

Resolution Products, Inc.

**Security Repeater
FCC ID: U5X-RE324**

Certification Test Report

October 4, 2010

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1. Introduction

This device is a repeater for use in a wireless security system. The unit is powered by a 12VDC or 9-18VAC power supply and is backed up by three AAA alkaline batteries. The transmitter is centered at 433.93MHz and is controlled by an Infineon PLL chip. The device measures 6.25 x 4 x 1.25” and weighs approximately 8.3 ounces.

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 by credit card.
- 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-RE324”. See Exhibit A 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.
- 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:

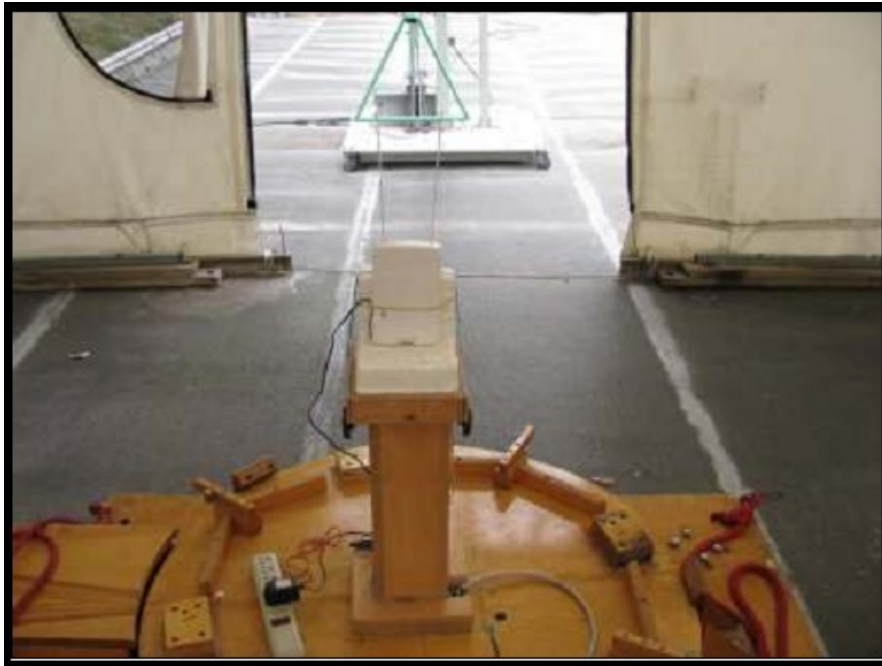
Rhein Tech Laboratories, Inc.

360 Herndon Pkwy, Suite 1400

Herndon, VA 20170

Contact: Rick McMurray 703-689-0368

A photograph of the test site is shown below:



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.
226 Locust Street, Suite 4
Hudson, WI 54016
 - (2) FCC Identifier is U5X-RE324
 - (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 - 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)

This transmitter is activated via a received RF signal or a tamper switch state change. Eight transmission packets are sent by the device upon valid activation. These packets are 25ms in length and are sent with a spacing that varies randomly between 112 and 240ms. Upon completion of these packets, the device goes into sleep mode and will not transmit again until another activation. In the absence of tamper switch activations, three supervisory packets are sent each hour with the same spacing given above.

A plot of the transmissions is shown in Exhibit I. 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.

3.2. FCC Part 15 §15.231(a)(3)

If no tamper switch activations have been received for a period of one hour, three supervision packets are transmitted. These supervision packets are then transmitted every hour 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)

While this device is used in a security application, it does not continue transmitting beyond the packets resulting from each activation.

3.4. FCC Part 15 §15.231(a)(5)

While this device is used in a security application, 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: 80.825dBuV/m
Spurious: 60.825dBuV/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. The packet begins with a 2.5ms "high time". This is followed by 48 bits of data, each of which is 500us long. A "zero" bit is low for the entire bit. A "one" bit is high for the first half of the bit. Therefore, the amount of "high time" in the packet is defined by the number of "ones" that are in the packet. The maximum number of "ones" possible in any packet is 40. Therefore, the worst-case "high time" is 2.5ms + (0.250)(40) = 12.5ms. The maximum transmitter duty cycle in a 100ms period thus is 12.5/100 = 12.5%.

Packet width measurements were made using Hewlett Packard Model 8591E Spectrum Analyzer (calibration due date 12/2/2010). Plot in Exhibit J shows an expanded view of the transmitted packet.

Calculating the allowed duty cycle correction factor:

$$20\log(12.5/100) = -18.06\text{dB}$$

This device therefore qualifies for 18.06dB of duty cycle correction. Resulting radiated field strength limits are as follows:

Fundamental:	98.89dBuV/m
Spurious :	78.89dBuV/m

3.5.3. Measured Radiated Field Strength Data

Measured radiated field strength data is shown in Exhibit L. Emissions data was taken at 3 meters in all three orthogonal planes in order to measure the highest peak emissions. Emissions from 0.009 MHz to the tenth harmonic were measured as per §15.33(a). Appropriate correction factors were applied to account for cable and other site-specific losses. This is referred to in the table as the Site Correction Factor. The highest measurements are shown in the table for each frequency showing measurable signal.

NOTE: The table in the report from the test lab in Exhibit L shows the limits assuming the full 20dB of duty cycle averaging. These limits are incorrect. The true limits are calculated above in section 3.5.2 of this report.

The fundamental signal, at 96.4dBuV/m, passed by 2.49dB.
The highest spurious signal was the third harmonic, which passed by 0.29dB.

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*433.93MHz

BW Limit = 1.0848MHz

Bandwidth measurements were made using Hewlett Packard Model 8591E Spectrum Analyzer (calibration due date 12/2/2010).

Exhibit N shows the modulated signal. Bandwidth of the modulated signal is 165.0kHz or .165MHz.

Settings of the spectrum analyzer for these measurements, such as RBW and VBW, are shown in the exhibit.

These measurements show compliance with the bandwidth requirements.