# SUBMITTAL APPLICATION REPORT

## FOR GRANT OF CERTIFICATION

FOR

## MODEL: 1140 SERIES KEY FOB 902 - 928 MHz Transmitter

FOR

## **DIGITAL MONITORING PRODUCTS, INC.**

2500 North Partnership Boulevard Springfield, MO 65802-6310

**Test Report Number: 060714** 



ROGERS LABS, INC.

4405 West 259<sup>th</sup> Terrace Louisburg, KS 66053 Phone / Fax (913) 837-3214

## ENGINEERING TEST REPORT FOR APLLICATION of GRANT of CERTIFICATION

FOR

## CFR 47, PART 15C - INTENTIONAL RADIATORS Paragraph 15.249 Low Power Transmitter

For

## **DIGITAL MONITORING PRODUCTS, INC.**

2500 North Partnership Boulevard Springfield, MO 65802-6310 Terry Shelton,

Model: 1140 SERIES KEY FOB wireless transmitter Frequency 902-928 MHz FCC ID#: CCKPC0098

Test Date: July 17, 2006

Certifying Engineer:

Scot DRogers

Scot D. Rogers ROGERS LABS, INC. 4405 West 259<sup>th</sup> Terrace Louisburg, KS 66053 Phone: (913) 837-3214 FAX: (913) 837-3214

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ROGERS LABS, INC.Digital Monitoring Products, Inc.4405 W. 259th TerraceMODEL: 1140 Series Wireless Key fobLouisburg, KS 66053Test #: 060714Phone/Fax: (913) 837-3214Test to: FCC Parts 2 and 15c (15.247)Page 2 of 23<br/>DMP 1140 Series Test Report.doc 7/20/2006

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## FORWARD

The following is submitted for consideration in obtaining a Grant of Certification for a frequency

hopping spread spectrum intentional radiator operating under CFR Paragraph 15.249.

Name of Applicant:

DIGITAL MONITORING PRODUCTS, INC. 2500 North Partnership Boulevard Springfield, MO 65802-6310

Model: 1140 SERIES KEY FOB wireless transceiver.

FCC I.D.: CCKPC0098.

Frequency Range: 902-928 MHz.

Operating Power: 92.7 dBµV/m @ 3-meters (3 meter effective radiated measurement).

## 1) Applicable Standards & Test Procedures

a) In accordance with the Federal Communications Code of Federal Regulations, dated October 1, 2005, Part 2, Subpart J, Paragraphs 2.907, 2.911, 2.913, 2.925, 2.926, 2.1031 through 2.1057, and applicable parts of paragraph 15, Part 15C Paragraph 15.249 the following information is submitted.

b) Test procedures used are the established Methods of Measurement of Radio-Noise Emissions as described in the ANSI 63.4-2003 Document FCC, documents DA00-1407 and DA00-705 and/or TIA/EIA 603-1.

## 2.1033(b) Application for Certification

(1)	Manufacturer:	DIGITAL MONITORING PRODUCTS, INC.
		2500 North Partnership Boulevard
		Springfield, MO 65802-6310

- (2) Identification: Model: 1140 SERIES KEY FOB wireless FCC I.D.: CCKPC0098
- (3) Instruction Book:

Refer to Exhibit for Instruction Manual.

(4) Description of Circuit Functions:

Refer to Exhibit of Operational Description.

(5) Block Diagram with Frequencies:

Refer to Exhibit of Operational Description.

(6) Report of Measurements:

Report of measurements follows in this Report.

- (7) Photographs: Construction, Component Placement, etc.:Refer to Exhibit for photographs of equipment.
- (8) No Peripheral Equipment was Necessary.
- (9) Transition Provisions of 15.37 are not being requested.
- (10) Frequency hopping Spread Spectrum transmitters:Not Applicable
- (11) Not Applicable. The EUT is not a scanning receiver.
- (12) Not Applicable. The EUT does not operate in the 59 64 GHz frequency band.

