

## Dual Remote Relay Transmitter and Receiver

User Instructions (5th January 2016)

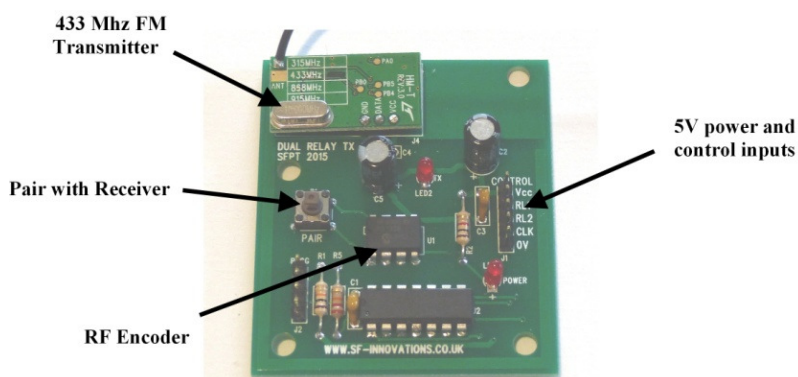
### Contents

- Introduction
- CE Compliance and Safety Information
- Radio Modules
- Pairing the Transmitter and Receiver
- Switching Relays On and Off

### Introduction

These two products allow the user to remotely switch appliances on and off. The Dual Remote Relay product consists of a transmitter and a receiver using 433MHz FM radio modules. Using good quality FM transmitters a range of 200 meters can be achieved 'line of sight' and more than 50 meters going through 2 or 3 sets of walls.

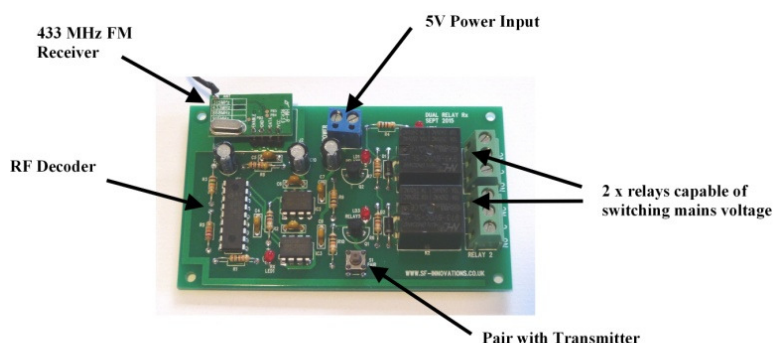
### Dual Relay Transmitter



**Dual Relay Transmitter**

- \* FM Radio transmitter operating at 433 MHz
- \* Wire antennae fitted
- \* Can be paired to Receiver
- \* Two separate relays can be switched ON and OFF
- \* Simple control interface
- \* Can be controlled form Raspberry Pi, Arduino or PIC.

### Dual Relay Receiver



**Dual Relay Receiver**

- \* FM Radio receiver operating at 433 Mhz
- \* Wire antennae fitted
- \* Two changeover relays with connectors
- \* Safety isolation on PCB between 'safe' and mains side
- \* LEDs to indicate relay status
- \* 5V supply required

## CE Compliance and Safety Information

- \* The Dual Relay Transmitter uses 5V or less and is outside the scope of the LVD Directive.
- \* The Dual Relay Receiver can be used by a competent person to switch mains voltage. There is basic insulation provided between the relay contacts and coil. When used to switch mains, the product has to be inside a plastic enclosure to prevent the user touching any part of the electronics inside. When assembling the product inside an enclosure great care has to be taken in keeping wires connected to the low voltage side away from components on the high voltage side. The mains input has to be fused at 5 Amps to protect the (10 Amp) Relays and the tracks on the PCB. If in doubt seek professional help in assembling and checking the product before use. **Remember: Mains voltage can kill - so please follow the instructions here.**
- \* The connection of incompatible devices to these products may cause damage and invalidate the warranty.
- \* All devices connected to these products must comply with all relevant standards to ensure that safety and performance is not compromised.
- \* These products comply with the Class B limit for Electromagnetic Radiation.
- \* These products provide reasonable protection against harmful interference in a residential installation. However there could be deterioration in performance in the presence of strong RF fields. For this reason, these products should not be used in any safety critical applications. Any wires connected to these products should be less than 2 metres in length. Avoid handling the PCB while it is powered. Only handle by the edges to avoid the risk of ESD damage.
- \* If these products are being incorporated in a commercial product which uses either all CE marked products or some CE marked and some non CE marked product, it is the responsibility of the system integrator to assess the end product for compliance with the relevant EU Directives.
- \* These products comply with the requirements of the RoHS regulations.

## Radio Modules

These products use FM Radio modules operating in the 433 MHz licence free band manufactured by HopeRF and supplied by RF Solutions Ltd.

### FM Transmitter and Receiver Modules

Many radio systems use AM (Amplitude Modulation) transmitter and receiver modules because they are very cheap. For examples a pair of modules operating at 433 MHz can be purchased for around £2 in the UK or for less than \$1 from the Far East. However range is a problem with AM units. While many manufacturers claim 50 metres this is usually for line of sight with no obstructions. When a brick wall is introduced this range can drop quickly to 10 metres or less.

The other major problem with AM radio modules is their performance in the presence of noise. FM modules are 75 times better than AM modules when performing in the presence of noise.

For this reason, although FM modules are more expensive than AM modules they deliver far superior performance in the field.

### Wire Antennae

These improve the performance of the transmitter and receiver. The transmitter and receiver modules are fitted with a 1/4 wave whip antennae consisting of a wire of length 17.3 cm. There is a ground plane on the PCB which forms the other half of the antennae.

### Effective Range

In trials the Dual Analogue Radio Transmitter and Universal Radio Receiver provide a range of greater than 200 metres line-of-sight. When working through 2 sets of brick walls with cavities a range of greater than 50 metres was obtained during field trials. The following factors will have an effect on range.

Obstructions

Position of antennae

Height above ground

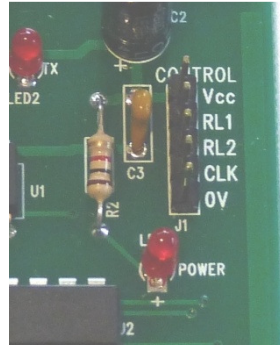
### Pairing the Transmitter and Receiver

Apply power at 5V to the Transmitter and Receiver.

1. Press briefly and release the pair switch on the Receiver
2. The status LED will illuminate while the switch is pressed and remain on when released.
3. Operate the pair button on the Transmitter once, status LED on the Receiver will extinguish
4. Operate the pair button on the Transmitter a second time, status LED on the decoder will flash
5. After the status LED has stopped flashing the transmitter has been successfully paired.

### Switching Relays ON and OFF

The Control Interface is shown below.



To switch Relay 1 ON, apply 5V to the RL1 input and take the CLK input from low to high (at least 0.2 s) to low. To switch it OFF apply 0V to the RL1 input and take the CLK input from low to high to low.

To switch Relay 2 ON, apply 5V to the RL2 input and take the CLK input from low to high (at least 0.2 s) to low. To switch it OFF apply 0V to the RL2 input and take the CLK input from low to high to low.

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