



1250 Peterson Dr., Wheeling, IL 60090

Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

FCC Rules and Regulations / Intentional Radiators

Periodic operational in the 40.66-40.70 MHz Band and above 70 MHz.

Part 15, Subpart C, Section 15.231

THE FOLLOWING "**MEETS**" THE ABOVE TEST SPECIFICATION

Formal Name: Reliance Controls "The Home Protectors" Wireless Remote Flood or Freeze Warning Alarm Transmitter

Kind of Equipment: Wireless Remote Flood or Freeze Warning Alarm

Test Configuration: Standalone or powered by wall-mounted AC-to-DC power supply (Tested at 9 vdc)

Model Number(s): 11034 (part of THP 203 system, part of THP204 system)

Model(s) Tested: 11034

Serial Number(s): NA

Date of Tests: October 23 & November 21, 2006

Test Conducted For: Reliance Controls Corporation  
2001 Young Court  
Racine, Wisconsin 53404

**NOTICE:** "This report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government". Please see the "Additional Description of Equipment Under Test" page listed inside of this report.

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1250 Peterson Dr., Wheeling, IL 60090

Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

SIGNATURE PAGE

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Reliance Controls Corporation



1250 Peterson Dr., Wheeling, IL 60090

Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

## TABLE OF CONTENTS

|      |   |    |
|------|---|----|
| i.   | Cover Page .....                            | 1  |
| ii.  | Signature Page .....                        | 2  |
| iii. | Table of Contents .....                     | 3  |
| iv.  | NVLAP Certificate of Accreditation .....    | 5  |
| 1.0  | Summary of Test Report .....                | 6  |
| 2.0  | Introduction .....                          | 6  |
| 3.0  | Object .....                                | 6  |
| 4.0  | Test Set-Up .....                           | 7  |
| 5.0  | Test Equipment .....                        | 8  |
| 6.0  | Ambient Measurements .....                  | 9  |
| 7.0  | Description of Test Sample .....            | 10 |
| 8.0  | Additional Description of Test Sample ..... | 11 |
| 9.0  | Photo Information and Test Set-Up .....     | 12 |
| 10.0 | Radiated Photos Taken During Testing .....  | 13 |
| 10.0 | Conducted Photos Taken During Testing ..... | 16 |
| 11.0 | Results of Tests .....                      | 18 |
| 12.0 | Conclusion .....                            | 18 |
|      | TABLE 1 – EQUIPMENT LIST .....              | 19 |



1250 Peterson Dr., Wheeling, IL 60090

Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

## TABLE OF CONTENTS

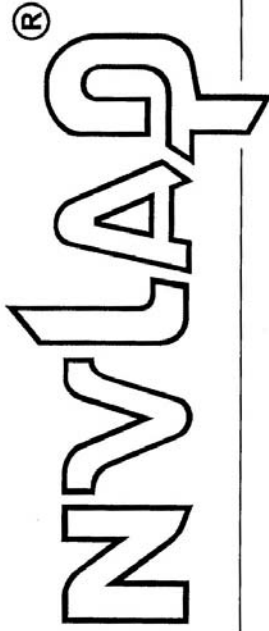
|   |    |
|---|----|
| Appendix A – Electric Field Radiated Emissions Test.....      | 21 |
| 1.0 Conducted Emission Measurements .....                     | 22 |
| 1.0 Conducted Data and Graph(s) taken during testing.....     | 23 |
| 2.0 Pulsed Operation (Duty Cycle Correction Factor).....      | 28 |
| 2.0 Graph taken of the Pulsed Operation (DCCF).....           | 29 |
| 3.0 Bandwidths .....  | 31 |
| 3.0 Graph taken of the Bandwidth Emissions.....               | 32 |
| 4.0 Field Strength of Spurious Emission Measurements .....    | 34 |
| 4.0 Data taken of the Fundamental and Spurious Emissions..... | 35 |
| 5.0 Restricted Bands .....                                    | 37 |



1250 Peterson Dr., Wheeling, IL 60090

Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

United States Department of Commerce  
National Institute of Standards and Technology



## Certificate of Accreditation to ISO/IEC 17025:1999

NVLAP LAB CODE: 100276-0

**D.L.S. Electronic Systems, Inc.**  
Wheeling, IL

is recognized by the National Voluntary Laboratory Accreditation Program for conformance with criteria set forth in  
NIST Handbook 150:2001 and all requirements of ISO/IEC 17025:1999.  
Accreditation is granted for specific services, listed on the Scope of Accreditation, for:

**ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS**



2006-10-01 through 2007-09-30

Effective dates

*Sally J. Bruce*  
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2005-05-19)



Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

1250 Peterson Dr., Wheeling, IL 60090

## 1.0 SUMMARY OF TEST REPORT

It was found that the Reliance Controls "The Home Protectors" Wireless Remote Flood or Freeze Warning Alarm Transmitter, Model Number(s) 11034, "**meets**" the radio interference conducted and radiated emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Section 15.231 for periodic operational in the 40.66-40.70 MHz Band and above 70 MHz.

This test report relates only to the items tested and contains the following number of pages.

Text: 37

## 2.0 INTRODUCTION

On October 23 & November 21, 2006, a series of radio frequency interference measurements was performed on Reliance Controls "The Home Protectors" Wireless Remote Flood or Freeze Warning Alarm Transmitter, Model Number(s) 11034, Serial Number: NA. The tests were performed according to the procedures of the FCC as stated in the "Methods of Measurement of Radio-Noise Emissions for Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" found in the American National Standards Institute, ANSI C63.4-2003. Tests were performed by personnel of D.L.S. Electronic Systems, Inc. who are responsible to Donald L. Sweeney, Senior EMC Engineer.

D.L.S. Electronic Systems, Inc. is a full service EMC/Safety Testing Laboratory accredited to ISO 17025. NVLAP Certificate and Scope can be viewed at <http://www.dlsemc.com/certificate>. Our facilities are registered with the FCC, Industry Canada, and VCCI.

## 3.0 OBJECT

The purpose of this series of tests was to determine if the test sample could meet the radio frequency interference emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Sections 15.33, 15.35, 15.205, 15.209 & 15.231 for Intentional Radiators operating in the Band 40.66-40.70 and above 70 MHz.



1250 Peterson Dr., Wheeling, IL 60090

Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

#### 4.0 TEST SET-UP

All emission tests were performed at D.L.S. Electronic Systems, Inc. and set up according to the American National Standards Institute, ANSI C63.4-2003, Section 8, (Figures 11a and 11b).

The conducted tests were performed with the test item placed on a non-conductive table (table top equipment), located in the test room. Equipment normally operated on the floor was tested by placing it on the metal ground plane. The ground plane has an electrical isolation layer over its surface approximately 7mm thick. The power line supplied was connected to a dual line impedance stabilization network electrically bonded to the ground plane, located on the floor. The networks were constructed per the requirements of the American National Standards Institute, ANSI C63.4-2003, Section 4, (Figure 2).

All radiated emissions tests were performed with the test item placed on a 80 cm high rotating non-conductive table, located in the test room. Equipment normally operated on the floor was placed on a metal covered turntable which is flush with the surrounding conducting ground plane. The ground plane has an electrical isolation layer over its surface approximately 7 mm thick. The EUT is separated from the turntable ground plane by a non-conductive layer. The equipment under test was set up according to ANSI C63.4-2003, Sections 6 and 8.



