

# Infrared Remote Control

## Infrared Remote Control

- 1. Software and Hardware
  - 2. Basic Principles
    - 2.1 Hardware Schematic
    - 2.2 Physical Connection Diagram
    - 2.3 Control Principle
  - 3. Project Configuration
    - 3.1 Description
    - 3.2 Pin Configuration
  - 4. Main Functions
  - 5. Experimental Phenomenon

This tutorial demonstrates: printing the corresponding key values of the infrared remote control through **serial port 0**

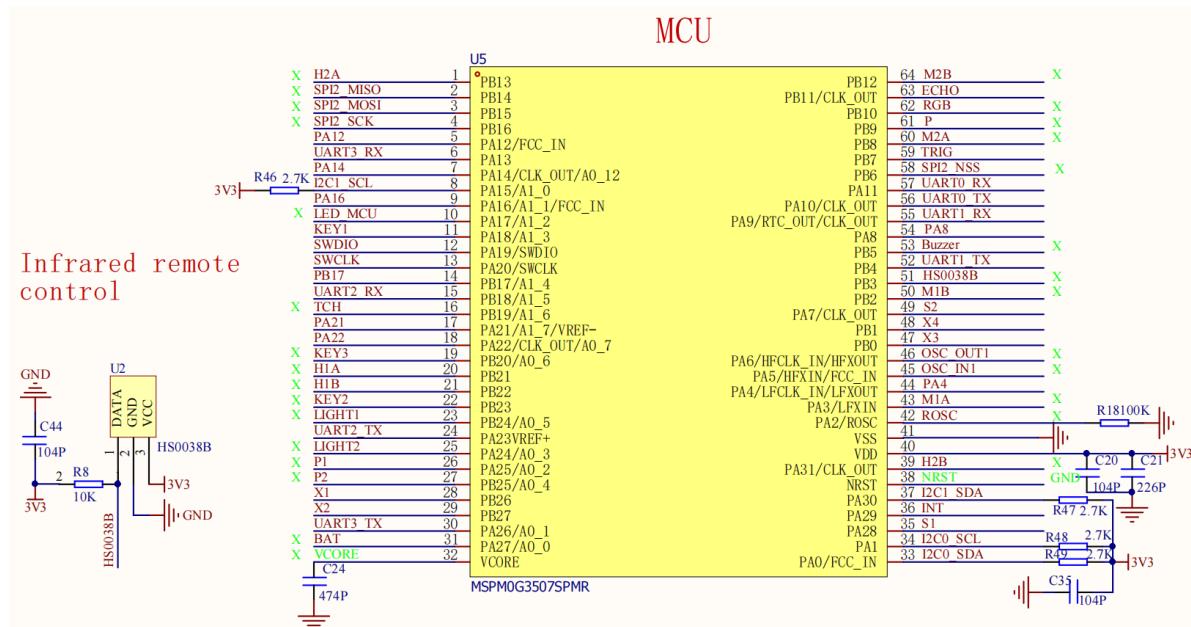
## **1. Software and Hardware**

- KEIL
  - MSPM0G3507 Development Board
  - Infrared Remote Control
  - Type-C data cable or DAP-Link

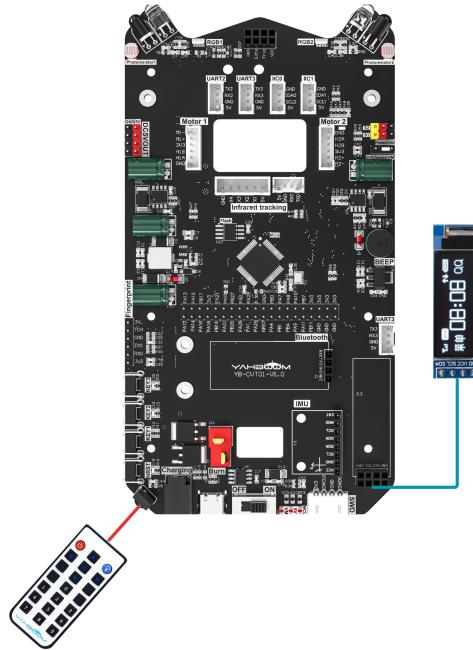
For programming download or simulation to the development board

## 2. Basic Principles

## 2.1 Hardware Schematic



## 2.2 Physical Connection Diagram



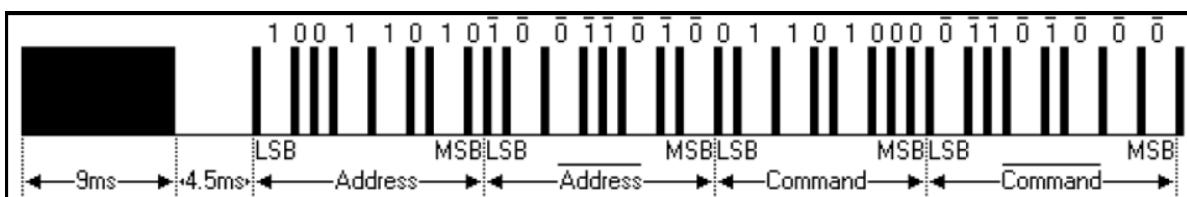
## 2.3 Control Principle

Receive infrared data through interrupt triggering, and determine whether the data is 0 or 1 based on the high-level duration of the infrared receiver's output pin, thereby achieving data reading of infrared remote control key values.

- **NEC Protocol**

The remote control included with the development board uses the NEC protocol with a carrier frequency of 38KHz.

