

**Resolution Products, Inc.**

**Wireless Security Sensor and Zwave Repeater  
FCC ID: U5X-RE220-LS**

**Certification Test Report**

**August 5, 2014**

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## **1. Introduction**

The RE220-LS is a device intended for use in a wireless security system. The unit is powered by a 5VDC power supply and is backed up by a rechargeable Li-ion battery. The device measures 9 x 5 x 1.375” and weighs approximately 13.2 ounces.

The device is a dual purpose/dual frequency wireless repeater. The device retransmits security sensor messages for the purpose of alerting a security system on frequency 345MHz. It also retransmits Zwave messages on a Zwave local network on frequency 908.415MHz.

This report pertains to the 345MHz frequency transceiver, a DSC Remote Control. A separate report will cover the 908.415MHz transceiver.

Certification is requested under FCC Rules, Part 15, Subpart C, Paragraph 15.231.

## **2. Statement of Compliance**

Specific sections of FCC Rules Part 2 that require information or listing are given below.

### **2.1. FCC Part 2 §2.907**

This is an application for certification of original equipment

### **2.2. FCC Part 2 §2.911**

- a) This application has been filed electronically using form 731.
- b) All required information has been supplied in this application and its attachments.
- c) This application has been electronically signed by an officer of Resolution Products, Inc.
- d) The technical test data has been signed by the agency performing the testing.
- e) Signature supplied in appropriate block on form 731.
- f) Processing fee has been paid.
- g) Signatures have been supplied electronically.

### **2.3. FCC Part 2 §2.913**

- a) This application has been filed electronically.
- b) Appropriate fees have been filed electronically.
- c) Equipment samples shall be supplied as requested.

### **2.4. FCC Part 2 §2.915**

We are requesting a grant of certification. This application shows compliance with the technical standards.

### **2.5. FCC Part 2 §2.925**

A label shall be affixed to each piece of equipment, showing the FCC identifier. The label shall read “FCC ID: U5X-RE220-LS”. See Exhibit B for a photograph showing the label and location on the device.

### **2.6. FCC Part 2 §2.943, 2.945**

Sample production equipment shall be submitted to the FCC upon request.

### **2.7. FCC Part 2 §2.947**

- a) Measurement procedure follows ANSI C63.4: 2009.
- b) A description of utilized test equipment is contained in the report.

### **2.8. FCC Part 2 §2.948**

Radiated measurements were taken at the following FCC-approved facility:

**Rhein Tech Laboratories, Inc.**  
**360 Herndon Parkway, Suite 1400**  
**Herndon, VA 20170 USA**  
**Contact: Rick McMurray**  
**703-689-0368**

Photographs of the test site are shown in Exhibit J.

