

# Overview

## Introduction

AW9523B uses an I2C interface and allows using 4 expansion boards at the same time by modifying the i2c address, expanding up to 64 I/O ports.

AW9523B IO Expansion Board



## Specification

Controller	AW9523B
Operating voltage	3.3V/5V
IOs	16
Interface	I2C

## Interfaces

PIN	FUNTION
VCC	Power input(3.3V/5V)
GND	GND
SDA	I2C Data input
SCL	I2C Clock input
INT	Intrrupt output
RST	Reset

# RPI User Guides

## Enable I2C Interface

Open a terminal and run the following commands:

```
sudo raspi-config  
Choose Interfacing Options -> I2C -> Yes.
```

Reboot Raspberry Pi:

```
sudo reboot
```

```
Raspberry Pi Software Configuration Tool (raspi-config)
1 Change User Password Change password for the current user
2 Network Options      Configure network settings
3 Boot Options         Configure options for start-up
4 Localisation Options Set up language and regional settings to match your location
5 Interfacing Options  Configure connections to peripherals
6 Overclock           Configure overclocking for your Pi
7 Advanced Options    Configure advanced settings
8 Update              Update this tool to the latest version
9 About raspi-config  Information about this configuration tool

<Select>                                <Finish>
```

```
Raspberry Pi Software Configuration Tool (raspi-config)
P1 Camera      Enable/Disable connection to the Raspberry Pi Camera
P2 SSH         Enable/Disable remote command line access to your Pi using SSH
P3 VNC         Enable/Disable graphical remote access to your Pi using RealVNC
P4 SPI         Enable/Disable automatic loading of SPI kernel module
P5 I2C         Enable/Disable automatic loading of I2C kernel module
P6 Serial      Enable/Disable shell and kernel messages on the serial connection
P7 1-Wire      Enable/Disable one-wire interface
P8 Remote GPIO Enable/Disable remote access to GPIO pins

<Select>                                <Back>
```

```
Would you like the ARM I2C interface to be enabled?

<Yes>                                <No>
```

## Install Libraries

- Install BCM2835 libraries:

```
#Open the Raspberry Pi terminal and run the following command
wget http://www.airspayce.com/mikem/bcm2835/bcm2835-1.71.tar.gz
tar zxvf bcm2835-1.71.tar.gz
cd bcm2835-1.71/
sudo ./configure && sudo make && sudo make check && sudo make install
# For more, you can refer to the official website at: http://www.airspayce.com/mikem/bcm2835/
```

- Install WiringPi libraries:

```
#Open the Raspberry Pi terminal and run the following command
cd
sudo apt-get install wiringpi
#For Raspberry Pi systems after May 2019 (earlier than that can be executed with
out), an upgrade may be required:
wget https://project-downloads.drogon.net/wiringpi-latest.deb
sudo dpkg -i wiringpi-latest.deb
gpio -v
# Run gpio -v and version 2.52 will appear, if it doesn't it means there was an
installation error

# Bullseye branch system using the following command:
git clone https://github.com/WiringPi/WiringPi
cd WiringPi
. /build
gpio -v
# Run gpio -v and version 2.70 will appear, if it doesn't it means there was an
installation error
```

## Download Examples

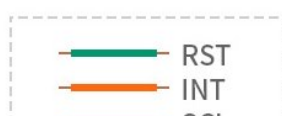
Open the Raspberry Pi terminal and run the following commands to download the examples:

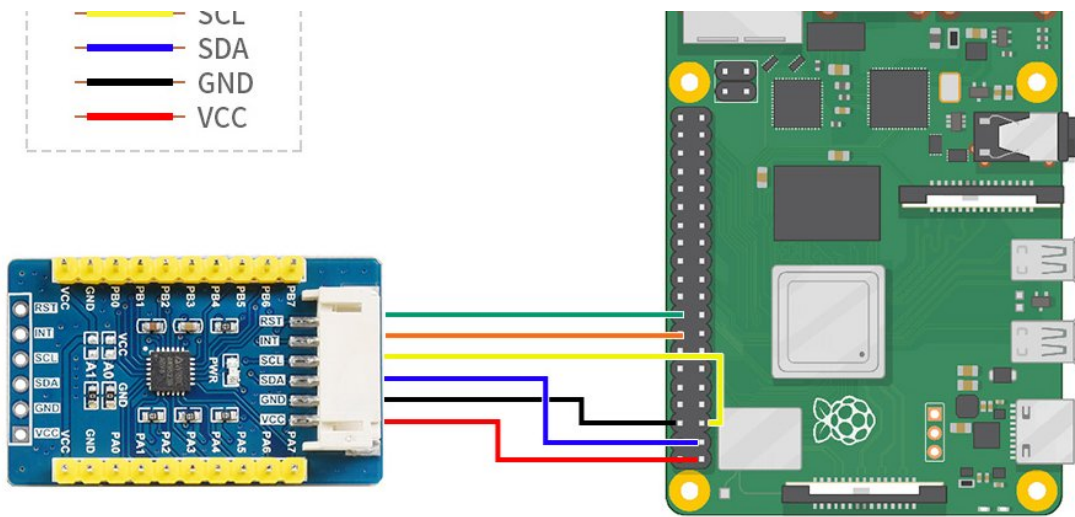
```
sudo apt-get install p7zip-full -y
sudo wget https://files.waveshare.com/upload/b/b8/AW9523B-I0-Expansion-Board-Code.7z
7z x AW9523B-I0-Expansion-Board-Code.7z -o./AW9523B-I0-Expansion-Board-Code
cd AW9523B-I0-Expansion-Board-Code/RaspberryPi/
```

## Hardware connection

Connect to Raspberry Pi

PCF8574	Raspberry Pi Board order	Function
VCC	5V	Power input
GND	GND	GND
SDA	3	I2C Data input
SCL	5	I2C clock input
INT	16	Interrupt input (could NC)
RST	18	Reset module (could NC)





## Test the example

Please first navigate to '**AW9523B-IO-Expansion-Board-Code/RaspberryPi/**' directly by cd command before you run the codes;

### C codes

- Compile the codes and run it.

```
cd C
sudo make clean
sudo make
sudo ./main
```

The examples use interrupt by default, if you want to disable the interrupt function, please add the following lines to `/boot/config.txt`, it will set the `gpio23` to pull-up mode.

```
gpio=23=pu
```

```
pi@raspberrypi:~/C $ sudo ./main
set wiringPi lib success !!!
Current environment: Raspbian
set wiringPi lib success !!!
Current environment: Raspbian
WIRINGPI I2C Device
AW9523B Init
find AW9523B, ID = 0x23
int pin 0
interrupted:read is change, time:1
output: pin0 = 1
input : pin0 = 1
int pin 0
interrupted:read is change, time:2
output: pin1 = 2
input : pin1 = 2
int pin 0
```

```
interrupted:read is change, time:3
output: pin2 = 4
input : pin2 = 4
int pin 0
interrupted:read is change, time:4
output: pin3 = 8
input : pin3 = 8
int pin 0
interrupted:read is change, time:5
output: pin4 = 16
input : pin4 = 16
int pin 0
interrupted:read is change, time:6
output: pin5 = 32
input : pin5 = 32
int pin 0
interrupted:read is change, time:7
output: pin6 = 64
input : pin6 = 64
int pin 0
interrupted:read is change, time:8
output: pin7 = 128
input : pin7 = 128
```

## python

---

Run the following commands:

```
cd python
sudo python AW9523B.py
```

### Expected result

Connect the PAX pin to PBx pin, for example, connect PA0 to PB0 by cables. The PAX pins are set as output, and PBx are set as input. The status of PAX pins output toggle every 550ms in order like a water lamp, every time the PAX pins toggle, it all cause the PBx pin to interrupt and printed the status to the terminal.