## 2) Equipment Tested

<u>Equipment</u>	Model	FCC I.D.#
EUT	1140 SERIES KEY FOB	CCKPC0098

## 3) Equipment Function and Testing Procedures

The EUT is a 902-928 MHz radio transmitter used to transmit alarm control conditions for use in an alarm panel installation. The 1140 SERIES KEY FOB wireless transmitter is a wireless link used for transmitting information from one remote location to the alarm control panel. The unit is marketed for use to incorporate a wireless link in an alarm system solution. Test software was installed in the test sample for testing purposes. The modified software allowed the transmitter to become activate without requiring the button press. The unit operates from internal 3 volt battery and has no provision to connect to utility power. For testing purposes, new 3 volt batteries, supplied by the manufacturer, were used to power the units. The device utilizes a permanently connected antenna system with no provision for user replacement. The unit has no provision to connect to external auxiliary equipment.

## 4) Equipment and Cable Configurations Conducted Emission Test Procedure

The unit typically operates from internal 3 volt batteries and has no provision to connect to utility power. Therefore no AC line conducted emissions testing was performed. For testing purposes, new 3 volt batteries were used to power the units.

## **Radiated Emission Test Procedure**

The EUT was placed on a rotating 1 x 1.5-meter wooden platform, 0.8 meters above the ground plane at a distance of 3 meters from the FSM antenna. EMI energy was maximized by equipment placement, raising and lowering the FSM antenna, changing the antenna polarization, and by rotating the turntable. Each emission was maximized before data was taken using a spectrum analyzer. Refer to photographs in the exhibits for EUT placement.

## 5) List of Test Equipment

A Hewlett Packard 8591EM Spectrum Analyzer was used as the measuring device for the emissions testing of frequencies below 1 GHz. A Hewlett Packard 8562A Spectrum Analyzer was used as the measuring device for testing the emissions at frequencies above 1 GHz. The analyzer settings used are described in the following table. Refer to the appendix for a complete list of test equipment.

HP 8591 EM ANALYZER SETTINGS					
CONDUCTED EMISSIONS:					
RBW	AVG. BW	DETECTOR FUNCTION			
9 kHz	30 kHz	Peak / Quasi Peak			
RADIATED EMISSIONS:					
RBW	AVG. BW	DETECTOR FUNCTION			
120 kHz	300 kHz	Peak / Quasi Peak			
HP 8562A ANALYZER SETTINGS					
RBW	VIDEO BW	DETECTOR FUNCTION			
100 kHz	100 kHz	PEAK			
1 MHz	1 MHz	Peak / Average			

EQUIPMENT MFG.	MODEL	CAL. DATES	DUE.
LISN Comp. Design	FCC-LISN-2-MOD.CD	10/05	10/06
Antenna ARA	BCD-235-B	10/05	10/06
Antenna EMCO	3147	10/05	10/06
Antenna EMCO	3143	5/06	5/07
AnalyzerHP	8591EM	5/06	5/07
AnalyzerHP	8562A	2/06	2/07

## 6) Units of Measurements

Conducted EMI	Data is in $dB\mu V$ ; $dB$ referenced to one microvolt.
Radiated EMI	Data is in dBµV/m; dB/m referenced to one microvolt per meter.

## 7) Test Site Locations

Conducted EMI	The AC power line conducted emissions tests were performed in a		
	shielded screen room located at Rogers Labs, Inc., 4405 W. 259th		
	Terrace, Louisburg, KS.		
Radiated EMI	The radiated emissions tests were performed at the 3 meters, Open		
	Area Test Site (OATS) located at Rogers Labs, Inc., 4405 W. 259 <sup>th</sup>		
	Terrace, Louisburg, KS.		
Site Approval	Refer to Appendix for FCC Site Approval Letter, Reference #		
	90910.		

