

Resolution Products, Inc.

**Wireless Panic Transmitter
FCC ID: U5X-RE403F**

Certification Test Report

March 14, 2014

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1. Introduction

The RE403V is a small keypad with a wireless transmitter. The device transmits a panic transmission to a security system. A PIC12LF1501 microcontroller monitors the key and transmits data packets when valid key presses are detected. The device is about the size of a wrist watch, measures approximately 1.5 x 1.25 x 0.5" and weights less than an ounce.

The RE403V transmitter circuit consists of a 9.84375MHz crystal and a Micrel MICRF113YM6 PLL Chip. This chip multiplies the crystal frequency to 315MHz. It also includes a circuit that allows ASK modulation of the 315MHz signal. A printed antenna radiates the RF signal.

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-RE403F". 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

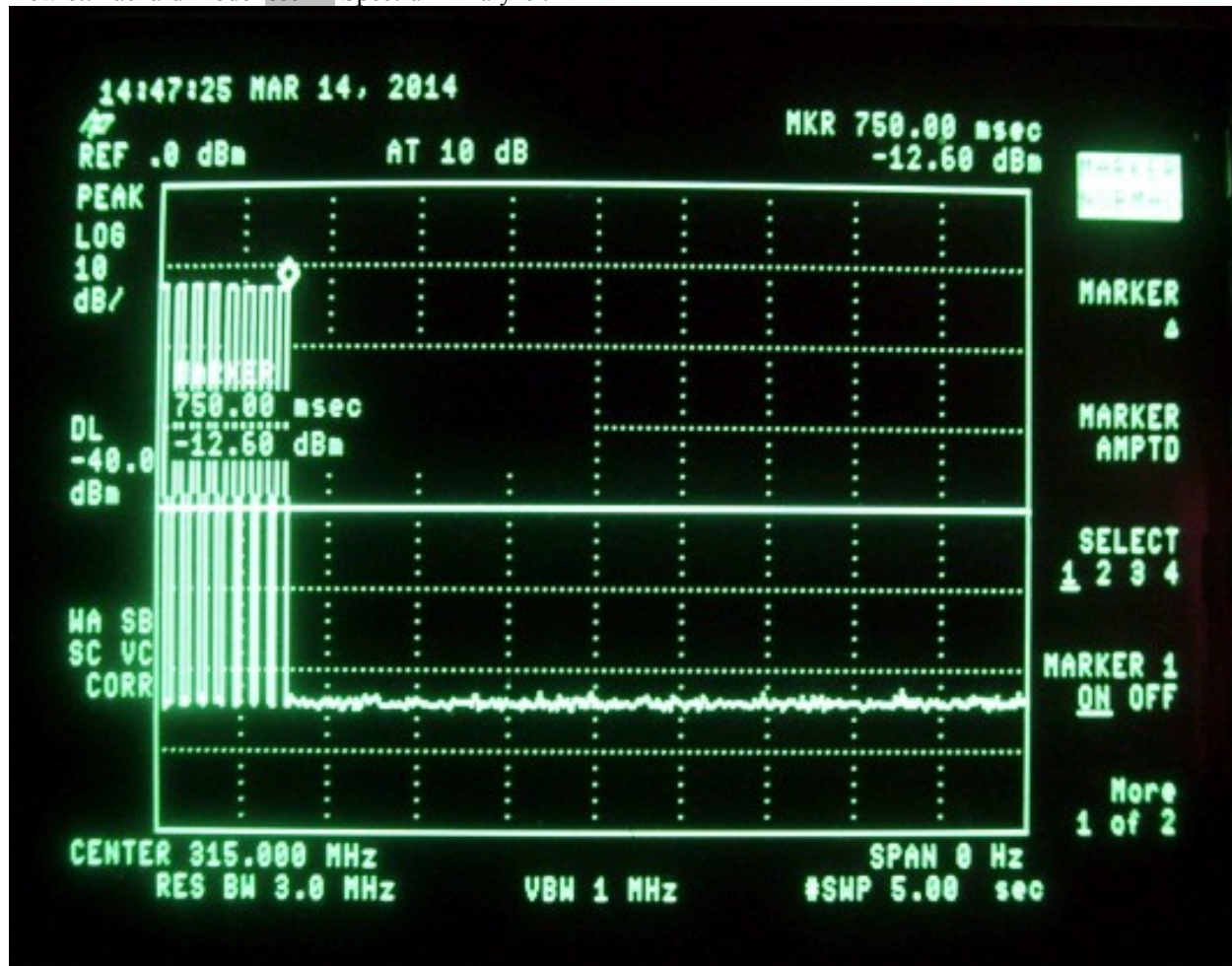
- a) Form 731 has been filed electronically.
- b) The technical report, along with its exhibits, contains the information as follows:
 - (1) full name and mailing address of the manufacturer of the device and the applicant for certification:
Resolution Products, Inc.
1402 Heggen Street
Hudson, WI 54016
 - (2) FCC Identifier is U5X-RE403F
 - (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)

This transmitter is manually activated via a pushbutton switch. Transmission of 8 packets are sent by the device upon valid keypress activation. These packets are 45.51ms in length and are sent with a spacing of 100ms. The device will send another 8 packets every 7 seconds for the pendency of the alarm condition, as allowed, as long as the switch is held down by the user. The unit then goes into sleep mode and will not transmit again until another valid keypress is detected.