### **2.9. FCC Part 2 §2.1033**

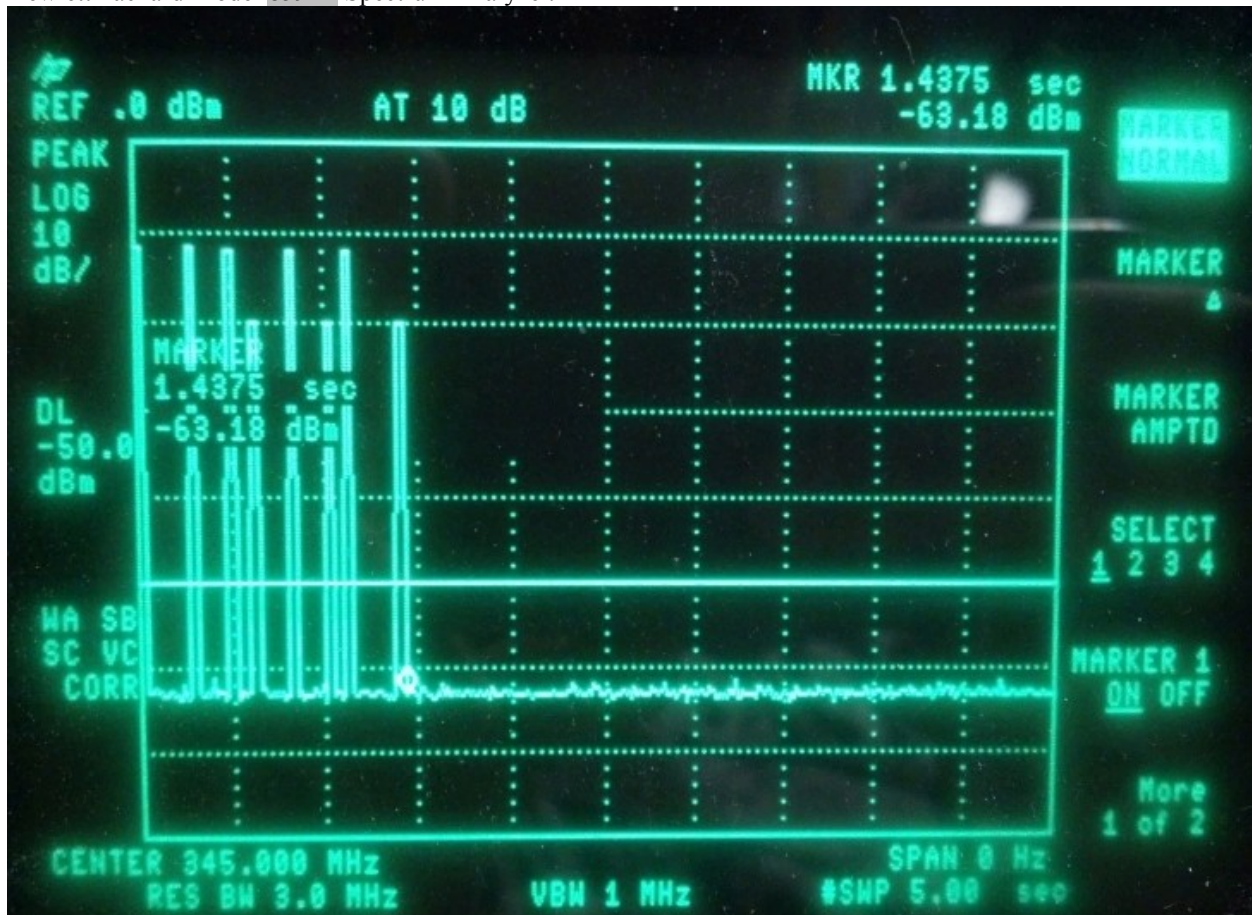
- a) Form 731 has been filed electronically.
- b) The technical report, along with its exhibits, contains the information as follows:
  - (1) full name and mailing address of the manufacturer of the device and the applicant for certification:  
Resolution Products, Inc.  
1402 Heggen Street  
Hudson, WI 54016
  - (2) FCC Identifier is U5X-RE220-LS
  - (3) Copy of the installation/user instructions is furnished as Exhibit E.
  - (4) A brief description of the device and operation is furnished in Exhibit F. Schematic is furnished in Exhibit G.
  - (5) Block diagram furnished in Exhibit H.
  - (6) This document constitutes a technical test report.
  - (7) Internal and external photographs have been furnished in Exhibits A and C.
  - (8) Not applicable. There are no peripheral or accessory devices used with this device. It is a standalone device.
  - (9) This application not pursuant to the transition rules of section 15.37
  - (10) Not applicable. This device does not include a scanning receiver.
  - (11) Not applicable.
  - (12) Not applicable.
- c) Not applicable. This device shall operate under Part 15 of the rules.
- d) Not applicable.
- e) Not applicable. This is not a composite system.

### 3. Discussion of Laboratory Measurements and Rules Compliance

#### 3.1. FCC Part 15 §15.231(a)(1)

The 345MHz transmitter is activated via a received RF signal from a security sensor or a tamper switch state change. Eight 345MHz transmission packets are sent by the device upon valid activation. These packets are approximately 30.24ms in length and are sent with a spacing that varies randomly between 100 and 275ms. In the absence of tamper switch activations, three supervisory packets are sent every 65 minutes with the same spacing given above.

