

TEST REPORT



Testing Certification # 1367-01

Laboratory ID

PRODUCT SAFETY ENGINEERING, INC.
12955 Bellamy Brothers Boulevard
Dade City, Florida 33525 USA
PH (352) 588-2209 FX (352) 588-2544

Submitter ID

UTC Fire & Security Americas Corporation
8985 Town Center Parkway
Bradenton, FL 34202

Report Issue Date: 23 Oct 2012

Sample S/N: NONE

Test Report Number: 12F335B

Model Designation: SMCSM10-Z &
SMCSD10-Z

Sample Receipt Date: 20 Aug 2012

Sample Test Date: see data sheets

Product Description: SMOKE DETECTOR

Description of non-standard test method or test practice: *None*

Estimated Measurement Uncertainty: *See page 9. This uncertainty represents and expanded uncertainty expressed at approximately 95% confidence level using a coverage factor of k=2.*

Special limitations of use: *None*

Traceability: *reference standards of measurement have been calibrated by a competent body using standards traceable to the NIST.*

According to testing performed at Product Safety Engineering, Inc., the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in regulations indicated on page (3) of the test report. The test results contained herein relate only to the item identified above. It is the manufacturer's responsibility to assure that additional production units are manufactured with identical electrical and mechanical characteristics.

As the responsible EMC Project Engineer, I hereby declare that the equipment tested as specified above conforms to the requirements indicated on page (3) of the test report.

Signature

Name David Foerstner

Title Engineering Group Leader

Date 24 OCT 2012

Reviewed by:

Approved Signatory

Date 24 OCT 2012

Steve Hoke (EMC Site Manager)

This report may only be reproduced in full without written permission from Product Safety Engineering, Inc.

Test Report Number 12F335B

Product Safety Engineering, Inc. 12955 Bellamy Brothers Blvd. Dade City, FL 33525
Tel (352) 588-2209 Fax (352) 588-2544

Page 1 of 12

DIRECTORY - EMISSIONS

		Page(s)
A) Documentation		
Test report		1 - 10
Directory		2
Test Regulations		3
General Remarks		10
Test-setups (Photos)		11 - 12
B) Test data		
Conducted emissions	10/150 kHz - 30 MHz	5, 9
Radiated emissions	10 kHz - 30 MHz	5, 9
Radiated emissions	30 MHz - 1000 MHz	6, 9
Interference power	30 MHz - 300 MHz	6, 9
Equivalent Radiated emissions	1 GHz - 18 GHz	7, 9
Antenna Disturbance Voltage	30 MHz - 1,000 MHz	7,9
C) Appendix A		
Test Data Sheets		A2 - A4
D) Appendix B		
System Under Test Description		B1 - B1
E) Appendix C		
Measurement Protocol		C1 - C2

Test Report Number 12F335B

Product Safety Engineering, Inc 12955 Bellamy Brothers Blvd. Dade City, FL 33525
Tel (352) 588-2209 Fax (352) 588-2544

EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

☐ - EN 61000-6-3:2007

☐ - EN 61000-6-4:2007

☐ - EN 55011 : 2009/A1:2010

☐ - Group 1

☐ - Group 2

☐ - Class A

☐ - Class B

☐ - EN 55013 : 2001 /A1:2003 /A2:2006

■ - RSS-210

☐ - EN 55014 -1: 2006

☐ - Household appliances and similar

☐ - Portable tools

☐ - Semiconductor devices

☐ - EN 55022:2010

☐ - Class A

☐ - Class B

☐ -AS/NZS CISPR 22

☐ - Class A

☐ - Class B

☐ - ICES-003

☐ - Class A

☐ - Class B

☐ - CNS 13438

☐ - Class A

☐ - Class B

☐ - VCCI V-3/2010.4

☐ - Class A

☐ - Class B

■ - FCC Part 15 (per ANSI C63.4)

☐ - Class A

☐ - Class B

■ - Certification

☐ - Verification

☐ - Declaration of Conformity

☐ - FCC Part 18

Test Report Number 12F335B

Product Safety Engineering, Inc 12955 Bellamy Brothers Blvd. Dade City, FL 33525
Tel (352) 588-2209 Fax (352) 588-2544

Environmental conditions during testing:

	LAB	OATS
Temperature: *	_____	: _____
Relative Humidity: **	_____	: _____

* The ambient temperature during the testing was within the range of (50° - 104° F) unless indicted above.

