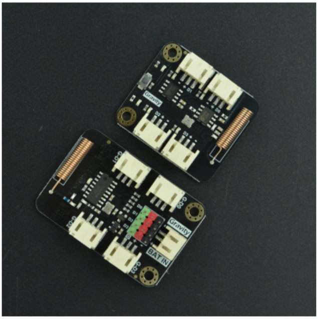
search
DFRobot Products (DFR) Index
Sensor (SEN) Index
Telecom Module (TEL) Index
Motor Driver (DRI) Index
Fitting (FIT) Index
Robot (ROB) Index
micro:bit (MBT) Index
Kit (KIT) Index
Toy (TOY) Index
Servos (SER) Index
What is XX series
How to select series
How it works series
PinPong Library

Introduction
Application
Features
Specification
Board Overview
Receiver operating instructions
Basic Example 1 - Connects Transmitter to Battery and Sensor
Basic Example 2 - Connect Transmitter to a Controller
Advanced Example 1 - Trigger in multiple states
Advanced Example 2 - Transmitter External Power Supply and Jumper Wires
Transmitter operating instructions
FAQ
More Documents

SKU:TEL0140orTEL0142



Introduction

When building a project that needs to transmit some simple signals wirelessly, have you been bothered by the any of the following problems: Bluetooth's cumbersome AT command configuration and high cost, Wifi's signal limitations and high power consumption, IR emission angle and inability to penetrate through the walls...

This Gravity: Digital Wireless Swtich might be just what you need! Based on 433Mhz RF communication technology, the module includes a transmitter and receiver and features the advantages of simple operation, high scalability, strong penetration, and ultra-low standby power consumption. It is able to transmit digital signals and compatible with any controller that can read and write digital signals. These modules are used on a wide variety of applications that require wireless control, such as, remote control, wireless doorbell, wireless signal transmission, upgrading wired buttons to wireless buttons, etc.

The module transmitter can be used without connecting to the controller. After connecting the battery, you can directly use the digital sensor or the switch button as the "trigger button" for signal transmission. Of course, you can also connect the module to a controller and control the signal transmission through the controller's digital pins. The product adopts the EV1527 encoding format and the four-digit key value code can be combined into 15 different states; the receiver has a corresponding pairing function to ensure that only the paired transmitting device can control the receiver, the receiver supports four working modes: inching, latching, self-locking, and interlocking. It can be paired with EV1527 coded transmitters. One receiver can be paired with up to 32 transmitters. The transmitter and receiver support "one-transmit and multiple-receive" or "one-receive and multiple-transmit" after pairing. Please see the examples part for specific usage.

Application

- wireless door bell
- remote control
- Deployed as a sensor signal acquisition node
- Wired button upgrade wireless button

Features

- Simple operation and strong scalability
- Strong penetration
- Ultra-low standby power consumption
- 15 button states of the transmitter
- Pairing function for the receiver
- Support one-transmit and multiple-receive/one-receive and multiple-transmit
- Multiple working modes: inching, latching, self-locking, and interlocking
- Digital signal, support 3.3-5V power input

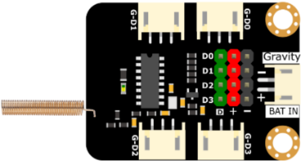
Specification

- Working voltage: 3.3 ~ 5.0V DC
- Input signal: digital
- Number of interfaces: 4
- Working frequency: 433Mhz
- Circuit board size: transmitting end 47×32mm, receiving end 37×32mm
- Mounting hole size: inner diameter 3.1mm/outer diameter 6mm

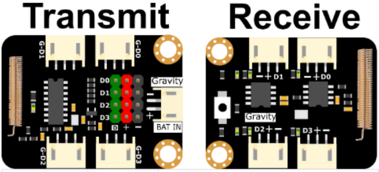
Operating current	Transmitter	Receiver
5V power supply, working	10mA	6mA
5V power supply, standby	<10uA	3mA
3.3V power supply, working	8mA	5mA
3.3V power supply, standby	<10uA	3mA

Status	Transmission distance
Office， no walls	**15M**
Office， 1 walls	**14~15M**
Office， 2 walls	**13~14M**

- Distance test description
    - The transmitter is connected to a 3.7V lithium battery
    - Receiver connects to UNO controller 5V power supply
    - Try to keep the transceiver module at the same height, about 0.5M above the ground
    - The antenna stays in the default position
    - There is no great attenuation after the signal passes through the wall, and the transmission distance is reduced by about 0.5M each time it passes through the wall
    - If the transmitter antenna is re-welded to the state shown in the figure below, the signal transmission distance can be increased to about **25M** (if there is no strong welding ability, and the long transmission distance is not required, it is not recommended to re-weld the antenna, because of this state The lower antenna is easily bent and damaged)