## 8) SUBPART B – UNINTENTIONAL RADIATORS Conducted EMI

The unit typically operates from internal 3 volt batteries and has no provision to connect to utility power. Therefore no AC line conducted emissions testing was performed. For testing purposes, new 3 volt batteries were used to power the units.

#### Radiated EMI

The EUT was arranged in a typical equipment configuration and operated through all of its various modes. Preliminary testing was performed in a screen room with the EUT positioned 1 meter from the FSM. Radiated emissions measurements were performed to identify the frequencies, which produced the highest emissions. Plots were made of the frequency spectrum from 30 MHz to 12,000 MHz for the preliminary testing. Refer to figures one through five for plots of the radiated emissions spectrum taken in a screen room. The highest radiated emission was then re-maximized at the OATS location before final radiated emissions measurements were performed. Final data was taken with the EUT located at the OATS at a distance of 3 meters between the EUT and the receiving antenna. The frequency spectrum from 30 MHz to 12,000 MHz was searched for radiated emissions. Measured emission levels were maximized by EUT placement on the table, rotating the turntable through 360 degrees, varying the antenna height between 1 and 4 meters above the ground plane and changing antenna position between horizontal and vertical polarization. Antennas used were Broadband Biconical from 30 to 200 MHz, Biconilog from 30 to 1000 MHz, Log Periodic from 200 MHz to 5 GHz and or, pyramidal horns and mixers from 4 GHz to 10 GHz, notch filters and appropriate amplifiers were utilized.





Figure one Radiated Emissions taken at 1 meter in screen room.





Figure two Radiated Emissions taken at 1 meter in screen room.

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Figure three Radiated Emissions taken at 1 meter in screen room.



Figure four Radiated Emissions taken at 1 meter in screen room.

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Figure five Radiated Emissions taken at 1 meter in screen room.

## **General Radiated Emissions Data from EUT**

Frequency in MHz	FSM Horz. (dBµV)	FSM Vert. (dBµV)	A.F. (dB/m)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	FCC Class B Limit @ 3m (dBµV/m)

Note: no emissions above 20 dB were found emanating from this device other than the fundamental and harmonics. Other emissions present had amplitudes at least 20 dB below the limit.

#### Summary of Results for Conducted Emissions

The unit typically operates from internal 3 volt batteries and has no provision to connect

to utility power. For testing purposes, new 3 volt batteries were used to power the unit.

Therefore no AC line conducted emissions testing was performed. The conducted

emissions for the EUT meet the requirements for CISPR 22 and FCC Part 15B CLASS B

Digital Devices.

### Summary of Results for Radiated Emissions

The radiated emissions for the EUT meet the requirements for CISPR 22 and FCC Part 15B CLASS B Digital Devices. The EUT had at least a 20 dB minimum margin below the quasi-peak limit. Other emissions were present with amplitudes at least 20 dB below the limit.

## Statement of Modifications and Deviations

No modifications to the EUT were required for the unit to meet the CISPR 22 or FCC Part 15B CLASS B emissions standards. There were no deviations or exceptions to the specifications.

## 9) Subpart C - Intentional Radiators

As per CFR Part 15, Subpart C, paragraph 15.249 the following information is submitted.

#### 15.203 Antenna Requirements

The unit is produced with a permanently attached antenna and has no provision for user service, replacement, or antenna modification. The requirements of 15.203 are fulfilled and there are no deviations or exceptions to the specification.

## 15.205 Restricted Bands of Operation

Spurious emissions falling in the restricted frequency bands of operation were measured at a distance of three meters at the OATS. The EUT utilizes frequency, determining circuitry, which generates harmonics falling in the restricted bands. Emissions were checked at the OATS, using appropriate antennas or pyramidal horns, amplification stages, and a spectrum analyzer. No other significant emission was observed which fell into the restricted bands of operation.

