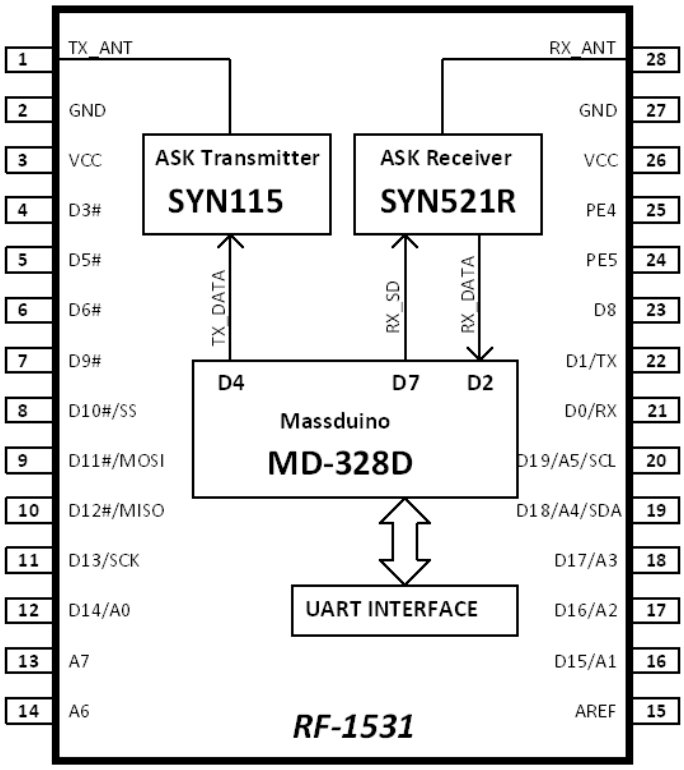
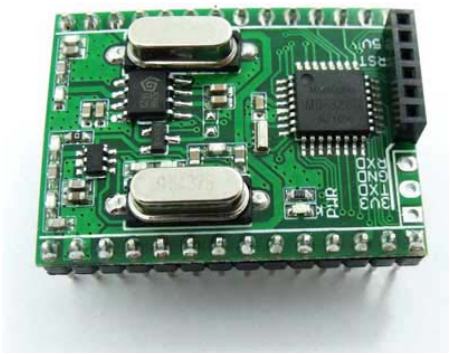
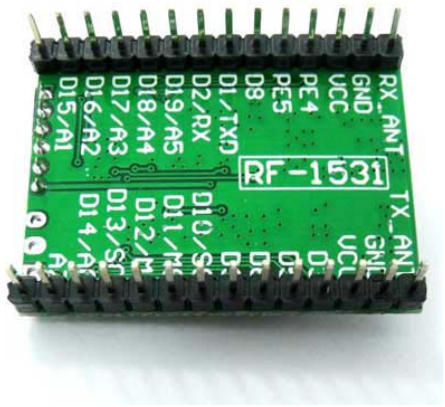
RF-1531

Arduino UNO Based 315MHz/433MHz ASK Transmitter and Receiver Module







Features & Parameters

- Massduino MD-328D with 32KB Flash , 2KB SRAM
- Fully Arduino IDE development
- Onboard ASK transmitter and receiver
- Connection to exist ASK device which with same frequency. (such as remote controller / PIR sensor / Magnetic / etc.)
- Two ISM band for choice:
  - RF-1531-315: **315MHz**
  - RF-1531-433: **433.92MHz**
- Arduino lib support : https://github.com/sui77/rc-switch
- 1 digital IO for transmitter
- 2 digital IOs for receiver
- All other IO are sink to connector for user usage
- Wide operation voltage : 2.4 to 4.5V, this feature let user can be use Li-ion battery powered without LDO. recommend voltage is 2.4 to 3.6V.
- 200m outdoor working distance and good for home using
- Ultra-low power consumption - down to 17uA in Standby mode
- Use Superheterodyne IC ,better than super-regenerative receiver
- RX circuit with shutdown function

- **Operation voltage :** DC 2.4 to 4.5V
- **TX Output power level:** 10dBm
- **TX Supply current (Pout = 10dBm):** 16.8mA
- **TX Standby delay time:** max 120mS
- **TX Data rate:** 10Kbps
- **RX Max input power**: 10dBm
- **RX Sensitivity:** -109dBm
- **Receive Modulation Duty Cycle:** 20% to 80%
- **RX current:** 315MHz: 7.8mA
  433MHz: 9.8mA
- **Shutdown current:** 18uA
- **Polled operation current (100:1 duty-cycle):** 78uA

Notice:

The TX and RX can not working in the same time.

