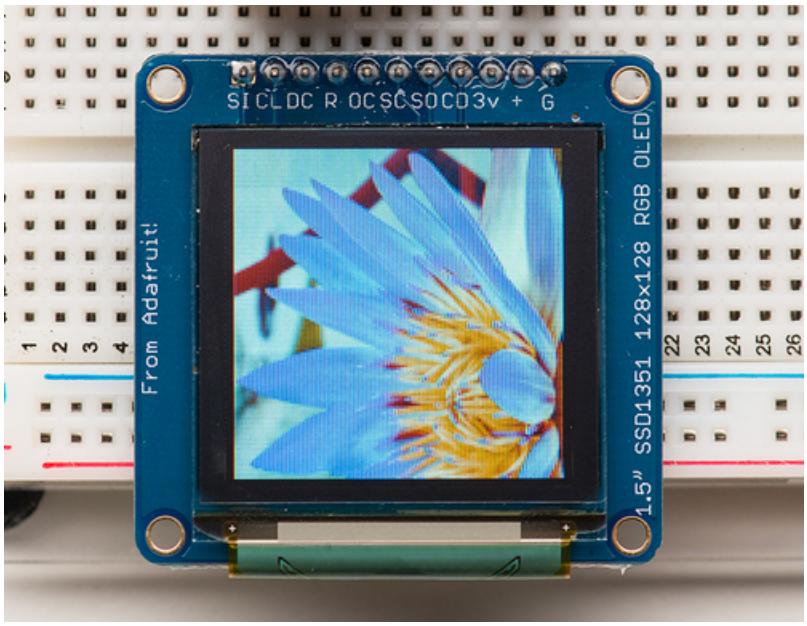
adafruit learning system

Adafruit 1.27" and 1.5" Color OLED Breakout Board

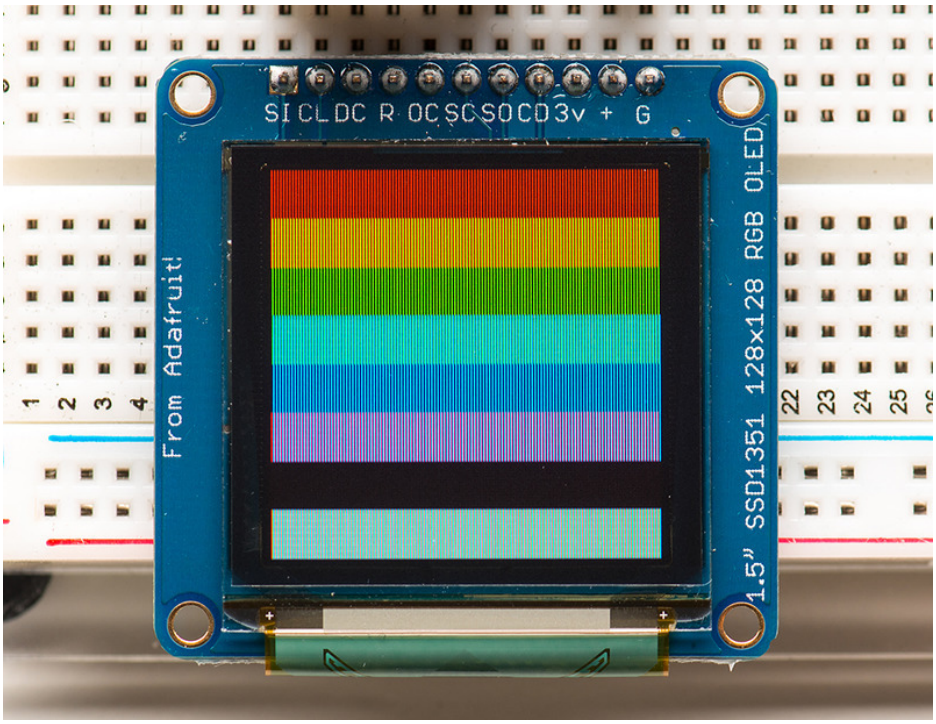
Created by Bill Earl



Last updated on 2018-12-12 04:15:11 AM UTC

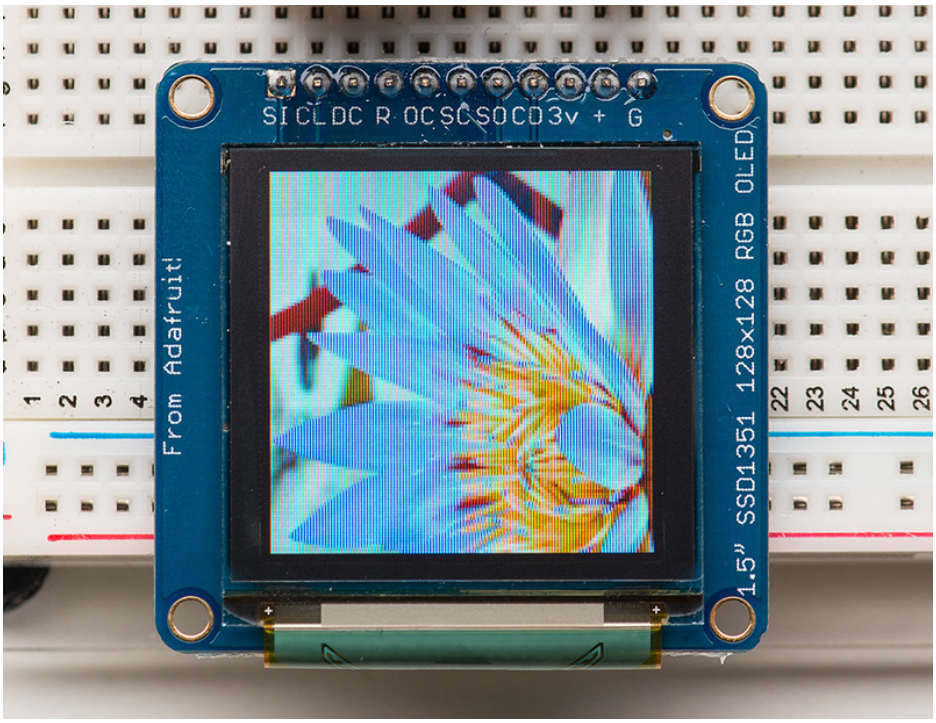
Guide Contents

Overview



We love our black and white monochrome displays but we also like to dabble with some color now and then. Our big 1.5" color OLED displays are perfect when you need a small display with vivid, high-contrast 16-bit color. The visible portion of the OLED measures 1.5" diagonal and contains 128x128 RGB pixels, each one made of red, green and blue OLEDs. Each pixel can be set with 16-bits of resolution for a large range of colors. Because the display uses OLEDs, there is no backlight, and the contrast is very high (black is really black). We picked this display for its excellent color, this is the nicest mini OLED we could find!