** The humidity levels during the testing was within the range of (10% - 90%) relative humidity unless indicated above.

Power supply system : _____ Volts _____ Hz SINGLE phase
Internal Battery

Sign Explanations:

☐ - not applicable

☒ - applicable

Test Report Number 12F335B

Product Safety Engineering, Inc 12955 Bellamy Brothers Blvd. Dade City, FL 33525
Tel (352) 588-2209 Fax (352) 588-2544

Emissions Test Conditions: CONDUCTED EMISSIONS (Interference Voltage)

The *CONDUCTED EMISSIONS (INTERFERENCE VOLTAGE)* measurements were performed at the following test location:

☒ - Test not applicable

- ☐ - Darby Test Site (Open Area Test Site)
- ☐ - Darby Laboratory

Test equipment used :

Model Number	Manufacturer	Description	Serial Number
☐ - 8028-50	Solar	50 Ω LISN	829012, 829022
☐ - 8012	Solar	50 Ω LISN	924840
☐ - EMC-30	Electro-Metrics	EMI Receiver	191
☐ - 8566B	Hewlett-Packard	Spectrum Analyzer	2421A00526
☐ - 85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
☐ - 85662A	Hewlett Packard	Analyzer Display	2403A07352
☐ - 8028-50	Solar	50 Ω LISN	903725, 903726
☐ - FCC-TLISN-T4-02	Fisher Custom Com.	Telecom ISN	20454
☐ - FCC-TLISN-T8-02	Fisher Custom Com.	Telecom ISN	20452
☐ - LI-125	Com-Power	50 Ω LISN	191080/191081

Emissions Test Conditions: RADIATED EMISSIONS (Magnetic Field)

The *RADIATED EMISSIONS (MAGNETIC FIELD)* measurements were performed at the following test location:

- ☒ - Darby Test Site (Open Area Test Site)
- ☐ -
- ☐ -

at a test distance of :

- ☒ - 3 meters
- ☐ - 30 meters

☐ - Test not applicable

Test equipment used :

Model Number	Manufacturer	Description	Serial Number
☐ - 3148	EMCO	Log Periodic Antenna	00044783
☐ - BIA-25	Electro-Metrics	Biconical Antenna	4283
☒ - 8566B	Hewlett-Packard	Spectrum Analyzer	2421A00526
☒ - 85662A	Hewlett-Packard	Analyzer Display	2403A07352
☒ - 85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
☒ - ALR-30M	Electro-Metrics	Loop Antenna	824
☒ - 8447D	Hewlett Packard	Preamplifier	2944A06832
☐ - EMC-30	Electro-Metrics	EMI Receiver	191
☐ - ALA-130/A	Antenna Research	Loop Antenna	106

Test Report Number 12F335B

Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *RADIATED EMISSIONS (ELECTRIC FIELD)* measurements, in the frequency range of 30 MHz-1000 MHz, were tested in a horizontal and vertical polarization at the following test location :

☐ - Test not applicable

- - Darby Site (Open Area Test Site)
- ☐ - Darby Lab
- ☐ -

at a test distance of :

- - 3 meters
- ☐ - 10 meters
- ☐ - 30 meters

Test equipment used :

	Model Number	Manufacturer	Description	Serial Number
☐	HLP 3003C	EMC Automation	Hybrid Periodic Antenna	017501
■	8447D	Hewlett-Packard	Preamplifier (26dB)	1937A03247
■	8566B	Hewlett-Packard	Spectrum Analyzer	2421A00526
■	85662A	Hewlett-Packard	Analyzer Display	2403A07352
■	85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
☐	BIA 25	Electro-Metrics	Biconical Antenna	4283
☐	EMC-30	Electro-Metrics	EMI Receiver	191
☐	8568B	Hewlett Packard	Spectrum Analyzer	2407A03213
☐	85650A	Hewlett Packard	Quasi-Peak Adapter	2043A00358
☐	85662A	Hewlett Packard	Analyzer Display	2340A05806
☐	LPA30	Electro-Metrics	Log Periodic	2280
■	3104C	Emco	Biconical Antenna	00075927
■	9005	Eaton	Log Periodic Antenna	1099