## Arduino User Guides

The provided examples and hardware connections are based on Arduino UNO R3. For other Arduino boards, you may need to modify the connection or codes

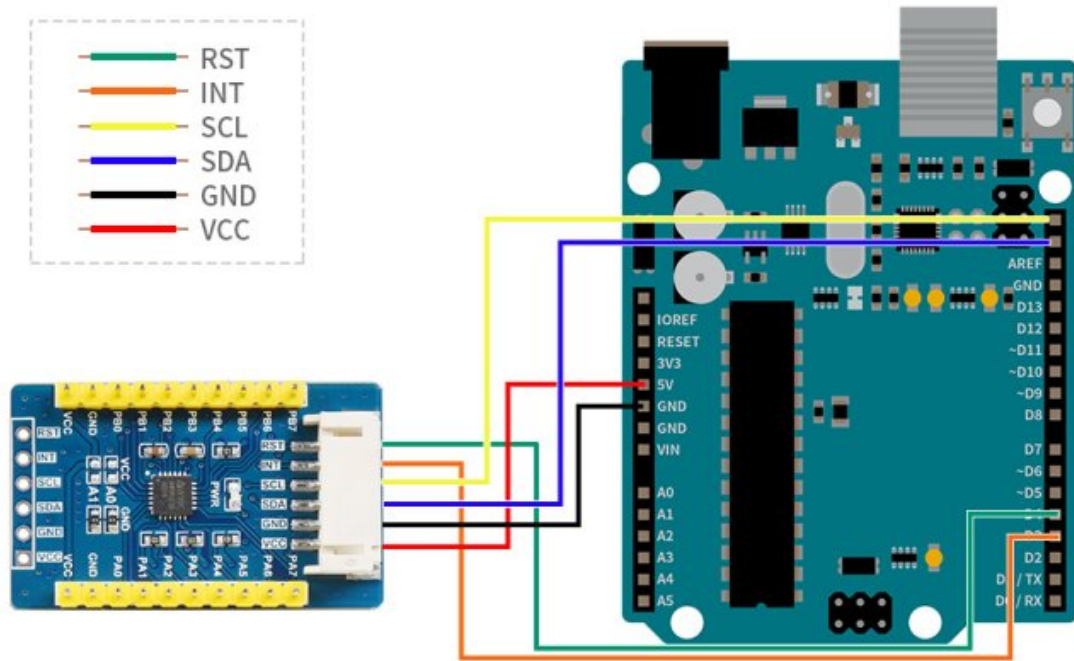
### Hardware Connection

You can connect the board according to the table

Connect to Arduino

PCF8574	Arduino	Function
VCC	5V	Power input
GND	GND	GND
SDA	SDA	I2C data input
SCL	SCL	I2C clock input

INT	D3	interrupt output
RST	D4	reset



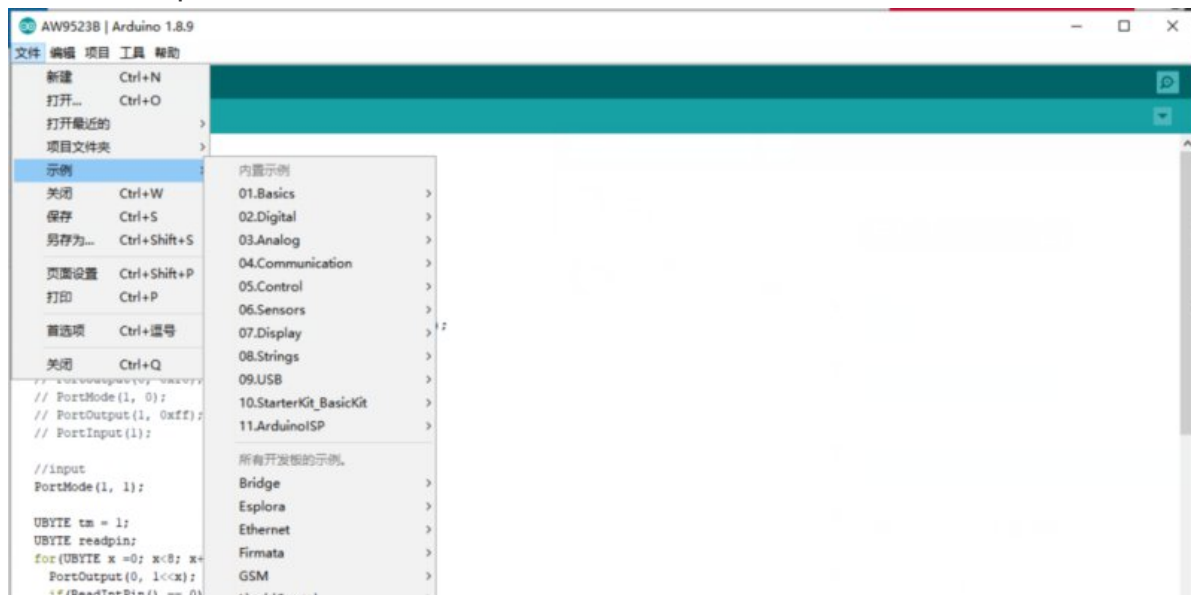
## Install Arduino IDE (Windows)

