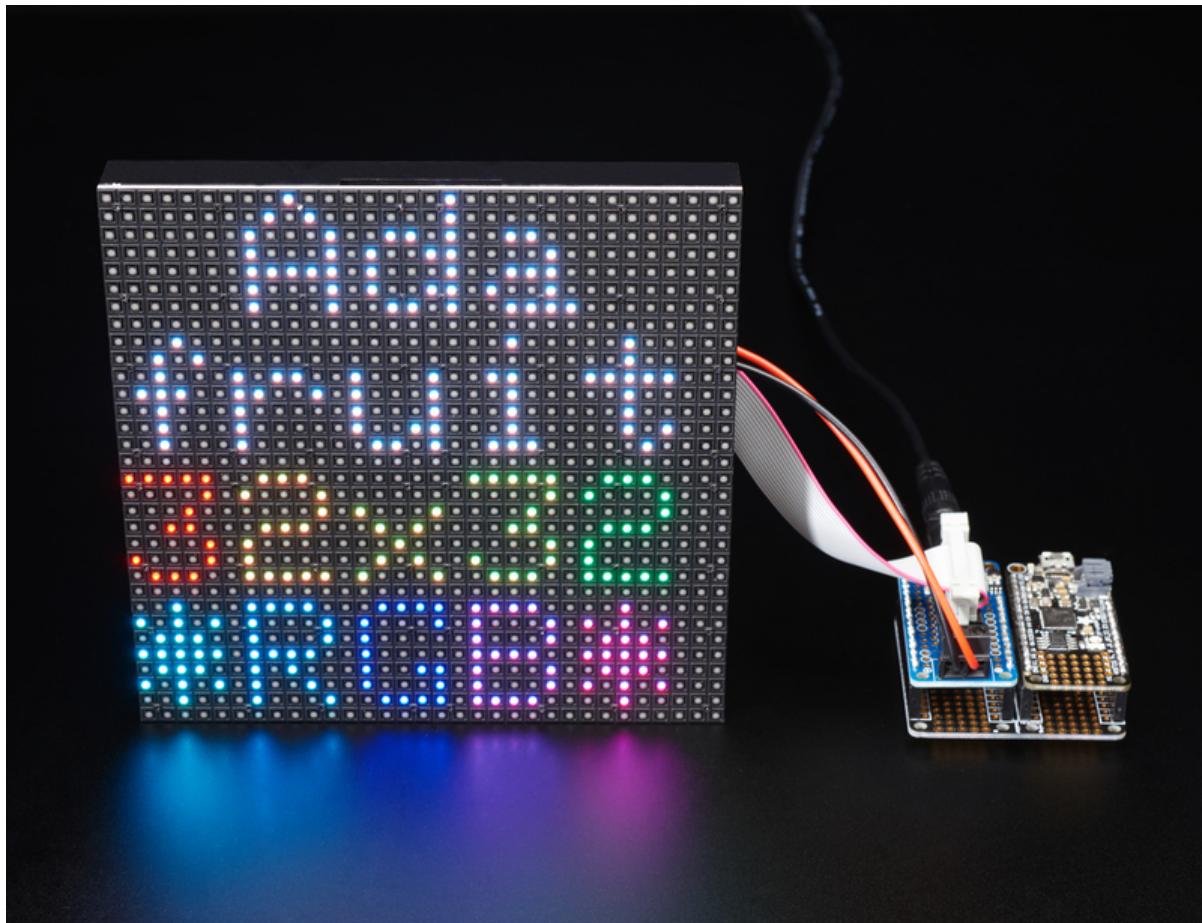




# Adafruit RGB Matrix FeatherWings

Created by lady ada



<https://learn.adafruit.com/rgb-matrix-featherwing>

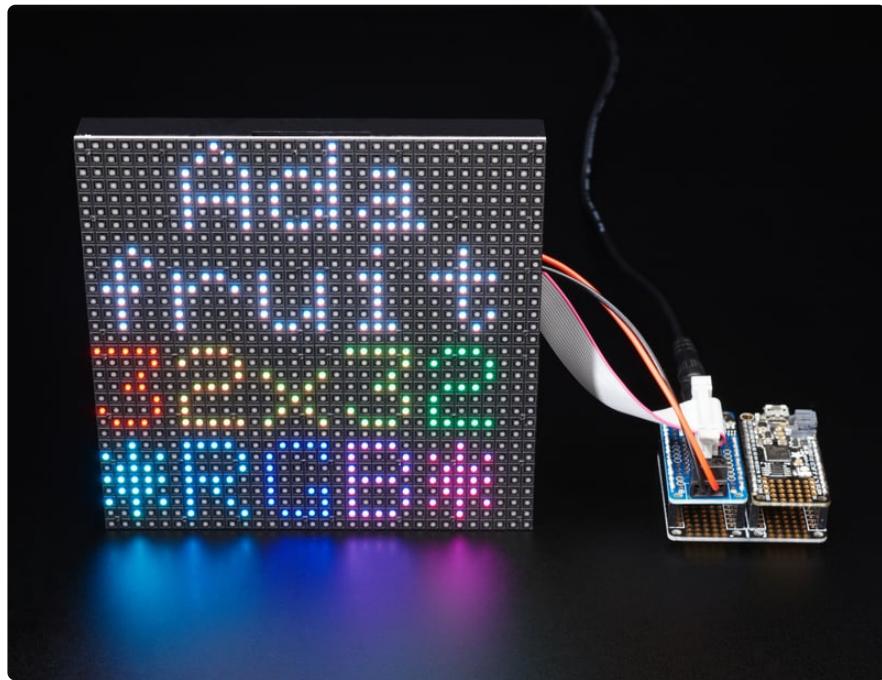
