuration option for external 9VDC power

POE Model:

- TCPIP-M819/M820; iCLASS (13.56 MHz) reader with magnetic card swipe only or iCLASS (13.56 MHz) reader with magnetic card swipe and keypad.

Operating Voltage:
P2-IM/IKM and TCPWI-M819/M820 - 9VDC nominal (6 – AA batteries) OR (Aux power supply)
P1-IM/IKM and TCPIP-M819/M820 - Power supplied through Ethernet (per standard 802.3af); Power Souring Equipment (PSE) = 44 – 57VDC

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

Test Sample Serial Number(s): ACS#1, ACS#2, ACS#3
Test Sample Condition: The test sample was provided in good working order with no visible defects.

1.3 Test Methodology and Considerations

The model variants are electrically identical with respect to the 13.56MHz RFID and differ only in options described above.

P2 and TCPWI variants include a collocated Quatech 802.11 radio module FCC ID: F4AWLNG1. Collocation was evaluated and found to be in compliance.

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: 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

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:

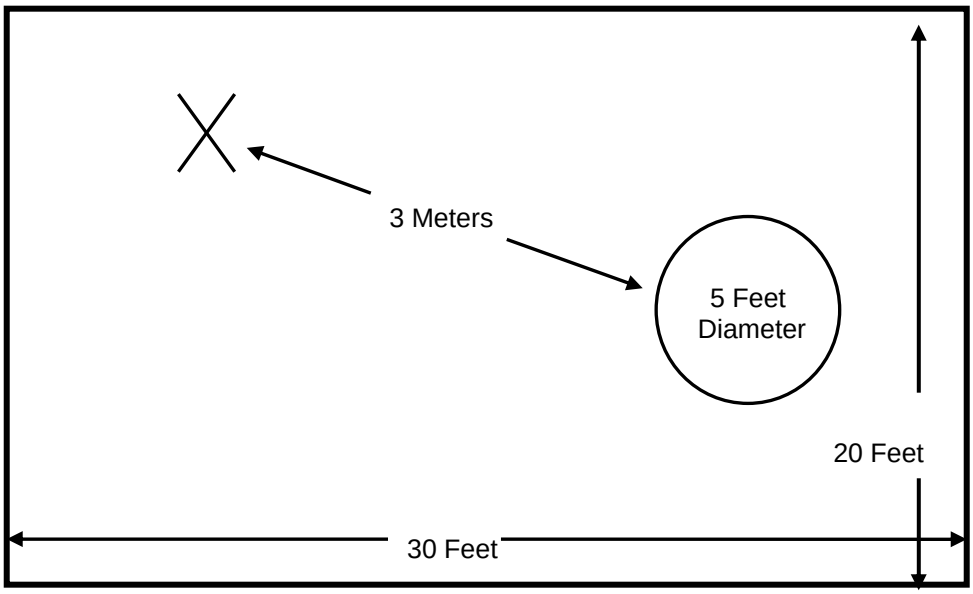

Figure 2.3-1: Semi-Anechoic Chamber Test Site

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:

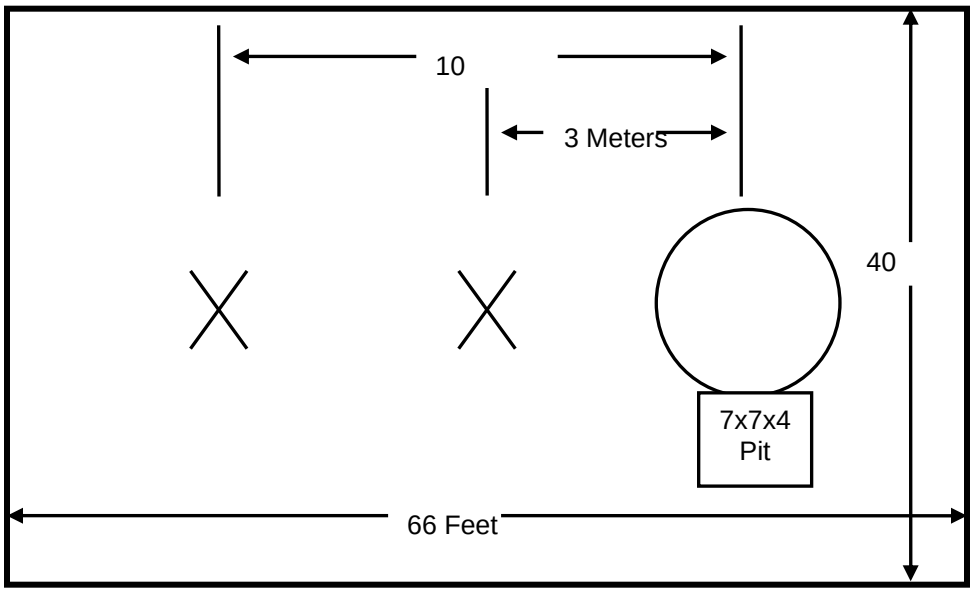

Figure 2.3-2: Open Area Test Site

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 2.4-1:

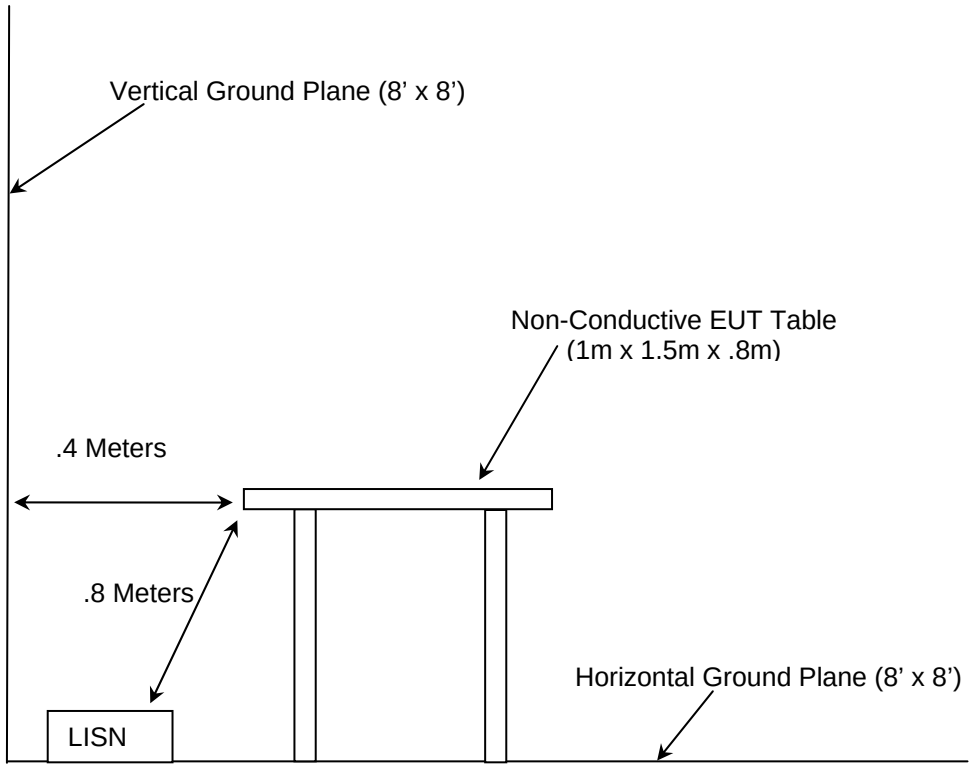

Figure 2.4-1: AC Mains Conducted EMI Site

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, 2010
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2010
- 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
22	Agilent	8449B	Amplifiers	3008A00526	9/2/2010	8/30/2011
25	Chase	CBL6111	Antennas	1043	9/13/2010	9/13/2012
30	Spectrum Technologies	DRH-0118	Antennas	970102	5/8/2009	5/8/2011
41	Electro-Metrics	BIA-25	Antennas	2925	12/21/2010	12/21/2012
73	Agilent	8447D	Amplifiers	2727A05624	3/21/2011	3/21/2012
78	EMCO	6502	Antennas	9104-2608	1/31/2011	1/31/2013
152	EMCO	3825/2	LISN	9111-1905	11/2/2010	11/2/2012
167	ACS	Chamber EMI Cable Set	Cable Set	167	1/26/2011	1/26/2012
168	Hewlett Packard	11947A	Attenuators	44829	2/4/2011	2/4/2012
193	ACS	OATS cable Set	Cable Set	193	1/6/2011	1/6/2012
211	Eagle	C7RFM3NFNM	Filters	HLC-700	12/23/2010	12/23/2011
213	TEC	PA 102	Amplifiers	44927	12/23/2010	12/23/2011
277	Emco	93146	Antennas	9904-5199	8/25/2010	8/25/2012
283	Rohde & Schwarz	FSP40	Spectrum Analyzers	1000033	8/31/2010	8/31/2011
291	Florida RF Cables	SMRE-200W-12.0-SMRE	Cables	None	12/7/2010	12/7/2011
292	Florida RF Cables	SMRE-290AW-480.0-SMR	Cables	None	12/7/2010	12/7/2011
422	Florida RF	SMS-200AW-72.0-SMR	Cables	805	12/29/2010	12/29/2011
426	Thermotron	S-8 Mini Max	Environmental Chamber	25-2888-10	8/30/2010	8/30/2011
RE40	Agilent Technologies	E7405A	Spectrum Analyzers	US39150132	7/20/2010	7/20/2011

5 Equipment UNDER TEST SETUP BLOCK DIAGRAM

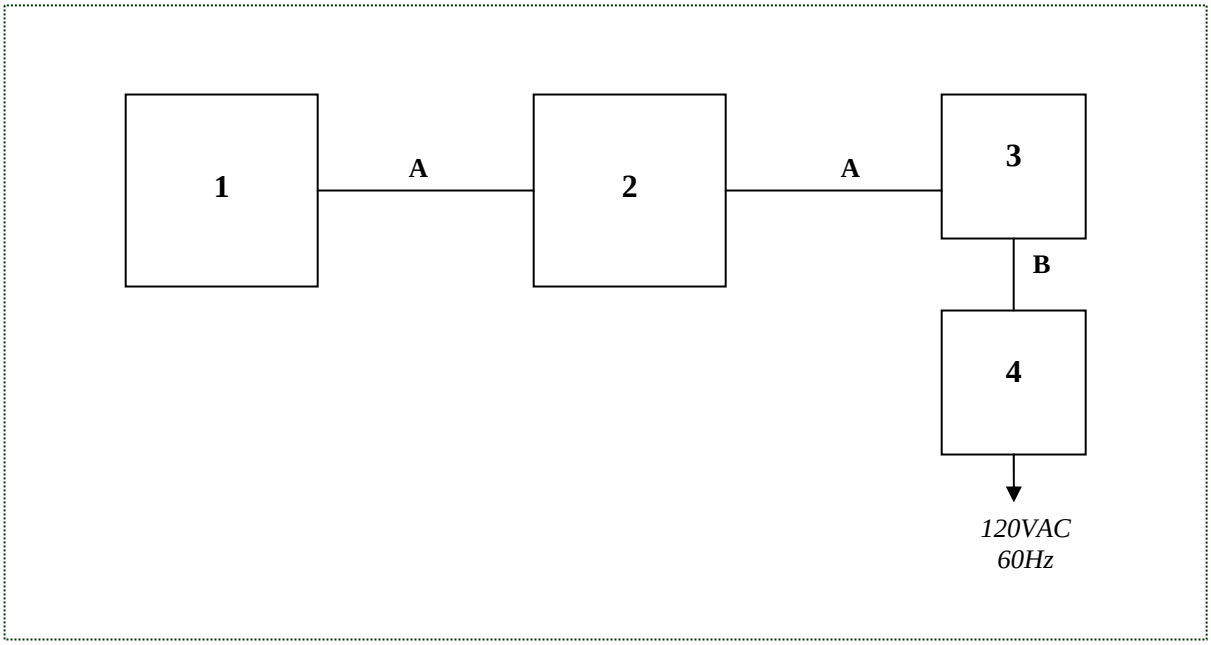

Figure 5-1: EUT and Support Equipment Block Diagram (POE)