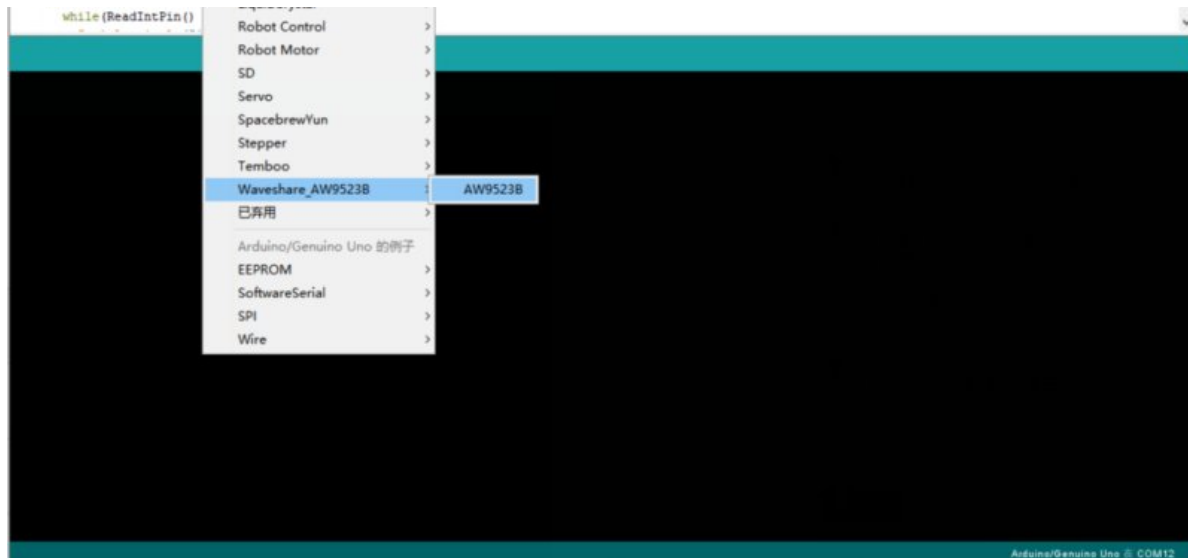
[arduino IDE Installation Guides](#)

## Run the Codes

Download the examples from [Demo codes](#), unzip the archive, and enter the AW9523B-IO-Expansion-Board-Code directory. Copy the AW9523B-Arduino-Library folder to the libraries directory which is under the installation path, generally, the path is C:\Program Files (x86)\Arduino\libraries

Open the Arduino IDE software, Tools choose UNO, then open the examples from File-> Example





Build and upload the examples, then open the serial monitor to check the logs

## Expected

Connect the PAX pin to PBx pin, for example, connect PA0 to PB0 by cables. The PAX pins are set as output, and PBx are set as input. The status of PAX pins output toggle every 550ms in order like water lamp, every time the PAX pins toggle, it all causes the PBx pin to interrupt and printed the status to the serial monitor.