A plot of the transmissions is shown below. This plot shows the transmissions occurring in a 5 second window as a result of one activation. The packets are shown to conclude within the 5-second window. This plot made using Hewlett Packard Model 8594E Spectrum Analyzer.



#### 3.2. FCC Part 15 §15.231(a)(3)

If no switch activations have been received for a period of 65 minutes, three supervision packets are transmitted. These supervision packets are then transmitted every 65 minutes in the absence of activations. The total transmission time resulting from these supervision transmissions is well under the allowed 2 seconds per hour. They conclude within the 5-second window.

### **3.3. FCC Part 15 §15.231(a)(4)**

Device does not continue transmitting beyond the packets resulting from each activation from the tamper switch and received RF security sensor signals.

### **3.4. FCC Part 15 §15.231(a)(5)**

There is no setup information transmitted with this device.

### **3.5. FCC Part 15 §15.231(b)**

#### **3.5.1. Raw Field Strength Limits**

Interpolation performed on the data in the §15.231(b) table yields raw field strength limits as follows:

Fundamental: 77.25dBuV/m

Spurious: 57.25dBuV/m

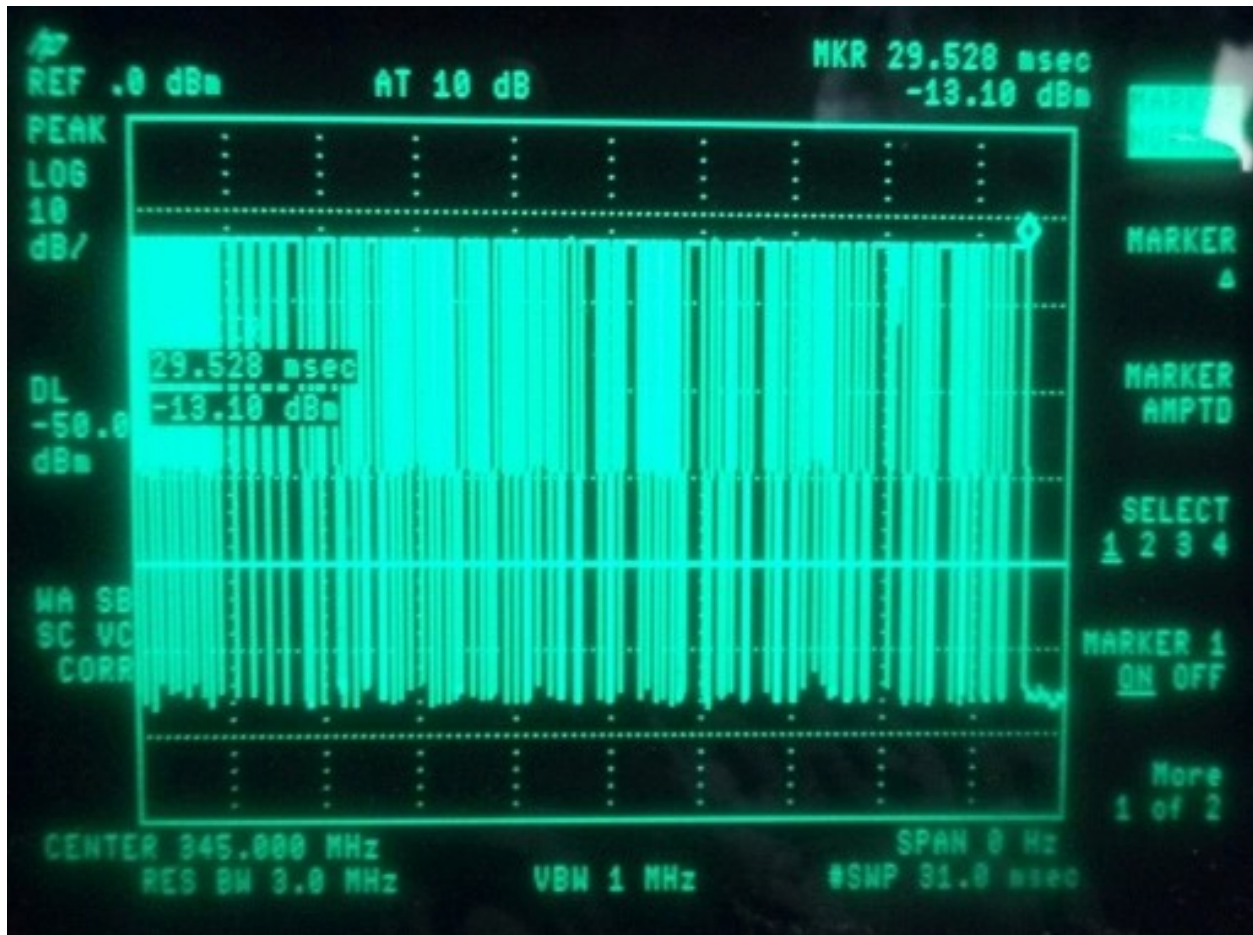
Certain harmonics of the transmitted signal fall in the restricted bands of §15.205. These harmonics are all above 960MHz and have the following limit as given in §15.209:

**Restricted band limit = 500uV/m = 54dBuV/m.**

#### **3.5.2. Duty Cycle Correction Factor and Resulting Limits**

This transmitter uses ASK modulation. Each transmitted packet has a length of 30.2mS, and are limited to one packet in any 100mS period. Each transmitted packet contains 112 bits, each 270us long with a duty cycle of 50%. Total packet on time is then 15.12ms. The maximum transmitter duty cycle in a 100ms period thus is  $15.12/100 = 15.12\%$ .

The packet width measurement below was made using Hewlett Packard Model 8594E Spectrum Analyzer.



Calculating the allowed duty cycle correction factor as given in §15.35(c):

$$20\log(15.12/100) = -16.41\text{dB}$$

Resulting radiated field strength limits are as follows:

**Fundamental:**  $77.25 + 16.41 = 93.66\text{dBuV/m}$   
**Spurious:**  $57.25 + 16.41 = 73.66\text{dBuV/m}$   
**Restricted Band:**  $54 + 16.41 = 70.41\text{dBuV/m}$

### 3.5.3. Measured Radiated Field Strength Data

Radiated fundamental and spurious emissions were tested at three meters. The EUT was tested in the three orthogonal planes with the receive antenna in both polarities. The emissions were maximized per ANSI C63.4:2003 8.3.1.2; that is, the measurement antenna height was varied between 1 and 4m, and the EUT was rotated through 360 degrees on a rotating turntable until the maximum emissions were found. Both horizontal and vertical measurement antenna polarizations were used. A resolution bandwidth of 100kHz was used for frequencies less than 1000MHz, and a resolution bandwidth of 1MHz was used for frequencies greater than or equal to 1000MHz. The video bandwidth was set to a value at least three times greater than the resolution bandwidth.

All spurious emissions in the applicable frequency range were investigated, only harmonic emissions were present as noted in the test report.

The EUT was adapted to continuously transmit for testing purposes.

The fundamental signal, at 93.2dBuV/m, passed by 0.46dB.  
The highest spurious signal was the 2<sup>nd</sup> harmonic, which passed by 11.11dB.  
The next highest spurious signal was the 3<sup>rd</sup> harmonic, which passed by 18.41dB.

Measured radiated field strength data is shown in Exhibit I.

### 3.6. FCC Part 15 §15.231(c)

Allowed 20dB bandwidth of the transmitted signal is 0.25% of the carrier frequency.

**BW Limit =  $0.0025 \times 345\text{MHz}$**

**BW Limit = 0.8625MHz**

Bandwidth measurements were made using Hewlett Packard Model 8594E Spectrum Analyzer. The plot below shows the modulated signal. Bandwidth of the modulated signal is 162.8kHz or 0.1628MHz. These measurements show compliance with the bandwidth requirements.



Resolution Bandwidth: 30kHz

Video Bandwidth: 30kHz

### 3.7. FCC Part 15 §15.207

Conducted line emissions are shown in Exhibit I and show compliance with the limits.