



FCC Part 15.209, Subpart C Test Report
on

Electromagnetic Swinghandle with Integrated RFID Reader Module
and CANBus Module
Model: H3-EM

Customer Name: Southco, Inc.

Customer P.O.: 7500016855

Date of Report Rev.: January 8, 2018

Test Report No.: R-2612P-1, Rev. A

Test Start Date: January 12, 2017

Test Finish Date: January 12, 2017

Test Technician: D. Fiore, M. Nowak

Test Engineer: D. Rybicki

Laboratory Supervisor: C. Reitz

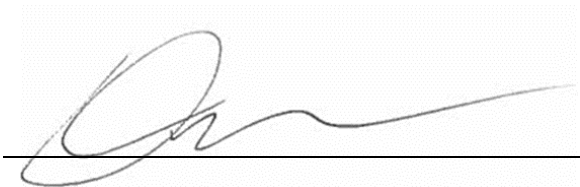
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FCC ID: YKRH3EM99521

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David M. Rybicki
EMC Test Engineer
NVLAP Approved Signatory



Colleen T. Reitz
Laboratory Supervisor
NVLAP Approved Signatory

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Report No. R-2612P-1, Rev. A

Revision History

Revisions to this document are listed below; the latest revised document supersedes all previous issues of this document.

Revision	Date	Pages Affected
-	December 11, 2017	Original Release
A	January 8, 2018	Global Changes: <ul style="list-style-type: none">• Test Report R-2612P-1 changed to R-2612P-1, Rev. A
		4: <ul style="list-style-type: none">• Removed 13.56 MHz from Operating frequency• Changed Equipment Class from DXT to DCD• Removed FCC Registered Test Site Number and Added FCC Accreditation Designation Number: US5342
		5-6: <ul style="list-style-type: none">• Changed Fundamental Frequency from 13.56 MHz to 125 kHz
		7: <ul style="list-style-type: none">• Radiated Emissions test results revised
		8: <ul style="list-style-type: none">• Add note under Equipment List



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Report No. R-2612P-1, Rev. A

Test Program Summary

Report Number:	R-2612P-1, Rev. A		
Customer:	Southco, Inc.		
Address:	210 N. Brinton Lake Road Concordville, PA 19331		
Test Sample:	Electromagnetic Swinghandle with Integrated RFID Reader Module and CANBus Module Consisting Of:		
System Components:	Electromagnetic Swinghandle with Integrated RFID Reader Module	CANBus Module	Door Switch Kit
Part Numbers:	H3-EM-99-521	EA-99-223	EA-99-240
Model Numbers:	H3-EM	N/A	N/A
Manufactured By:	Southco Mfg. Ltd.	Vexos EMS	Vexos EMS
Type:	Low Power Transceiver		
Power Requirements:	5 VDC Provided by CANBus Module		
Frequency of Operation:	125 kHz		
Equipment Class:	DCD		
Equipment Use:	Fixed Mount, < 20 cm		

Test Specification:

FCC Rules and Regulations Part 15, Subpart C, Paragraph 15.209

Test Procedure:

ANSI C63.10:2013

Test Site:

ANSI C63.4:2014

Test Facility:

Retlif Testing Laboratories
3131 Detwiler Road
Harleysville, PA 19438

FCC Accreditation Designation Number: US5342



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Report No. R-2612P-1, Rev. A

Purpose:

The purpose of this test program was to demonstrate compliance of the Electromagnetic Swinghandle with Integrated RFID Reader Module to the requirements of FCC Part 15.209.

Test Methods:

The following table detailed the test method performed on the EUT and the corresponding test results:

Testing Date	Test Method	Test Results
January 12, 2017	15.209, Radiated Emissions (9 kHz to 1 GHz)	Complied

Test Sample Operation:

The EUT is an Electromagnetic Swinghandle with Integrated RFID Reader Module and CANBus Module. The EUT is installed in rack panels which are used in datacenters, industrial enclosures, and secure storage.

Test Sample/Test Program:

- 15.203 Antenna Requirements -The device uses a permanently attached internal antenna. The antenna is totally enclosed inside the case.
- 15.205 Restricted Bands - No emissions were observed from the EUT
- 15.209 Radiated Emissions-Fundamental Frequency 125 kHz, Harmonic/Spurious Emissions 9 kHz to 1000 MHz
- No harmonic or spurious emissions were observed within 10 dB of the specified limit at test distances of 3 meters.
- Radiated Emissions from the EUT were measured in all three axis. The attached Radiated Emissions test data shows the maximized fundamental emission of each orientation.



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Determination of Field Strength Limits:

The field strength limits shown below are derived from Section 15.209.

