



## 433.92 MHz RF Switch User's Manual

**Document ID: RFSW1139– User**

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## Revision History

Revision	Date	Purpose
-	07/11/08	Initial release

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## Scope

This manual introduces the RFTrax Wireless RF Switch unit and describes the technical details required to install and operate the unit.

We at RFtrax would like to make this manual as helpful as possible. Comments and suggestions can be sent to us by email at our website: [www.rftrax.com](http://www.rftrax.com)

## Applicable Documents

FCC Part 15.231

## Instruction to the User

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

## General Description

The RFTrax RF Switch is an inexpensive wireless radio operating on the 433.92 MHz ISM band. The primary purpose of the RF Switch is to report to the Access Command Unit (ACU) the current state a load-switch or a brake-switch (open or closed).

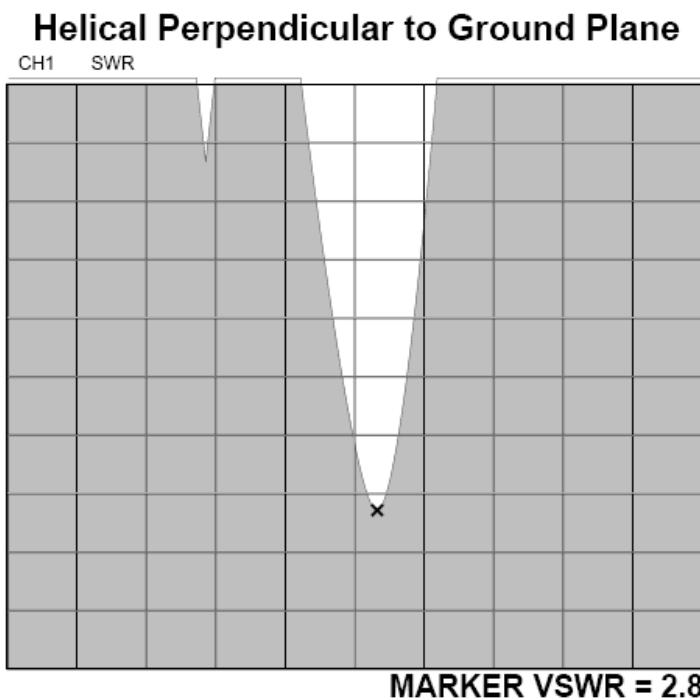
An RFTrax RF Switch consists of a transmitter unit and a receiver unit. These two units are tested, programmed and will be used together as a pair. After the pair is programmed by RFTrax, the receiver will only recognize the message from its associate transmitter. It will ignore messages from other transmitters.

In brief, the main function of the RF Switch transmitter is to monitor the state of the external switch. Any time the external switch changes its state, the information (open or closed) will be latched and send to the data encoder. The encoder will record the states of its data lines, assemble the packet, activate the transmitter module, and send the packet as a serial bit stream to the transmitter circuit. The transmitter circuit transmits the modulated RF signal at 433.92MHz to the receiver. The duration of each transmission is less than 2 seconds

The RF section and antenna are carefully designed to comply with the allowed power and harmonic limitation imposed by FCC Part 15.

Both RF switch transmitter and receiver consist a permanent mounted  $\frac{1}{4}$  Wave Monopole Helical Antenna that is solder directly to the PCB. The antenna is concealed inside a housing.

*Figure below shows the VSWR of the  $\frac{1}{4}$  wavelength helical antenna.*



## Product Specifications

**Table 1:** Product Specifications

Product Features	
Operating frequency	ISM: 433.92 MHz
Physical Characteristics	
Transmitter module size	95 x 95 x 55 mm
Transmitter module weight	100 grams
Receiver module size	188 x 95 x 55 mm
Receiver module weight	300 grams
Environmental	
Operating temperature	-30° C +75° C
Storage temperature	-40° C +85° C
Performance	
Operating voltage	2.7 - 3.6VDC
Current consumption	TX module in sleep mode: 90 uA TX module in TX mode: 3.4 mA RX module: 1 mA (with 10% duty cycle)
TX power	-17dBm
TX center frequency	433.92 MHz, ± 50 KHz
TX harmonic emissions	< 36 dBc
Data rate	9,600 bits per second
RX sensitivity	-112 dBm (typ)
RX IF frequency	10.7 MHz
RX RSSI	Dynamic range: 80dB Gain: 16 mV per dB Voltage with no carrier: 1.5 V
Antenna Ports RF impedance	50 Ohm
Communication distance	Up to 200 meters (LOS)
Operating life time	Up to 3 years