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 12 hours, three supervision packets are transmitted. These supervision packets are then transmitted every 12 hours 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.

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: 75.6dBuV/m

Spurious: 55.6dBuV/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:

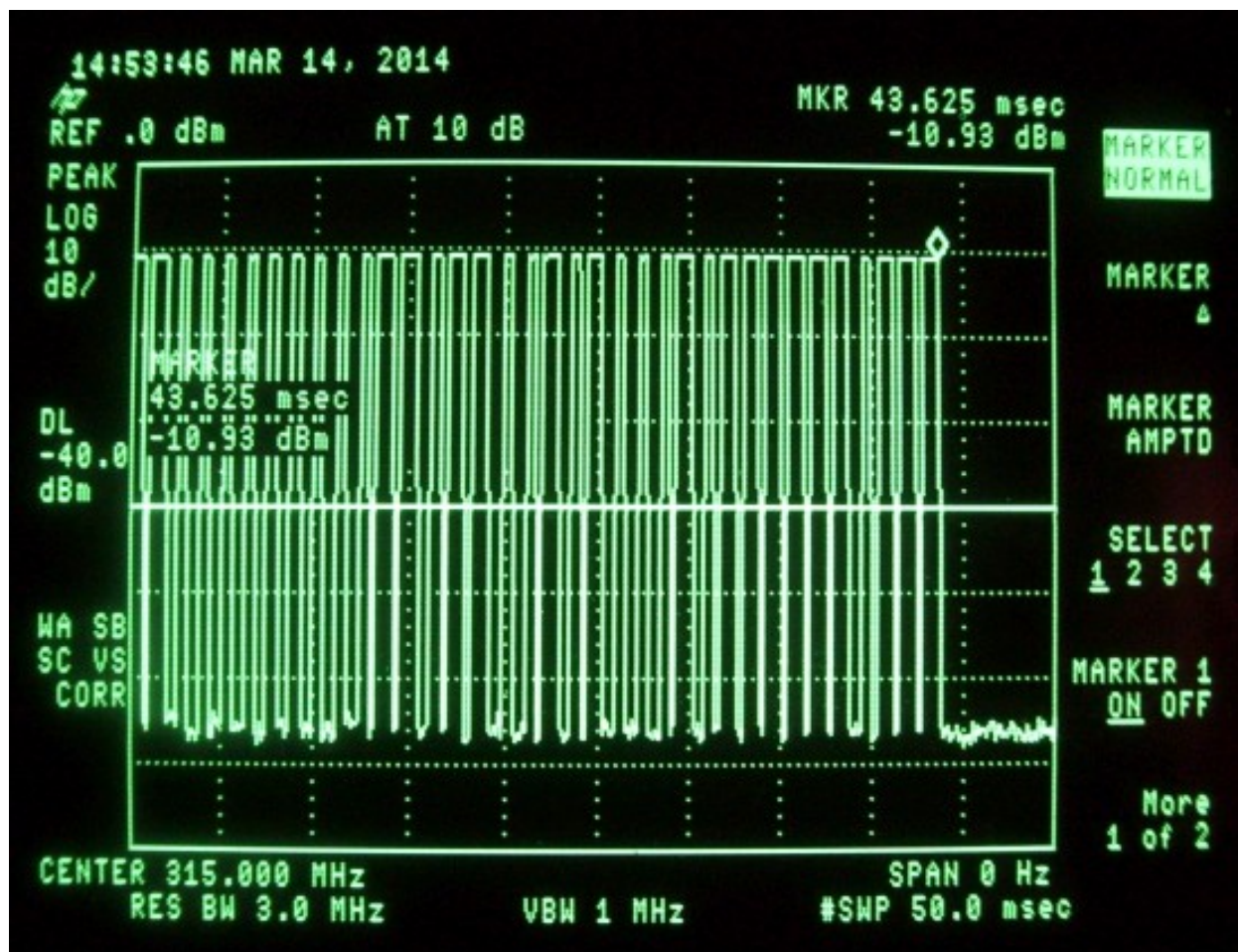
Restricted band limit = 500uV/m = 54dBuV/m.

3.5.2. Duty Cycle Correction Factor and Resulting Limits

This transmitter uses ASK modulation. Each transmitted packet has a length of 45.51mS with at a minimum of 100ms gap between each packet.