Emissions Test Conditions): INTERFERENCE POWER

The *INTERFERENCE POWER* measurements were performed by using the absorbing clamp on the mains and interface cables in the frequency range 30 MHz - 300 MHz at the following test location :

■ - Test not applicable

- ☐ - Darby Lab
- ☐ -

Test equipment used :

	Model Number	Manufacturer	Description	Serial Number
☐	MDS-21	Rhode&Schwarz	Absorbing Clamp	8608447020
☐	8566B	Hewlett-Packard	Spectrum Analyzer	2421A00526
☐	85662A	Hewlett-Packard	Analyzer Display	2403A07352
☐	85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
☐	8447D	Hewlett-Packard	Amplifier (26 dB)	2944A06832
☐	EMC-30	Electro-Metrics	EMI Receiver	191

Test Report Number 12F335B

The **EQUIVALENT RADIATED EMISSIONS** measurements in the frequency range 1 GHz -24 GHz were performed in a horizontal and vertical polarization at the following test location :

■ - Darby Test Site (Open Area Test Site)

- ☐ -
- ☐ -
- ☐ -

at a test distance of:

- - 1 meters
- - 3 meters
- ☐ - 10 meters

☐ - Test not applicable

Test equipment used :

Model Number	Manufacturer	Description	Serial Number
■ - 8566B	Hewlett-Packard	Spectrum Analyzer	2421A00526
■ - 85662A	Hewlett-Packard	Analyzer Display	2403A07352
■ - 85650A	Hewlett-Packard	Quasi-Peak Adapter	2043A00209
■ - 8449B	Hewlett-Packard	Preamplifier	3008A00320
■ - 3115	Electro-Mechanics	Double Ridge Guide Horn	3810

The **ANTENNA TERMINAL DISTURBANCE VOLTAGE** in the frequency range 30 MHz - 1,000 MHz were performed.

☐ - Darby Test Site (Open Area Test Site)

- ☐ - Laboratory
- ☐ -
- ☐ -

■ - Test not applicable

Model Number	Manufacturer	Description	Serial Number
☐ - 2F9-3C4-3C5	Wavecom	UHF PAL TV Modulator	185879
☐ - 2F1-3C4-3C5	Wavecom	VHF PAL TV Modulator	157728
☐ - A-8000	IFR	Spectrum Analyzer	1306
☐ - 8648B	Hewlett-Packard	Signal Generator	3623A01433
☐ - 8648B	Hewlett-Packard	Signal Generator	3623A01477
☐ - LMV-182A	Leader	RMS Milli-Voltmeter	8010091
☐ - 3202	Krhon-Hite	Active filter	5899
☐ - FMT115	Leaming	FM Modulator	NONE
☐ - 371	UDT	Optical power meter	06657
☐ - TSG95	Tektronix	PAL video / Audio gen	B028883

Test Report Number 12F335B

Product Safety Engineering, Inc 12955 Bellamy Brothers Blvd. Dade City, FL 33525
Tel (352) 588-2209 Fax (352) 588-2544

Page 7 of 12

Equipment Under Test (EUT) Test Operation Mode - Emission tests :

The device under test was operated under the following conditions during emissions testing:

- ☐ - Standby
- ☐ - Test program (H - Pattern)
- ☐ - Test program (color bar)
- ☒ - Test program (customer specific)
- ☐ - Practice operation
- ☐ - Normal Operating Mode
- ☐ -

Configuration of the device under test:

- ☒ - See System Under Test Information in Appendix B

Rationale for EUT setup / configuration:

ANSI C63.4:2003

Emission Test Results:

Conducted emissions 150 kHz - 30 MHz

The requirements are ☐ - MET ☐ - NOT MET
Minimum limit margin dB at MHz
MU: 5.3 dB

