

Resolution Products, Inc.

**Wireless PIR Motion Detector
FCC ID: U5X-RE153**

Certification Test Report

September 13, 2012

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1. Introduction

This device is a wireless motion detector transmitter for use in a wireless security system. The unit is powered by a 3V lithium battery. The transmitter is centered at 319.5MHz and is controlled by a crystal. The device measures 6.75 x 3 x 2.5" and weighs approximately 8.2 ounces.

This transmitter is activated via a motion detector or tamper switch. Four transmission packets are sent by the device only upon valid activation. Upon completion of these packets, the device goes into sleep mode and will not transmit again until another activation. If no activation is received for one hour, three supervisory packets are sent.

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-RE153". 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

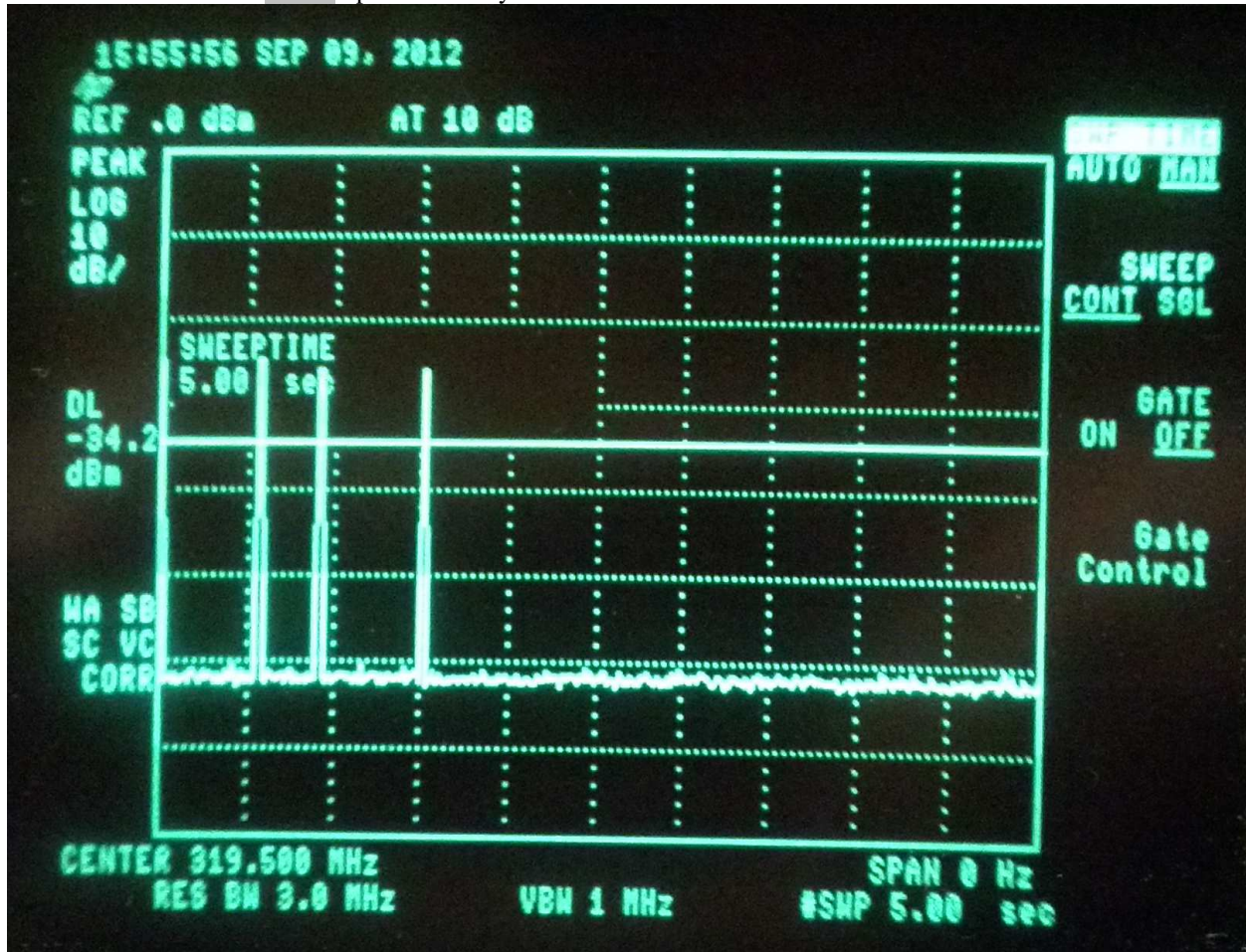
- a) Form 731 has been filed electronically.
- b) The technical report, along with its exhibits, contains the information as follows:
 - (1) full name and mailing address of the manufacturer of the device and the applicant for certification:
Resolution Products, Inc.
226 Locust Street, Suite 4
Hudson, WI 54016
 - (2) FCC Identifier is U5X-RE153
 - (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 activated via a motion detector. Four transmission packets are sent by the device upon valid activation. These packets are 17.4ms in length, and are spaced randomly between 150ms and 500ms to avoid packet collision with other wireless sensors. Upon completion of these packets, the device goes into sleep mode and will not transmit again until another activation. If no activation is received for one hour, three supervisory packets are sent with 17.4ms packet length and random spacing between 150ms and 500ms.