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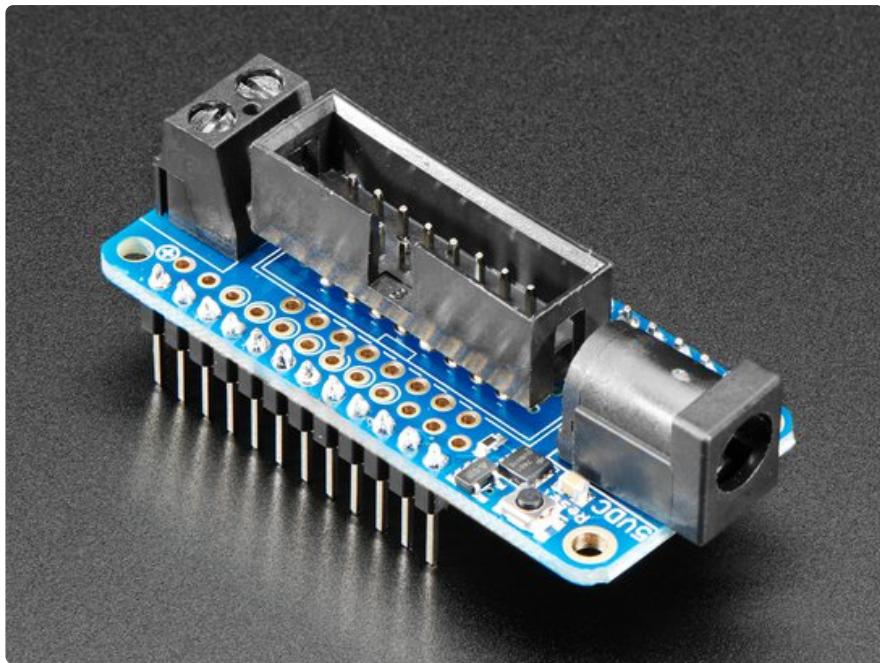
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# Overview