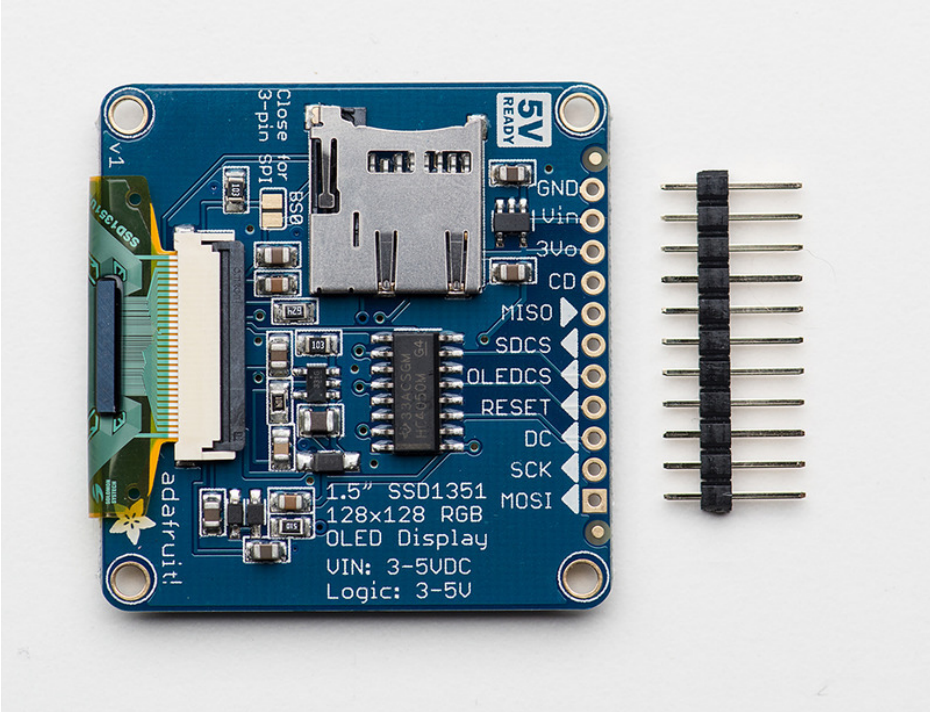
This OLED uses the SSD1351 driver chip, which manages the display. You can talk to the driver chip using 4-wire write-only SPI (clock, data, chip select, data/command and an optional reset pin). Included on the fully assembled breakout is the OLED display and a small boost converter (required for providing 12V to the OLED) and a microSD card holder. This design includes built-in logic level shifting so you can use it with 3-5VDC power and logic levels. Our example code shows how to read a bitmap from the uSD card and display it all via SPI.