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 8591E Spectrum Analyzer.



3.2. FCC Part 15 §15.231(a)(3)

If motion has been detected 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)

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: 75.9dBuV/m

Spurious: 55.9dBuV/m

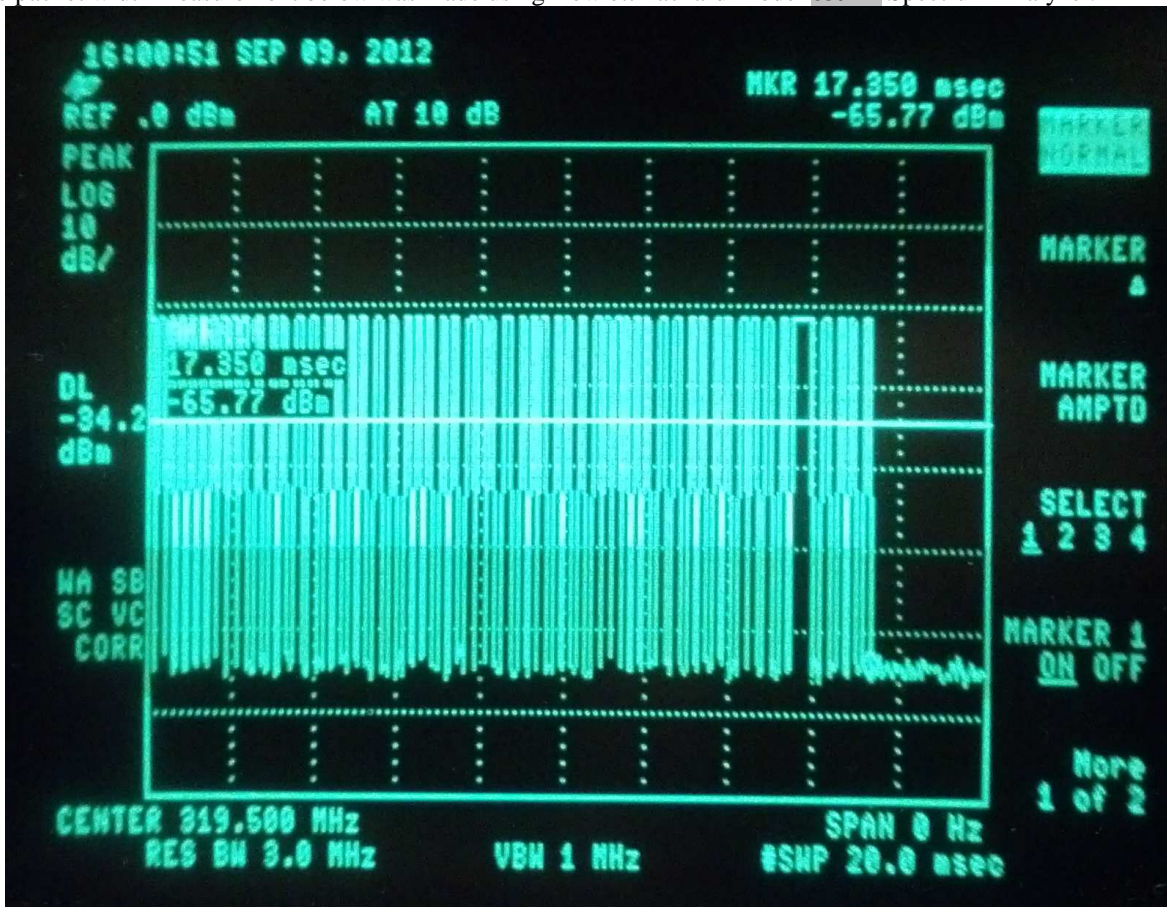
Certain harmonics of the transmitted signal fall in the restricted bands of §15.205. These harmonics are all above 960MHz and have the following limit as given in §15.209:

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

3.5.2. Duty Cycle Correction Factor and Resulting Limits

This transmitter uses ASK modulation. 63 bits are transmitted in each packet, and the "on" time for each bit is 122usec, except for one bit which has an "on" time of 366usec. The resulting "on" time per packet is 7.93ms. The transmitted packets are limited to one packet in a 125ms period. The transmitter duty cycle over a 100ms time period is therefore $7.93/100 = 7.93\%$.