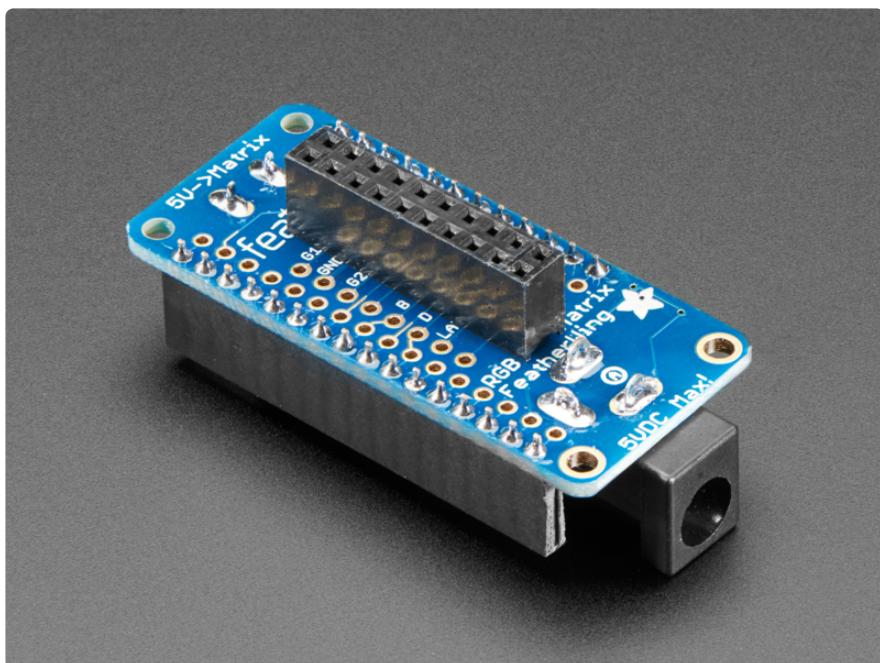


Ahoy! It's time to create a dazzling light up project with our **RGB Matrix FeatherWing**. Now you can quickly and easily create projects featuring your favorite 16 or 32-pixel tall matrix boards. Using our RGB Matrix library is easy and works wonderfully with a majority of our Feather boards.

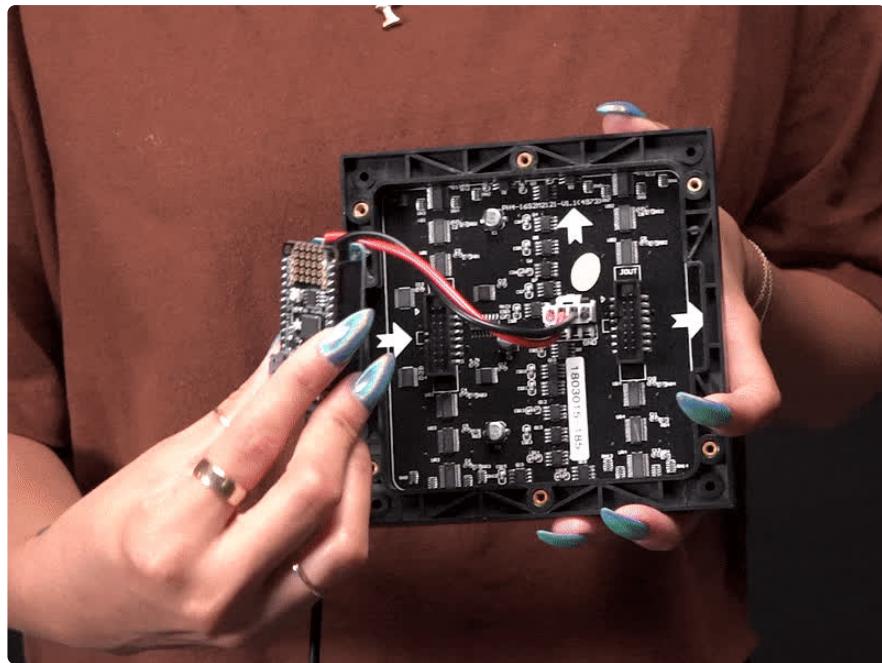
**Please note:** We have **two wings**: one wing is [tested/designed to work with the SAMD21 M0, SAMD51 M4, RP2040 and ESP32 \(S2, S3\) Feathers](http://adafru.it/3036) (<http://adafru.it/3036>). Another wing is [only tested/design to work with the nRF52840 Feathers](http://adafru.it/4702) (<http://adafru.it/4702>). These two designs have slightly different wiring/schematic to optimize for the pinouts of the different chips. They not for use with any other Feathers at this time. (That said, if you'd like to add support, [we'd be happy to take a pull request](https://adafru.it/aHj) (<https://adafru.it/aHj>) on the library repo)



