



Simplifying · Security

Door/Window Sensor
FCC ID: U5X-RE636

Certification Test Report

June 3, 2019

Contents

1.	Introduction	3
2.	Statement of Compliance	3
2.1.	FCC Part 2 §2.907	3
2.2.	FCC Part 2 §2.911	3
2.3.	FCC Part 2 §2.913	3
2.4.	FCC Part 2 §2.915	3
2.5.	FCC Part 2 §2.925	3
2.6.	FCC Part 2 §2.943, 2.945	3
2.7.	FCC Part 2 §2.947	4
2.8.	FCC Part 2 §2.948	4
2.9.	FCC Part 2 §2.1033	4
3.	Discussion of Laboratory Measurements and Rules Compliance	4
3.1.	FCC Part 15 §15.231(a)(1)	4
3.2.	FCC Part 15 §15.231(a)(2)	4
3.3.	FCC Part 15 §15.231(a)(3)	4
3.4.	FCC Part 15 §15.231(a)(4)	5
3.5.	FCC Part 15 §15.231(a)(5)	5
3.6.	FCC Part 15 §15.231(b).....	5
3.6.1.	Raw Field Strength Limits	5
3.6.2.	Duty Cycle Correction Factor and Resulting Limits	5
3.6.3.	Measured Radiated Field Strength Data.....	5
3.7.	FCC Part 15 §15.231(c).....	6

1. Introduction

There will be one model listed under FCC ID: U5X-RE636. This models is RE636.

The RE636 is a wireless outdoor siren. The siren's main function is to provide an auditory and visual warning in alarm conditions. Alarm conditions are determined by a wirelessly connected home security system. The RE636 PCB measures 5.5" x 5.3" x 1.3" and weighs 3.9 oz. The full outdoor siren enclosure measures 12" x 11.2" x 2.2" and weighs 2.6 lbs. with three C-cell batteries.

The RE636 outdoor siren's primary function is to act as a receiver, but also sends tamper packets. Tamper packets transmit when a user opens the cover of the device. This trouble condition transmits four packets within 5 seconds.

A microcontroller on the RE636 is powered by three C-Cell batteries or a wall transformer. Tamper packets are sent by the RE636 only upon a valid tamper condition. The transmitted packet is OOK modulated and has an on-time of 8.5ms. Precautions are taken in the firmware to ensure there is at least 100ms between packets, and that the transmission ends within 5 seconds. In the absence of tampering the device, one supervision packet is transmitted every hour when powered from the wall transformer or every 18 seconds when on battery power.

The RE636 transmitter circuit consists of a 13.56MHz crystal and a Si4460 transceiver chip. This chip generates the 433.92MHz transmit frequency. It also OOK modulates the signal. A whip 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 Alula.
- 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-RE636". 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:

Alula
1402 Heggen St.
Hudson, WI 54016
 - (2) FCC Identifier is U5X-RE636
 - (3) Copy of the installation/user instructions for each host device 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) Description of host devices are furnished in Exhibit F.
 - (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 RE636 outdoor siren strobe monitors a tamper switch. When the tamper switch is triggered by opening the cover of the enclosure, a tamper packet is transmitted. 4 packets are transmitted by the device upon a tamper condition. The Manchester encoded packets are 20mS in length. The spacing between each packet is randomized from 112mS to 240mS. After transmission is complete, the device will go into receive mode. If the device is operating on battery power, the device will go into sleep mode after a short period of receive mode. The device will remain in sleep mode until a supervision period expires or the tamper switch changes states.

3.2. FCC Part 15 §15.231(a)(2)

Precautions are taken in the firmware to ensure that all transmissions end within 5 seconds after activation as shown in Exhibit I.

3.3. FCC Part 15 §15.231(a)(3)

If no alarm activations have been received for a supervision period (18 seconds on battery, one hour on wall power), one supervision packet is transmitted. The total transmission time resulting from a supervision transmission is under the allowed 2 seconds per hour and each concludes within the 5-second window. The

maximum operating transmission rate is when the RE636 is operating on battery power. In this case, the device transmits a supervision packet every 18 seconds. The on time per packet is 10 milliseconds (0.01 seconds) because of Manchester encoding.

$$\text{Total Transmit Time per Hour} = 0.01 \text{ seconds} * (3600\text{seconds}/18 \text{ seconds}) = 2 \text{ seconds}$$

3.4. FCC Part 15 §15.231(a)(4)

Device does not continue transmitting beyond the packets resulting from each activation.

3.5. FCC Part 15 §15.231(a)(5)

There is no setup information transmitted with this device.

3.6. FCC Part 15 §15.231(b)

3.6.1. Raw Field Strength Limits

The table that follows shows the emission limits as determined by interpolation of the data in §15.231(b), the requirements of §15.35(b) regarding peak emission limits, and the requirements of §15.205/§15.209 regarding restricted bands and their limits.

	Average Emission Limit (dBuV/m)	Peak Emission Limit (dBuV/m)
Fundamental (433.92 MHz)	80.825	100.825
Spurious	60.825	80.825
Restricted Band	54.00	74.00

3.6.2. Duty Cycle Correction Factor and Resulting Limits

The following pertains to the RE636 model. This transmitter uses OOK modulation. 100 bits are transmitted in each packet, and the “on” time for each bit is 100uS. The resulting “on” time per packet is 10.0mS. The transmitted packets are limited to one packet in a 100mS period. The transmitter duty cycle over a 100ms period is therefore 10/100 = 10%.

Thus, the average emission level for the RE636 model, as given in §15.35(c), is calculated as follows:

$$\text{Average Emission Level} = \text{Peak Measurement} + 20\log(10\text{mS}/100\text{mS})$$

3.6.3. 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 120kHz 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. The EUT was adapted to continuously transmit for testing purposes. Further details of measured radiated field strength are shown in Exhibit I.

The tables that follow shows both peak and average emissions, limits, resulting margins, and pass/fail results of RE636.

Emission Frequency (MHz)	RE636 Peak Emissions				RE636 Average Emissions			
	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Test Result	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Test Result
433.92	100.2	100.8	-0.6	PASS	80.2	80.8	-0.6	PASS
867.84	47.2	80.8	-33.6	PASS	27.2	60.8	-33.6	PASS
1301.76	51.7	74.0	-22.3	PASS	31.7	54.0	-22.3	PASS
1735.68	54.4	80.8	-26.4	PASS	34.4	60.8	-26.4	PASS
2169.60	34.5	80.8	-46.3	PASS	14.5	60.8	-46.3	PASS
2603.52	48.5	80.8	-32.3	PASS	28.5	60.8	-32.3	PASS
3037.44	45.8	80.8	-35.0	PASS	25.8	60.8	-35.0	PASS
3471.36	49.4	80.8	-31.4	PASS	29.4	60.8	-31.4	PASS
3905.28	40.6	74.0	-33.4	PASS	20.6	54.0	-33.4	PASS
4339.20	56.2	74.0	-17.8	PASS	36.2	54.0	-17.8	PASS

3.7. FCC Part 15 §15.231(c)

The allowed 20dB bandwidth of the transmitted signal is 0.25% of the carrier frequency:

$$\text{BW Limit} = 0.0025 * 433.92\text{MHz} = 1.0848\text{MHz}$$

Bandwidth 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

The plots below show the modulated signals. The highest measured 20dB bandwidth of the modulated signal is 129.5kHz or 0.1295MHz. These measurements show compliance with the bandwidth requirements.

RE636 Outdoor Siren Strobe