1250 Peterson Dr., Wheeling, IL 60090

Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

## 5.0 TEST EQUIPMENT (Bandwidths and Detector Function)

All preliminary data below 1000 MHz was automatically plotted using the HP Spectrum Analyzer or ESI 26/40 Fixed Tuned Receiver. The data was taken using Peak, Quasi-Peak or the Average Detector Functions as required. This information was then used to determine the frequencies of maximum emissions. Above 1000 MHz, final data was taken using the Average Detector.

Below 1000 MHz, final data was taken using the HP Spectrum Analyzer and/or ESI 26/40 Fixed Tuned Receiver. These plots were made using the Peak or Quasi-Peak Detector functions, with manual measurements performed on the questionable frequencies using the Quasi-Peak or the Average Detector Function of the Analyzer or ESI 26/40 Fixed Tuned Receiver as required. Above 1000 MHz, final data was taken using the Average Detector on the Spectrum Analyzer.

The bandwidths shown below are specified by ANSI C63.4-2003, Section 4.2.

| Frequency Range   | Bandwidth (-6 dB) |
|-------------------|-------------------|
| 10 to 150 kHz     | 200 Hz            |
| 150 kHz to 30 MHz | 9 kHz             |
| 30 MHz to 1 GHz   | 120 kHz           |
| Above 1 GHz       | 1 MHz             |

A list of the equipment used can be found in Table 1. All primary equipment was calibrated against known reference standards with a verified traceable path to NIST.





Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

1250 Peterson Dr., Wheeling, IL 60090

## 6.0 AMBIENT MEASUREMENTS

For emissions measurements, broadband antennas and an EMI Test Receiver with a panoramic spectrum display are used. First the frequency range is scanned and displayed on the test receiver display. Next the scanned frequency range is divided into smaller ranges, and then it is manually tuned through to determine the emissions from the EUT. A headset or loudspeaker is connected to the test receiver's AM/FM demodulated output as an aid in detecting ambient signals and finding frequencies of significant emission from the EUT. If there is any doubt as to the source of the emission, it is further investigated by rotating the EUT, or by disconnecting the power from the EUT.

The EUT is set up in its typical configuration and operated in its various modes. For tabletop systems, cables are manipulated within the range of likely configurations. For floor-standing equipment, the cables are located in the same manner as the user would install them and no further manipulation is made. If the manner of cable installation is not known, or if it changes with each installation, cables or wires for floor-standing equipment shall be manipulated to the extent possible to produce the maximum level of emissions. For each mode of operation, the frequency spectrum is monitored. Variations in antenna height, antenna polarization, EUT azimuth, and cable or wire placement (each variable within bounds specified elsewhere) are explored to produce the emissions that have the highest amplitude relative to the limit. These methods are performed to the specifications in MP-5 or ANSI C63.4-2003, as appropriate.



1250 Peterson Dr., Wheeling, IL 60090

Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

7.0 DESCRIPTION OF TEST SAMPLE: (See also Paragraph 8.0)

7.1 Description:

The transmitter module includes an internal temperature sensor and an external water sensor. When either of the sensors is activated, the alert code generator is activated. It reads the alert code from the code selector and synthesizes the code to be transmitted. It also triggers the power amplifier to the on-state for a brief period of time (~ 0.5 sec), at which time the oscillator signal is modulated by the alert code, and the resultant is amplified and provided to the transmitting antenna for transmission. The transmitting antenna consists of a circuit board trace. No external antenna is used.

7.2 PHYSICAL DIMENSIONS OF EQUIPMENT UNDER TEST

Length: 4.6" x Width: 2.7" x Height: 1.3"

7.3 LINE FILTER USED:

NA

7.4 INTERNAL CLOCK FREQUENCIES:

Switching Power Supply Frequencies:

NA

Clock Frequencies:

315 MHz

7.5 DESCRIPTION OF ALL CIRCUIT BOARDS:

1. Transmitter Board

PN: 11034 Rev. 2



1250 Peterson Dr., Wheeling, IL 60090

Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

8.0 ADDITIONAL DESCRIPTION OF TEST SAMPLE:  
(See also Paragraph 7.0)

1: There were no additional descriptions noted at the time of test.

I certify that the above, as described in paragraph 7.0, describes the equipment tested and will be manufactured as stated.

By: \_\_\_\_\_  
Signature Title

For: \_\_\_\_\_  
Company Date



Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

1250 Peterson Dr., Wheeling, IL 60090

## 9.0 PHOTO INFORMATION AND TEST SET-UP

Item 0 Reliance Controls "The Home Protectors" Wireless Remote Flood or Freeze Warning Alarm Transmitter

Model Number: 11034; Serial Number: NA

Item 1 Radio Shack 9 vdc Power Supply

Model 273-1767A

Item 2 Non-shielded Cable to Remote Switch to activate transmitter. 60'  
(For testing purposes only)

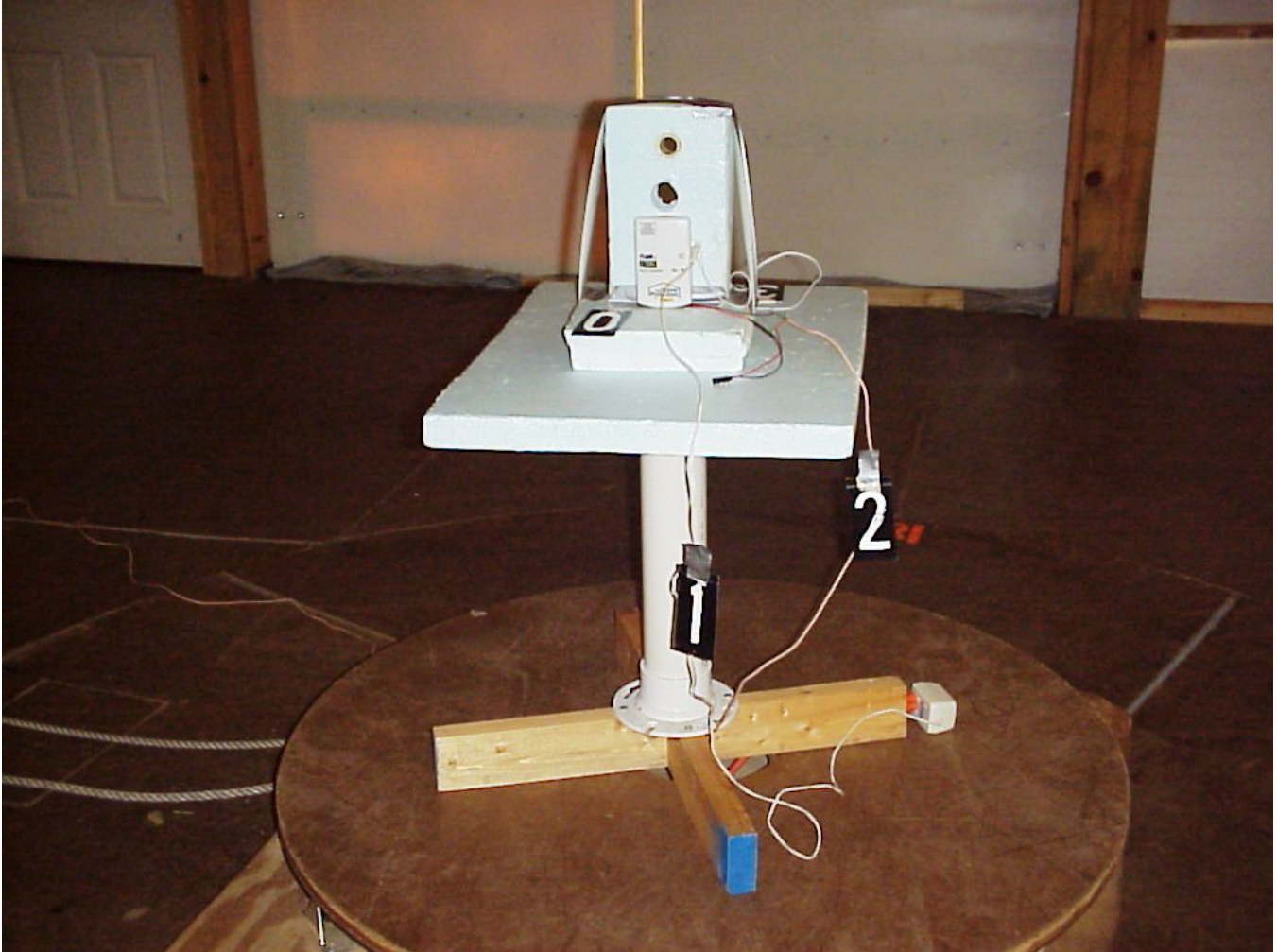
Item 3 Flood Sensor Wire. (.6 meters)



Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

1250 Peterson Dr., Wheeling, IL 60090

## 10.0 RADIATED PHOTOS TAKEN DURING TESTING



FRONT VIEW



Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

1250 Peterson Dr., Wheeling, IL 60090

## 10.0 RADIATED PHOTOS TAKEN DURING TESTING (CON'T)



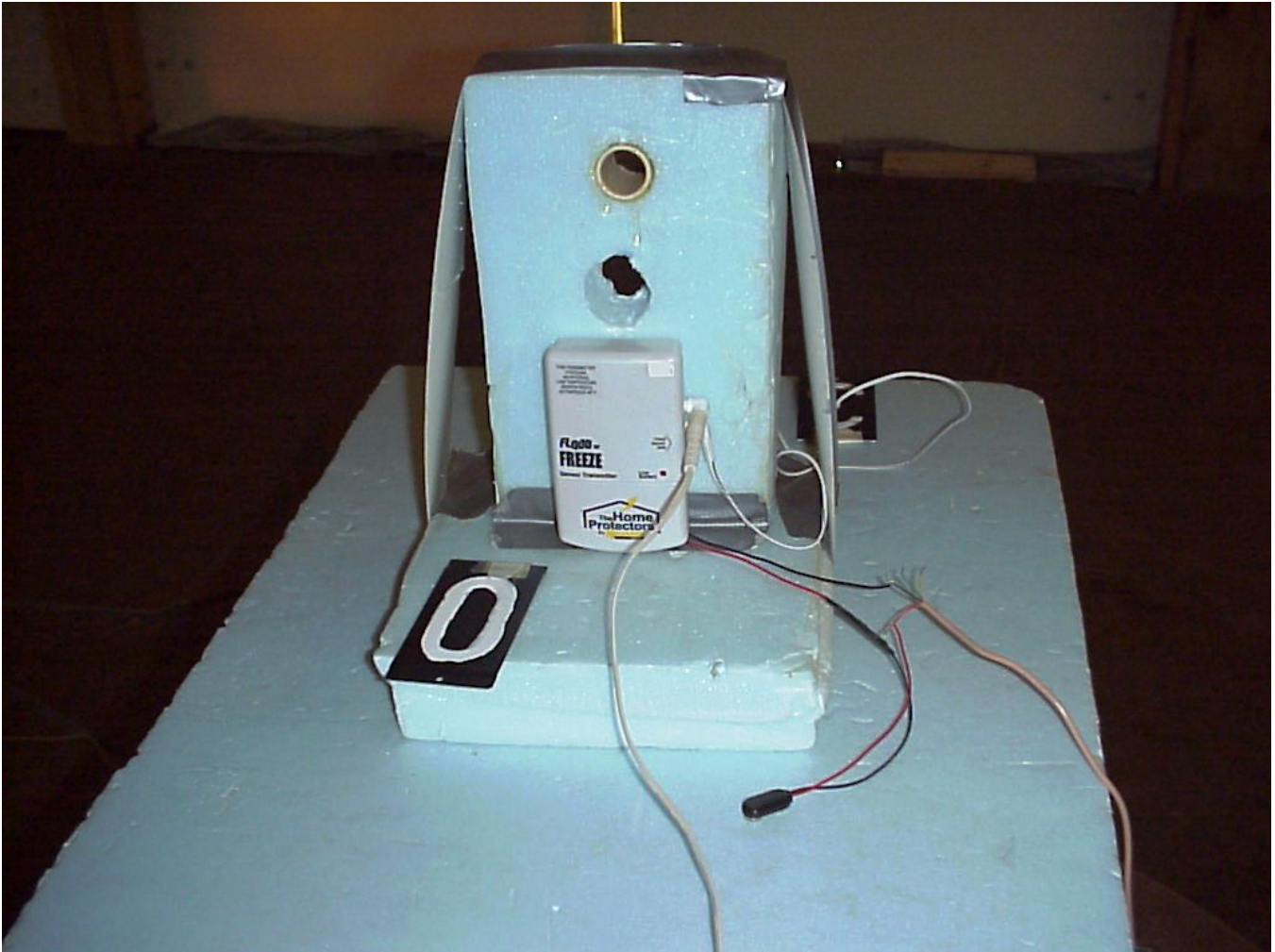
REAR VIEW



Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

1250 Peterson Dr., Wheeling, IL 60090

## 10.0 RADIATED PHOTOS TAKEN DURING TESTING (CON'T)



FRONT VIEW – CLOSE UP



Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

1250 Peterson Dr., Wheeling, IL 60090

### 10.0 CONDUCTED PHOTOS TAKEN DURING TESTING







Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

1250 Peterson Dr., Wheeling, IL 60090

### 10.0 CONDUCTED PHOTOS TAKEN DURING TESTING (CON'T)





Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

1250 Peterson Dr., Wheeling, IL 60090

## 11.0 RESULTS OF TESTS

The radio interference emission charts results can be seen on the pages at the end of this report. Data sheets indicating the test measurements taken during testing can also be found at the end of this report. Points on the emission charts shown with a yellow mark are background frequencies that were verified during testing.

## 12.0 CONCLUSION

It was found that the Reliance Controls "The Home Protectors" Wireless Remote Flood or Freeze Warning Alarm Transmitter, Model Number(s) 11034 **meets** the radio interference conducted and radiated emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Section 15.231 for periodic operational in the 40.66-40.70 MHz Band and above 70 MHz.