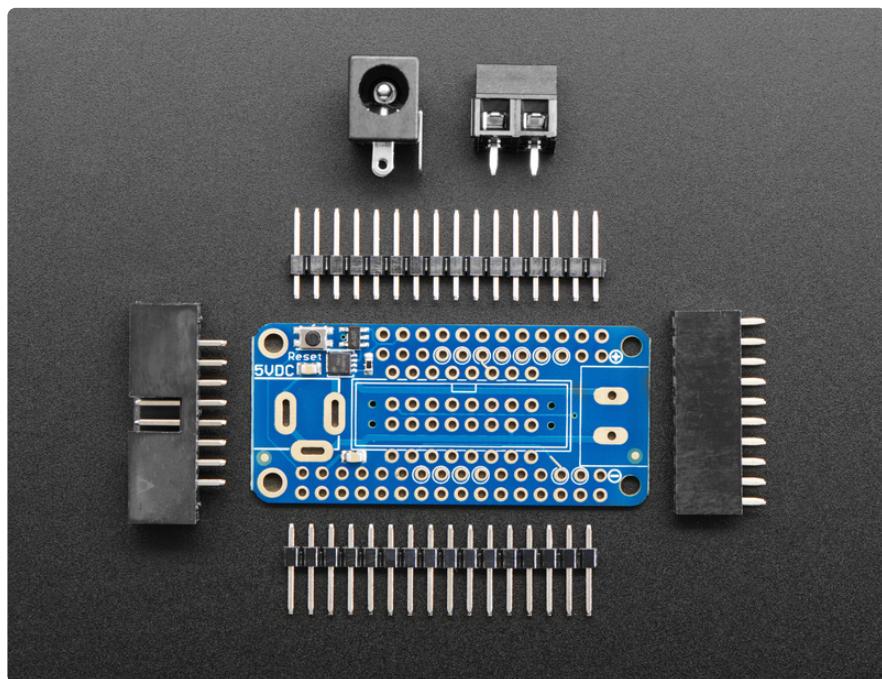
This wing can be assembled in one of two ways. You can either solder in a 2x8 IDC shrouded header on the top, then plug in the IDC cable that came with your matrix. This makes it easy to stack on top of your Feather. Or, you can solder in the 2x10 socket header on the bottom of the Wing, and then stack your Feather on top. That way you can plug it directly into the back of the matrix \*mind blown\*



This FeatherWing will work great with any of our [16x32](https://adafru.it/CIE) (<https://adafru.it/CIE>), [32x32](https://adafru.it/CIF) (<https://adafru.it/CIF>) or [64x32](https://adafru.it/CIG) (<https://adafru.it/CIG>) RGB matrices, and is definitely the easiest way to glow and go.

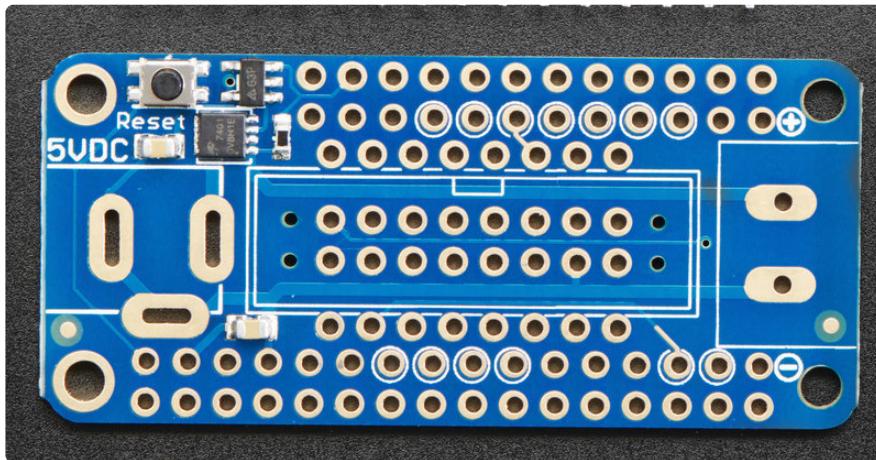


Either way you decide to go, you can plug a 5V DC power pack into the 2.1mm DC jack. That 5V is polarity protected and then output on the other side to a 5.08mm terminal block. An onboard regulator will provide 3.3V power to your Feather so you don't need a separate USB or battery, this makes for a very compact build!