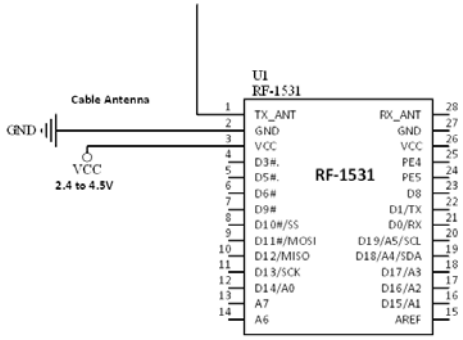
In **TX** Mode: D7 = High, Set RX shutdown
In **RX** Mode: D7 = LOW , D4 = Low , Set TX shutdown

Hardware Design

The RF-1531 has onboard integrated all the necessary peripheral parts, user just need to connected a low noise DC power supply (Voltage 2.4V to 4.5V) , then module can be work.

When you plug the USB to UART cable on the RF-1531 , the Cable will be powered to the board , also it will be worked.

The module have two VCC and GND , users only need to connect one, the other can be left unconnected.



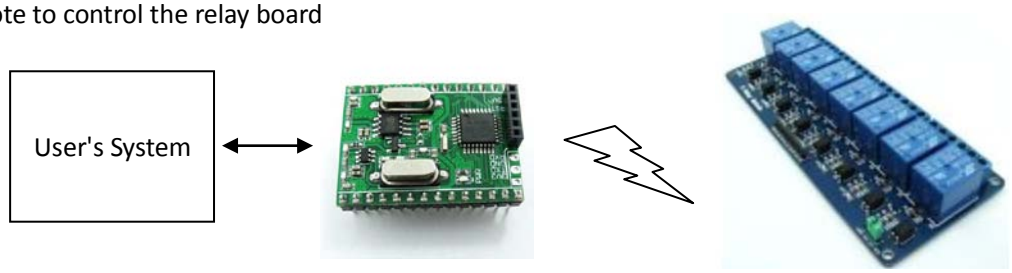
About the antenna , you can simple connected a AWG#24 wire as the cable , the length is:

315MHz: 23cm

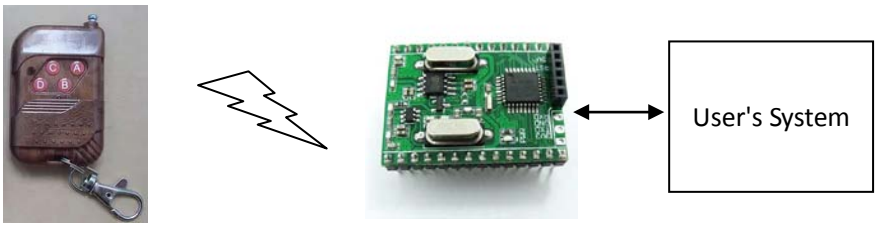
433MHz: 17cm

RF-1531 can be very flexible and work with an existing device:

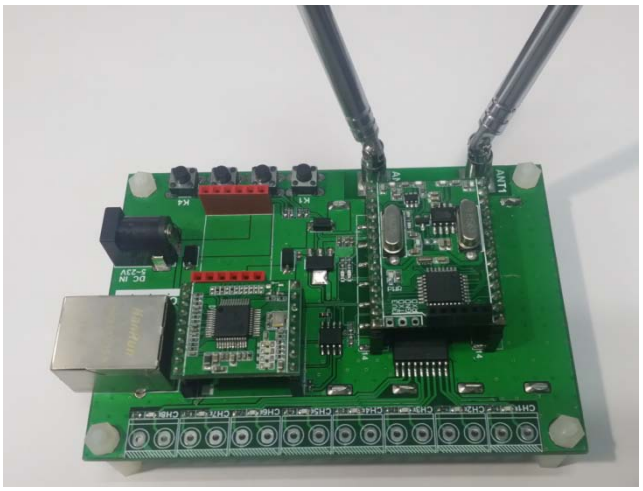
(1), As a remote to control the relay board

