# 1. Introduction to Testing Platform

Development board: Arduino UNO/MEGA2560

MCU: AVR\_ATmega328P/AVR\_ATmega2560

Frequency: 16MHz/16MHz

# 2. Pin connection instructions

The display module is connected to the microcontroller using a DuPont cable, with specific instructions as follows:



#### **Module Back Pins**

### NOTE:

- A. Connect to a 5V microcontroller, which can short circuit J1 to keep the IO voltage and IO high level consistent;
- B. R8 is not soldered by default. If there is no need to control the CS pin, R8 solders the 0R resistor to keep the CS signal grounded;
- C. If SPI communication mode is selected, R5 will weld 0R resistor, and R4 and R9 will be disconnected;
- D. If IIC communication mode is selected, R4 and R9 will be welded with 0R resistor, and R5 will be disconnected;

www.lcdwiki.com

| Arduino UNO and Mega2560 microcontroller SPI test program wiring<br>instructions |     |              |                     |                              |   |  |  |  |  |
|--|-----|--------------|---------------------|------------------------------|---|--|--|--|--|
|  |     | C<br>develop | Correspo<br>oment b | onding to<br>oard wiring pin |   |  |  |  |  |
| Number   | Pin | Hardware SPI |                     |                              | Remarks   |  |  |  |  |
|  |     | UNO          | Mega<br>2560        | SoftWare SPI                 |   |  |  |  |  |
| 1  | GND |              | GI                  | ND                           | OLED screen power supply ground   |  |  |  |  |
| 2  | VCC |              | 5V/                 | 3.3V                         | OLED screen power supply positive   |  |  |  |  |
| 3  | SCL | 13 52        |                     | 13                           | SPI bus clock signal  |  |  |  |  |
| 4  | SDA | 11           | 51                  | 11                           | SPI bus write data signal   |  |  |  |  |
| 5  | RES |              | ٤                   | 3                            | OLED screen reset control signal,<br>low-level reset  |  |  |  |  |
| 6  | DC  |              | Q                   | )                            | OLED screen command/data<br>selection control signal<br>High level: data, low level: command                            |  |  |  |  |
| 7  | CS  |              | 1                   | 0                            | OLED screen chip selection control<br>signal, effective at low level (if<br>welding R8, CS pin may not be<br>connected) |  |  |  |  |

Arduino UNO and Mega2560 microcontroller IIC test program wiring instructions

|        |     | Corresponding to<br>development board wiring |              |              |                                   |  |  |
|--------|-----|--|--------------|--------------|-----------------------------------|--|--|
| Number | Pin | Hardware IIC                                 |              |              | Remarks                           |  |  |
|        |     | UNO  | Mega<br>2560 | SoftWare IIC |                                   |  |  |
| 1      | GND | GNE  |              | ND           | OLED screen power supply ground   |  |  |
| 2      | VCC | 5V/3.3V                                      |              | 3.3V         | OLED screen power supply positive |  |  |
| 3      | SCL | A5 21  |              | A5           | IIC bus clock signal              |  |  |
| 4      | SDA | A4   | 20           | A4           | IIC bus data signal               |  |  |

www.lcdwiki.com

| 5 | RES | 8/3.3V     | OLED screen reset control signal,<br>low-level reset (if no control is<br>required, the RES pin can be<br>connected to a high-level (3.3V))  |
|---|-----|------------|--|
| 6 | DC  | 9/GND/3.3V | IIC bus selects signal from device<br>address<br>When connecting to the pin 9, pin 9<br>is low level: 0x78, and pin 9 is high<br>level: 0x7A<br>Low level (connected to GND): 0x78,<br>high level (connected to 3.3V): 0x7A  |
| 7 | CS  | 10/GND     | OLED screen chip selection control<br>signal, effective at low levels<br>When using IIC communication,<br>there is no need for control. When<br>connecting to pin 10, it must be set to<br>low level or GND can be connected<br>(such as welding R8, CS pin can not<br>be connected) |

## 3. Demo Function Description

This set of testing programs includes two MCU programs, Arduino UNO and Mega2560. Each MCU program includes spi and iic testing programs, and each testing program includes hardware and software functional testing, which is located in





### ♦ Description of sample program content

The testing program includes the following test items:

- A. Example01-graph\_ Test is a graphical display test
- B. Example02 string\_ Test is a character display test;
- C. Example03 show\_ BMP is a BMP bitmap display test;

# Example program IIC slave device address modification instructions (only for IIC test programs)

Open any IIC sample program and locate the setup function. If using the 0x7A slave

device address, there is no need to annotate the two lines of code digitalWrite(9,