Each order comes with one FeatherWing PCB with surface mount parts attached, a 2x8 IDC header, a 2x10 female socket, 2.1mm DC jack, 5.08mm terminal block, and some male header. You may also want some [Feather stacking headers](http://adafru.it/2830) (<http://adafru.it/2830>) or [female headers](http://adafru.it/2886) (<http://adafru.it/2886>) depending on how you plan to attach/stack your Feather.

# Pinouts



## 5V Power

RGB matrices are powered from 5V. We recommend using a 5V 2A or 5V 4A power pack to provide power to your Feather+Matrix



### [5V 2A \(2000mA\) switching power supply - UL Listed](#)

This is an FCC/CE certified and UL listed power supply. Need a lot of 5V power? This switching supply gives a clean regulated 5V output at up to 2000mA. 110 or 240 input, so it works...

<https://www.adafruit.com/product/276>

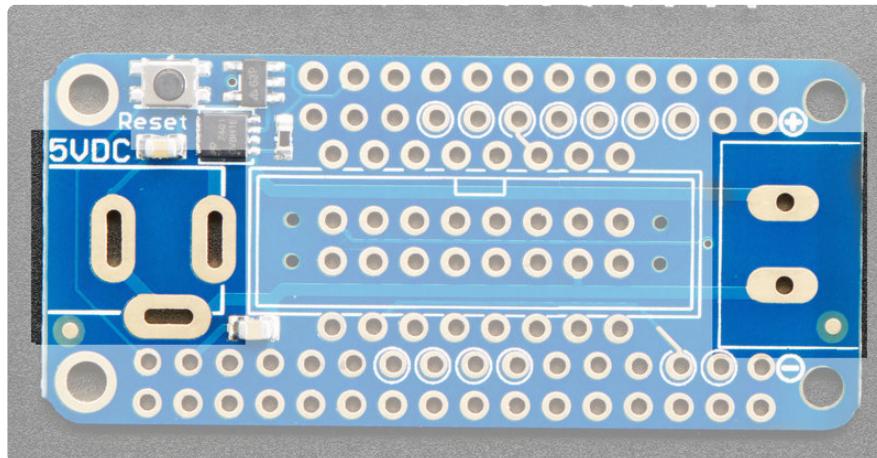


### [5V 4A \(4000mA\) switching power supply - UL Listed](#)

Need a lot of 5V power? This switching supply gives a clean regulated 5V output at up to 4 Amps (4000mA). 110 or 240 input, so it works in any country. The plugs are "US..."

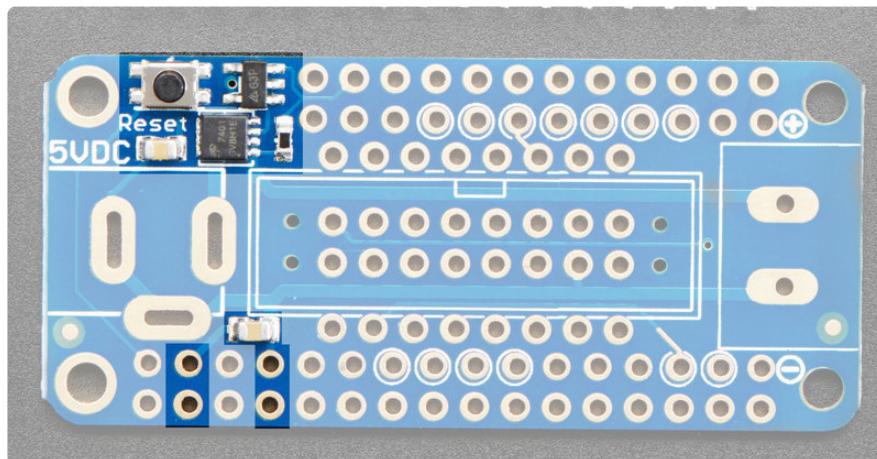
<https://www.adafruit.com/product/1466>

You can plug in the 5V adapter directly into the 2.1mm plug shown on the left, and the output to the matrix is available on the right. In between it goes through a P-FET 'ideal diode' which will protect the circuitry if you plug in the power backwards.