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Sample Calculations: RFS (dB $\mu$ V/m @ 3m) = FSM(dB $\mu$ V) + A.F.(dB) - Gain(dB) = 22.5 + 35.5 - 30 = 28.0

Frequency in MHz	FSM Horz. (dBµV)	FSM Vert. (dBµV)	A.F. (dB/m)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	FCC Class B Limit @ 3m (dBµV/m)
2710.1	22.5	18.8	35.5	30	28.0	24.3	54.0
2735.7	26.0	20.5	35.2	30	31.2	25.7	54.0
2782.8	27.0	25.3	343.8	30	31.8	30.1	54.0
3613.3	29.0	18.6	39.0	30	38.0	27.6	54.0
3647.5	23.3	23.6	39.3	30	32.6	32.9	54.0
3710.4	25.5	23.5	39.6	30	35.1	33.1	54.0
4516.8	26.3	21.6	32.5	30	28.8	24.1	54.0
4559.4	28.6	24.6	32.5	30	31.1	27.1	54.0
4638.0	30.3	24.3	32.5	30	32.8	26.8	54.0

#### **Radiated Emissions Data in Restricted Bands (15.205)**

Other emissions present had amplitudes at least 20 dB below the margin.

#### Summary of Results for Radiated Emissions in Restricted Bands

The radiated emissions for the EUT meet the requirements for FCC Part 15C Intentional Radiators. The EUT had a 9.6 dB minimum margin below the limits. Both average and peak amplitudes were checked for compliance with the regulations. No other emissions where found in the restricted frequency bands. Other emissions were present with amplitudes at least 10 dB below the FCC Limits.

#### 15.209 Radiated Emissions Limits; General Requirements

#### **Radiated EMI**

The EUT was arranged in a typical equipment configuration and operated through all of its various modes. Preliminary testing was performed in a screen room with the EUT positioned 1 meter from the FSM. Radiated emissions measurements were performed to identify the frequencies, which produced the highest emissions. Emissions were checked in the screen room from 30 to 10,000 MHz and plots were made of the frequency spectrum from 30 MHz to 10,000 MHz for the preliminary testing. The highest radiated emission was then re-maximized at this location before final radiated emissions measurements were performed. Final data was taken with the EUT located at the open area test site at a distance of 3 meters between the EUT and the receiving antenna. The frequency spectrum from 30 MHz to 10,000 MHz was searched for radiated emissions. Measured emission levels were maximized by EUT placement on the table, rotating the turntable through 360 degrees, varying the antenna height between 1 and 4 meters above the ground plane and changing antenna polarization between horizontal and vertical. Antennas used were Broadband Biconical from 30 MHz to 200 MHz, Biconilog from 30 MHz to 1000 MHz, Log Periodic from 200 MHz to 5 GHz, and/or Pyramidal Horns from 4 GHz to 10 GHz.

General Radiated Emissions Data from EUT (15.2
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Frequency in MHz	FSM Horz. (dBµV)	FSM Vert. (dBµV)	A.F. (dB/m)	Amp. Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	FCC Class B Limit @ 3m (dBµV/m)

Note: no emissions above 20 dB were found emanating from this device other than the fundamental and harmonics. Other emissions present had amplitudes at least 20 dB below the limit.

#### Summary of Results for Radiated Emissions

The radiated emissions for the EUT meet the requirements for CISPR 22 and FCC Part

15B CLASS B Digital Devices. The EUT had at least a 20 dB minimum margin below

the quasi-peak limit. Other emissions were present with amplitudes at least 20 dB below

the limit.

#### 15.249 Operation in the Band 902-928 MHz

The power output was measured on an open field test site @ 3 meters.

The EUT was placed on a wooden turntable 0.8 meters above the ground plane and at a distance of 3 meters from the FSM antenna. The peak and quasi-peak amplitude of the carrier frequency was measured using a spectrum analyzer. The peak and average amplitude of the spurious emissions were measured using a spectrum analyzer then data recorded from the analyzer display.