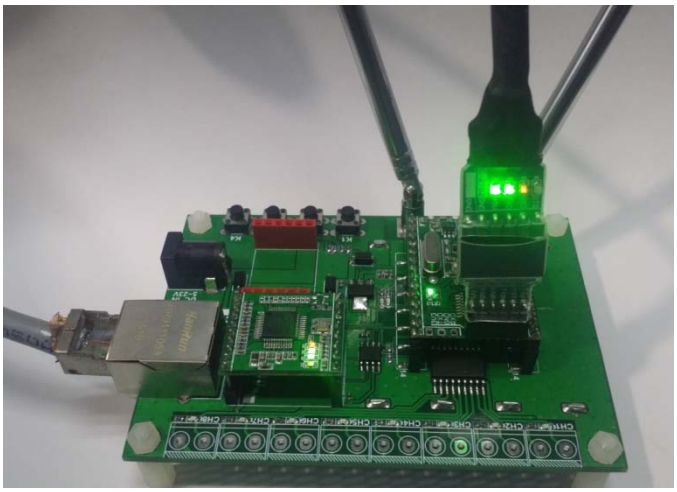


(2), As a receiver to receive data form the remote controller



(3), Full functional (below picture is a smart home control center based on webserver)





Programming

The RF-1531 is completed Arduino compatible device , which means user can be use the full feature in Arduino IDE. here is some instruction.

1, About Massduino

Massduino is a Arduino compatible product serial which using MD-328D . the MD-328D has same resource than the ATMega328P and more suitable for mass production. more information about Massduino , please refer the link :

(1), UM-MASSDUINO-V3.0-EN MassDuino User Maunal: http://www.inhaos.com/downcount.php?download_id=217

(2), Arduino - MassDuino_Support_Package V33 : http://www.inhaos.com/downcount.php?download_id=218

(3),(MassDuino) CH341 USB to Serial Driver : http://www.inhaos.com/downcount.php?download_id=193

2, Arduino IDE

To download Arduino IDE , please visit: www.arduino.cc

3, rc-switch

The rc-switch lib let you use your Arduino to operate remote radio connection devices.

rc-switch: https://github.com/sui77/rc-switch

4, Programming

Compared with a general Arduino development board , the RF-1513 has 3 DIOs is used for RF control , so users must be properly operate these three DIO to make the RF IC work.

(1) : D4 - TX_Data: This IO must set to output mode, pull high this pin will let RF TX working , and pull low this pin will let RF TX shutdown.

(2): D7 - RX_SD: This IO is used to control the RX chip, if RX_SD pull high , the RX will be shutdown , and pull low to active the RX function.

(3): D2 - RX_Data: This IO is used to receive data which from the RX chip, user need to pull low RX_SD to active the RX function , then can be got data form this pin.

Please Notice , the RX and TX can not working in same time , before you operate the TX to send data , you must pull high the D7 pin to turn-off (shutdown) the RX , also before you operate RX function , you need to ensure the D4 pin is pull low to make the TX shutdown.