HIGH) and u8g2.setI2CAddress(0x7A) (to make them effective). If using the 0x78

slave device address, the two lines of code digitalWrite(9, HIGH) and

u8g2.setI2CAddress(0x7A) need to be annotated (to make them ineffective), as

shown in the following figure:

```
void setup()
{
    Serial.begin(9600);
    pinMode(9, OUTPUT);
    pinMode(10, OUTPUT);
    digitalWrite(9, LOW);
    digitalWrite(10, LOW);
    /*When using 0x7A slave device address, please use the following definition*/
    //digitalWrite(9, HIGH);
    //u8g2.setI2CAddress(0x7A);
    u8g2.begin();
}
```

## 4. Demo Usage Instructions

#### ♦ Installing development tool software

Download the installation package from the Arduino official website.

Download address: https://www.arduino.cc/en/software

Download the corresponding installation package according to your PC system,

as shown in the following figure (the version in the picture may not be the latest

version, and the download interface may not be the latest):



After the download is completed, unzip and click Install.

### ♦ Installing software library

After the development environment is set up, the software library used by the

sample program needs to be copied to the project library directory so that the sample

program can be called. The software library is located in the

Demo\_UNO\_Mega2560\Install libraries directory, as shown in the following figure:



You can also download the latest software library from Github and unzip it (for easy differentiation, you can rename the unzipped folder, as shown in the Install libraries directory), and then copy it to the engineering library directory. The download address is as follows:

#### https://github.com/olikraus/U8g2 Arduino

The default path for the engineering library directory is **C: Users\Administrator \Documents\Arduino\libraries**. You can also change the project library directory: open the Arduino IDE software, click **File** ->**Preferences**, and reset the **Sketchbook location** in the pop-up interface, as shown in the following figure:

#### MSP242X UNO\_Mega2560 Demo Instructions

| clear_Screen   Arduino 1.8.19  | Preferences   |
|--|---|
| <u>File</u> Edit <u>S</u> ketch <u>T</u> ools <u>H</u> elp   | Settings Network  |
| New Ctrl+N<br>Open Ctrl+O<br>Open Recent ,<br>Sketchbook ,   | Sketchbook location:         C:\Users\Administrator\Documents\Arduino         Editor language:       English (English)         • (requires restart of Arduino)  |
| Examples , If<br>Close Ctrl+W<br>Save Ctrl+S o:<br>Save As Ctrl+Shift+S T I<br>Page Setup Ctrl+Shift+P n :<br>Print Ctrl+P ont     | Editor font size: 16<br>Interface scale: Automatic 100 + (requires restart of Arduino)<br>Theme: Default theme + (requires restart of Arduino)<br>Show verbose output during: Compilation Upload<br>Compiler varnings: None +   |
| Preferences         Ctrl+Comma           Quit         Ctrl+Q         PC,           //Arduino         Mega2560         10         5 | Display line numbers       Enable Code Folding         Verify code after upload       Use external editor         Check for updates on startup       Vare when verifying or uploading         Use accessibility features       Use accessibility features                       |
|  | Additional Boards Manager URLs: i://espressif.github.io/arduino-esp32/package_esp32_index.json<br>More preferences can be edited directly in the file<br>C:\Users\Administrator\AppData\Local\Arduino15\preferences.txt<br>(edit only when Arduino is not running)<br>OK Cancel |

Copy the software library to the project library directory, as shown in the following

figure:

| $\bigcirc$ | 🗼 ▶ 库 ▶ 文档 ▶ Arduino ▶ libraries ▶ | ▼ 4 搜索 libraries ♀ |
|------------|------------------------------------|--------------------|
| 文件(F) 编    | 辑(E) 查看(V) 工具(T) 帮助(H)             |                    |
| 组织 ▼       | 门打开 共享▼ 电子邮件 新建文件夹                 | II • 🔟 📀           |
|            | 文档库<br>libraries                   | 排列方式: 文件夹 ▼        |
|            | 名称                                 | ·                  |
|            | U8qlib                             |                    |
|            | 📙 U8g2_Arduino                     |                    |
| -          | L TouchScreen                      | -                  |
|            |                                    | 4                  |