## STM32 User Guides

The example and related hardware connection are based on STM32F103RBT6. If you want to use other STM32 board, you may need to change the hardware connection and codes.

### Hardware Connection

Connect to STM32F103RB

PCF8574	STM32	Function
VCC	3.3V	Power input
GND	GND	GND
SDA	PB9	I2C data input
SCL	PB8	I2C clock input
INT	PB8	Interrupt
RST	PB8	Reset

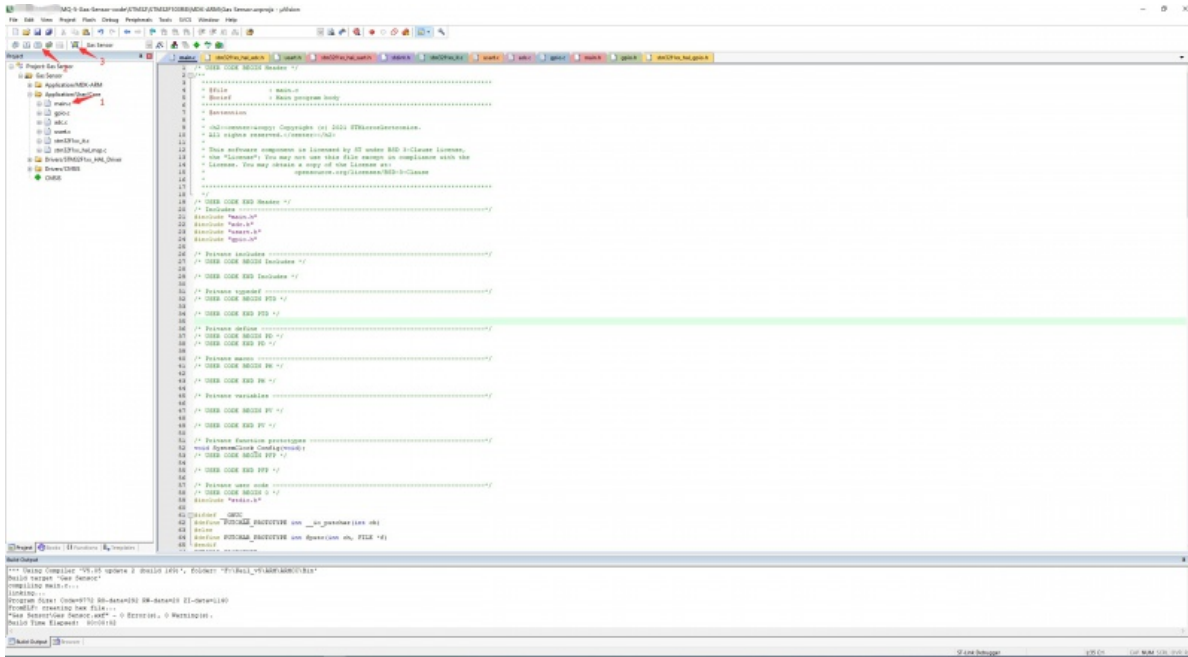


### Run the codes

The examples are based on HAL libraries. Download the [Demo codes](#), and find the STM32 directory. Open the PCF8574 IO Expansion Board.uvprojx file from STM32\STM32F103RB\MDK-ARM folder.



Open the main.c file, rebuild the codes, and download.



After downloading, Run the SSCOM software, choose the related COM and set the baud rate to 115200, check the logs.



## Exptect result

1. Use a multimeter to measure the voltage of every IOs, the P0~P3 are High and P4 ~ P7 are Low.



2. Open the SSCOM software, the status of IOs is printed on the software.

## Resource

### Documents

- [Schematic](#)
- [AW9523B-EN](#)

### Demo Codes

- [Demo Codes](#) 

## Support

### Technical Support

If you need technical support or have any feedback/review, please click the **Submit Now** button to submit a ticket, Our support team will check and reply to you within 1 to 2 working days. Please be patient as we make every effort to help you to resolve the issue.

Working Time: 9 AM - 6 AM GMT+8 (Monday to Friday)

[Submit Now](#)