Fundamental Frequency: 124 kHz

Frequency (MHz)	Field Strength ($\mu\text{V}/\text{m}$)	Measurement Distance (m)
0.009 to 0.490	2400 / F(kHz)	300
0.490 to 1.705	24000 / F(kHz)	30
1.705 to 30	30	30
30 to 88	100	3
88 to 216	150	3
216 to 960	200	3
960 to 1000	500	3

Distance Factor:

Testing was performed at a 3 meter distance and the field strength reading extrapolated to 300 meters for comparison to the 300 meter limit. The field strength reading was extrapolated using the extrapolation (distance) factor of 40dB/decade as specified in 15.31 (f) (2) for frequencies below 30MHz.

Distance Factor from 300 meters to 3 meters (2 decades) = -80dB



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Test Methods:

15.209 Radiated Emissions

The test sample was placed on an 80cm high wooden test stand which was located 3 meters from the test antenna on an FCC listed open area test site. Emissions from the EUT were maximized by rotating the test sample and adjusting the test sample orientation and antenna polarization.

Test Results:

The maximized peak field strength at 13.56 MHz was 4.02uV/M (12.10 dBμV/M) and met the limit specified in 15.209. All harmonic/spurious emissions observed at 3 meter test distances met the limit specified in 15.209. The maximized corrected peak field strength was calculated as follows:

$$R_C = M_R + C_F - D_F$$

Where:

R_C = Corrected Reading in dBμV/M

M_R = Uncorrected Meter Reading in dBμV

C_F = Correction Factor in dB (Antenna Factor + Cable Loss)

D_F = Distance Factor in dB

$$M_R = 43.40 \text{ dB}\mu\text{V}$$

$$C_F = 8.70 \text{ dB}$$

$$D_F = 40 \text{ dB}$$

$$R_C = 43.40\text{dB}\mu\text{V} + 8.7\text{dB} - 40\text{dB} = 12.10 \text{ dB}\mu\text{V/M}$$



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Equipment List Radiated Emissions

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
127A	ETS / EMCO	ANTENNA, BICONICAL	20 - 200 MHz	3104	3/24/2016	9/30/2017
8016	ETS / EMCO	ANTENNA, LOG PERIODIC	200 MHz - 1 GHz	3146	7/18/2016	1/31/2018
8079	ROHDE & SCHWARZ	RECEIVER, EMI	9 kHz - 30 MHz	ESH3	6/15/2016	6/30/2017
8080	ROHDE & SCHWARZ	RECEIVER, EMI	20 - 1300 MHz	354-3000.56ESVP	8/26/2016	8/31/2017
8300	RETLIF	OPEN AREA TEST SITE, ATTENUATION	3/10 Meter OATS	RPA	8/7/2014	8/31/2017
8300C	UNKNOWN	CABLE, COAXIAL	3/10 METER	3 METER CABLE	10/25/2016	10/31/2017
8322	ETS / EMCO	ANTENNA, LOOP	10 KHz - 30 MHz	6512	4/19/2016	4/30/2018
8411	SONOMA INSTRUMENT	PRE-AMPLIFIER	9 KHz - 1 GHz	310N	9/19/2016	9/30/2017
8644	AGILENT / HP	ANALYZER, SPECTRUM	100 Hz - 22 GHz	85662A	7/21/2016	7/31/2017
8644A	AGILENT / HP	ANALYZER, SPECTRUM	100 Hz - 22.5 GHz	8566B	7/21/2016	7/31/2017

Note: Testing was performed January 12, 2017, therefore all equipment listed above was within calibration at the time of test.



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Report No. R-2612P-1, Rev. A