Table 5-1: EUT and Support Equipment Description

Item #	Type Device	Manufacturer	Model/Part #	Serial #
1	EUT	Assa Abloy	P1, TCPIP	N/A
2	Hinge	Assa Abloy	N/A	N/A
3	Switch	Netgear	FS108P	1DL16C2T001 C3
4	Switch Power Supply	D-Link	VAN90C-480B	10053805331-2A

Table 5-2: Cable Description

Cable #	Cable Type	Length	Shield	Termination
A	PoE Cable	14'	No	1 & 2 2 & 3
B	Power Cable	6'	No	3 & 4

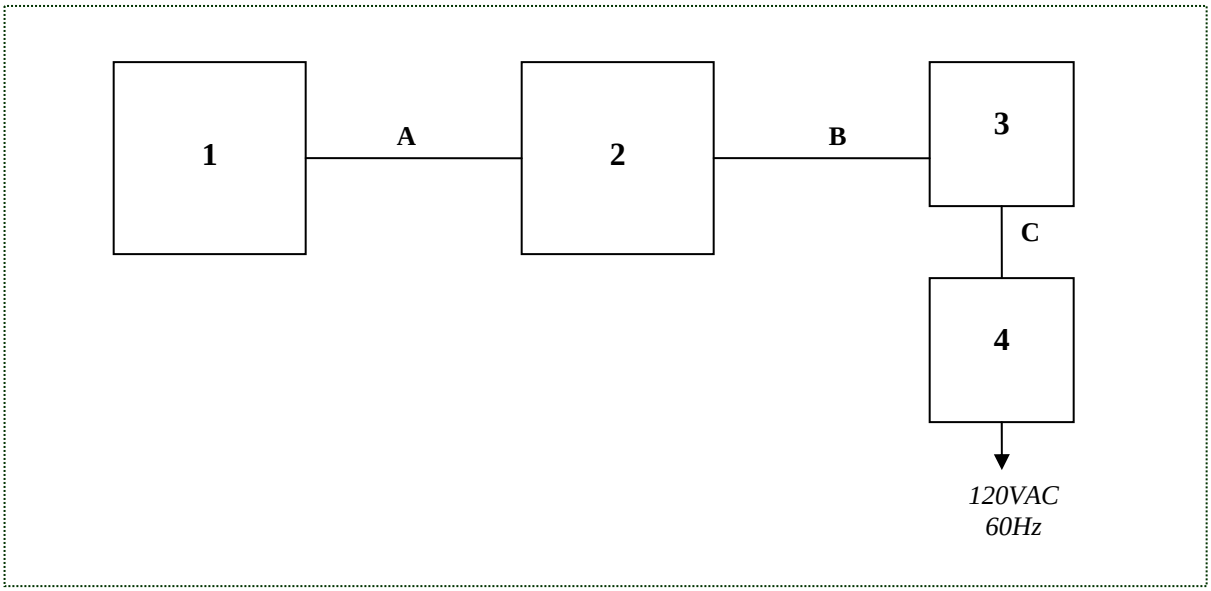

Figure 5-2: EUT and Support Equipment Block Diagram (AUX Power)

Table 5-3: EUT and Support Equipment Description

Item #	Type Device	Manufacturer	Model/Part #	Serial #
1	EUT	Assa Abloy	P2, TCPWI - AUX PWR	N/A
2	Hinge	Assa Abloy	N/A	N/A
3	Aux Power Box	Assa Abloy	N/A	N/A
4	Wall Charger	N/A	E193069	RT-G1640SL/M

Table 5-4: Cable Description

Cable #	Cable Type	Length	Shield	Termination
A	Aux Power Cable	3'	No	1 & 2
B	Aux Power Cable	3'	No	2 & 3
C	Aux Power Cable	15'	No	3 & 4

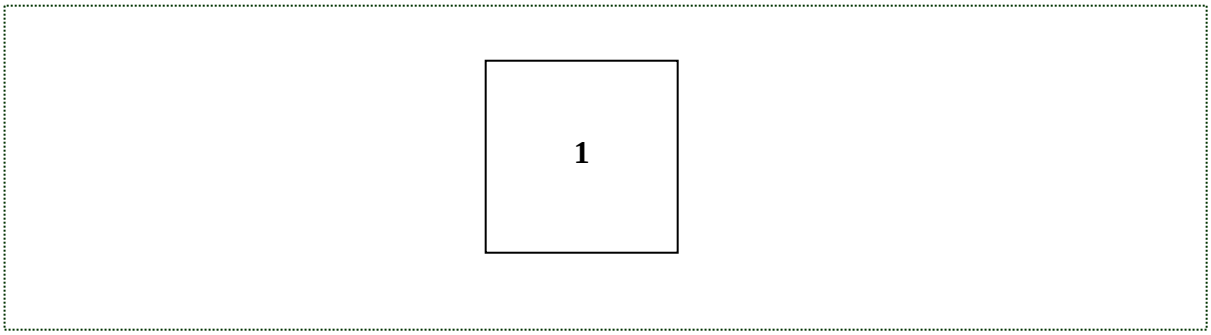

Figure 5-3: EUT and Support Equipment Block Diagram (Battery Power)

Table 5-5: EUT and Support Equipment Description

Item #	Type Device	Manufacturer	Model/Part #	Serial #
1	EUT	Assa Abloy	P2, TCPWI - Battery PWR	N/A

See Test Setup photographs for additional detail.