## Feather Power

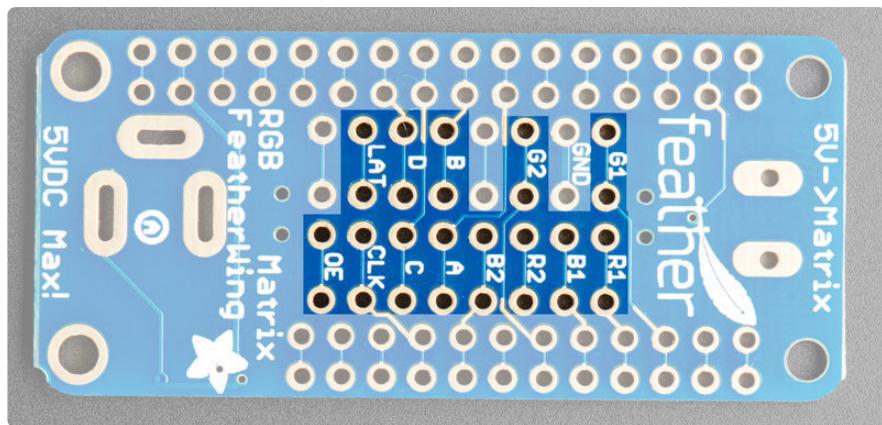
The 5V power input is also regulated to 3.3V and provided to the Feather 3.3V and Ground pads. This means that the Feather will 'self power' naturally from the 5V adapter even if USB or battery is not plugged in.



## Data Pins

RGB Matrices require many data pins to push data out. We've picked what we think are a good range of pins that let you use I2C, SPI and two analog pins. There's not a lot of pins left over, but you can still add other wings and sensors if you need!

On the 64x32 2.5mm panels (product ID [5036](#)), the green and blue channels are swapped compared to the standard HUB75 pinout. When using with libraries, simply swap the pin numbers for G1, G2 with B1, B2 in software to flip them back around.



## M0/M4/RP2040/ESP32-S2/S3 FeatherWing wiring

Here are the following 'default' pinouts

- CLK on #13
- LAT on #0 (a.k.a RX)
- OE on #1 (a.k.a TX)
- Address A on A5
- Address B on A4
- Address C on A3
- Address D on A2
- R1, G1, B1, R2, G2, B2 on 6, 5, 9, 11, 10, 12 in that order

That leaves **A0**, **A1**, **SCK**, **MOSI**, **MISO**, **SDA**, **SCL** available. Feathers with built in SPI devices like SD cards, Bluetooth or WiFi will still work since the CS pins are not exposed.

The [ESP32-S2 TFT Feather](http://adafru.it/5300) (<http://adafru.it/5300>) and [ESP32-S3 TFT Feather](http://adafru.it/5483) (<http://adafru.it/5483>), while technically compatible (with some Wing modification in the S2 case), have a small display on top that would normally be blocked by this 'Wing. You can make such a combo work by adding a FeatherWing [Doubler](http://adafru.it/2890) (<http://adafru.it/2890>) or [Tripler](http://adafru.it/3417) (<http://adafru.it/3417>) to place the boards side-by-side.

## nRF52840 FeatherWing wiring

Here are the following 'default' pinouts

- CLK on #12
- LAT on #0 (a.k.a RX)
- OE on #1 (a.k.a TX)
- Address A on #10

- Address B on #5
- Address C on #13
- Address D on #9
- R1, G1, B1, R2, G2, B2 on #6, A5, A1, A0, A4, #11 in that order

That leaves **A2, A3, SCK, MOSI, MISO, SDA, SCL** available. nRF52840 Feathers with built in sensors will still work since I2C is available.

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## Usage

Our Arduino library will do all the heavy lifting for you.

Visit the RGB Matrix ProtoMatter library guide page at <https://learn.adafruit.com/adafruit-protomatter-rgb-matrix-library> (<https://adafru.it/MNa>) to install the Arduino library and load up the examples.

Use the following configuration when uploading example code, and you'll be glowing in a minute!