**FCC Part 15, Subpart B, Class B, Radiated Emissions, 9 kHz to 1 GHz
Paragraph 15.209(a)
Test Data**



Retlif Testing Laboratories

Report No. R-2612P-1, Rev. A

Test Method:	FCC Part 15, Subpart B, Class B, Radiated Emissions, 9 kHz to 1 GHz, Paragraph 15.209(a)							
Customer:	Southco Inc	Job No.:		R-2612P-1				
Test Sample:	Electromagnetic Swing handle with Integrated RFID Reader Module and CANBUS							
Model:	H3-EM							
Operating Mode:	Continuously Locking and Unlocking							
Technician:	D.Fiore / M. Nowak			Date:		01/12/2017		
Notes:	Test Distance: 3 Meters via 1/D		Temp: 10.1 °C		RH: 51%			
	Detector: Quasi-Peak & Average Below 1 GHz, Peak above 1 GHz							
Frequency	Antenna Position	EUT Orientation	Meter Readings	Correction Factor	Distance Correction	Corrected Reading	Converted Reading	Limit
MHz	(V/H) / Meters	Degrees	dBuV	dB	dB	dBuV/m	uV/m	uV/m
0.009								
0.124	Parallel	202.0	58.70	11.79	-80.00	-9.51	0.334	19.35
0.124	Perpendicular	255.1	50.80	11.79	-80.00	-17.41	0.135	19.35
*0.248	Parallel	178.0	32.10	11.71	-80.00	-36.19	0.155	9.68
*0.248	Perpendicular	183.1	37.20	11.71	-80.00	-31.09	0.028	9.68
0.372	Parallel	2.12	32.00	11.39	-80.00	-36.61	0.014	6.45
0.372	Perpendicular	152.6	32.30	11.39	-80.00	-36.31	0.015	6.45
*0.496	Parallel	119.0	26.40	11.73	-40.00	-1.87	0.806	48.39
*0.496	Perpendicular	181.1	27.70	11.73	-40.00	-0.57	0.936	48.39
*0.620	Parallel	0.15	32.10	11.67	-40.00	3.77	1.54	38.71
*0.620	Perpendicular	262.0	30.00	11.67	-40.00	1.67	1.21	38.71
*0.744	Parallel	163.0	33.60	11.69	-40.00	5.29	1.84	32.25
*0.744	Perpendicular	189.0	44.40	11.69	-40.00	16.09	6.37	32.25
*0.868	Parallel	96.8	28.80	11.72	-40.00	0.52	1.06	27.65
*0.868	Perpendicular	229.0	29.80	11.72	-40.00	1.52	1.19	27.65
*0.992	Parallel	330.7	29.50	11.73	-40.00	1.23	1.15	24.19
*0.992	Perpendicular	229.3	33.00	11.73	-40.00	4.73	1.72	24.19
*1.116	Parallel	185.2	26.10	11.76	-40.00	-2.14	0.781	21.50
*1.116	Perpendicular	191.1	27.60	11.76	-40.00	-0.64	0.929	21.50
*1.240	Parallel	179.1	31.10	11.75	-40.00	2.85	1.39	19.35
*1.240	Perpendicular	180.0	30.20	11.75	-40.00	1.95	1.25	19.35
13.56	Parallel	301.2	43.40	8.70	-40.00	12.10	4.02	30.00
13.56	Perpendicular	131.4	41.90	8.70	-40.00	10.60	3.39	30.00
*27.12	Parallel	180.0	1.10	5.88	-40.00	-33.02	0.022	30.00
*27.12	Perpendicular	360.0	2.40	5.88	-40.00	-31.72	0.026	30.00
30.00								100
40.68	V/1.00	181.1	9.10	13.33	0	22.43	13.23	100



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40.68	H/1.00	180.0	2.30	13.33	0	15.63	6.05	100
*54.24	V/1.00	180.0	8.50	12.40	0	20.90	11.09	
*54.24	H/1.00	180.0	10.7	12.40	0	23.10	14.29	
*67.80	V/1.00	180.0	11.80	9.65	0	21.45	11.82	
*67.80	H/1.00	180.0	9.40	9.65	0	19.05	8.96	
*81.36	V/1.00	180.0	9.5	8.46	0	17.96	7.91	
*81.36	H/1.00	180.0	9.0	8.46	0	17.46	7.46	
88.00								100
88.00								150
*94.92	V/1.00	180.0	9.80	11.78	0	21.58	11.99	
*94.92	H/1.00	180.0	9.50	11.78	0	21.28	11.59	
108.48	V/1.00	201.5	9.60	13.69	0	23.29	14.60	
108.48	H/2.00	180.0	6.40	13.69	0	20.09	10.10	
122.04	V/1.00	263.3	11.90	13.95	0	25.85	19.61	
122.04	H/1.00	194.1	5.69	13.95	0	19.64	9.59	
135.63	V/1.00	319.6	24.40	13.85	0	38.25	81.75	
135.63	H/3.63	189.6	23.35	13.85	0	37.20	72.44	
143.98	V/1.00	204.2	17.80	14.80	0	32.60	42.66	
143.98	H/3.15	178.4	16.80	14.80	0	31.60	38.02	
149.18	V/1.04	170.7	18.40	15.87	0	34.27	51.70	
149.18	H/2.86	178.7	21.63	15.87	0	37.50	74.99	
203.37	V/1.00	189.6	18.20	13.70	0	31.90	39.36	
203.37	H/1.15	174.5	14.40	13.70	0	28.10	25.41	
216								150
216								200
271.22	V/1.00	235.0	14.40	16.14	0	30.54	33.65	
271.22	H/1.10	188.1	18.30	16.14	0	34.44	52.72	
298.34	V/1.00	82.2	14.9	17.62	0	32.52	42.27	
298.34	H/1.00	190.6	15.10	17.62	0	32.72	43.25	
366.10	V/1.00	74.7	18.80	18.55	0	37.35	73.71	
366.10	H/1.00	189.6	24.60	18.55	0	43.15	143.71	
447.51	V/1.00	153.3	16.60	20.67	0	37.27	73.03	
447.51	H/1.00	188.9	19.60	20.67	0	40.27	103.16	
474.62	V/1.00	203.9	14.50	21.91	0	36.41	66.14	
474.62	H/1.00	213.7	18.1	21.91	0	40.01	100.11	
960.00								200
960.00								500
1000.0								500

The frequency range was scanned from 9kHz to 1 GHz.
The emissions observed from the EUT do not exceed the specified limits.
Emissions not recorded were more than 20dB under the specified limit.
*This represents the minimum sensitivity of measurement system.



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