Format	Function
Guide Code	Marks the beginning of instruction
Address Code (User Code)	Identifies the device address of the remote control
Address Inverse Code	Enhances data transmission reliability
Data Code	Specific remote control instruction
Data Inverse Code	Enhances data transmission reliability



- **Infrared Remote Control**

## User code: 00FF



**0:** Composed of 560us 38KHz carrier + 560us no-carrier interval

**1:** Composed of 560us 38KHz carrier + 1680us no-carrier interval

- **Infrared Receiver**

**0:** 560us low level + 560us high level

**1:** 560us low level + 1680us high level

When the infrared receiver receives infrared carrier signal, the DATA output pin of HS0038B outputs low level

When the infrared receiver does not receive infrared carrier signal, the DATA output pin of HS0038B outputs high level

Infrared Receiver (Development Board Integrated)	Corresponding Pin
HS0038B	PB3

## 3. Project Configuration

### 3.1 Description

You can refer to the basic tutorial to complete the development environment setup.

## 3.2 Pin Configuration

The screenshot shows the TI LaunchPad Pin Configuration tool interface. At the top, there's a red header bar. Below it, the navigation path is Software > GPIO. The main area is titled "GPIO (5 Added)". There are five items listed with checkboxes:

- LED (checked)
- Infrared\_borad (checked)
- IRContorl (checked)
- OLED (checked)
- SPI (checked)

Below these, there are three dropdown fields:

- Name: IRContorl
- Port: PORTB
- Port Segment: Any

Under "Group Pins", it says "1 added". There is one item listed:

- GET\_OUT (checked)

Below this, there are three dropdown fields:

- Name: GET\_OUT
- Direction: Input
- IO Structure: Any

There are three expandable sections:

- Digital IOMUX Features
  - Assigned Port: PORTB
  - Assigned Port Segment: Any
  - Assigned Pin: 3
- Interrupts/Events
  - LaunchPad-Specific Pin: No Shortcut Used

&lt; → Software &gt; GPIO

**GPIO (5 Added) ②****ADD****REMOVE ALL** LED  Infrared\_borad  IRContorl  OLED  SPI 

Name

Infrared\_borad

Port

Any

Port Segment

Any

**Group Pins****1 added****ADD****REMOVE ALL** IR\_switch

Name

IR\_switch

Direction

Output

Initial Value

Cleared

IO Structure

Any

**Digital IOMUX Features**

Assigned Port

Any

Assigned Port Segment

Any

Assigned Pin

9

**Interrupts/Events**

GPIO (5 Added) ?

 ADD

 REMOVE ALL

 LED



 Infrared\_borad



 IRContorl



 OLED



 SPI



Name

OLED

Port

PORATA

Port Segment

Any

Group Pins

2 added

 ADD

 REMOVE ALL

 SCL1



 SDA1



Name

SCL1

Direction

Output

Initial Value

Set

IO Structure

Any

Digital IOMUX Features

Assigned Port

PORATA

Assigned Port Segment

Any

Assigned Pin

15

The screenshot shows the software configuration interface for setting up an SPI peripheral. The top navigation bar indicates the path: Software > GPIO. The main configuration area is titled "SPI" with a green checkmark icon. It includes fields for "Name" (OLED), "Port" (PORTA), and "Port Segment" (Any). A section titled "Group Pins" shows two pins added: SCL1 and SDA1, each with a green checkmark icon. Below this, there are additional configuration fields for SDA1: "Name" (SDA1), "Direction" (Output), "Initial Value" (Set), and "IO Structure" (Any). There are also sections for "Digital IOMUX Features", "Interrupts/Events", and "PinMux Peripheral and Pin Configuration". The "Other Dependencies" section is currently collapsed.

## 4. Main Functions

Mainly introduces the functional code written by users. **For detailed code, you can open the project files we provide and view the source code in the Bsp folder.**

## 4.1 User Functions

### Function: receiving\_infrared\_data

<b>Function Prototype</b>	<code>uint8_t receiving_infrared_data()</code>
Function Description	Receive infrared data
Input Parameters	None
Output Parameters	Infrared data

### Function: guide\_and\_repeat\_code\_judgment

<b>Function Prototype</b>	<code>uint8_t guide_and_repeat_code_judgment(void)</code>
Function Description	Infrared data correctness judgment
Input Parameters	None
Output Parameters	0 and 1 used to judge whether address code and command code are correct

## 5. Experimental Phenomenon

After successfully downloading the program, press the RESET button on the development board and observe the phenomenon on the serial port debugging assistant!

For program download, refer to [【3. Development Environment Setup and Usage: 3. Uniflash burning】](#)

### Phenomenon:

Press different key values on the infrared remote control, and the serial port will print different data corresponding to the key values.

**XCOM V2.6**

```
0 ff 28 d7  
Key data:28  
0 ff a8 57  
Key data:a8  
0 ff 68 97  
Key data:68  
0 ff 18 e7  
Key data:18|  
0 ff 18 e7  
Key data:18  
0 ff 18 e7  
Key data:18  
0 ff 18 e7  
0 ff 18 e7  
Key data:18  
0 ff 98 67  
Key data:98  
0 ff 98 67  
Key data:98  
0 ff 18 e7  
Key data:18  
0 ff 18 e7
```

## Port

COM3:USB-SERIAL CH34C

Baud rate 115200

Stop bits 1

Data bits 8

Parity None

Operation  Open Save Data  Clear Data Hex  DTR RTS  自动保存 TimeStamp 1000 ms

Single Send Multi Send Protocol Transmit Help

 Send