Emissions radiated outside of the specified bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in 15.209, whichever is the lesser attenuation. The amplitude of each emission was maximized by varying the FSM antenna height, polarization, and by rotating the turntable. A Biconilog Antenna was used for measuring emissions from 30 to 1000 MHz, a Log Periodic Antenna for 200 to 5000 MHz, and Pyramidal Horn Antennas from 4 GHz to 25 GHz. Emissions were measured in dB $\mu$ V/m @ 3 meters. The power output was measured at the open area test site at a three-meter distance. Data was taken per Paragraph 2.1046(a) and 15.249. The 902 and 928 MHz band edges are protected due to the 902.4 – 927.6 MHz channels used for frequency of operation. Refer to figure seven nine showing plots taken of the EUT performance displaying compliance with the specifications.

Sample Calculation RFS (dB $\mu$ V/m @ 3m) = FSM(dB $\mu$ V) + A.F.(dB) - Gain(dB) =69.85 + 22.9 - 0 = 92.7

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MARKER	ACTV DET: PEAK
921.38 MHz	MEAS DET: PEAK QP
71.35 dBµV	MKR 921.38 MHz
·	71.35 dBµV



Figure six Band edge.

<b>Radiated</b>	Emissions	Data	from	EUT	(15.249)
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Emission Frequency (MHz)	FSM Horz. (dBµV)	FSM Vert. (dBµV)	Ant. Factor (dB)	Amp Gain (dB)	RFS Horz. @ 3m (dBµV/m)	RFS Vert. @ 3m (dBµV/m)	Limit @ 3m (dBµV/m)
903.3	69.8	56.3	22.9	0	92.7	79.2	94
1806.8	25.5	20.6	29.2	30	24.7	19.8	54
2710.1	22.5	18.8	35.5	30	28.0	24.3	54
3613.3	29.0	18.6	39.0	30	38.0	27.6	54
4516.8	26.3	21.6	32.5	30	28.8	24.1	54
911.9	69.5	57.3	23.0	0	92.5	80.3	94
1823.7	28.5	25.0	29.1	30	27.6	24.1	54
2735.7	26.0	20.5	35.2	30	31.2	25.7	54
3647.5	23.3	23.6	39.3	30	32.6	32.9	54
4559.4	28.6	24.6	32.5	30	31.1	27.1	54
927.6	67.3	55.3	23.5	0	90.8	78.8	94
1855.2	22.5	26.0	29.1	30	21.6	25.1	54
2782.8	27.0	25.3	34.8	30	31.8	30.1	54
3710.4	25.5	23.5	39.6	30	35.1	33.1	54
4638.0	30.3	24.3	32.5	30	32.8	26.8	54

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## Summary of Results for Radiated Emissions of Intentional Radiator

The EUT had the highest emission of 92.7 dB $\mu$ V/m at 3 meters at the fundamental frequency of operation. The EUT had a worst-case of 9.6 dB margin below the limit for the harmonic emissions. The radiated emissions for the EUT meet the requirements for FCC Part 15.249 Intentional Radiators. There are no measurable emissions in the restricted bands other than those recorded in this report. Other emissions were present with amplitudes at least 20 dB below the FCC Limits. The specifications of 15.249 were met; there are no deviations or exceptions to the requirements.

### Statement of Modifications and Deviations

No modifications to the EUT were required for the unit to meet the FCC Part 15C emissions standards. There were no deviations to the specifications.

## **APPENDIX**

Model: 1140 SERIES KEY FOB wireless DATA TRANSMITTER

- 1. Test Equipment List
- 2. Rogers Qualifications
- 3. FCC Site Approval Letter

## TEST EQUIPMENT LIST FOR ROGERS LABS, INC.

The test equipment used is maintained in calibration and good operating condition. Use of this calibrated equipment ensures measurements are traceable to national standards.

The test equipment used is maintained in calibration and good operating condition. Use of this calibrated equipment ensures measurements are traceable to national standards.