6 SUMMARY OF TESTS

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

6.1 Antenna Requirement

The EUT utilizes a PCB loop antenna thus satisfying the requirements of 15.203.

6.2 Power Line Conducted Emissions – FCC Part 15.207 / IC RSS-Gen 7.2.4

6.2.1 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

6.2.2 Test Results

Results of the test are shown below in and Table 6.2.2-1 to 6.2.2-4.

Table 6.2.2-1: Conducted EMI Results – Line 1 – POE

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.15	25.04	18.67	10.09	35.13	28.76	66.00	56.00	30.9	27.2
0.317	20.32	19.1	10.13	30.45	29.23	59.78	49.78	29.3	20.6
13.56	35.54	30.5	10.44	45.98	40.94	60.00	50.00	14.0	9.1
16.04	18.4	17.17	10.49	28.89	27.66	60.00	50.00	31.1	22.3
22.91	28.53	28.48	10.97	39.50	39.45	60.00	50.00	20.5	10.6
27.2	13.76	11.28	11.00	24.76	22.28	60.00	50.00	35.2	27.7

Table 6.2.2-2: Conducted EMI Results – Line 2 – POE

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.16	21.76	14.92	10.09	31.85	25.01	65.46	55.46	33.6	30.5
0.317	24.27	23.61	10.13	34.40	33.74	59.78	49.78	25.4	16.0
13.56	35.14	30.1	10.44	45.58	40.54	60.00	50.00	14.4	9.5
16.09	19.9	18.3	10.49	30.39	28.79	60.00	50.00	29.6	21.2
22.91	17.13	12.49	10.97	28.10	23.46	60.00	50.00	31.9	26.5
26.45	22.25	18.07	10.98	33.23	29.05	60.00	50.00	26.8	20.9

Table 6.2.2-3: Conducted EMI Results – Line 1 – AUX Power

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.15	47.22	13.69	10.09	57.31	23.78	66.00	56.00	8.7	32.2
0.161	46.67	12.35	10.09	56.76	22.44	65.41	55.41	8.7	33.0
0.171	42.12	4.43	10.09	52.21	14.52	64.91	54.91	12.7	40.4
0.19	38.25	10.03	10.08	48.33	20.11	64.04	54.04	15.7	33.9
0.204	39.88	9.82	10.02	49.90	19.84	63.45	53.45	13.5	33.6
0.309	22.88	3.29	10.12	33.00	13.41	60.00	50.00	27.0	36.6
13.56	8.56	2.88	10.44	19.00	13.32	60.00	50.00	41.0	36.7

Table 6.2.2-4: Conducted EMI Results – Line 2 – AUX Power

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.15	48.05	13.55	10.09	58.14	23.64	66.00	56.00	7.9	32.4
0.172	46.49	12.41	10.09	56.58	22.50	64.86	54.86	8.3	32.4
0.189	38.53	11.43	10.08	48.61	21.51	64.08	54.08	15.5	32.6
0.226	36.21	4.59	10.02	46.23	14.61	62.60	52.60	16.4	38.0
0.262	26.49	7.06	10.02	36.51	17.08	61.37	51.37	24.9	34.3
0.309	27.11	5.02	10.12	37.23	15.14	60.00	50.00	22.8	34.9
13.56	4.9	0.98	10.44	15.34	11.42	60.00	50.00	44.7	38.6

6.3 Radiated Emissions

6.3.1 In-Band Emissions Limitations – FCC Part 15.225(a),(b),(c) / IC RSS-210 A2.6

6.3.1.1 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 6.3.2.2 and 6.3.2.4.

6.3.1.2 Test Results

Compliance with the emissions levels are shown in figure 6.3.1.2-1 through 6.3.1.2-3 below.

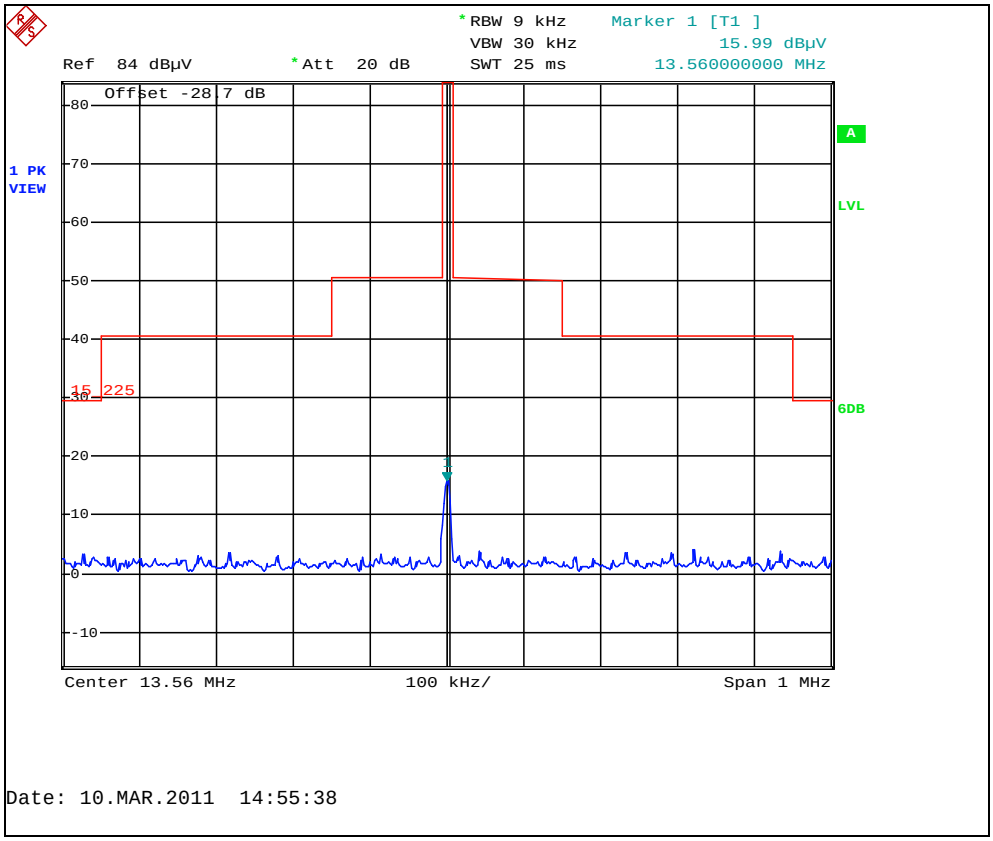

Figure 6.3.1.2-1: Emission Mask Plot – P1-IM/IKM, TCPIP-M819/M820 (PoE)