### ♦ Compile and Run Programs

- A. Connect the display module to the UNO or Mega2560 development board, and then power up the development board.
- B. Open any example under Demo\_UNO\_Mega2560 directory (Here is the Example01-graph\_test of the hardware SPI testing program as an example), as shown in the following figure:

| 00-             | . « Demo MSP242X UNO Mega2560 H         | lardware SPI ▶ Exam     | ple01-graph test   | <b>▼  4</b> | Example01-graph test |
|-----------------|---|-------------------------|--------------------|-------------|----------------------|
| 文件(F) 编<br>组织 ▼ | 辑(E) 查看(V) 工具(T) 帮助(H) 包含到库中▼ 共享▼ 新建文件夹 |                         | 5                  | 7           | ≣ - □ 0              |
| *               | 名称<br>② Example01-graph_test.ino        | 修改日期<br>2023/6/25 17:06 | 类型<br>Arduino file | 大小<br>9 KB  |                      |
|                 |   |                         |                    |             |                      |

C. After opening the sample project, select the UNO or Mega2560 device, as shown

in the following figure:

Select UNO:

| 💿 clear_Screen   Ard  | uino 1.8.19  |                              |   |  | R                             | 》远择▼      | 百度   |
|---|--|------------------------------|---|--|-------------------------------|-----------|------|
| File Edit Sketch To   | ols Help   |                              |   |  | li                            | 编辑        | 保    |
| Clear_Screen  | Auto Format<br>Archive Sketch<br>Fix Encoding & Beload                     | Ctrl+T                       |   | ₽<br>▼                                 |                               |           |      |
| // IMPORTANT<br>// CONFIGURE                                      | Manage Libraries<br>Serial Monitor   | Ctrl+Shift+I<br>Ctrl+Shift+M | BOARD.  |  |                               |           |      |
| //This progr  | Serial Plotter<br>Teensy 4 Security<br>WiFi101 / WiFiNINA Firmware Updater | Ctri+Snitt+L                 | black, white, red, green, rdware spi lines to th      | blue. =<br>e LCD,                      |                               |           |      |
| //the SDA pi<br>//if you don<br>//other pins<br>//pin usage<br>// | Board: "Arduino Uno"<br>Port<br>Get Board Info                             |                              | Boards Manager<br>Arduino AVR Boards<br>ESP32 Arduino | pin c<br>Arduino Yú<br>Arduino Ur      | in<br>10                      | or Diecim | vila |
| //Arduino Un<br>//Arduino Me                                      | Programmer<br>Burn Bootloader  | olav module                  | 12 5 5V/3.3<br>50 5 5V/3.3                            | Arduino Na<br>Arduino Ma<br>Arduino Ma | ano<br>ega or Mega<br>ega ADK | 2560      | ina  |

### Select Mega2560:

| 💿 clear_Screen   Ard         | luino 1.8.19   | -                            | _                                       |                         | *                     | ▶ 选择 ▼       | 百度网  |
|------------------------------|--|------------------------------|---|-------------------------|-----------------------|--------------|------|
| File Edit Sketch To          | ols Help   |                              |   |                         | 5                     | 编辑           | 保存   |
| Clear_Screen                 | Auto Format<br>Archive Sketch<br>Fix Encoding & Reload                   | Ctrl+T                       |   | <u>ې</u>                |                       |              |      |
| // IMPORTANT<br>// CONFIGURE | Manage Libraries<br>Serial Monitor                                       | Ctrl+Shift+I<br>Ctrl+Shift+M | BOARD.                                  |                         |                       |              |      |
| //This progr                 | Serial Plotter<br>Teensy 4 Security                                      | Ctrl+Shift+L                 | lack, white, red, green,                | ,blue. <sup>≡</sup>     |                       |              |      |
| //when using<br>//the SDA pi | WiFi101 / WiFiNINA Firmware Updater                                      | -                            | dware spi lines to the an't be modified | ne LCD,                 |                       |              |      |
| //if you don                 | Board: "Arduno Mega or Mega 2560"<br>Processor: "ATmega2560 (Mega 2560)" |                              | Boards Manager                          | e pin c                 | /ún                   |              |      |
| //pin usage                  | Port   |                              | ESP32 Arduino                           | Arduino l               | Jno                   |              |      |
| //<br>//Arduino Un           | Get Board Info   |                              | Teensyduino                             | Arduino I               | Duemilano             | ve or Diecir | nila |
| //Arduino Me                 | Programmer<br>Burn Bootloader  |                              | 50 5 50/3.30                            | Arduino I     Arduino I | vano<br>Vega or M     | ega 2560     |      |
| //Remember to :              | set the pins to suit your disp   | lay module!                  | * | Arduino I<br>Arduino I  | vlega ADK<br>.eonardo |              |      |

www.lcdwiki.com

D. Set the port. If you choose Mega2560, you also need to set the processor based

on the development board used, as shown in the following figure:

| 💿 clear_Screen   Ard | uino 1.8.19                         |              | _ 🗆 🗙                          |
|----------------------|-------------------------------------|--------------|--------------------------------|
| File Edit Sketch Too | ols Help                            |              |                                |
|                      | Auto Format                         | Ctrl+T       | <b>₽</b>                       |
|                      | Archive Sketch                      |              |                                |
| clear_Screen         | Fix Encoding & Reload               |              |                                |
| // IMPORTANT         | Manage Libraries                    | Ctrl+Shift+I |                                |
| // CONFIGURE         | Serial Monitor                      | Ctrl+Shift+M | BOARD.                         |
| //This progr         | Serial Plotter                      | Ctrl+Shift+L | lack, white, red, green, blue. |
| 1 1                  | Teensy 4 Security                   |              |                                |
| //when using         | WiFi101 / WiFiNINA Firmware Updater |              | dware spi lines to the LCD,    |
| //the SDA pi         | ,,                                  |              | an't be modified.              |
| //if you don         | Board: "Arduino Mega or Mega 2560"  |              | t to 3.3V and set the pin c    |
| //other pins         | Processor: "ATmega2560 (Mega 2560)" |              | ATmega2560 (Mega 2560)         |
| //pin usage          | Port: "COM49"                       |              | ATmega1280                     |
| 11                   | Get Board Info                      |              | MISO LED VCC GND               |
| //Arduino Un         | D                                   |              | 12 5 5V/3.3V GND               |
| //Arduino Me         | Programmer                          |              | 50 5 5V/3.3V GND               |
|                      | Burn Bootloader                     |              |                                |

E. Click the upload button to compile and download the program, as shown in the

following figure:

| 💿 clear_Screen   Arduino 1       | 8.19    | -       | 4       | _           |       |            |       |            |         |
|----------------------------------|---------|---------|---------|-------------|-------|------------|-------|------------|---------|
| <u>File Edit Sketch Tools He</u> | lp      |         |         |             |       |            | -     |            |         |
|                                  |         |         |         |             |       |            |       |            | P       |
| clear_Screen                     |         |         |         |             |       |            |       |            |         |
| // IMPORTANT: LCDWI              | KI_S    | PI LIBR | ARY MUS | T BE SPECI  | FICAL | LY         |       |            |         |
| // CONFIGURED FOR E              | ITHE    | R THE T | FT SHIE | LD OR THE   | BREAK | OUT BOARD. |       |            |         |
| //This program is a              | dem     | o of cl | earing  | screen to   | displ | ay black,w | hite, | red,green, | blue. E |
| //when using the BR              | EAKO    | UT BOAR | D only  | and using   | these | hardware   | spi l | ines to th | ne LCD, |
| //the SDA pin and S              | ск р    | in is d | efined  | by the sys  | tem a | nd can't b | e mod | ified.     |         |
| //if you don't need              | to      | control | the LE  | D pin,you   | can s | et it to 3 | .3V a | nd set the | e pin c |
| //other pins can be              | def     | ined by | yousel  | f, for exam | ple   |            |       |            |         |
| //pin usage as foll              | ow:     |         |         |             |       |            |       |            |         |
| 11                               | CS      | DC/RS   | RESET   | SDI/MOSI    | SCK   | SDO/MISO   | LED   | VCC        | GND     |
| //Arduino Uno                    | 10      | 9       | 8       | 11          | 13    | 12         | 5     | 5V/3.3V    | GND     |
| //Arduino Mega2560               | 10      | 9       | 8       | 51          | 52    | 50         | 5     | 5V/3.3V    | GND     |
|                                  |         |         |         |             |       |            |       |            |         |
| //Remember to set t              | he p    | ins to  | suit yo | ur display  | modu  | le!        |       |            |         |
| /*****                           | * * * * | ******  | ******  | *****       | ****  | ******     | ****  | *****      | *****   |
| * Gattention                     |         |         |         |             |       |            |       |            |         |
| *                                |         |         |         |             |       |            |       |            | ~       |

F. If the following prompt appears, it indicates that the program has been compiled

and downloaded successfully, and has already been run:

| 😄 clear_Screen   Arduino 1.8.19                                     |   |
|---|---|
| <u>F</u> ile <u>E</u> dit <u>S</u> ketch <u>T</u> ools <u>H</u> elp |   |
|   | P C C C C C C C C C C C C C C C C C C C |
| clear_Screen  |   |
|   | 4                                       |
| Done uploading.   |   |
| Reading   ###################################                       | 100% 1.43s 🔷                            |
| avrdude: verifying  |   |
| avrdude: 11806 bytes of flash verified                              |   |
| avrdude done. Thank you.  |   |
|   |   |
| <   | - F                                     |
| 1   | Arduino Uno on COM49                    |

G. If the display module displays content, it indicates that the program has run successfully.