List of Test Equipment	Calibration Date
Scope: Tektronix 2230	2/06
Wattmeter: Bird 43 with Load Bird 8085	2/06
Power Supplies: Sorensen SRL 20-25, SRL 40-25, DCR 150, DCR 140	2/06
H/V Power Supply: Fluke Model: 408B (SN: 573)	2/06
R.F. Generator: HP 606A	2/06
R.F. Generator: HP 8614A	2/06
R.F. Generator: HP 8640B	2/06
Spectrum Analyzer: HP 8562A,	2/06
Mixers: 11517A, 11970A, 11970K, 11970U, 11970V, 11970W	
HP Adapters: 11518, 11519, 11520	
Spectrum Analyzer: HP 8591 EM	5/06
Frequency Counter: Leader LDC 825	2/06
Antenna: EMCO Biconilog Model: 3143	5/06
Antenna: EMCO Log Periodic Model: 3147	10/05
Antenna: Antenna Research Biconical Model: BCD 235	10/05
Antenna: EMCO Dipole Set 3121C	2/06
Antenna: C.D. B-101	2/06
Antenna: Solar 9229-1 & 9230-1	2/06
Antenna: EMCO 6509	2/06
Audio Oscillator: H.P. 201CD	2/06
R.F. Power Amp 65W Model: 470-A-1010	2/06
R.F. Power Amp 50W M185- 10-501	2/06
R.F. PreAmp CPPA-102	2/06
LISN 50 µHy/50 ohm/0.1 µf	10/05
LISN Compliance Eng. 240/20	2/06
LISN Fischer Custom Communications FCC-LISN-50-16-2-08	6/05
Peavey Power Amp Model: IPS 801	2/06
Power Amp A.R. Model: 10W 1010M7	2/06
Power Amp EIN Model: A301	2/06
ELGAR Model: 1751	2/06
ELGAR Model: TG 704A-3D	2/06
ESD Test Set 2010i	2/06
Fast Transient Burst Generator Model: EFT/B-101	2/06
Current Probe: Singer CP-105	2/06
Current Probe: Solar 9108-1N	2/06
Field Intensity Meter: EFM-018	2/06
KEYTEK Ecat Surge Generator	2/06
Shielded Room 5 M x 3 M x 3.0 M (101 dB Integrity)	
5/2/2006	

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## QUALIFICATIONS

## Of

## SCOT D. ROGERS, ENGINEER

#### ROGERS LABS, INC.

Mr. Rogers has approximately 16 years experience in the field of electronics. Six years working in the automated controls industry and 6 years working with the design, development and testing of radio communications and electronic equipment.

#### POSITIONS HELD:

Systems Engineer:	A/C Controls Mfg. Co., Inc. 6 Years
Electrical Engineer:	Rogers Consulting Labs, Inc. 5 Years
Electrical Engineer:	Rogers Labs, Inc. Current

#### EDUCATIONAL BACKGROUND:

- 1) Bachelor of Science Degree in Electrical Engineering from Kansas State University.
- 2) Bachelor of Science Degree in Business Administration Kansas State University.
- 3) Several Specialized Training courses and seminars pertaining to Microprocessors and Software programming.

Scot DRogers Scot D. Rogers July 17, 2006

Date

1/11/03

#### FEDERAL COMMUNICATIONS COMMISSION

Laboratory Division 7435 Oakland Mills Road Columbia, MD 21046

May 16, 2006

**Registration Number: 90910** 

Rogers Labs, Inc. 4405 West 259th Terrace Louisburg, KS 66053

Attention: Scot Rogers

Re: Measurement facility located at Louisburg 3 & 10 meter site Date of Renewal: May 16, 2006

Dear Sir or Madam:

Your request for renewal of the registration of the subject measurement facility has been received. The information submitted has been placed in your file and the registration has been renewed. The name of your organization will remain on the list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that the file must be updated for any changes made to the facility and the registration must be renewed at least every three years.

Measurement facilities that have indicated that they are available to the public to perform measurement services on a fee basis may be found on the FCC website <u>www.fcc.gov</u> under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincere hyllis Parish

Information Technician

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