## M0/M4/RP2040/ESP32-S2/S3 FeatherWing

```
// Use FeatherWing pinout
uint8_t rgbPins[] = {6, 5, 9, 11, 10, 12};
uint8_t addrPins[] = {A5, A4, A3, A2};
uint8_t clockPin = 13;
uint8_t latchPin = 0;
uint8_t oePin = 1;

// Create a 32-pixel tall, 64 pixel wide matrix with the defined pins
Adafruit_Protomatter matrix(
  64, 4, 1, rgbPins, 4, addrPins, clockPin, latchPin, oePin, false);
```

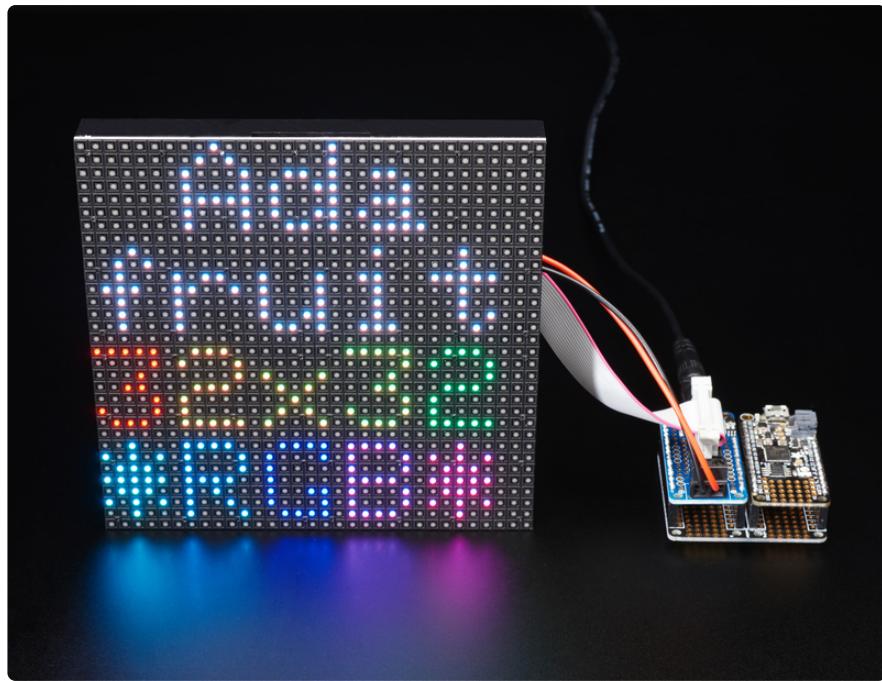
## nRF52840 FeatherWing

```
// Special nRF52840 FeatherWing pinout
uint8_t rgbPins[] = {6, A5, A1, A0, A4, 11};
uint8_t addrPins[] = {10, 5, 13, 9};
uint8_t clockPin = 12;
uint8_t latchPin = PIN_SERIAL1_RX;
uint8_t oePin = PIN_SERIAL1_TX;

// Create a 32-pixel tall, 64 pixel wide matrix with the defined pins
Adafruit_Protomatter matrix(
  64, 4, 1, rgbPins, 4, addrPins, clockPin, latchPin, oePin, false);
```

For the smaller **16x32** matrix, the last line is a little different:

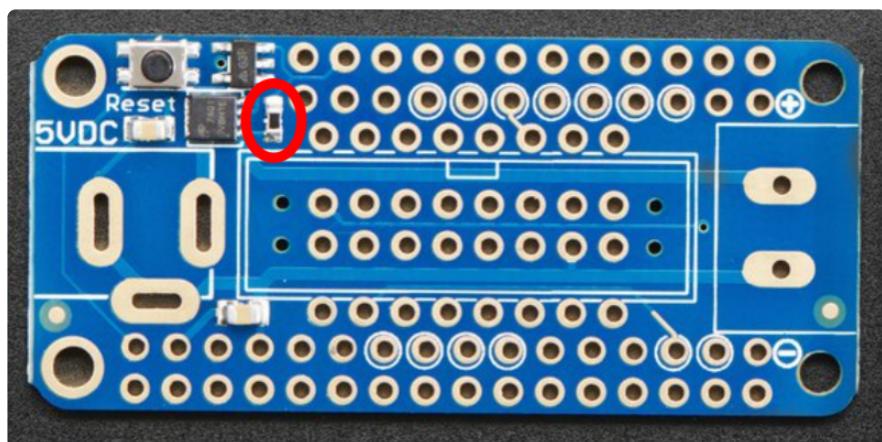
```
Adafruit_Protomatter matrix(
  32, 4, 1, rgbPins, 3, addrPins, clockPin, latchPin, oePin, false);
```



## Troubleshooting

- ? Does not power up when powering through the FeatherWing

This may happen on some M4 based Feathers when used with the Rev A version of the RGB Matrix FeatherWing that has a 100K pull up resistor on the enable (EN) pin. It can be solved by either replacing the 100K resistor with or adding a 10K resistor on top of it. You can even use a through hole resistor if you want.