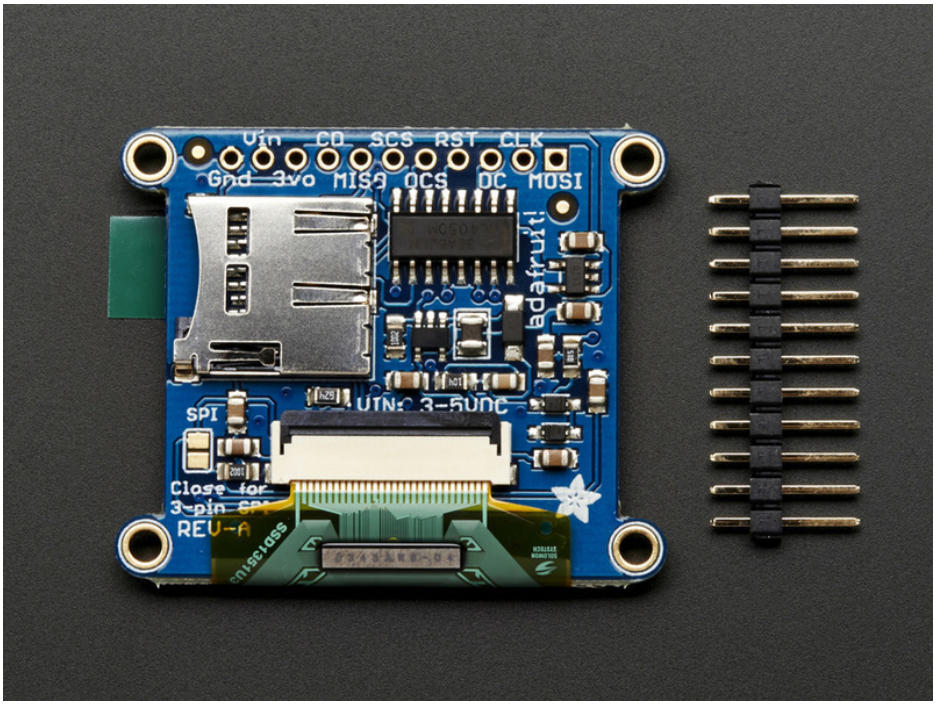


Board Technical Details

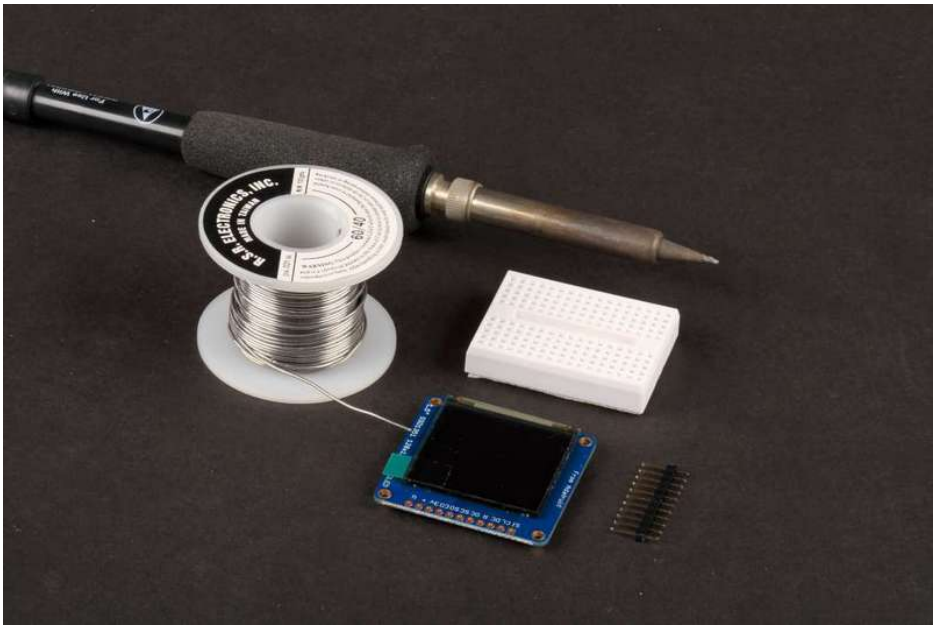
- 1.5" diagonal OLED, 16-bit color
- SPI interface
- 3.3-5V logic and power
- Micro-SD card holder
- Dimensions: 43.17mm / 1.7" x 42mm / 1.65" x 5.42mm / 0.2"

Assembly



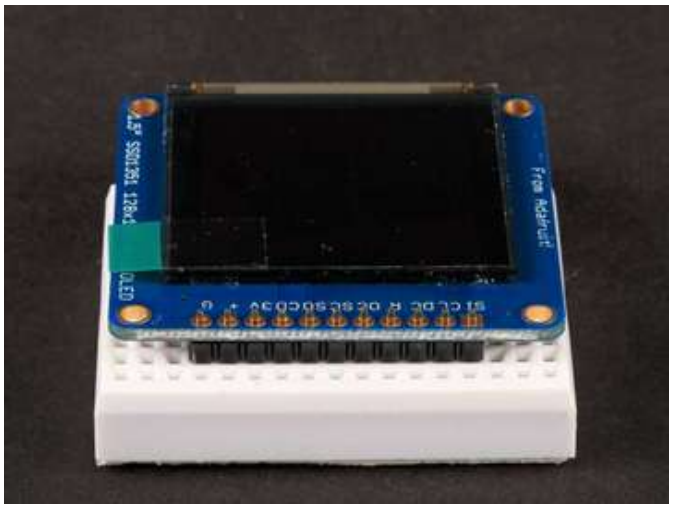


The breakout board comes fully assembled and tested. We include an optional strip of header pins to make it easier to use this display in a breadboard. The header can be installed in just a few minutes with your soldering iron:



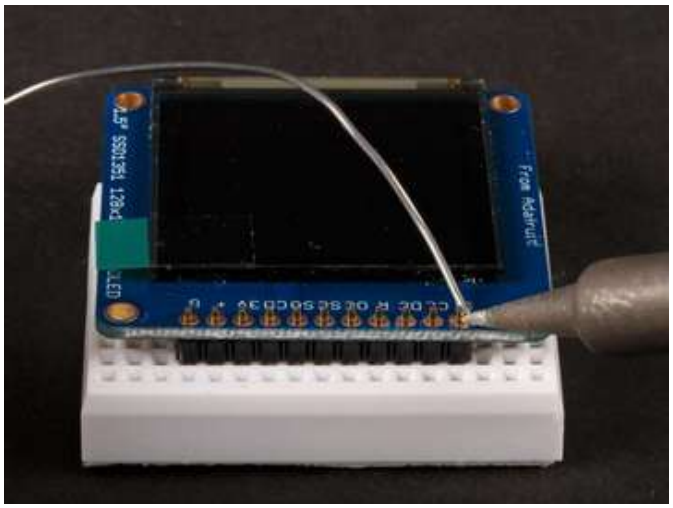
Prepare the header strip

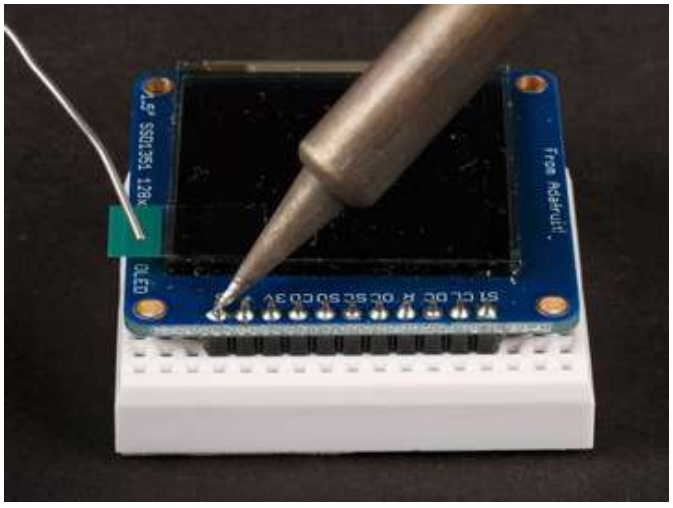
Cut the header to size and insert (long pins down) into a breadboard to stabilize for soldering.