Radiated emissions (magnetic field) 10 kHz - 30 MHz

The requirements are ☒ - MET ☐ - NOT MET
Minimum limit margin >20 dB at MHz
MU: NA

(Ant (10 kHz to 30 MHz) = Magnetic Loop

Radiated emissions (electric field) 30 MHz - 1000 MHz

The requirements are ☒ - MET ☐ - NOT MET
Minimum limit margin 6.9 dB at 68.1 MHz
MU: 5.2 dB

(Ant (30 - 200) MHz) = biconical (Ant (200 - 1,000) MHz) = Log Periodic

Interference Power at the mains and interface cables 30 MHz - 300 MHz

The requirements are ☐ - MET ☐ - NOT MET
Minimum limit margin dB at MHz
MU: NA

Radiated emissions 1 GHz - 25 GHz

The requirements are ☒ - MET ☐ - NOT MET
Minimum limit margin 3.9 dB at 9,920 GHz
MU: 4.9 dB

(Ant (1-25) GHz) = Horn

Antenna Terminal Disturbance Voltage 30 MHz - 1,000 MHz

The requirements are ☐ - MET ☐ - NOT MET
Minimum limit margin dB at MHz
MU: NA

MU = Measurement Uncertainty

Test Report Number 12F335B

GENERAL REMARKS:

Conducted emissions - Exploratory measurements are used to identify the frequency of the emission that has the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable positions, and with a typical system equipment configuration and arrangement. For each mode of operation and for each ac power current-carrying conductor, cable manipulation is performed within the range of likely configurations. For this measurement or series of measurements, the frequency spectrum of interest is monitored looking for the emission that has the highest amplitude relative to the limit. Once that emission is found for each current-carrying conductor of each power cord associated with the EUT (but not the cords associated with non-EUT equipment in the overall system), the one and arrangement and mode of operation that produces the emission closest to the limit across all the measured conductors is recorded. Software used is Electro metrics OS-30-CAT ver 1.10

Radiated emissions - The equipment under test is oriented at (0) degrees azimuth with respect to the measuring antenna. The antenna is placed in the vertical polarity and the software performs an automated set of measurements across the frequency range of interest. When complete, a database of all signals labeled "suspects" is displayed and the test engineer manually investigates any signal that is within (15) dB of the limit. Those determined to be from the EUT are placed on a separate database labeled "finals" and those not from the EUT are placed in the ambient database. The EUT is then rotated (90) degrees and the process is repeated. Upon completion of (4) scans, the antenna polarity is changed to horizontal, the EUT orientation is set to (45) degrees and the process is repeated (4) additional times. After every scan, the final list is completed re-measured and updated for amplitude and polarity if higher in amplitude.

Once all (8) scans are complete, the highest (6) signals are re-measured by maximizing the amplitude with cable manipulation, antenna height and EUT azimuth. The final (6) six signals are included in the test report. Software used is HP 85870A Opt655/Rev A.02.01.

SUMMARY:

The requirements according to the technical regulations are

- ☒ - met
- ☐ - **not** met.

The device under test does

- ☒ - fulfill the general approval requirements mentioned on page 3.
- ☐ - **not** fulfill the general approval requirements mentioned on page 3.

Testing Start Date 21 Aug 2012

Testing End Date: 10 Sep 2012

- PRODUCT SAFETY ENGINEERING INC -

Test Report Number 12F335B

Product Safety Engineering, Inc 12955 Bellamy Brothers Blvd. Dade City, FL 33525
Tel (352) 588-2209 Fax (352) 588-2544

Test-setup photo(s):
Conducted emission 150 kHz - 30 MHz

NA

Test Report Number 12F337B

Product Safety Engineering, Inc 12955 Bellamy Brothers Blvd. Dade City, FL 33525
Tel (352) 588-2209 Fax (352) 588-2544

Page 11 of 12

Test-setup photo(s):
Radiated emission 30 MHz - 1000 MHz



Test Report Number 12F337B

Product Safety Engineering, Inc 12955 Bellamy Brothers Blvd. Dade City, FL 33525
Tel (352) 588-2209 Fax (352) 588-2544