Board Overview



Transmitter	Name	Description
Transmitter	D0 ~ D3	The digital signal input terminal powers the external sensor the green pin receives the high-level transmit signal
Transmitter	G-D0 ~ G-D3	Digital signal input terminal After connecting to the controller, it can supply power to the transmitter, DC 3.3-5V receive high-level transmission signal
Transmitter	BAT IN	External power input 3.3-5V
Receiver	D0 ~ D3	Digital signal output terminal the default low level, the received signal is high level
Receiver	Button	Pairing/mode switching

Receiver operating instructions

Pairing

- step1. Click the button of the receiver(Press and hold for <0.5S), the blue indicator light next to the button will light up, and the receiver waits for pairing.;
- step2. Make any channel of the transmitter continuously transmit signals within six seconds, until the blue indicator light of the receiver flashes 3 times, then the pairing is successful;
- step3. The blue indicator light flashes three times after the pairing is successful, and it will light up again. At this time, the next transmitter can be paired. If there is no next transmitter to be paired, it will automatically exit the pairing mode after waiting for 6S;
- Note: The pairing waiting time is 6S, if the pairing signal from the transmitter is not received within 6S, the pairing mode will be automatically exited.
- Note:**After the pairing is successful, the transmitter must re-transmit the signal and the receiver can receive it.** If it fails, repeat the previous two steps.
- Note: You only need to pair any one of the transmitter D0~D3

signals, and the other three will automatically match.

Mode switch

Note: The receiver is in inching mode by default, the following examples all take inching mode as an example. If there is no requirement for using other modes, you can skip this step

Mode	Description
Inching	After D0 receives the signal once, it stays high until D1~D3 receive the signal
Latching	Each time D0 receives a signal, the corresponding output state is inverted once, the same is true for D1~D3
Self-locking	D0 receives the signal and outputs high level, but does not receive the signal low, the same is true for D1~D3
Interlocking	When receives the signal D0, D0 stays at a high level, and all the others are low. The same applies to D1~D3.

Press and hold the button for 0.5~1.5 seconds, then release it, the blue indicator light flashes twice, indicating that you have entered the mode switching state, and then you can enter different modes according to the different times of pressing the button within 6 seconds:

Press once to enter the latching mode;

Press twice to enter the self-locking mode;

Press 3 times to enter the inching mode;

Press 4 times to enter the interlocking mode;

According to the mode you need to enter, press the button for the corresponding number of times, and then hold the button for 0.5~1.5 seconds as a confirmation signal. After letting go, the blue indicator light flashes 2 times to set successfully and enter the corresponding working mode. 0.5-1.5 seconds is relatively short, be careful not to press overtime.

Clear pairing

The receiver can store up to 32 sets of transmitter codes. When there are more than 32 sets, the first paired code will be overwritten; Clear all paired transmitters: Press and hold the button on the receiving end for more than 4 seconds. After releasing your hand, the blue indicator light flashes twice to successfully clear all paired transmitters; if the clearing fails, repeat the above operation.

Basic Example 1 - Connects Transmitter to Battery and Sensor

- **This sample is mainly used for demonstration: the transmitter is powered by a battery and the sensor's signal is sent out through RF signal, which simulates the function of a wireless doorbell**
- Take Arduino as an example, the other main controllers use the same principle, only need to connect to the corresponding digital port.

- Take inching mode in the receiver as an example, the principles of other modes are the same.

Requirements

- **Hardware**
  - DFRuino UNO R3 x 1
  - Wireless switch transmitter x 1
  - Wireless switch receiver x 1
  - 3.3-5V power supply x 1
  - Button x 1
  - Motion Sensor x 1

Other sensor application scenarios

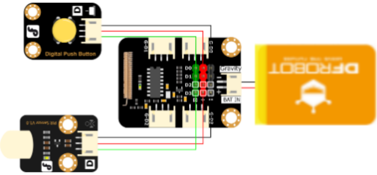
- Crash sensor: position detection-automatic position recovery in scenarios where the closed container is not easy to wire
- Vibration sensor: vibration detection-door opening and closing vibration
- Infrared photoelectric switch: counting detection-number of people/workpiece counting
- Other digital sensors(Play with your imagination)

Note: The sensor can be selected arbitrarily, as long as it is digital. The button and motion sensor are used here as a function demonstration to simulate the function of a wireless doorbell.