Each transmitted packet contains 37bits, and each bit is 1.23uS in length. I 'zero' bit starts with 410uS “off” and is followed by 820uS “on”, and a 'one' bit starts with 820uS “off” and is followed by 410uS “on”. Assuming an average packet will contain half ones and zeros, the resulting 'on' time per packet is therefore $1/2 * 37 * (820uS + 410uS) = 22.755mS$. The transmitter duty cycle over a 100ms time period is therefore $22.755/100 = 22.755\%$

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):

$$20\log(22.755/100) = -12.86\text{dB}$$

Resulting radiated field strength limits are as follows:

Fundamental:	85.9dBuV/m
Spurious:	65.9dBuV/m
Restricted Band:	64.3dBuV/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 85.6dBuV/m, passed by 10.3dB.
The highest spurious signal was the 7th harmonic, which passed by 17.5dB.
The next highest spurious signal was the 9th harmonic, which passed by 25.9dB.

Measured radiated field strength data is shown in Exhibit I.

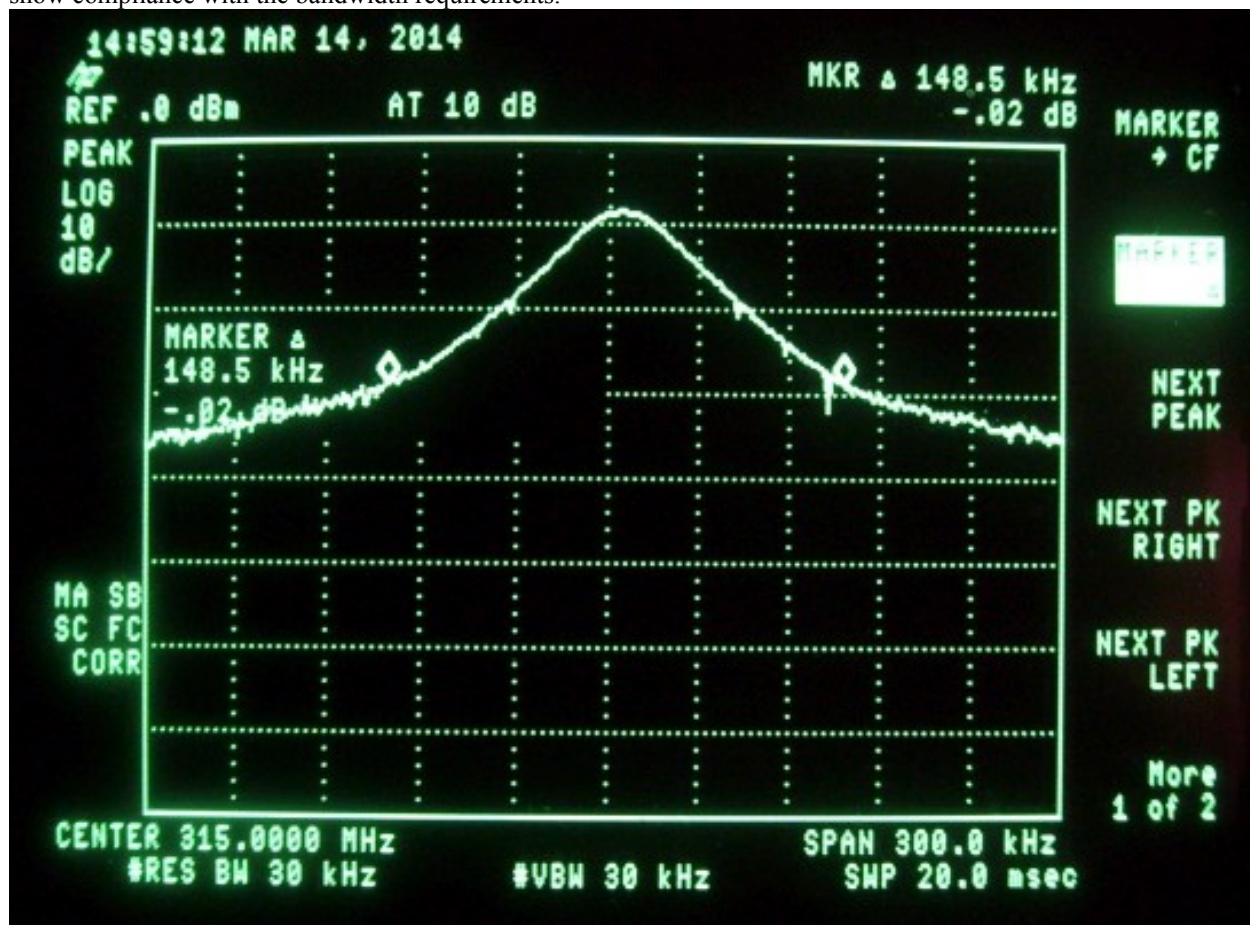
3.6. FCC Part 15 §15.231(c)

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

BW Limit = $0.0025 \times 315\text{MHz}$

BW Limit = 0.7875MHz

Bandwidth measurements were made using Hewlett Packard Model 8594E Spectrum Analyzer. The plot below shows the modulated signal. Bandwidth of the modulated signal is 148.5kHz or 0.1485MHz. These measurements show compliance with the bandwidth requirements.



Resolution Bandwidth: 30kHz
Video Bandwidth: 30kHz