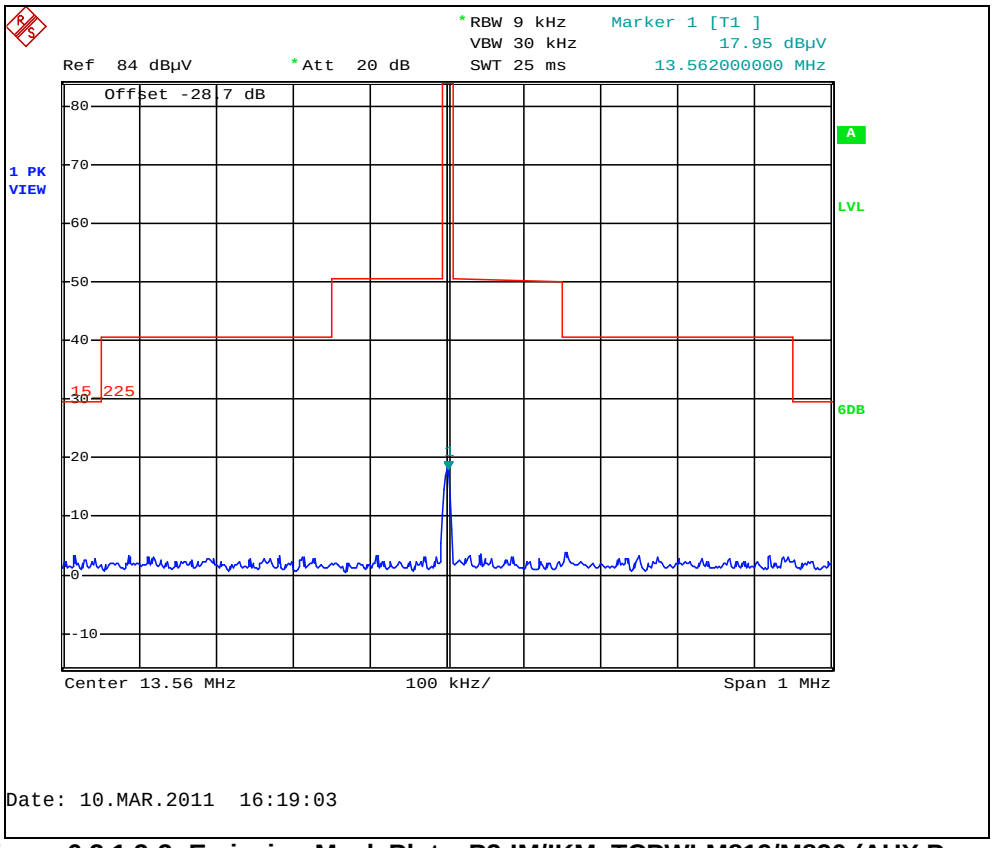

Figure 6.3.1.2-2: Emission Mask Plot – P2-IM/IKM, TCPWI-M819/M820 (AUX Power)

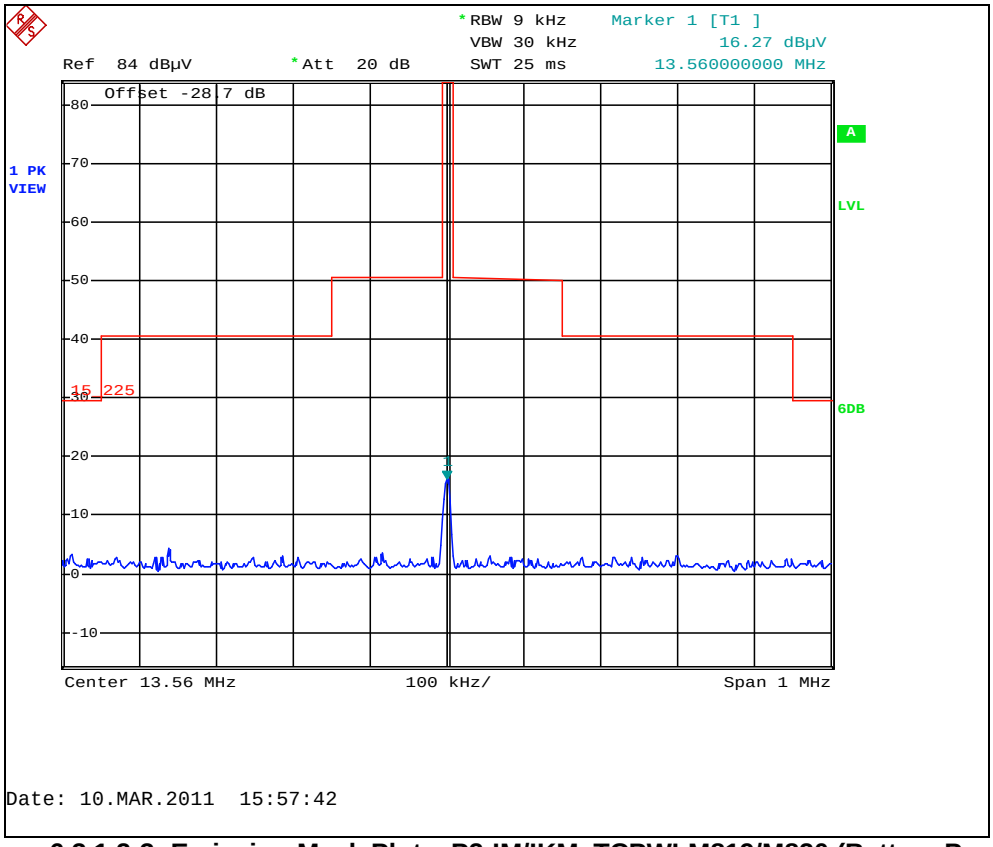

Figure 6.3.1.2-3: Emission Mask Plot – P2-IM/IKM, TCPWI-M819/M820 (Battery Power)

6.3.2 Out-of-Band Emissions – FCC Part 15.225(d), 15.209, 15.109 / IC RSS-210 2.5

6.3.2.1 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.