Company: Reliance Controls Corporation  
 Model Tested: 11034  
 Report Number: 12918

1250 Peterson Dr., Wheeling, IL 60090

TABLE 1 – EQUIPMENT LIST

| Test Equipment | Manufacturer    | Model Number | Serial Number | Frequency Range  | Cal Due Dates |
|----------------|-----------------|--------------|---------------|------------------|---------------|
| Receiver       | Rohde & Schwarz | ESI 26       | 837491/010    | 20 Hz – 26 GHz   | 11/06         |
| Receiver       | Rohde & Schwarz | ESI 40       | 837808/006    | 20 Hz – 40 GHz   | 12/06         |
| Receiver       | Rohde & Schwarz | ESI 40       | 837808/005    | 20 Hz – 40 GHz   | 12/06         |
| Antenna        | EMCO            | 3104C        | 00054891      | 20 MHz – 200 MHz | 2/07          |
| Antenna        | Electrometrics  | LPA-25       | 1114          | 200 MHz – 1 GHz  | 3/07          |
| Antenna        | EMCO            | 3104C        | 00054892      | 20 MHz – 200 MHz | 3/07          |
| Antenna        | Electrometrics  | 3146         | 1205          | 200 MHz – 1 GHz  | 3/07          |
| Antenna        | EMCO            | 3104C        | 97014785      | 20 MHz – 200 MHz | 2/07          |
| Antenna        | EMCO            | 3146         | 97024895      | 200 MHz – 1 GHz  | 3/07          |
| Antenna        | EMCO            | 3115         | 2479          | 1 GHz – 18 GHz   | 8/07          |
| Antenna        | EMCO            | 3115         | 99035731      | 1 GHz – 18 GHz   | 4/07          |
| Antenna        | Rohde & Schwarz | HUF-Z1       | 829381001     | 20 MHz – 1 GHz   | 2/07          |
| Antenna        | Rohde & Schwarz | HUF-Z1       | 829381005     | 20 MHz – 1 GHz   | 8/07          |

All primary equipment is calibrated against known reference standards with a verified traceable path to NIST.



Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

1250 Peterson Dr., Wheeling, IL 60090

TABLE 1 – EQUIPMENT LIST

| <b>Test Equipment</b> | <b>Manufacturer</b> | <b>Model Number</b> | <b>Serial Number</b> | <b>Frequency Range</b> | <b>Cal Due Dates</b> |
|-----------------------|---------------------|---------------------|----------------------|------------------------|----------------------|
| LISN                  | Solar               | 8012-50-R-24-BNC    | 8305116              | 10 MHz – 30 MHz        | 8/07                 |
| LISN                  | Solar               | 8012-50-R-24-BNC    | 814548               | 10 MHz – 30 MHz        | 8/07                 |
| LISN                  | Solar               | 9252-50-R-24-BNC    | 961019               | 10 MHz – 30 MHz        | 12/06                |
| LISN                  | Solar               | 9252-50-R-24-BNC    | 971612               | 10 MHz – 30 MHz        | 10/07                |
| LISN                  | Solar               | 9252-50-R-24-BNC    | 92710620             | 10 MHz – 30 MHz        | 7/07                 |

All primary equipment is calibrated against known reference standards with a verified traceable path to NIST.



1250 Peterson Dr., Wheeling, IL 60090

Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

# APPENDIX A

## TEST PROCEDURE

Part 15, Subpart C, Section 15.231 (b)

ELECTRIC FIELD RADIATED EMISSIONS TEST



Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

### TEST PROCEDURE

#### ELECTRIC FIELD RADIATED EMISSIONS TEST

##### 1.0 CONDUCTED EMISSION MEASUREMENTS

Conducted emissions were measured over the frequency range from 150 kHz to 30 MHz in accordance with the power line measurements as specified in FCC Part 15, Subpart C, Section 15.207 & ANSI C63.4-2003. Since the device is operated from the public utility lines, the 120 Vac, 60 Hz power leads, high (hot) and low (neutral) sides, were measured by connecting the measuring equipment to the appropriate meter terminal of the LISN. During the test, the cables were placed and items moved (when appropriate) to maximize emissions. All signals were then recorded. The allowed levels for Intentional Radiators which is designed to connected to the public utility (AC) power line shall not exceed 250 uV (47.96 dBuV) from 150 kHz to 30 MHz

##### **NOTE:**

All test measurements were made at a screen room temperature of **72°F** at **26%** relative humidity.



1250 Peterson Dr., Wheeling, IL 60090

Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

APPENDIX A

TEST PROCEDURE

ELECTRIC FIELD RADIATED EMISSIONS TEST

CONDUCTED DATA AND GRAPH(S) TAKEN  
DURING TESTING

PART 15.207

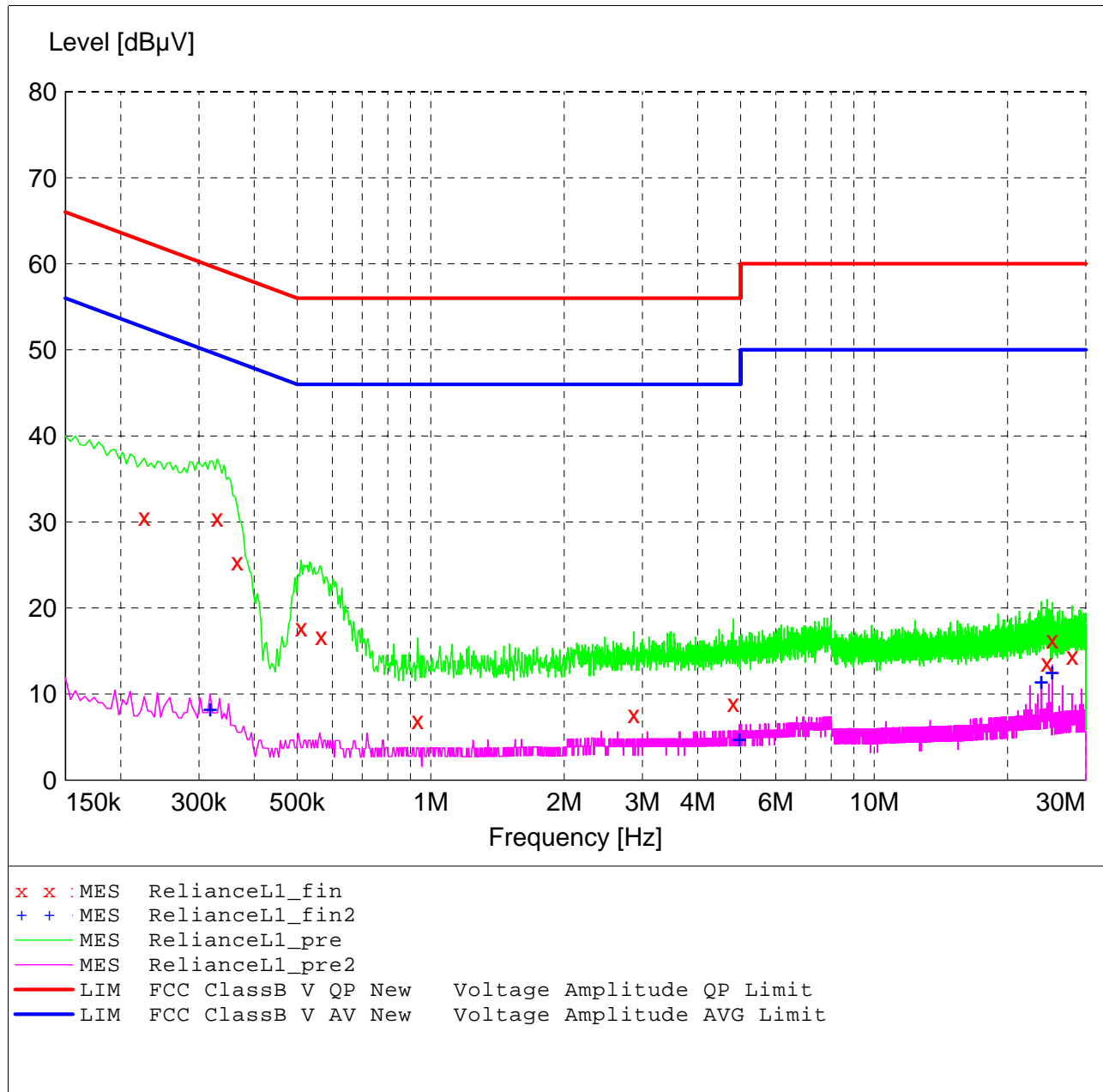
**FCC Part 15 Class B**

**Voltage Mains Test**

EUT: Model: 11034  
 Manufacturer: Reliance Controls  
 Operating Condition: 72 deg. F, 26% R.H.  
 Test Site: DLS O.F. Site 1 (Screenroom)  
 Operator: Jason Lauer  
 Test Specification: 120 VAC @ 60 Hz to 9 VDC Power Transformer  
 Comment: Line 1  
 Date: 11-21-2006