# Why are green and blue reversed on my 2.5mm panel?

On the 64x32 2.5mm panels (product ID [5036](<https://www.adafruit.com/product/5036>)), the green and blue channels are swapped compared to the standard HUB75 pinout. When using with libraries, simply swap the pin numbers for G1, G2 with B1, B2 in software to flip them back around.

If you are using the `MatrixPortal` library, you do not need to swap pins explicitly. Instead, add this argument to the constructor:

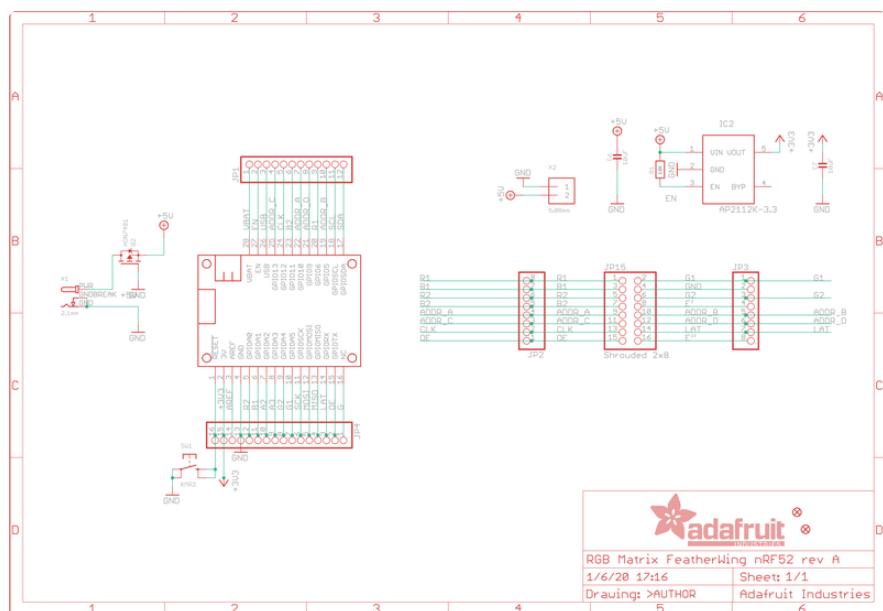
`MatrixPortal(..., color_order="RBG")`. The default order is `"RGB"`, and this argument will swap the pins to match the specified `"RBG"` order.

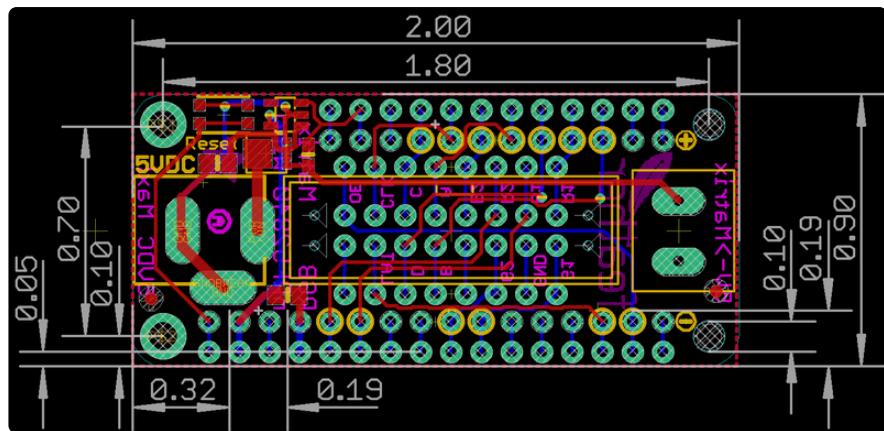
## Downloads

### Files

- [EagleCAD PCB files on GitHub \(<https://adafru.it/CIH>\)](https://adafru.it/CIH)

## Schematic & Fabrication Print for nRF52840 Wing





## Schematic & Fabrication Print for M0/M4/RP2040/ESP32-S2/S3 Wing