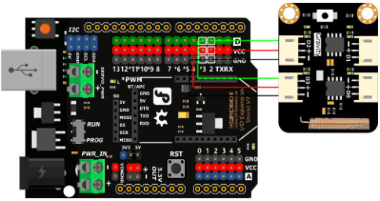
- **Software**
  - Arduino IDE

Connection

The transmitting end:



** Receiving end: **



Sample code

```
#define Button_D2 2//Arduino
#define Button_D3 3//Arduino
//#define Button_D2 D2 //ESP32
//#define Button_D3 D3 //ESP32
```

```
void setup() {
    Serial.begin(115200);
    pinMode(Button_D2, INPUT);
    pinMode(Button_D3, INPUT);
}
void loop() {
    if (((digitalRead(Button_D2)==1) && (digitalRead(Button_D3
        Serial.println("Someone presses the doorbell");
        delay(3000);
    }
    else if (((digitalRead(Button_D2)==0) && (digitalRead(Butt
        Serial.println("Someone passes by but does not press t
        delay(100);
    }
    else if (((digitalRead(Button_D2)==1) && (digitalRead(Butt
        Serial.println("Someone has waited for a while and the
        delay(3000);
    }
    delay(100);
}
```

Result:

**When someone passes by and presses the button, the serial port prints "Someone presses the doorbell"; when someone passes by but does not press the doorbell, the serial port prints "Someone passes by but does not press the doorbell"; when someone comes to the door and stands for a while Press the doorbell, and the serial port prints "Someone has waited for a while and then press the doorbell". **

Basic Example 2 - Connect Transmitter to a Controller

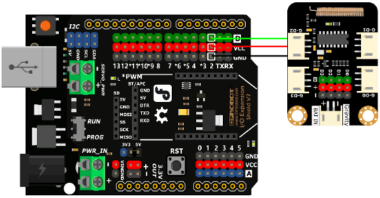
- **This sample is mainly used for demonstration: power the transmitter through the controller, and control the transmitter to transmit signals**
- Take Arduino as an example, the other main controllers use the same principle, only need to connect to the corresponding digital port.
- Take inching mode in the receiver as an example, the principles of other modes are the same.

Requirements

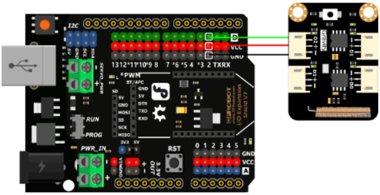
- **Hardware**
    - DFRuino UNO R3 x2
    - Wireless switch transmitter x1
    - Wireless switch receiver x1
- **Software**
    - Arduino IDE

Connection

The transmitting end:



Receiving end:



Sample code

The transmitting end:

```
#define Button_D2 2//Arduino
//#define Button_D2 D2 //ESP32

void setup() {
  pinMode(LED_BUILTIN, OUTPUT);
}

void loop() {
  digitalWrite(Button_D2, HIGH);
  delay(1000);
  digitalWrite(Button_D2, LOW);
  delay(1000);
}
}
```

Receiving end:

```
#define Button_D2 2//Arduino
//#define Button_D2 D2 //ESP32

void setup() {
    Serial.begin(115200);
    pinMode(Button_D2, INPUT);
}
void loop() {
    if (digitalRead(Button_D2)) {
        Serial.println("Pressed: D2");
        delay(1000);
    }
}
```

Result:

The transmitter G-D2 sends out signals every 1 second, and the receiver D2 receives signals every 1 second.

Advanced Example 1 - Trigger in multiple states

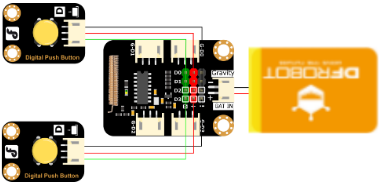
- **Control the transmitter to emit a variety of signals**
- Take Arduino as an example, the other main controllers use the same principle, only need to connect to the corresponding digital port.
- Take inching mode in the receiver as an example, the principles of other modes are the same

Requirements

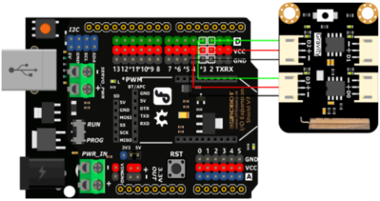
- **Hardware**
    - DFRuino UNO R3 x1
    - Wireless switch transmitter x1
    - Wireless switch receiver x1
    - 3.3-5V power supply x 1
    - Button x 2
- **Software**
    - Arduino IDE

Connection

Transmitting end :



Receiving end:



Sample code

Receiving end:

```
#define Button_D2 2//Arduino
#define Button_D3 3//Arduino
//#define Button_D2 D2 //ESP32
//#define Button_D3 D3 //ESP32

void setup() {
  Serial.begin(115200);
  pinMode(Button_D2, INPUT);
  pinMode(Button_D3, INPUT);
}
void loop() {
  if (((digitalRead(Button_D2)==0) && (digitalRead(Button_D3)=
    Serial.println("State:1,Pressed:NONE");
    delay(500);
```

```
  }
  if (((digitalRead(Button_D2)==0) && (digitalRead(Button_D3)=
    Serial.println("State:2,Pressed:D3");
    delay(500);
  }
  if (((digitalRead(Button_D2)==1) && (digitalRead(Button_D3)=
    Serial.println("State:3,Pressed:D2");
    delay(500);
  }
  if (((digitalRead(Button_D2)==1) && (digitalRead(Button_D3)=
    Serial.println("State:4,Pressed:D2&D3");
    delay(500);
  }
  delay(100);
}
```

Result:

Press different key combinations, the serial port will print different status values.

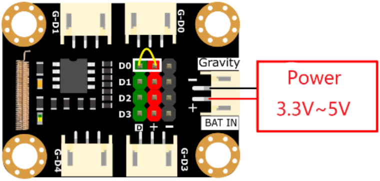
Advanced Example 2 - Transmitter External Power Supply and Jumper Wires

- **This sample is mainly used for demonstration: the transmitter is powered by the battery and the radio frequency signal is sent out by the jumper short circuit**
- Take Arduino as an example, the other main controllers use the same principle, only need to connect to the corresponding digital port.
- Take inching mode in the receiver as an example, the principles of other modes are the same

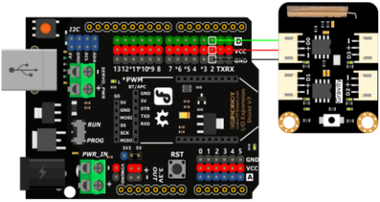
Requirements

- **Hardware**
  - DFRuino UNO R3 x1
  - Wireless switch transmitter x1
  - Wireless switch receiver x1
  - 3.3-5V power supply x 1
  - Lead / jumper cap x1
- **Software**
  - Arduino IDE

The transmitting end:



Receiving end:



Sample code

```
#define Button_D2 2//Arduino
//#define Button_D2 D2 //ESP32

void setup() {
    Serial.begin(115200);
    pinMode(Button_D2, INPUT);
}
void loop() {
    if (digitalRead(Button_D2)) {
        Serial.println("Pressed: D2");
        delay(1000);
    }
}
```

Result:

1. Connect the power first, then use the lead/jumper cap to short-circuit the red and green pins of the transmitting D0 port, the transmitter will emit a signal, and the corresponding pin of the receiver will receive the signal at the same time

2. Use the lead wire/jumper cap to short-circuit the red and green pins of the transmitting end D0 port, and supply power to the transmitter through a controllable power supply (Power supply time>60ms) . The transmitter port connected to the wire will send a signal at the moment of powering on, and the corresponding pin of the receiver will receive the signal at the same time. If the power supply continues to supply power, the transmitter will always be in the transmitting state.

Transmitter operating instructions

Transmitter Power Supply Description:

- The transmitter cannot be used for charging battery.
- The D0 to D3 pin headers have only power output function and cannot be used as power input terminals, otherwise the module will be damaged
- When using G-D0 to G-D3 interface to connect to the controller, you can leave the external power supply unconnected. If the external power supply is connected at this time, the module will automatically select a high-voltage power supply.
- When using G-D0 to G-D3 Gravity interface to connect to the controller for power supply, D0~D3 have voltage output

FAQ

Q1: The receiver is connected to the controller, the transmitter does not transmit signal but the receiver receives the signal

A: The receiver receives the control of the code, burn the corresponding sample code or burn an empty code to solve the problem

Q2: When using a battery to connect the transmitter and sensor, how to reduce the power consumption as much as possible

A: For some passive sensors, such as button, Collision sensor, magnetic sensor, connect the sensor The red and green wires to the transmitter, disconnect the black wire, which can reduce power consumption

Q3: Can it be used with other transmitters and receivers?

A: Yes, but make sure that the encoding format and rate are the same,different devices D0-D3 may not correspond exactly. The encoding format of the transmitter is EV1527, and the transmission rate is less than 10K; the decoding format of the receiver is EV1527, and the decoding rate is 0~10K.

Q4: Can the receiver directly control the relay?

A: Yes, the positive and negative terminals of any one interface of the receiver is connected to the 3.3/5V power supply, other ports can be directly connected to the relay.

For any questions, advice or cool ideas to share, please visit the **DFRobot Forum**.

More Documents

TEL0140 Schematic

TEL0140 Dimensions

TEL0142 Schematic

TEL0142 Dimensions

Downloaded from Arrow.com.