Position the display

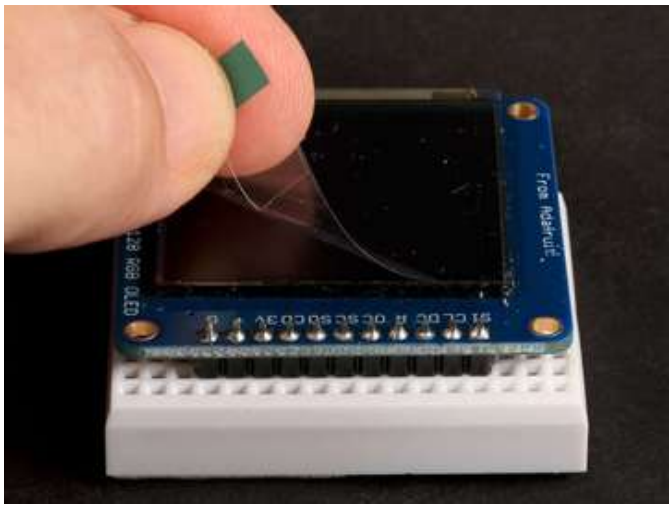
Place the display breakout on the header so that the short pins protrude through the holes.





And Solder!

Solder all pins to assure a good electrical connection.

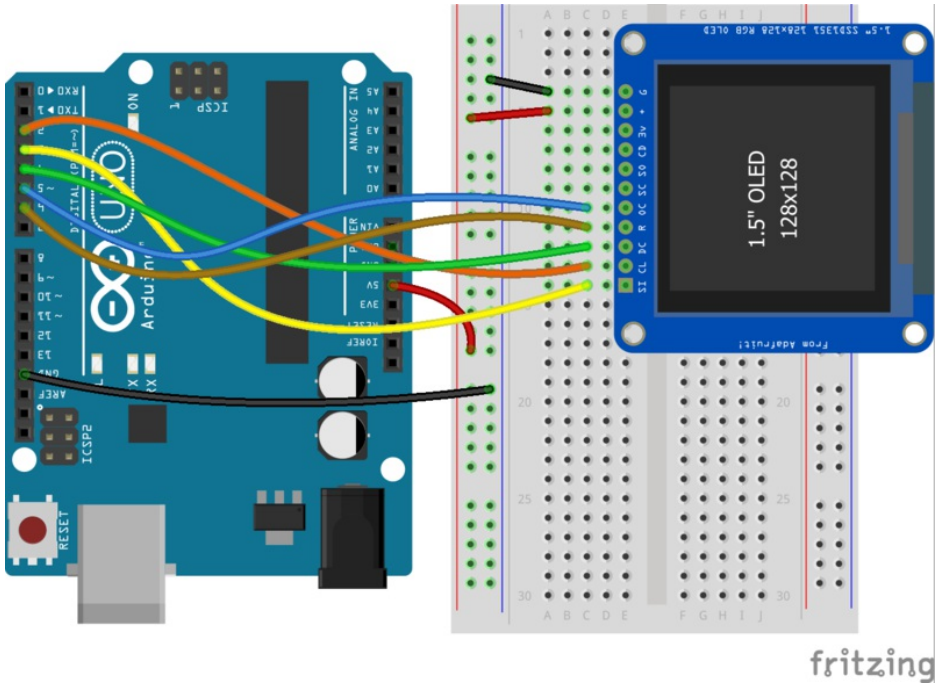


Remove the protective film

Gently pull up on the tab to remove the film.

Wiring and Graphics Test

The pinout ordering is the same for both the 1.27" and 1.5" version of the OLED!



https://adafru.it/sVa

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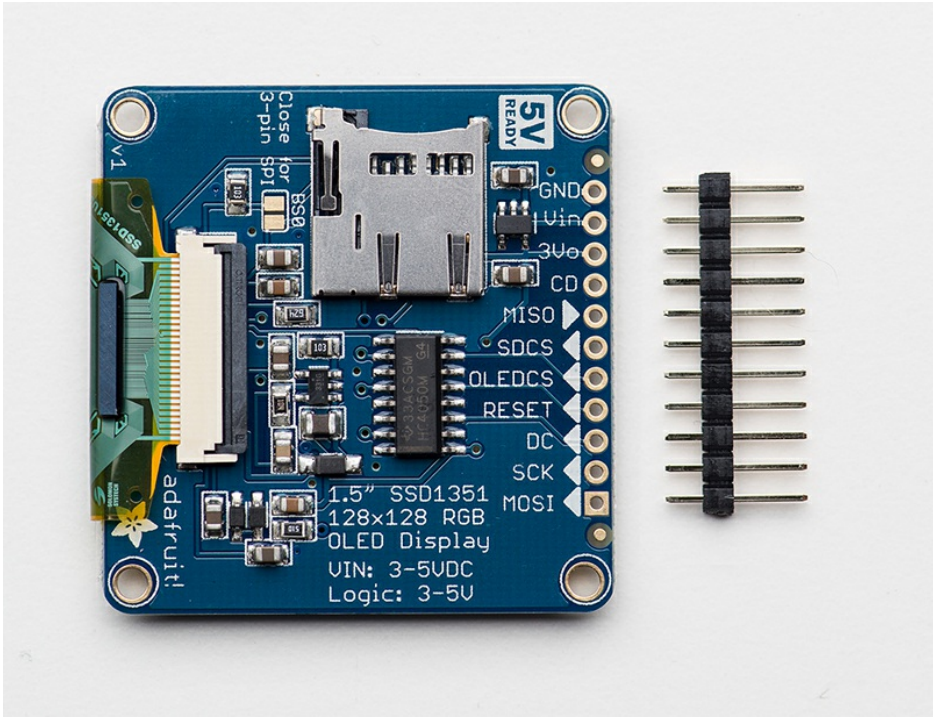
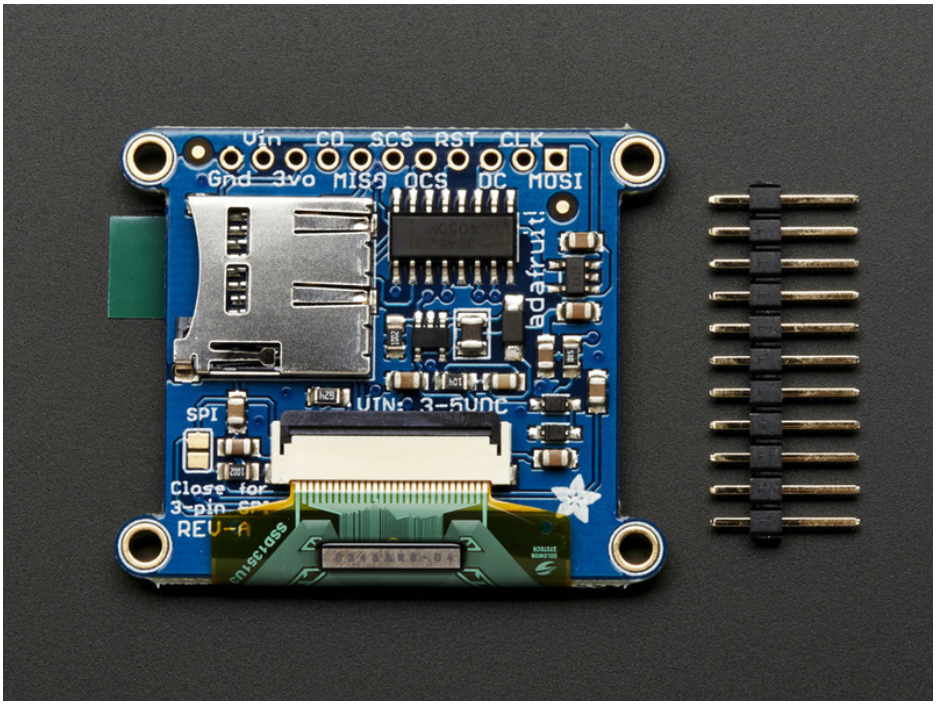
The library supports flexible wiring to minimize pin conflicts with other shields and breakouts. For the initial test, we'll use the same wiring as the "test" example from the library:

- **GND -> GND (G)**
- **5v -> VIN (+)**
- **#2 -> SCLK (CL)**
- **#3 -> MOSI (SI)**
- **#4 -> DC**
- **#5 -> OLEDCS (OC)**
- **#6 -> RST (R)**

Hint:

If you are confused by the abbreviations on the front of the board, the full signal names are printed on the back!

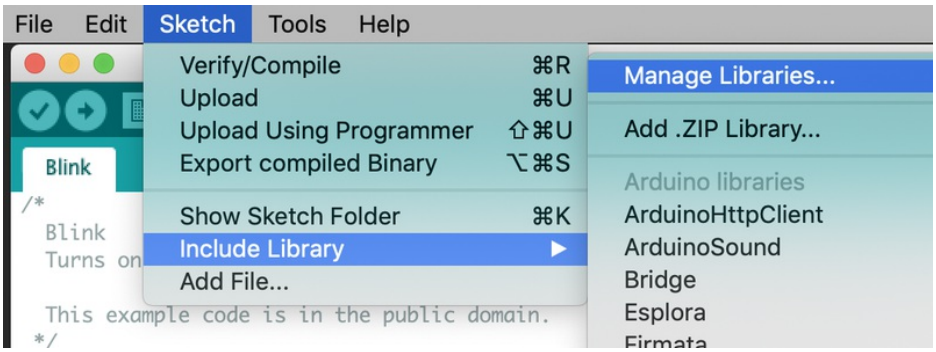




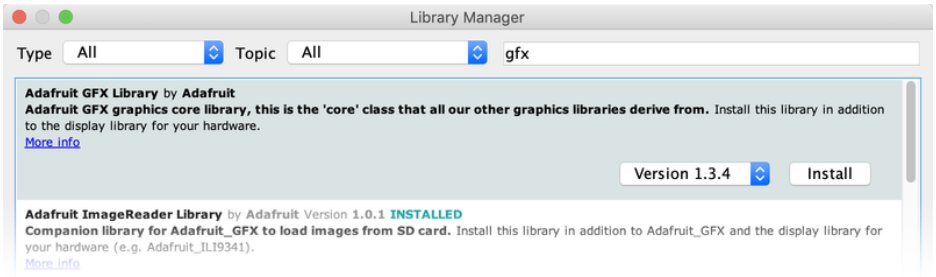
Installing the Arduino software

Now we can run the test software on the Arduino.

Three libraries need to be installed using the **Arduino Library Manager**...this is the preferred and modern way. From the Arduino "Sketch" menu, select "Include Library" then "Manage Libraries..."



Type “gfx” in the search field to quickly find the first library — **Adafruit_GFX**:



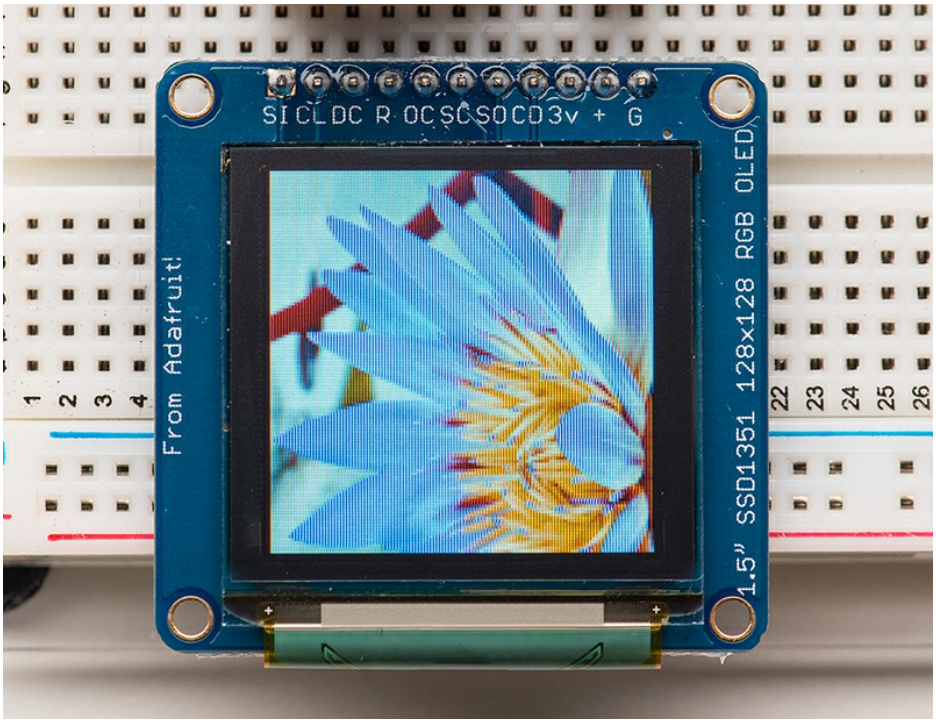
Repeat the search and install steps, looking for the **Adafruit_ZeroDMA** and **Adafruit_SSD1351** libraries.

After you restart, you should be able to select **File→Examples→Adafruit_SSD1351→test** - this is the example sketch that just tests the display by drawing text and shapes. Upload the sketch and you should see the following:

The test sketch demonstrates all the basic drawing functions of the Adafruit GFX Library. Read through the code to see how to draw text, circles, lines, etc.

For a detailed tutorial on the Adafruit GFX library, including all the functions available please visit the GFX tutorial page (https://adafru.it/aPx)

Drawing Bitmaps

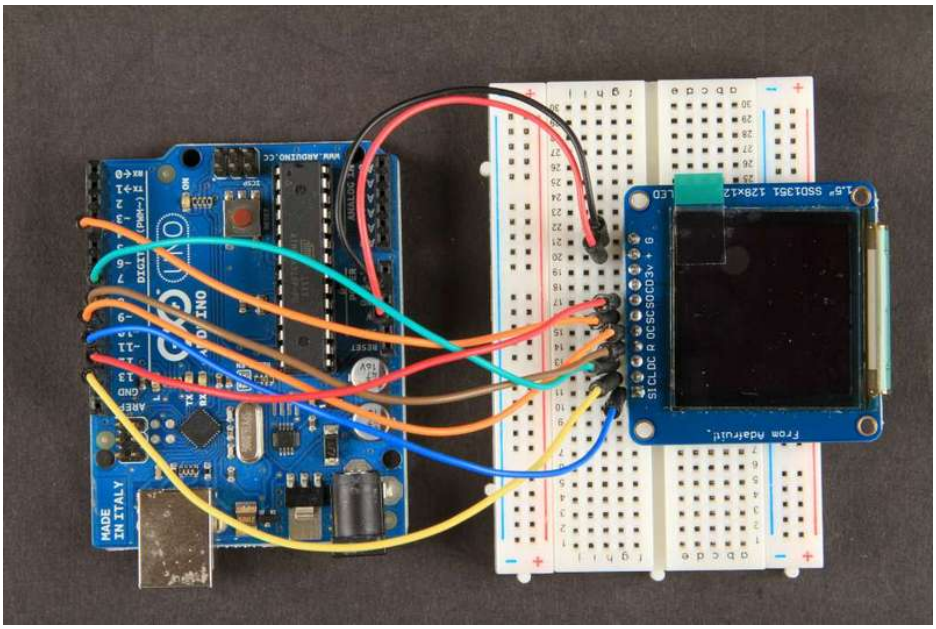


Wiring for the Bitmap Example

Drawing bitmaps from the on-board micro SD card requires a few more connections to communicate with the SD card. The library allows you to use any pins. The Arduino connections listed below match the code in the "bmp" example from the library:

- **GND -> GND (G)**
- **5v -> VIN (+)**
- **#4 -> SDCS (SC)**
- **#8 -> DC**
- **#9 -> RST (R)**
- **#10 -> OLEDCS (OC)**
- **#11 -> MOSI (SI)**
- **#12 -> MISO (SO)**
- **#13 -> SCLK (CL**

Note that the Bitmap example code uses hardware SPI wiring for maximum speed. You can still use software SPI, but make sure that the pin definitions match your wiring and that you modify the example to select the Software SPI option (#1) in the code. The SPI pins shown are for Atmega-328 processors. To use this wiring on other processors, software SPI must be used.