Page 12 of 12

APPENDIX

A

Test Equipment Calibration Information & Test Data Sheets

TEST EQUIPMENT CALIBRATION INFORMATION				
Manufacturer	Model	Description	Serial Number	Cal Due *
Hewlett Packard	8566B	Spectrum Analyzer	2421A00526	10/13/2012
Hewlett Packard	85662A	Display	2403A07352	10/13/2012
Hewlett Packard	85650A	Quasi-peak Adapter	2043A00209	9/6/2012
Hewlett Packard	8566B	Spectrum Analyzer	2532A02418	
Hewlett Packard	85662A	Display	2403A06604	
Hewlett Packard	85650A	Quasi-peak Adapter	2043A00358	
Hewlett Packard	8447D	Preamplifier 0.1 - 1,000 MHz	2944A06832	
Hewlett Packard	8447D	Preamplifier 0.1 - 1,000 MHz	2944A06901	
Hewlett Packard	8447D	Preamplifier 0.1 - 1,000 MHz	1937A03247	9/19/2013
Hewlett Packard	8449B	Preamplifier 1 - 26.5 GHz	3008A00320	5/7/2013
Hewlett Packard	E7402A	Portable Spectrum Analyzer	US40240204	
Eaton	96005	Log Periodic Antenna	1099	12/27/2012
Electro-Metrics	BIA-30	Biconical Antenna	3852	
EMCO	3104C	Biconical Antenna	75927	4/5/2013
Electro-Metrics	ALR30M	Magnetic Loop Antenna	824	11/9/2013
Electro-Metrics	EMC-30	EMI Receiver	191	
Electro-Metrics	3115	Double Ridge Guide Antenna	3810	5/25/2013
Solar	8028	LISN	829012/809022	
Com-Power	LI-125	LISN	191180/191181	
EMCO	3148	Log Periodic Antenna	75741	
Schwartzbeck	MDS-21	Absorbing Clamp	2581	
Fisher Custom	FCC-TLISN-T4-02	T LISN	20454	
Fisher Custom	FCC-TLISN-T8-02	Fisher Custom	20452	
		* Cal Due Date Format = MM/DD/YY		
All equipment was calibrated one year prior to the cal due date listed unless otherwise indicated				

Radiated Emissions (30 - 1,000) MHz

PRODUCT EMISSIONS

HP 85870A Rev. A.02.00 Data File: UTC 4 DIFF SENSORS FCCB 21AUG12

No	EMISSION	SPEC	MEASUREMENTS			SITE			CORR	COMMENTS
	FREQUENCY MHz	LIMIT dBuV/m	ABS	dLIM	MODE	POL	HGT cm	AZM deg	FACTOR dB	
1	48.000	40.0	29.6	-10.4	PK	V	150	225	-18.2	
2	68.100	40.0	33.1	-6.9	QP	V	100	135	-19.6	
3	87.788	40.0	30.1	-9.9	PK	V	150	225	-20.5	
4	120.000	43.5	32.2	-11.3	PK	V	150	180	-14.4	
5	144.000	43.5	30.0	-13.5	PK	V	100	180	-14.2	
6	168.001	43.5	30.2	-13.3	PK	V	100	135	-12.7	
7	215.990	43.5	31.1	-12.4	PK	H	200	1	-15.3	
8	240.004	46.0	31.7	-14.3	PK	H	150	270	-14.4	
9	359.999	46.0	32.7	-13.3	PK	H	150	180	-11.4	
10	391.791	46.0	33.8	-12.2	PK	H	150	180	-11.3	
11	480.002	46.0	31.9	-14.1	PK	V	100	135	-9.	
12	600.002	46.0	33.3	-12.7	PK	V	100	180	-7.7	

At each of the signals listed above, the transmitter frequency was changed from 2405 to 2445 and 2480. We saw no difference in the signal amplitude when the frequency was changed.