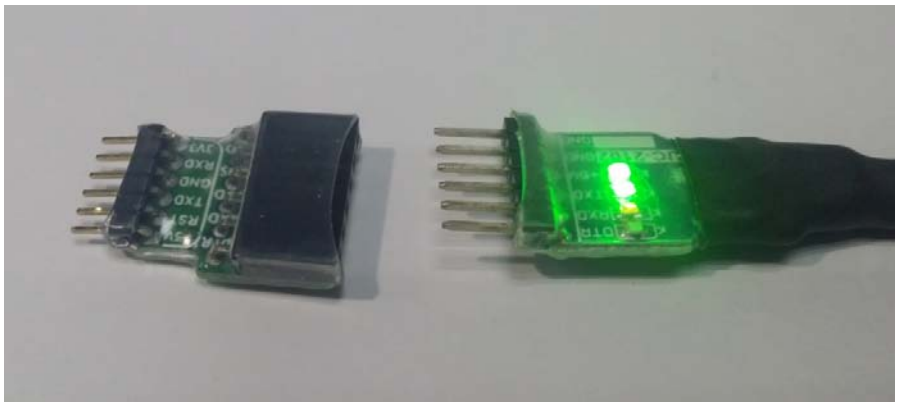
The sample code form rc-switch is just working with signal RF circuit (ONLY transmitter or ONLY receive) , so it have no TX/RX status switch operate , to make it working with RF-1531 , you must add below code in the sketch:

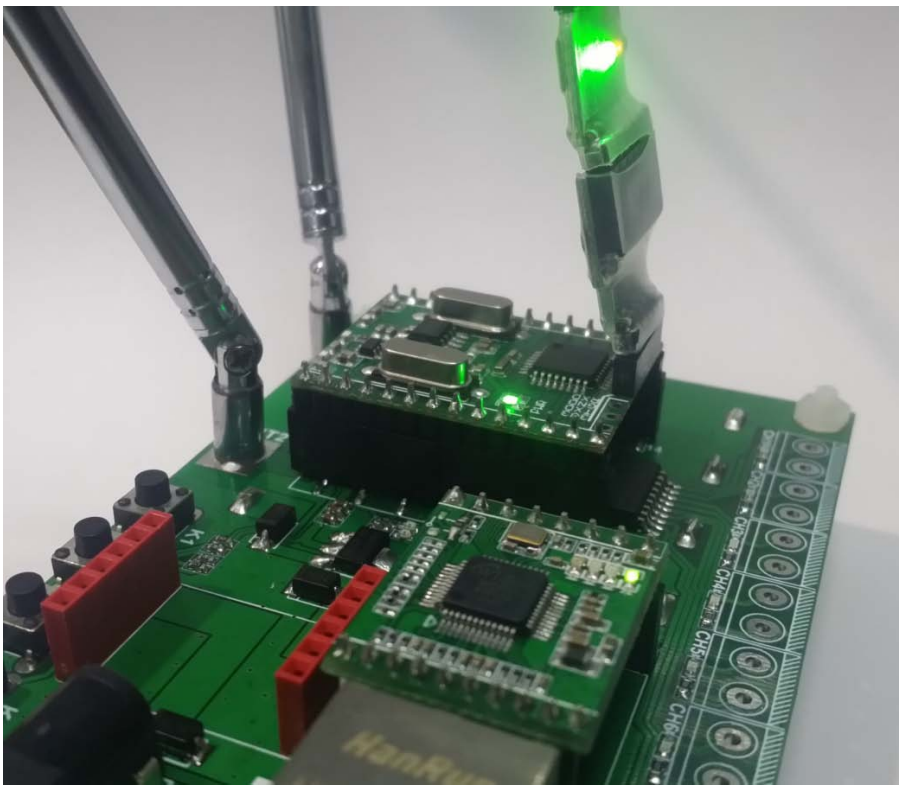
```
int TX_Data = 4;
int RX_Data = 2;
int RX_ShutDown = 7 ;

#define RF_Mode_RX      0
#define RF_Mode_TX      1
#define RF_Mode_IDLE    2



void setup() {

  Serial.begin(115200);
  mySwitch.enableTransmit(TX_Data);

  pinMode ( RX_ShutDown , OUTPUT );
  RF_1531_Set_RF_Mode ( RF_Mode_TX ) ;
}


void RF_1531_Set_RF_Mode ( int RF_Mode ) {
  switch ( RF_Mode ) {

    case RF_Mode_RX:
      digitalWrite ( TX_Data , LOW );
      digitalWrite ( RX_ShutDown , LOW );
      break;

    case RF_Mode_TX:
      digitalWrite ( RX_ShutDown , HIGH );
      break;

    case RF_Mode_IDLE:
      digitalWrite ( TX_Data , LOW );
      digitalWrite ( RX_ShutDown , HIGH );
      break;

    default:
      break;
  }
}

```

Upload Sketch

Arduino IDE uploading sketch via UART communication , when click "Upload" button to active the uploading operation, Arduino IDE will pull-low the DTR pin , and DTR pin has serial a capacitor to MCU's Reset pin, pull low the DTR pin will reset the MCU.