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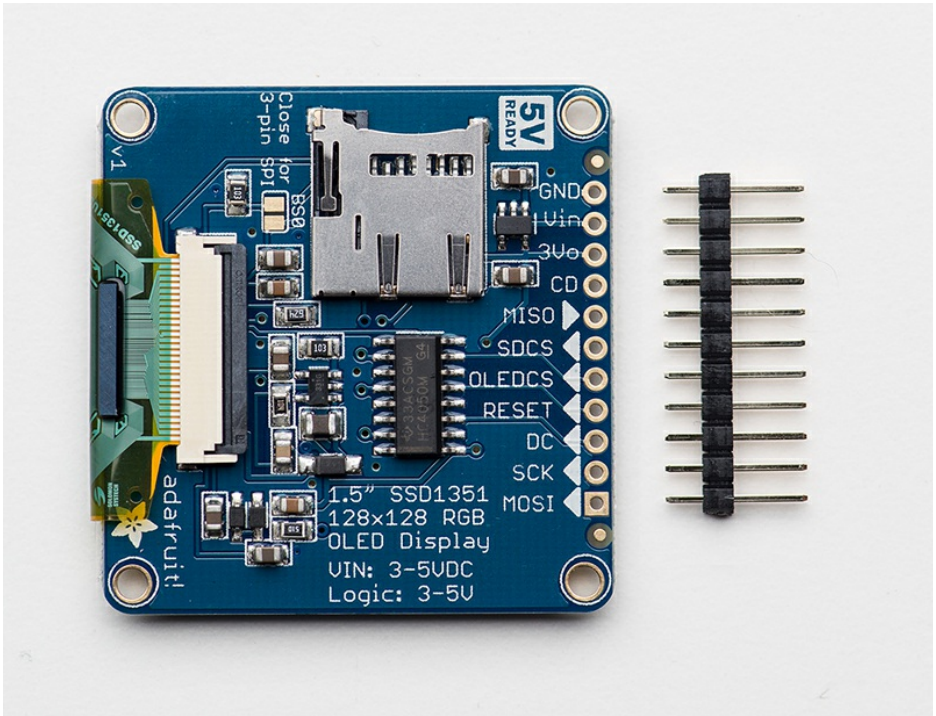
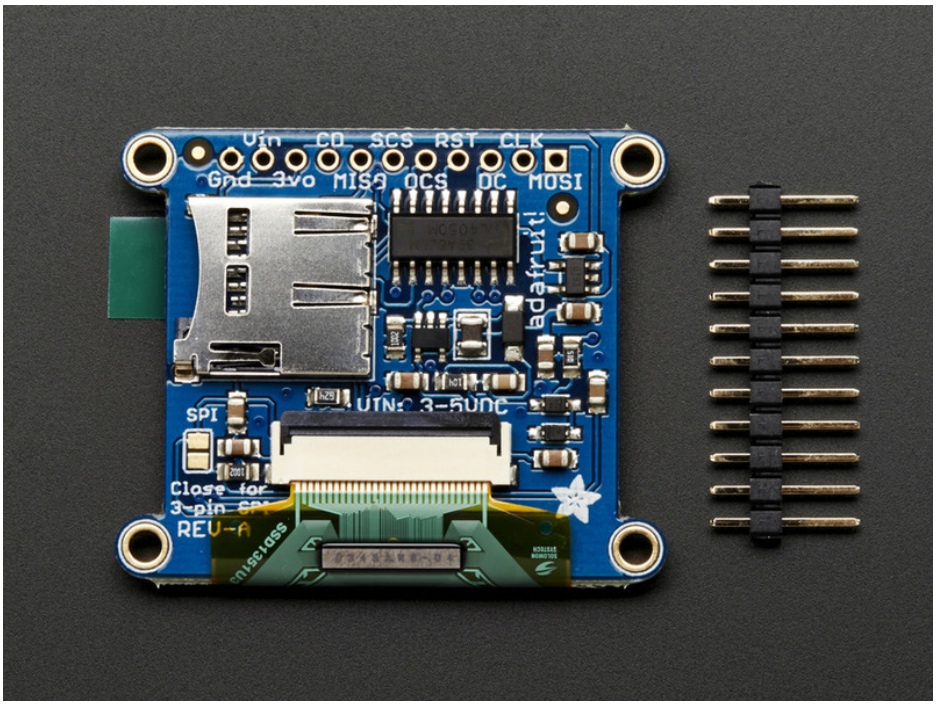
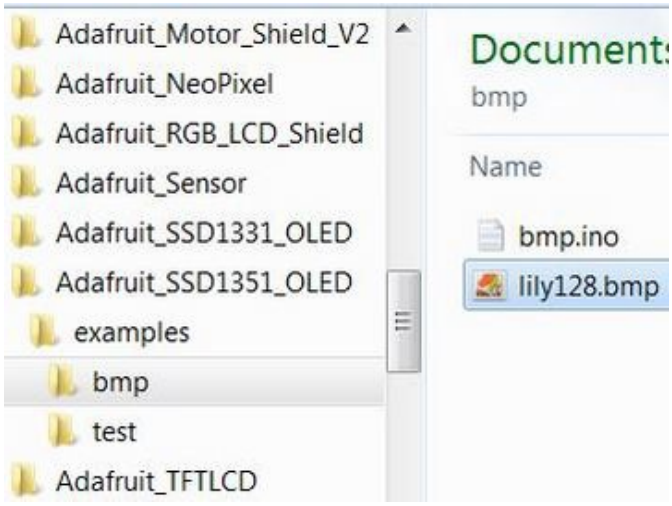




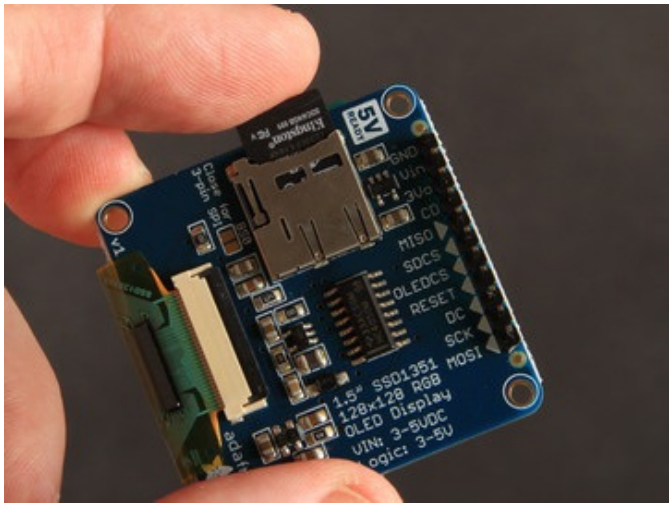
Bitmap Example Sketch

To display bitmaps from the on-board micro SD slot, you will need a micro SD card (http://adafru.it/102).