Radiated Emissions (1 - 24) GHz

			UTC SMCGB10 Glass Break Sensor								
Channels chosen so that 3 Different Transmitter Frequencies could be measured from lowest to highest frequency range possible.											
All Levels measured (and reported below) are Highest with Measurement Horn Antenna in Vertical Position.											
Transmitters are investigated at 3 orthogonal positions, Levels are Highest with Tx in Vertical upright position.											
Fundamental thru 4th Harmonic are Measured at 3 Meter Distance											
Freq.	Peak			PA	Adj Peak	Peak	Delta	Average Level	AVG	Delta	
	Measured @ 3 m		ACF	CL	Gain	Limit			Limit		
MHz	dBuV		dB/m	dB	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
2405	95		28.4	7.5	30	100.9	114	-13.1	87.2	94	-6.8
2445	95.1		28.4	7.5	30	101	114	-13	86.3	94	-7.7
2480	95.3		28.5	7.5	30	101.3	114	-12.7	87	94	-7
4810	41.6		32.7	11.5	30	55.8	74	-18.2	41.9	54	-12.1
4890	42		32.8	11.5	30	56.3	74	-17.7	41.8	54	-12.2
4960	41.9		32.9	11.5	30	56.3	74	-17.7	42.6	54	-11.4
7215	37.5		35.9	17.2	30	60.6	74	-13.4	46.8	54	-7.2
7335	37.2		36.5	17.2	30	60.9	74	-13.1	46.3	54	-7.7
7440	38		36.6	17.2	30	61.8	74	-12.2	47.9	54	-6.1
9620	32.6		37.6	21.5	30	61.7	74	-12.3	47.9	54	-6.1
9780	33		37.8	21.5	30	62.3	74	-11.7	48.7	54	-5.3
9920	33.2		38.1	21.5	30	62.8	74	-11.2	48.3	54	-5.7
5th Harmonic and Higher Measured at 1 Meter Distance											
Freq.	Peak			PA	Adj Peak	Peak	Delta	Average Level	AVG	Delta	
	Measured @ 1 m		ACF	CL	Gain	Limit			Limit		
MHz	dBuV		dB/m	dB	dB	dBuV/m	dBuV/m	dB	dBuV/m	dBuV/m	dB
12025	25.2		39.1	5.2	30	39.5	83.5	-44	25	63.5	-38.5
12225	24.6		38.8	5.2	30	38.6	83.5	-44.9	24.8	63.5	-38.7
12400	25		38.7	5.2	30	38.9	83.5	-44.6	25.9	63.5	-37.6
14430	23		41.8	5.8	30	40.6	83.5	-42.9	28.4	63.5	-35.1
14670	22.4		41.6	5.8	30	39.8	83.5	-43.7	26.3	63.5	-37.2
14880	23		41.1	5.8	30	39.9	83.5	-43.6	25.4	63.5	-38.1
**There are no Emissions to Measure above 15 GHz within 30 dB of the Limit, (Harmonics #7 thru #10)											
3 Meter Limit changed to 1 Meter Limit using $20 \text{ Log } (3/1) = 9.5$, Therefore Limit at 1 Meter is adjusted +9.5dB Higher											

APPENDIX

B

System Under Test Description

Test Report Number 12F335B

Product Safety Engineering, Inc 12955 Bellamy Brothers Blvd. Dade City, FL 33525
Tel (352) 588-2209 Fax (352) 588-2544

APPENDIX

C

Measurement Protocol

ANSCI C63.4 2003 was the guiding document for test procedures as required by 47 CFR Part 15 Subpart A Section 15.31(a)(3).

The EUT was powered with an internal battery during the collection of data included within.

The data is compared to the FCC Part 15 Class B limits.

The "EMI" instrumentation is capable of calculating the final emission level based on the following formula:

Level at the receiver (dBμV) + Antenna Correction Factor (dB/M) + Cable Loss (dB) - Preamp Gain (dB) = Actual Level in dBμV/M.

The sample calculation below is based on the actual test data collected:

Observed Level		50.3	dBμV	
ACF	+	8.6	dB/M	
Cable Loss	+	0.2	dB	
Preamp Gain	-	<u>26.0</u>	dB	
Actual Level		33.1	dBμV/M	@ 68.1 MHz

Please have a company official review this report and sign.