To make the board simple, we design a convertor board, this board is used with USB to Serial convertor (UC-2102 or UC-340G) , and move the Reset circuit on the convertor board , so user can be connected the board direct to MCU Reset pin , the connection for uploading sketch , please refer below picture:

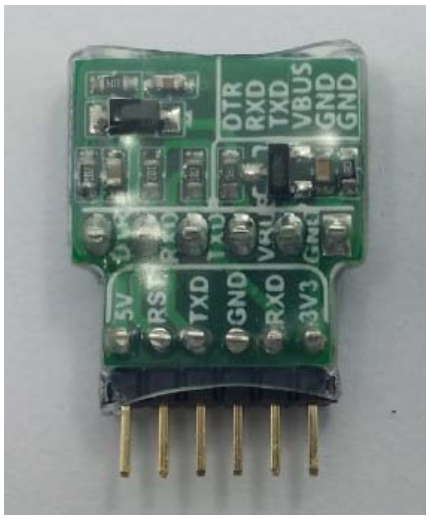
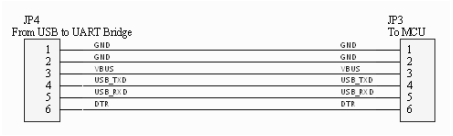
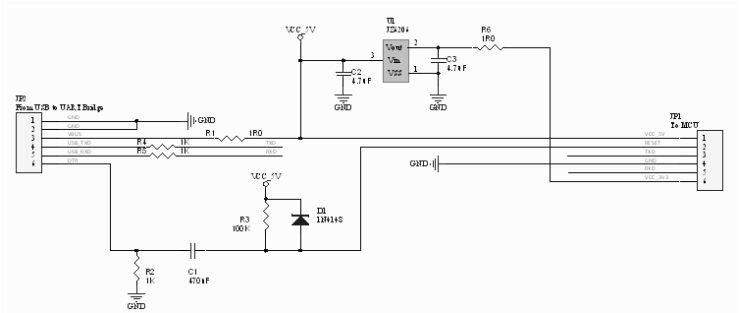




2.54mm to 2.0mm Adaptor

The UC-2102 and UC-340G use standard pin define as the Arduino USB2Serial Light cable, the pitch of the connector is 2.54mm , this interface was used for UNO Lite / Mega2560-Core / DUE-Core / etc. for some model (like UNO-Core / UNO NANO) , the board size is limit , so we reduce the pin pitch to 2.0mm , in this case , user need to use a 2.54mm to 2.0mm adaptor for the connection.

In RF-1531 , we create a new adaptor , this adaptor has integrated a 5V to 3.3V LDO / Reset circuit and resistor in onboard . This measure further simplifies the circuit application system. The difference of the two adaptor as below:

Item	S-Type Adaptor (Simple type)	C-Type Adaptor (Completed type)
Picture		
Schematic		
Pinout（2.0mm side）	1 - GND 2 - GND 3 - VBUS（5V） 4 – USB_TXD 5 – USB_RXD 6 - DTR	1 – VCC_5V 2 - RESET 3 – USB_TXD 4 – GND 5 – USB_RXD 6 – VCC_3V3
Application	BUONO / Massduino UNO Lite BUONO / Massduino Core BUONO / Massduino NANO Mega2560-Core DUE-Core Etc.	INHAOS Smart System series: RF-1531 AL-1000 DM-1000 RM-1000 Etc.

INHAOS Headquarter：：

1111 Oakmont Drive #C, San Jose, CA 95117

E-mail ： support@inhaos.com

INHAOS China office：：

No.6 Building,Songke Estate,Songshan Lake National Hi-tech Industrial Development Zone,Dongguan,Guangdong Province，523808,China

E-mail：Support@inhaos.com