Additionally 15.209(f) states, In accordance with §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit. Emissions which must be measured above the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator and which fall within the restricted bands shall comply with the general radiated emission limits in §15.109 that are applicable to the incorporated digital device.

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 from 30MHz to 135.6 MHz 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.

Harmonic emissions from the 13.56 MHz RFID intentional radiator were measured to the 10th harmonic. Above the 10th harmonic the six highest emission levels with respect to the limit are provided.

6.3.2.2 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

Distance correction factor (10m Specified Test Distance) = 40*Log (Test Distance/10)
= 40*Log (3/10)
= - 21 dB

6.3.2.3 Test Results

Radiated spurious emissions found are reported in Tables 6.3.2.3-1 through 6.3.2.3-3.

Table 6.3.2.3-1: Radiated Spurious Emissions – P1-IM/IKM, TCPIP-M819/M820 (PoE)

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
40.68	---------	17.80	H	-12.33	---------	5.47	--------	40.0	---------	34.5
40.68	---------	23.67	V	-12.33	---------	11.34	--------	40.0	---------	28.7
54.24	---------	30.85	H	-18.53	---------	12.32	--------	40.0	---------	27.7
54.24	---------	43.24	V	-18.53	---------	24.71	--------	40.0	---------	15.3
67.8	---------	48.83	H	-19.42	---------	29.41	--------	40.0	---------	10.6
67.8	---------	55.41	V	-19.42	---------	35.99	--------	40.0	---------	4.0
74 *	---------	43.66	V	-16.24	---------	27.42	--------	39.1	---------	11.7
81.36	---------	29.02	H	-17.73	---------	11.29	--------	40.0	---------	28.7
81.36	---------	41.59	V	-17.73	---------	23.86	--------	40.0	---------	16.1
94.92	---------	36.52	H	-15.61	---------	20.91	--------	43.5	---------	22.6
94.92	---------	48.68	V	-15.61	---------	33.07	--------	43.5	---------	10.4
108.48	---------	33.95	H	-13.99	---------	19.96	--------	43.5	---------	23.5
108.48	---------	36.03	V	-13.99	---------	22.04	--------	43.5	---------	21.5
122.04	---------	34.81	H	-13.32	---------	21.49	--------	43.5	---------	22.0
122.04	---------	47.08	V	-13.32	---------	33.76	--------	43.5	---------	9.7
124.8 *	---------	50.7	V	-10.92	---------	39.78	--------	43.5	---------	3.7
135.6	---------	39.05	H	-13.54	---------	25.51	--------	43.5	---------	18.0
135.6	---------	47.71	V	-13.54	---------	34.17	--------	43.5	---------	9.3
250 *	---------	49.42	H	-10.30	---------	39.12	--------	46.4	---------	7.3
375 *	---------	45.32	H	-7.85	---------	37.47	--------	46.4	---------	8.9
626	---------	42.81	V	-2.18	---------	40.63	--------	46.4	---------	5.8
678	---------	37.82	H	0.62	---------	38.44	--------	46.4	---------	8.0

Note: Spurious emissions associated with the digital device and all spurious emissions above the 10th harmonic of the fundamental emission were measured at 10m and compared to the Part 15.109 Class A emission limits as described in section 6.3.2.1 above.

*Emissions from digital device.

Table 6.3.2.3-2: Radiated Spurious Emissions - P2-IM/IKM, TCPWI-M819/M820 (AUX Power)

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
40.68	---------	26.28	V	-12.33	---------	13.95	--------	40.0	---------	26.0
67.8	---------	26.51	V	-19.42	---------	7.09	--------	40.0	---------	32.9
108.48	---------	27.81	H	-13.99	---------	13.82	--------	43.5	---------	29.7
122.04	---------	25.72	H	-13.32	---------	12.40	--------	43.5	---------	31.1
122.04	---------	27.42	V	-13.32	---------	14.10	--------	43.5	---------	29.4
135.6	---------	24.2	H	-13.54	---------	10.66	--------	43.5	---------	32.8
135.6	---------	30.62	V	-13.54	---------	17.08	--------	43.5	---------	26.4
321	---------	27.03	H	-7.67	---------	19.36	--------	46.4	---------	27.0
624.9	---------	40.8	V	-2.20	---------	38.60	--------	46.4	---------	7.8
651.8	---------	37.9	H	-1.03	---------	36.87	--------	46.4	---------	9.5
678.8	---------	38.01	H	0.69	---------	38.70	--------	46.4	---------	7.7
705.1	---------	27.39	H	-0.20	---------	27.19	--------	46.4	---------	19.2
732.2	---------	33.71	H	-0.14	---------	33.57	--------	46.4	---------	12.8

Note: Spurious emissions associated with the digital device and all spurious emissions above the 10th harmonic of the fundamental emission were measured at 10m and compared to the Part 15.109 Class A emission limits as described in section 6.3.2.1 above.