The packet width measurement below was made using Hewlett Packard Model 8591E Spectrum Analyzer.



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

$$20\log(7.93/100) = -22.01\text{dB}$$

This transmitter therefore qualifies for the maximum duty cycle correction factor allowed in §15.35(c). The maximum duty cycle correction factor allowed is 20dB. Resulting radiated field strength limits are as follows:

Fundamental:	95.9dBuV/m
Spurious:	75.9dBuV/m
Restricted Band:	74dBuV/m

3.5.3. Measured Radiated Field Strength Data

Radiated emissions of the harmonics 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.

The EUT was adapted to continuously transmit for testing purposes.

The fundamental signal, at 94.7dBuV/m, passed by 1.2dB
The highest spurious signal was the 8th harmonic, which passed by 12.2dB.

3.6. FCC Part 15 §15.231(c)

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

BW Limit = $0.0025 \times 319.5\text{MHz}$
BW Limit = 0.799MHz

Bandwidth measurements were made using Hewlett Packard Model 8591E Spectrum Analyzer. The plot below shows the modulated signal. Bandwidth of the modulated signal is 146.3kHz or 0.1463MHz. These measurements show compliance with the bandwidth requirements.

19:40:06 SEP 09, 2012

REF .0 dBa

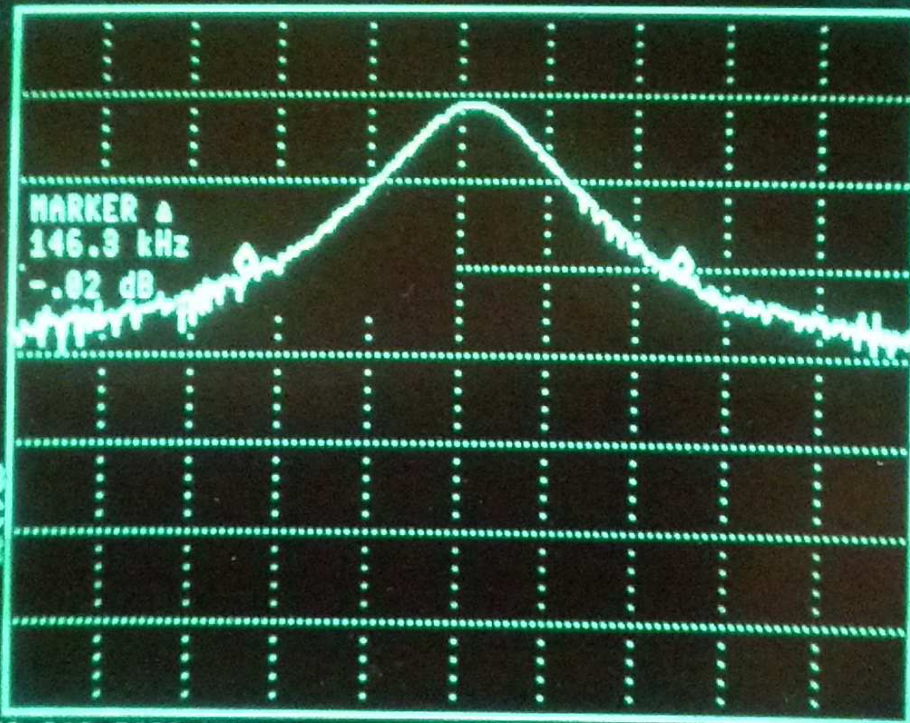
AT 10 dB

MKR Δ 146.3 kHz
-.02 dB

MARKER
+ CF

PEAK
LOG
10
dB/

HA SB
SC FC
CORR



MARKER

NEXT
PEAK

NEXT PK
RIGHT

NEXT PK
LEFT

More
1 of 2

CENTER 319.5000 MHz
RES BW 30 kHz

VBW 30 kHz

SPAN 300.0 kHz
SNP 20.0 nsec