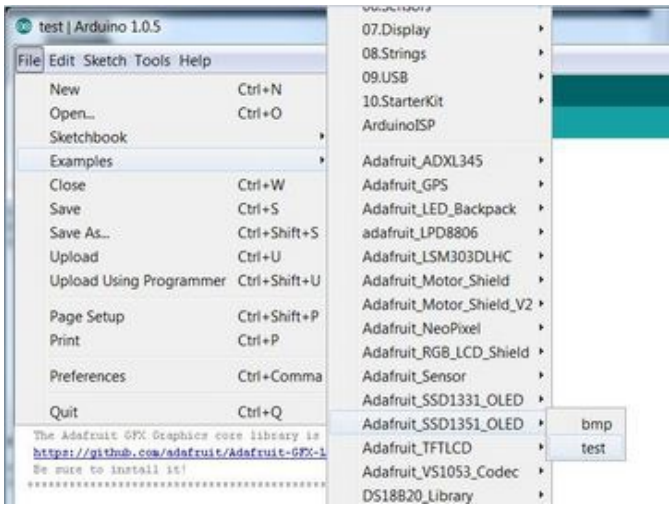
Copy the bitmap file

Copy the file **"lily128.bmp"** from the Adafruit_SSD1351_OLED\examples\bmp folder to the root directory of your micro-SD card.



Insert the card

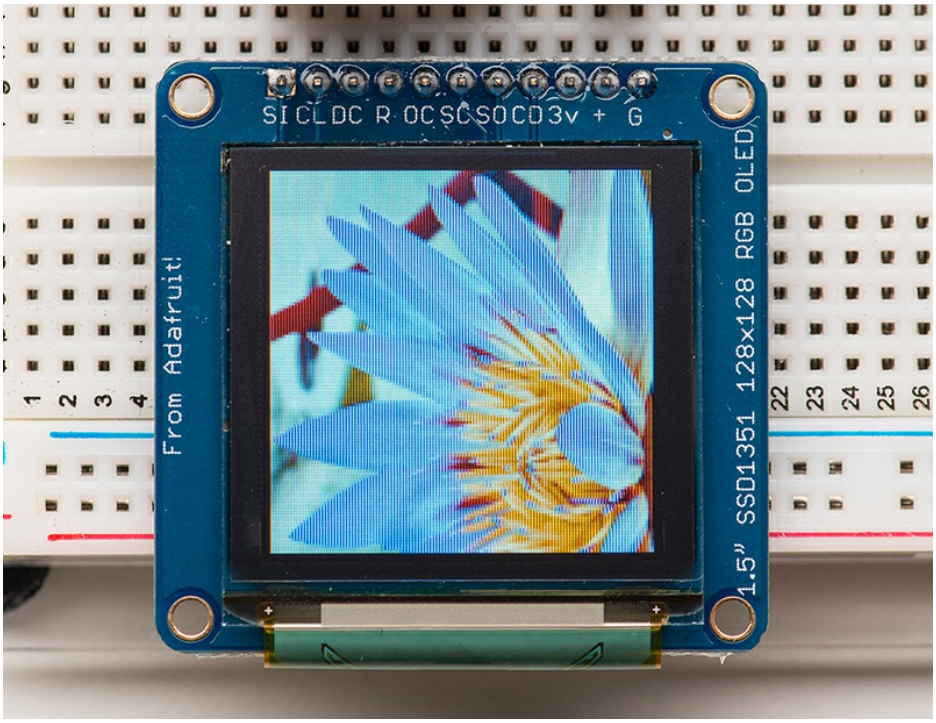
Insert the micro SD card into the slot on the back of the SSD1351 breakout board.



Load the bitmap example sketch

Select **"Examples->Adafruit_SSD1351_OLED->bmp"** and upload it to your Arduino.

When the Arduino restarts, you should see the flower as below!



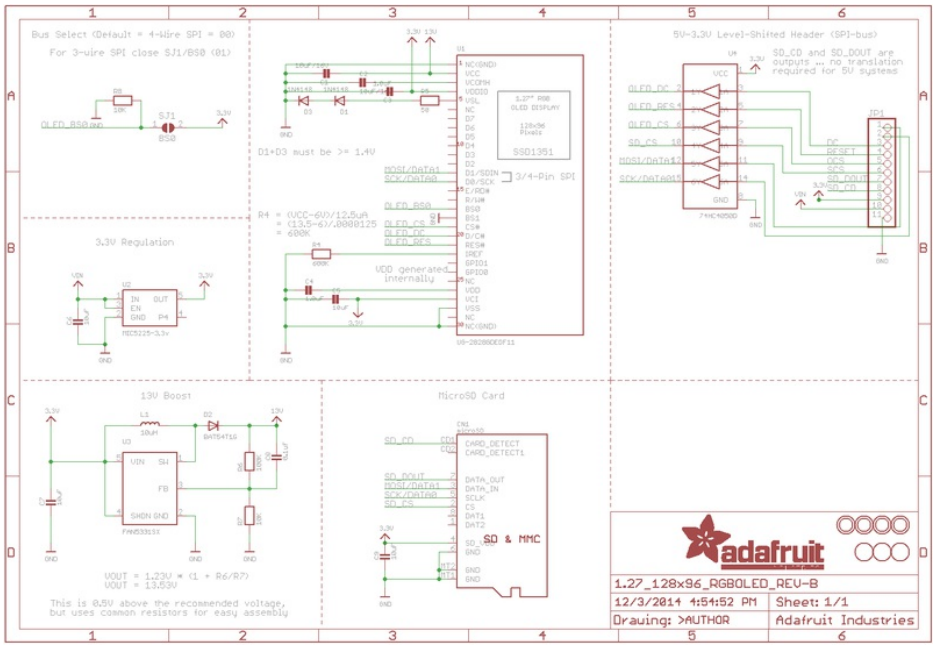
Downloads and Links

Data Sheets:

- SSD151 Display Controller Datasheet (https://adafru.it/sVb)
- 1.5" OLED Display Module datasheet (https://adafru.it/cBE)
- Fritzing objects in the Adafruit Fritzing library (https://adafru.it/aP3)
- EagleCAD PCB for 1.27" Color OLED (https://adafru.it/rqB)
- EagleCAD PCB for the 1.5" Color OLED (https://adafru.it/rqC)

Schematic

Click to enlarge



For the level shifter we use the CD74HC4050 (https://adafru.it/Boj) which has a typical propagation delay of ~10ns