**SCAN TABLE: "Line Cond Scrn RmFin"**

| Short Description: |          |         | Line Conducted Emissions |            |           | Transducer   |
|--------------------|----------|---------|--------------------------|------------|-----------|--------------|
| Start              | Stop     | Step    | Detector                 | Meas. Time | IF Bandw. |              |
| 150.0 kHz          | 30.0 MHz | 4.0 kHz | QuasiPeak                | 2.0 s      | 9 kHz     | LISN DLS#128 |
| CISPR AV           |          |         |                          |            |           |              |





**MEASUREMENT RESULT: "RelianceL1\_fin"**

11/21/2006 1:31PM

| Frequency<br>MHz | Level<br>dBμV | Transd<br>dB | Limit<br>dBμV | Margin<br>dB | Detector | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.226000         | 30.60         | 10.7         | 63            | 32.0         | QP       | ---  | --- |
| 0.330000         | 30.50         | 10.4         | 60            | 29.0         | QP       | ---  | --- |
| 0.366000         | 25.40         | 10.3         | 59            | 33.2         | QP       | ---  | --- |
| 0.510000         | 17.70         | 10.2         | 56            | 38.3         | QP       | ---  | --- |
| 0.566000         | 16.70         | 10.2         | 56            | 39.3         | QP       | ---  | --- |
| 0.934000         | 7.00          | 10.3         | 56            | 49.0         | QP       | ---  | --- |
| 2.870000         | 7.70          | 10.4         | 56            | 48.3         | QP       | ---  | --- |
| 4.810000         | 9.00          | 10.5         | 56            | 47.0         | QP       | ---  | --- |
| 24.518000        | 13.60         | 11.6         | 60            | 46.4         | QP       | ---  | --- |
| 25.206000        | 16.30         | 11.7         | 60            | 43.7         | QP       | ---  | --- |
| 27.958000        | 14.40         | 12.0         | 60            | 45.6         | QP       | ---  | --- |

**MEASUREMENT RESULT: "RelianceL1\_fin2"**

11/21/2006 1:31PM

| Frequency<br>MHz | Level<br>dBμV | Transd<br>dB | Limit<br>dBμV | Margin<br>dB | Detector | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.318000         | 8.40          | 10.5         | 50            | 41.4         | CAV      | ---  | --- |
| 4.970000         | 4.90          | 10.5         | 46            | 41.1         | CAV      | ---  | --- |
| 23.834000        | 11.50         | 11.5         | 50            | 38.5         | CAV      | ---  | --- |
| 25.206000        | 12.60         | 11.7         | 50            | 37.4         | CAV      | ---  | --- |

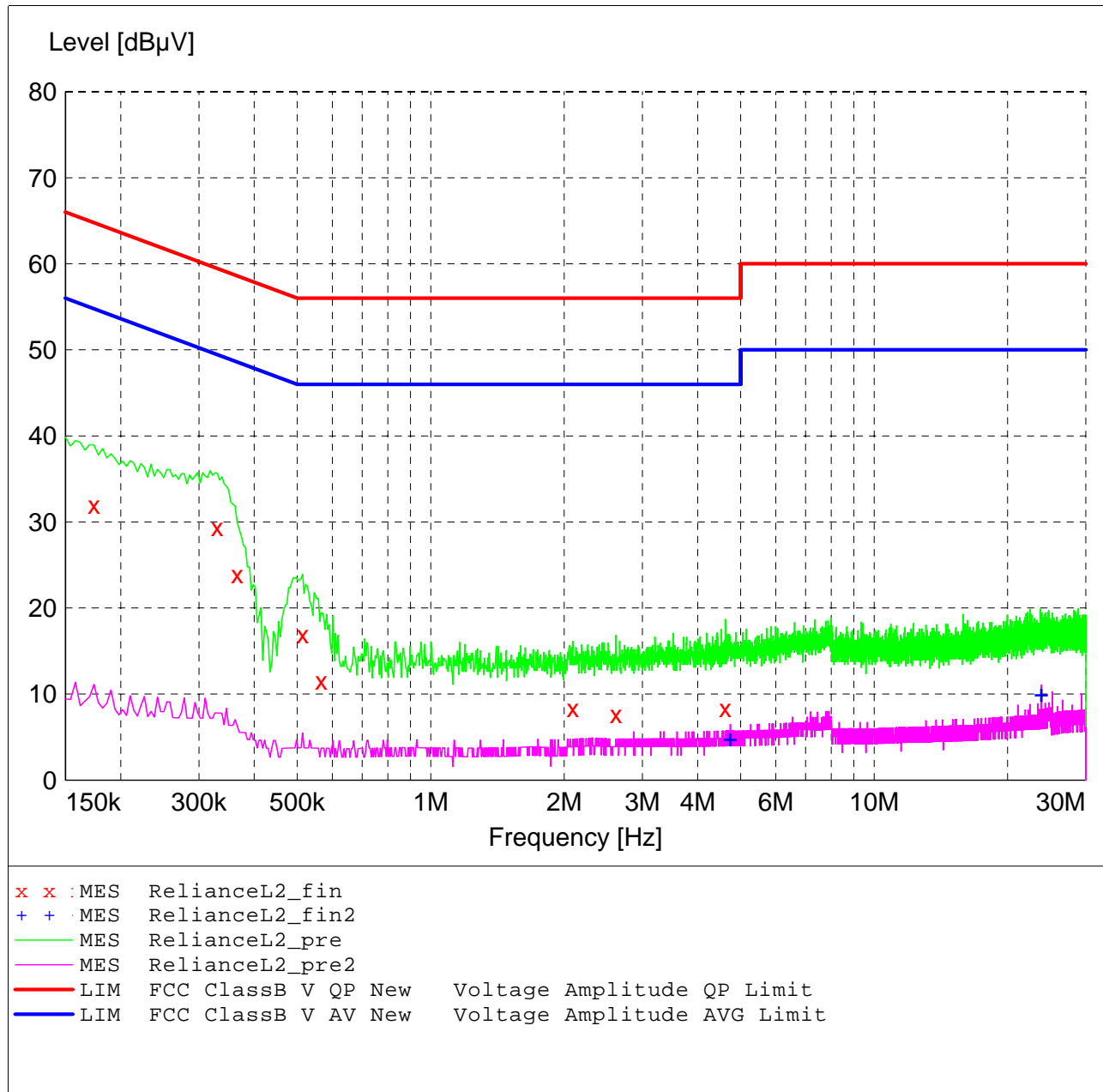
**FCC Part 15 Class B**

**Voltage Mains Test**

EUT: Model: 11034  
 Manufacturer: Reliance Controls  
 Operating Condition: 72 deg. F, 26% R.H.  
 Test Site: DLS O.F. Site 1 (Screenroom)  
 Operator: Jason Lauer  
 Test Specification: 120 VAC @ 60 Hz to 9 VDC Power Transformer  
 Comment: Line 2  
 Date: 11-21-2006