Table 6.3.2.3-3: Radiated Spurious Emissions - P2-IM/IKM, TCPWI-M819/M820 (Battery Power)

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
40.68	---------	22.19	V	-12.33	---------	9.86	--------	40.0	---------	30.1
67.8	---------	24.68	V	-19.42	---------	5.26	--------	40.0	---------	34.7
94.92	---------	22.88	V	-15.61	---------	7.27	--------	43.5	---------	36.2
122.04	---------	24.33	H	-13.32	---------	11.01	--------	43.5	---------	32.5
135.6	---------	23.01	H	-13.54	---------	9.47	--------	43.5	---------	34.0
623.75	---------	42.94	H	-1.45	---------	41.49	--------	46.0	---------	4.5
623.75	---------	41.57	V	-1.45	---------	40.12	--------	46.0	---------	5.9
677.99	---------	39	H	-1.18	---------	37.82	--------	46.0	---------	8.2
677.99	---------	38.75	V	-1.18	---------	37.57	--------	46.0	---------	8.4
704.11	---------	40.65	H	-0.85	---------	39.80	--------	46.0	---------	6.2
704.11	---------	40.8	V	-0.85	---------	39.95	--------	46.0	---------	6.1
731.98	---------	38.75	H	-0.64	---------	38.11	--------	46.0	---------	7.9
731.98	---------	36.16	V	-0.64	---------	35.52	--------	46.0	---------	10.5
759.35	---------	39.71	H	-0.40	---------	39.31	--------	46.0	---------	6.7
759.35	---------	38.45	V	-0.40	---------	38.05	--------	46.0	---------	8.0
786.47	---------	42.13	H	0.43	---------	42.56	--------	46.0	---------	3.4
786.47	---------	39.41	V	0.43	---------	39.84	--------	46.0	---------	6.2

Note: Spurious emissions associated with the digital device and all spurious emissions above the 10th harmonic of the fundamental emission were measured at 3m and compared to the Part 15.109 Class B emission limits as described in section 6.3.2.1 above.

6.3.2.4 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: 22.19 - 12.33 = 9.86dBuV
Margin: 40.0dBuV – 9.86dBuV = 30.1dB

6.4 Occupied Bandwidth – FCC Part 15.215(c) / IC RSS-Gen 4.6.1

6.4.1 Measurement Procedure

The spectrum analyzer span was set to encompass the peak emission and at least 20dB below the peak. The RBW was to 1% - 3% of the estimated emission 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.

6.4.2 Measurement Results

Results are shown below in Table 6.4.2-1 and Figures 6.4.2-1 and 6.4.2-2.