**Table 2:** RFTrax part numbers

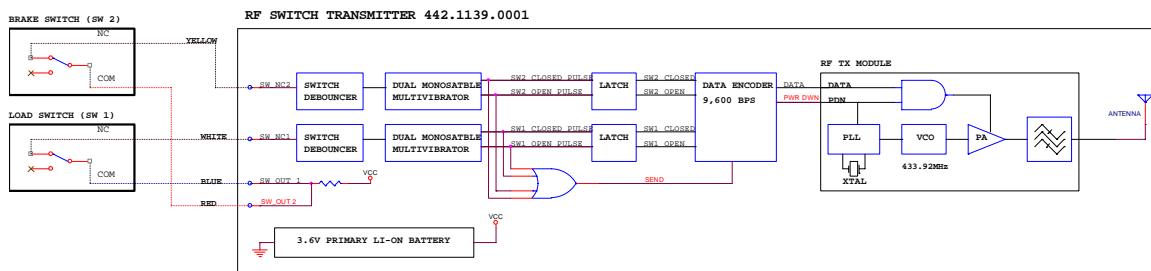
RF Switch Transmitter Unit	442.1139.0001
RF Switch Receiver Unit	442.1140.0001
RF Switch Transmitter board	309.1341.0001
RF Switch Receiver board	309.1351.0001

## Regulatory Approval

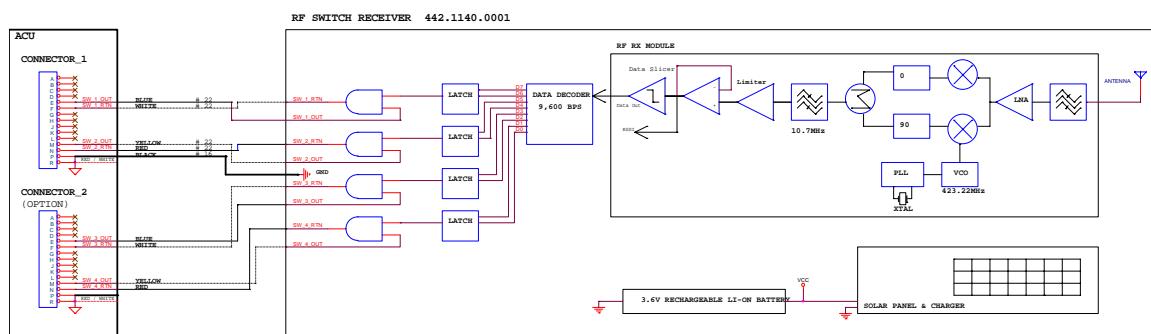
The following regulatory approval applies for the RFTrax's RF Switch transmitter:  
FCC

FCC ID: U7VRFSW1139

## RF Switch Transmitter Block Diagram



## RF Switch Receiver Block Diagram



## Installation

### Package Contents

- Transmitter unit , part # 442.1139.0001      Qty:1
- Receiver unit, part # 442.1140.0001      Qty:1

### Activation

To activate the supplied receiver unit, it is necessary to open the lid and connect the battery cables to apply power to the unit. As soon as power is applied, the receiver unit is On and ready to receive data from the transmitter unit.

The supplied transmitter unit is already activated and is in standby mode. It will transmit data to the receiver unit when an external switch is connected and switch condition is changed from *Normally Open* to *Closed*. After that, it will transmit any time the switch condition is changed.

### Mounting the Receiver Unit

When securing the receiver to field equipment, the solar panel should be oriented to receive the sun light as much as possible. In addition, in order to have good and reliable

communications, the distance between transmitter and receiver should be as close as possible.

After securing the receiver to field equipment, the receiver is wired to the ACU via a Barrier Strip terminal, the wire assignments are shown in the table below:

#### Receiver wire assignments

Wire	Signal name	Connect to:
Blue	SW_OUT1	ACU's SW_OUT1 black wire (#22 black wire)
White	SW_RNT1	ACU's SW_RTN 1 black/white wire
Red*	SW_RTN2	ACU's SW_RTN 2 blue wire
Yellow*	SW_OUT2	ACU's SW_OUT2 blue/white wire
Black	GND	ACU's GND #16 black wire

**\* Notes:**

- *SW\_RTN2 and SW\_OUT2 are only to be used for applications that require two switches.*
- *The RF switch receiver is capable of handling up to 4 switches, if needed. Switch 3 has the same color code and as switch 1; switch 4 has the same color code as switch 2.*

#### Mounting the Transmitter Unit

When securing the transmitter unit to field equipment, if possible, place the transmitter at a location that has a clear path toward the receiver.

After securing the transmitter to field equipment, the transmitter is wired to the switch(es) as shown in the following wire assignment table

#### RF Switch Transmitter wire assignments

Wire	Signal name	Connect to:
Blue	SW_COM1	Switch 1 Common terminal
White	SW_NC1	Switch 1 Normally Closed terminal
Red*	SW_COM2	Switch 2 Common terminal
Yellow*	SW_NC2	Switch 2 Normally Closed terminal

**\* Note:** *SW\_COM2 and SW\_NC2 are only to be used for applications that require two switches.*

#### Maintenance

The RF Switch transmitter and receiver are designed to be inexpensive modular and maintenance free for at least 3 years. After three years of service, RFTrax recommends that both the transmitter and receiver be replaced.

***Tech Support***

For technical support and customer service dealing with the RF Switch, please contact RFTrax by any of the following methods:

Technical Support Phone: 888-519-4050  
Phone: 281-276-5900  
Website: <https://www.rftrax.net>  
<http://www.rftrax.com>  
Email: support@rftrax.com