**SCAN TABLE: "Line Cond Scrn RmFin"**

| Short Description: |          | Line Conducted Emissions |           |            |           |              | Transducer |
|--------------------|----------|--------------------------|-----------|------------|-----------|--------------|------------|
| Start              | Stop     | Step                     | Detector  | Meas. Time | IF Bandw. |              |            |
| 150.0 kHz          | 30.0 MHz | 4.0 kHz                  | QuasiPeak | 2.0 s      | 9 kHz     | LISN DLS#128 |            |
| CISPR AV           |          |                          |           |            |           |              |            |



**MEASUREMENT RESULT: "RelianceL2\_fin"**

11/21/2006 1:38PM

| Frequency<br>MHz | Level<br>dBμV | Transd<br>dB | Limit<br>dBμV | Margin<br>dB | Detector | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 0.174000         | 32.00         | 11.1         | 65            | 32.8         | QP       | ---  | --- |
| 0.330000         | 29.40         | 10.4         | 60            | 30.1         | QP       | ---  | --- |
| 0.366000         | 23.90         | 10.3         | 59            | 34.7         | QP       | ---  | --- |
| 0.514000         | 16.90         | 10.2         | 56            | 39.1         | QP       | ---  | --- |
| 0.566000         | 11.50         | 10.2         | 56            | 44.5         | QP       | ---  | --- |
| 2.090000         | 8.30          | 10.3         | 56            | 47.7         | QP       | ---  | --- |
| 2.618000         | 7.70          | 10.4         | 56            | 48.3         | QP       | ---  | --- |
| 4.618000         | 8.40          | 10.5         | 56            | 47.6         | QP       | ---  | --- |

**MEASUREMENT RESULT: "RelianceL2\_fin2"**

11/21/2006 1:38PM

| Frequency<br>MHz | Level<br>dBμV | Transd<br>dB | Limit<br>dBμV | Margin<br>dB | Detector | Line | PE  |
|------------------|---------------|--------------|---------------|--------------|----------|------|-----|
| 4.738000         | 4.90          | 10.5         | 46            | 41.1         | CAV      | ---  | --- |
| 23.838000        | 10.00         | 11.5         | 50            | 40.0         | CAV      | ---  | --- |



Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

### TEST PROCEDURE

#### ELECTRIC FIELD RADIATED EMISSIONS TEST

##### 2.0 PULSED OPERATION (Duty Cycle Correction Factor)

The radiated emission tests made at D.L.S. Electronic Systems, Inc. for the Reliance Controls "The Home Protectors" Wireless Remote Flood or Freeze Warning Alarm Transmitter, Model Number 11034, are shown by the graphs on the following pages. The actual total "on time" during the 100 msec is 35.71141 msec with a total "off time" of 64.29 msec resulting in a **8.94 Duty Cycle Correction Factor**.

To find the actual "on time" during the 100 msec period, the data word is multiplied by the number of data words per 100 msec, yielding actual on time. Taking this number and dividing it by the 100 msec period gives us the Duty Cycle. We then take the Log of the Duty Cycle and multiply it by 20. This gives us the Duty Cycle Correction Factor. The following method was used to determine the Duty Cycle Correction Factor:

Total on time during 100 msec.

$811.623 \text{ usec/pulse on time} * 44 \text{ pulses} = 35.71141 \text{ msec (data word on time)}$

$35.71141 \text{ msec (total "on time")} / 100 \text{ msec} = 0.3571141 \text{ Duty Cycle}$

$20 * \text{LOG}_{10} 0.3571141 = \mathbf{8.944 \text{ dB Duty Cycle Correction Factor}}$

NOTE:

For pulsed operation, the switches were set to generate their maximum "on" time, and measurements were made with the peak detector. As stated in Docket 86-422, the duty cycle of the pulse is determined from the total "on" time for the worst case condition during 100 msec. Using the percentage of the total "on" time over a 100 msec period, the total absolute average value was determined. As stated in Section 3, a maximum of 20 dB can be used.

See the following pages for the graphs of the actual measurements that were made:



1250 Peterson Dr., Wheeling, IL 60090

Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

## GRAPH TAKEN OF THE PULSED OPERATION

### PART 15.231

GRAPHS TAKEN OF THE PULSE TRAIN SHOWING THE FOLLOWING:

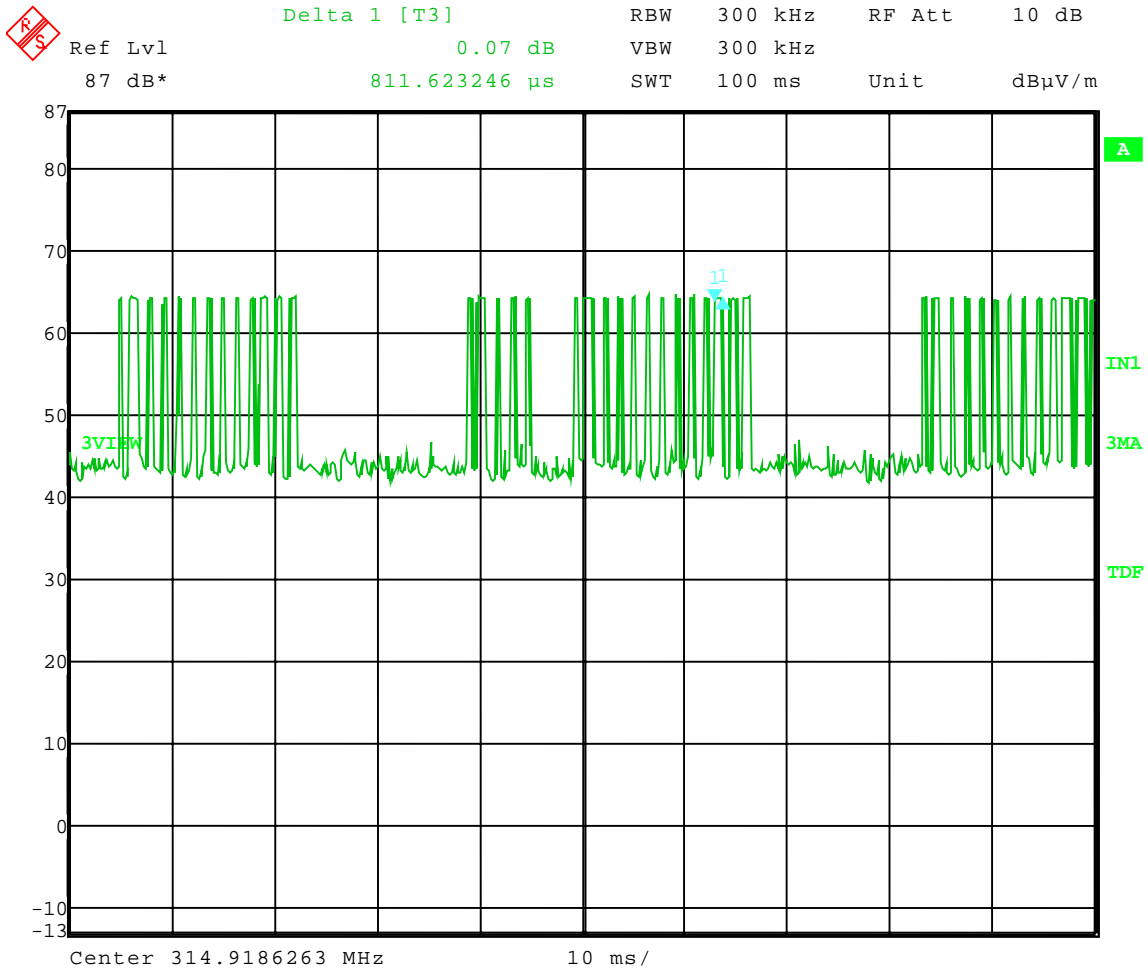
1. Number of Bits per Data Word
2. Number of Pulses per 100 msec
3. Off Time between Data Words
4. Data Word On Time



Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 10-23-2006  
Company: Reliance Controls  
EUT: Model: 11034  
Test: Duty Cycle  
Operator: Craig Brandt  
Comment: Pulse = 811.623  $\mu$ s  
44 Pulses in 100 ms  
Total on Time = 35.71 ms during 100 ms Sweep  
20 log (35.71/100) = -8.944  
**Duty Cycle Correction Factor = 8.94 dB**



Date: 23.OCT.2006 10:10:53



Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

1250 Peterson Dr., Wheeling, IL 60090

## APPENDIX A

### TEST PROCEDURE

#### ELECTRIC FIELD RADIATED EMISSIONS TEST

#### 3.0 BANDWIDTHS

The bandwidth of the transmitter shall be confined to the following specifications as specified in Section 15.231c & d:

|                       |                                    |
|-----------------------|------------------------------------|
| 40.66 MHz to 40.7 MHz | $\pm 0.01\%$ within the band edges |
| 70 MHz to 900 MHz     | .25% of the center frequency       |
| Above 900 MHz         | .50% of the center frequency       |

The bandwidth is determined at the points 20 dB down from the modulated carrier.

As shown by the graph(s) on the following page(s), the bandwidth for the Reliance Controls "The Home Protectors" Wireless Remote Flood or Freeze Warning Alarm Transmitter was measured at 23.27287 kHz, which meets the above specification. With a fundamental frequency of 314.9022 MHz, the FCC Bandwidth limit is 787.2555 kHz when multiplying the fundamental by 0.0025%, with a margin of 763.9827 kHz.



1250 Peterson Dr., Wheeling, IL 60090

Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

# GRAPH TAKEN OF THE BANDWIDTH EMISSIONS


PART 15.231c & d

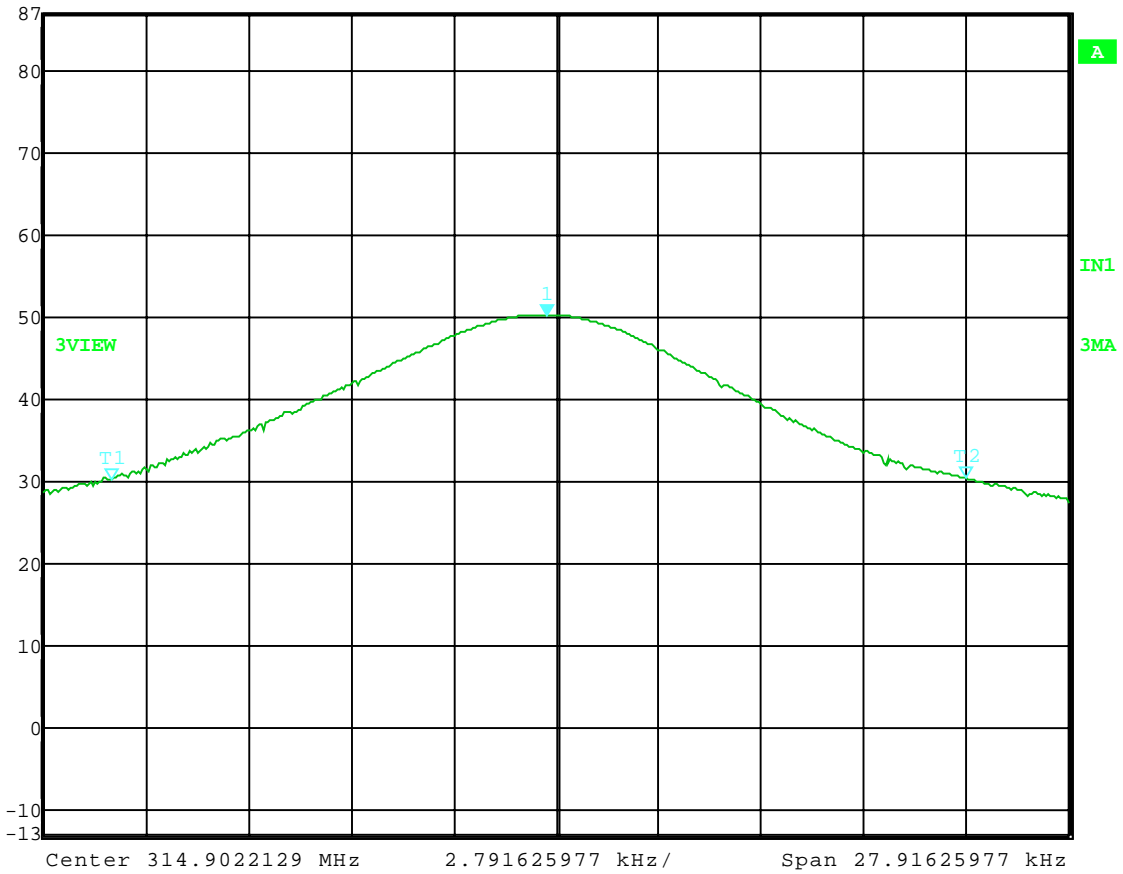




Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

1250 Peterson Dr., Wheeling, IL 60090

 Marker 1 [T3 ndB] RBW 5 kHz RF Att 10 dB  
Ref Lvl ndB 20.00 dB VBW 5 kHz  
87 dB $\mu$ V BW 23.27287387 kHz SWT 17 ms Unit dB $\mu$ V



Date: 23.OCT.2006 12:08:05



Company: Reliance Controls Corporation  
 Model Tested: 11034  
 Report Number: 12918

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

TEST PROCEDURE

ELECTRIC FIELD RADIATED EMISSIONS TEST

4.0 FIELD STRENGTH OF SPURIOUS EMISSION MEASUREMENTS - SECTION 15.231(b)

For operation in the band 40.66 to 40.70 MHz and above 70 MHz the field strength of any emissions within this band shall not exceed the following table at a distance of 3 meters as specified in FCC, Part 15, Section 15.231(b), based on the average value of the measured emissions. The limits are shown in the following table.

| Fundamental Frequency in MHz | Field Strength of Fundamental (uV/m at 3m) | Field Strength of Harmonics (uV/m at 3m) |
|------------------------------|--|--|
| 40.66 to 40.70               | 2250 (67.04 dBuV)                          | 225 (47.04 dBuV)                         |
| 70 to 130                    | 1250 (61.94 dBuV)                          | 125 (41.94 dBuV)                         |
| 130 to 174                   | 1250 (61.94 dBuV) to 3750 (71.48 dBuV)     | 125 (41.94 dBuV) to 375 (51.48 dBuV)     |
| 174 to 260                   | 3750 (71.48 dBuV)                          | 375 (51.48 dBuV)                         |
| 260 to 470                   | 3750 (71.48 dBuV) to 12500 (81.84 dBuV)    | 375 (51.48 dBuV) to 1250 (61.94 dBuV)    |
| 470 and above                | 12500 (81.84 dBuV)                         | 1250 (61.94 dBuV)                        |

**NOTE:**

Preliminary radiation measurements may have been performed at a 3 meter or ten meter test distance. The frequency range from 30 MHz to 1000 MHz was scanned at receive antenna heights from one to four meters, and with a 360° rotation of the EUT. Plots were made and the worst-case emissions were recorded.