Table 6.4.2-1 – Occupied Bandwidth

Frequency (MHz)	20 dB BW (Hz)	99% Bandwidth (Hz)
13.56	140.4	139.6

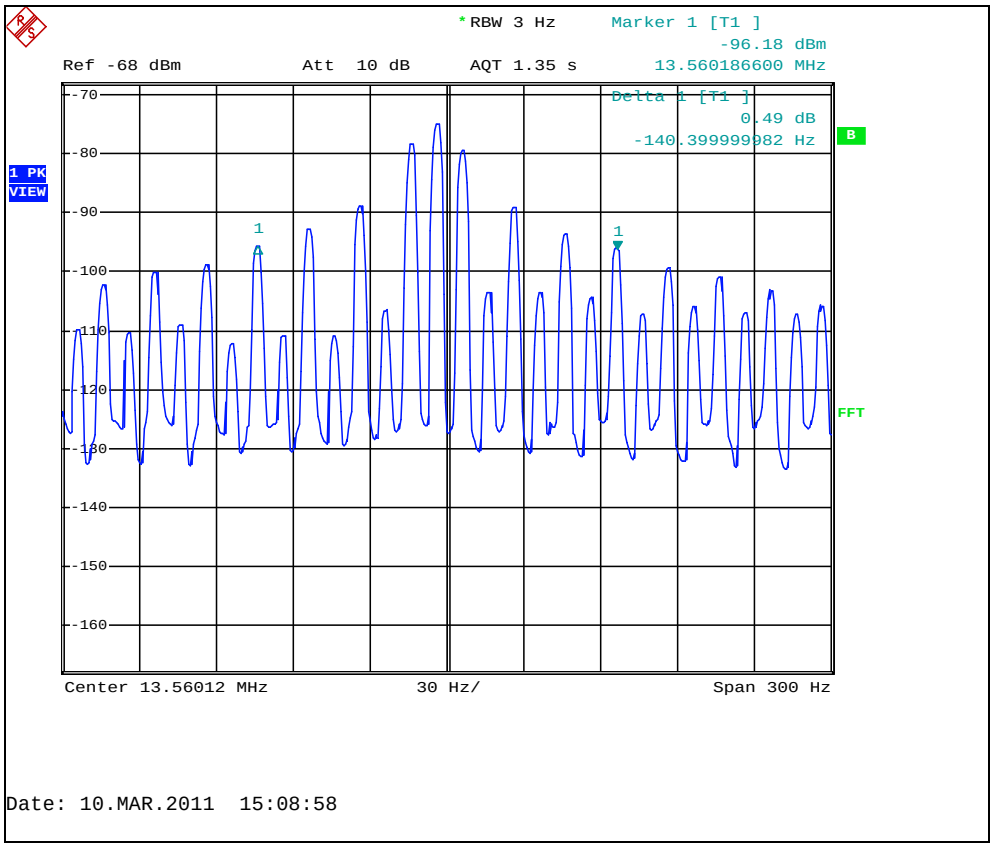

Figure 6.4.2-1: 20dB Bandwidth

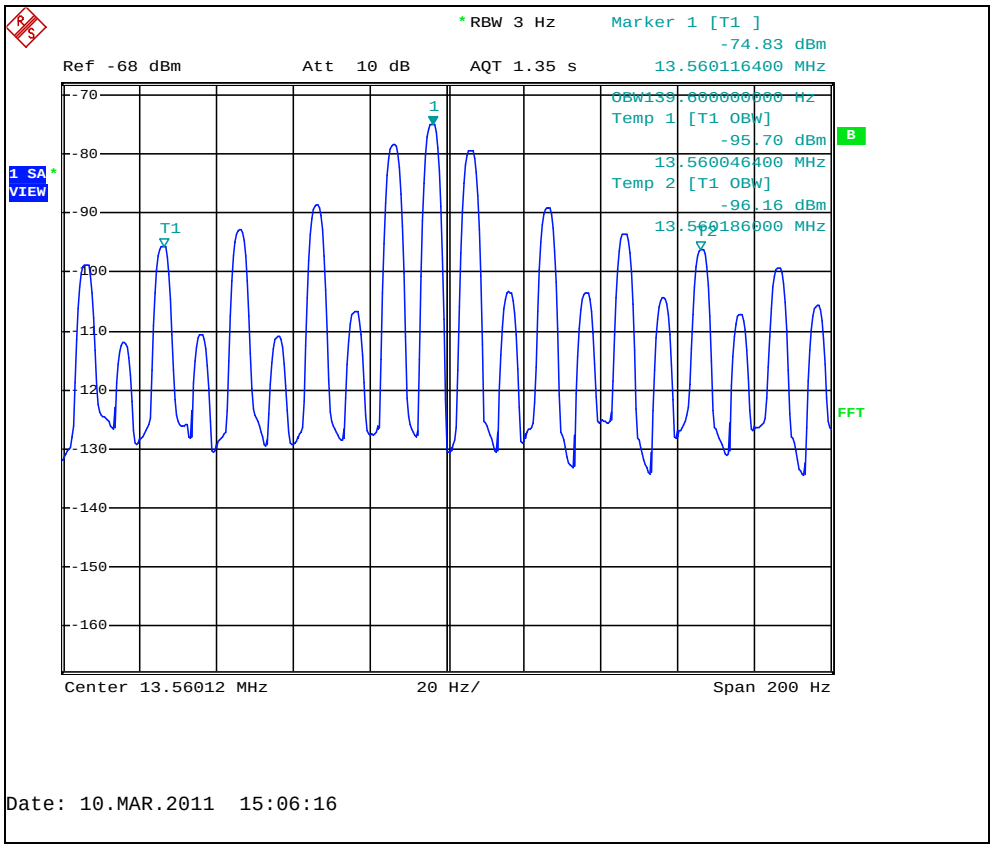

Figure 6.4.2-2: 99% Bandwidth

6.5 Frequency Stability – FCC Part 15.225(e) / IC RSS-210 A2.6

6.5.1 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.

6.5.2 Test Results

Results of the test are shown below in Figure 6.5.2-1.

Frequency Stability

Frequency (MHz): 13.56
Deviation Limit (PPM): 100ppm

Temperature	Frequency	Frequency Error	Voltage	Voltage
C	MHz	(PPM)	(%)	(VDC)
-20 C	**13.560220**	**16.224**	100%	9.00
-10 C	**13.560224**	**16.519**	100%	9.00
0 C	**13.560232**	**17.109**	100%	9.00
10 C	**13.560224**	**16.519**	100%	9.00
20 C	**13.560196**	**14.454**	100%	9.00
30 C	**13.560192**	**14.159**	100%	9.00
40 C	**13.560144**	**10.619**	100%	9.00
50 C	**13.560120**	**8.850**	100%	9.00
20 C	**13.560184**	**13.569**	85%	7.65
20 C	**13.560180**	**13.274**	100%	10.35

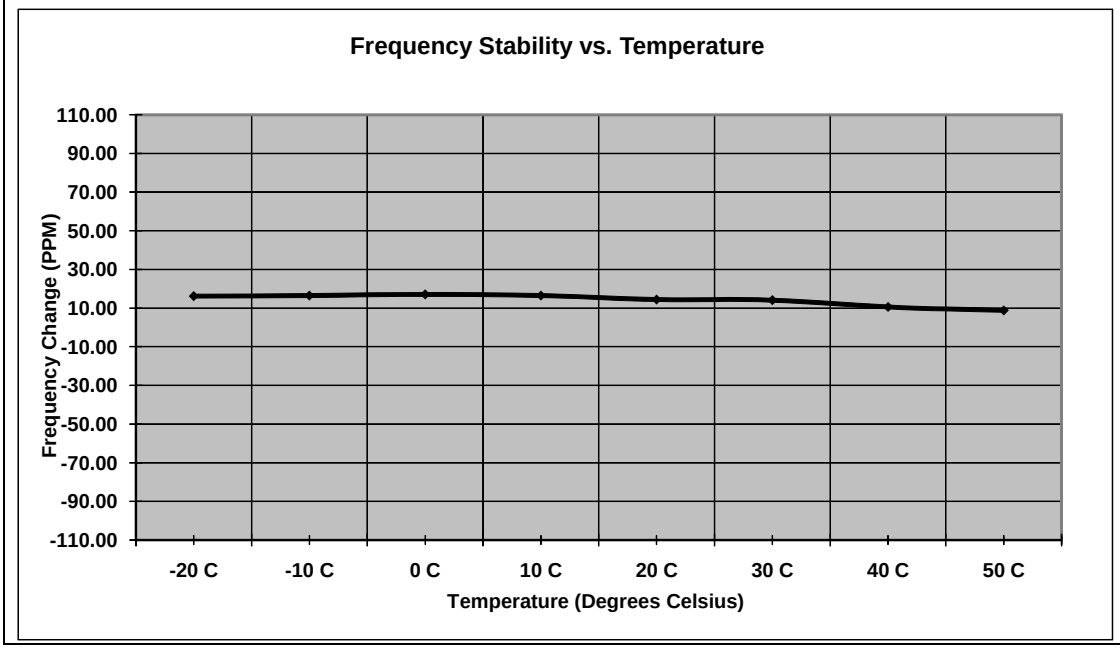

Figure 6.5.2-1: Frequency Stability

7 CONCLUSION

In the opinion of ACS, Inc. the P1-IM/IKM, TCPIP-M819/M820, P2-IM/IKM, TCPWI-M819/M820 models 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