As stated in 15.35b the 20 dB peak-to-average limit is applicable to all devices measured using an average detector.



1250 Peterson Dr., Wheeling, IL 60090

Company: Reliance Controls Corporation  
Model Tested: 11034  
Report Number: 12918

# DATA TAKEN OF FUNDAMENTAL AND SPURIOUS EMISSIONS

## PART 15.231b



Company: Reliance Controls Corporation  
 Model Tested: 11034  
 Report Number: 12918

1250 Peterson Dr., Wheeling, IL 60090

**Radiated Fundamental and Spurious Emissions – 30 MHz to 4 GHz  
 Tested at a 3 Meter Distance**

**EUT:** Model: 11034  
**Manufacturer:** Reliance Controls Corp.  
**Operating Condition:** 70 deg F; 33% R.H.  
**Test Site:** Site 3  
**Operator:** Craig Brandt  
**Test Specification:** FCC Part 15.231(b) and FCC Part 15.205  
**Comment:** Transmit and standby modes  
**Date:** 10/23/2006

**Note:** All other emissions at least 20 dB under the limit.

| Frequency (MHz) | Measurement Detector | Ant. Pol. | Level (dBuV) | Antenna Factor (dB/m) | System Loss (dB) | Total Level (dBuV/m) | Duty Cycle Correction (dB) | Final Corrected (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Ant. Height (m) | EUT Angle (deg) | Comment               |
|-----------------|----------------------|-----------|--------------|-----------------------|------------------|----------------------|----------------------------|--------------------------|----------------|-------------|-----------------|-----------------|-----------------------|
| 63.48           | Max Peak             | Vert      | 18.44        | 8.84                  | 1.7              | 28.9                 | 8.94                       | 19.96                    | 55.62          | 35.66       | 1.00            | 225             | Spurious              |
| 314.9           | Max Peak             | Vert      | 52.19        | 14.62                 | 3.7              | 70.5                 | 8.94                       | 61.56                    | 75.62          | 14.06       | 1.60            | 0               | Fundamental           |
| 314.9           | Max Peak             | Horz      | 56.94        | 14.62                 | 3.7              | 75.3                 | 8.94                       | 66.36                    | 75.62          | 9.26        | 2.10            | 30              | Fundamental           |
| 629.8           | Max Peak             | Vert      | 30.45        | 19.12                 | 5.7              | 55.3                 | 8.94                       | 46.36                    | 55.62          | 9.26        | 1.60            | 315             | 2 <sup>nd</sup> Harm. |
| 629.8           | Max Peak             | Horz      | 31.47        | 19.12                 | 5.7              | 56.3                 | 8.94                       | 47.36                    | 55.62          | 8.26        | 1.30            | 225             | 2 <sup>nd</sup> Harm. |
| 944.7           | Max Peak             | Vert      | 18.62        | 22.61                 | 7.2              | 48.4                 | 8.94                       | 39.46                    | 55.62          | 16.16       | 1.00            | 0               | 3 <sup>rd</sup> Harm. |
| 944.7           | Max Peak             | Horz      | 18.23        | 22.61                 | 7.2              | 48.0                 | 8.94                       | 39.06                    | 55.62          | 16.56       | 1.30            | 200             | 3 <sup>rd</sup> Harm. |
| 1259.6          | Max Peak             | Vert      | 58.76        | 24.47                 | -37.7            | 45.5                 | 8.94                       | 36.56                    | 55.62          | 19.06       | 1.30            | 30              | 4 <sup>th</sup> Harm. |
| 1259.6          | Max Peak             | Horz      | 56.55        | 24.47                 | -37.7            | 43.3                 | 8.94                       | 34.36                    | 55.62          | 21.26       | 1.00            | 0               | 4 <sup>th</sup> Harm. |
| 1574.5          | Max Peak             | Vert      | 54.34        | 25.31                 | -37.8            | 41.9                 | ---                        | 41.9                     | 54             | 12.1        | 1.30            | 315             | Res. Band             |
| 1574.5          | Max Peak             | Horz      | 53.93        | 25.31                 | -37.8            | 41.5                 | ---                        | 41.5                     | 54             | 12.5        | 1.70            | 30              | Res. Band             |
| 1889.4          | Max Peak             | Vert      | 56.77        | 26.64                 | -37.6            | 45.9                 | 8.94                       | 36.96                    | 55.62          | 18.66       | 1.00            | 0               | 6 <sup>th</sup> Harm. |
| 1889.4          | Max Peak             | Horz      | 55.03        | 26.64                 | -37.6            | 44.1                 | 8.94                       | 35.16                    | 55.62          | 20.46       | 1.70            | 30              | 6 <sup>th</sup> Harm. |
| 2204.3          | Max Peak             | Vert      | 55.77        | 27.63                 | -37.3            | 46.1                 | ---                        | 46.1                     | 54             | 7.9         | 1.10            | 0               | Res. Band             |
| 2204.3          | Max Peak             | Horz      | 51.61        | 27.63                 | -37.3            | 41.9                 | ---                        | 41.9                     | 54             | 12.1        | 1.70            | 60              | Res. Band             |



Company: Reliance Controls Corporation  
 Model Tested: 11034  
 Report Number: 12918

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

TEST PROCEDURE

ELECTRIC FIELD RADIATED EMISSIONS TEST

5.0 RESTRICTED BANDS

As stated in Section 15.205a, the fundamental emission from the Reliance Controls "The Home Protectors" Wireless Remote Flood or Freeze Warning Alarm Transmitter shall not fall within any of the bands listed below:

| Frequency<br>in MHz | Frequency<br>in MHz | Frequency<br>in MHz | Frequency<br>in GHz |
|---------------------|---------------------|---------------------|---------------------|
| .0900 to .1100      | 162.0125 to 167.17  | 2310.0 to 2390      | 9.30 to 9.50        |
| .4900 to .5100      | 167.7200 to 173.20  | 2483.5 to 2500      | 10.60 to 12.70      |
| 2.1735 to 2.1905    | 240.000 to 285.00   | 2655.0 to 2900      | 13.25 to 13.40      |
| 8.362 to 8.3660     | 322.200 to 335.40   | 3260.0 to 3267      | 14.47 to 14.50      |
| 13.36 to 13.410     | 399.900 to 410.00   | 3332.0 to 3339      | 15.35 to 16.20      |
| 25.50 to 25.670     | 608.000 to 614.00   | 3345.8 to 3358      | 17.70 to 21.40      |
| 37.50 to 38.250     | 960.000 to 1240.00  | 3600.0 to 4400      | 22.01 to 23.13      |
| 73.00 to 75.500     | 1300.000 to 1427.00 | 4500.0 to 5250      | 23.60 to 24.00      |
| 108.00 to 121.94    | 1435.000 to 1626.50 | 5350.0 to 5450      | 31.20 to 31.80      |
| 123.00 to 138.00    | 1660.000 to 1710.00 | 7250.0 to 7750      | 36.43 to 36.50      |
| 149.90 to 150.00    | 1718.800 to 1722.20 | 8025.0 to 8500      | ABOVE 38.60         |
| 156.70 to 156.90    | 2200.000 to 2300.00 | 9000.0 to 9200      |                     |

**NOTE:**

The noise floor within the Restricted Bands for the EMC Receiver and HP Spectrum Analyzer will typically lay 20 dB below the limit.