Coela Can't!

Manufacturing Files:

Protogen LED Board V1
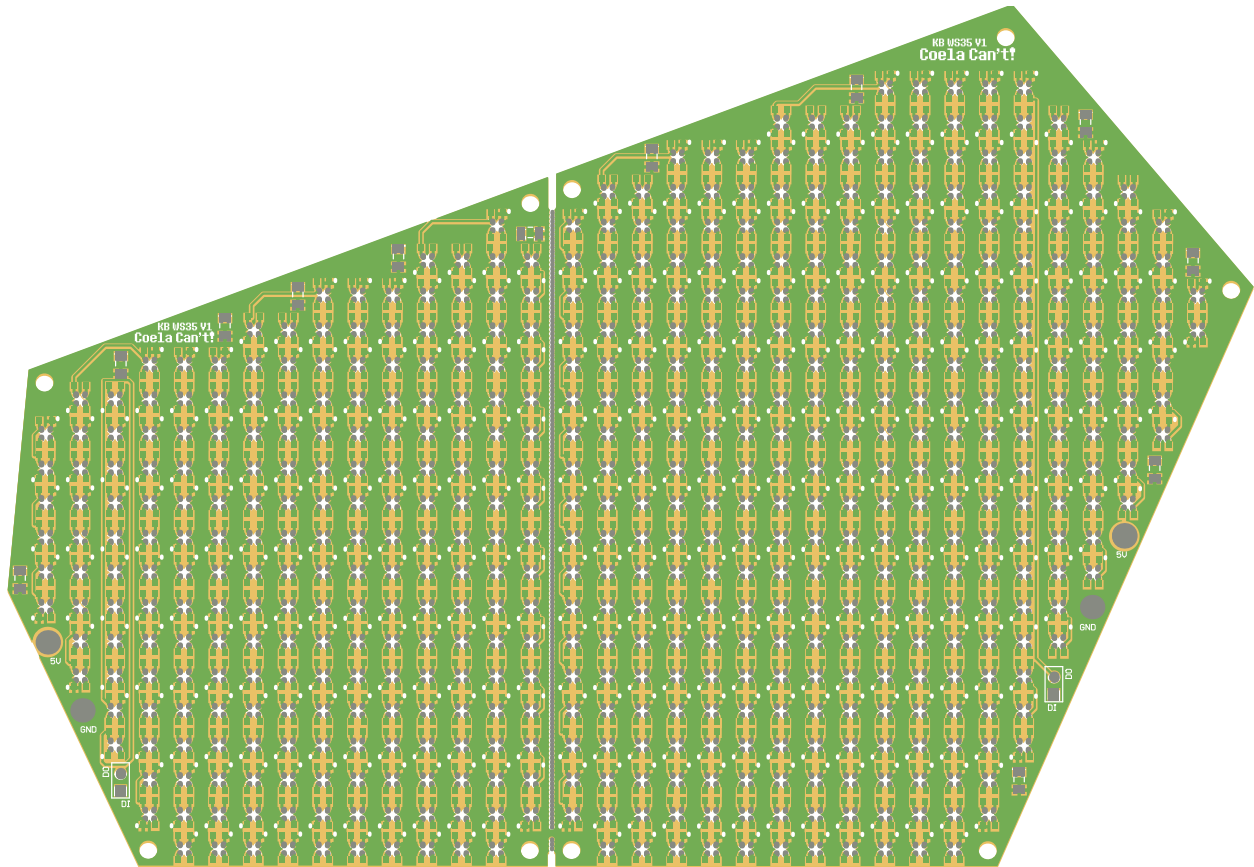
Contents

0 Overview

0.1 Background Information
The following documentation will walk you through how to order a PCB from JLCPCB with SMT Assembly for the following design:
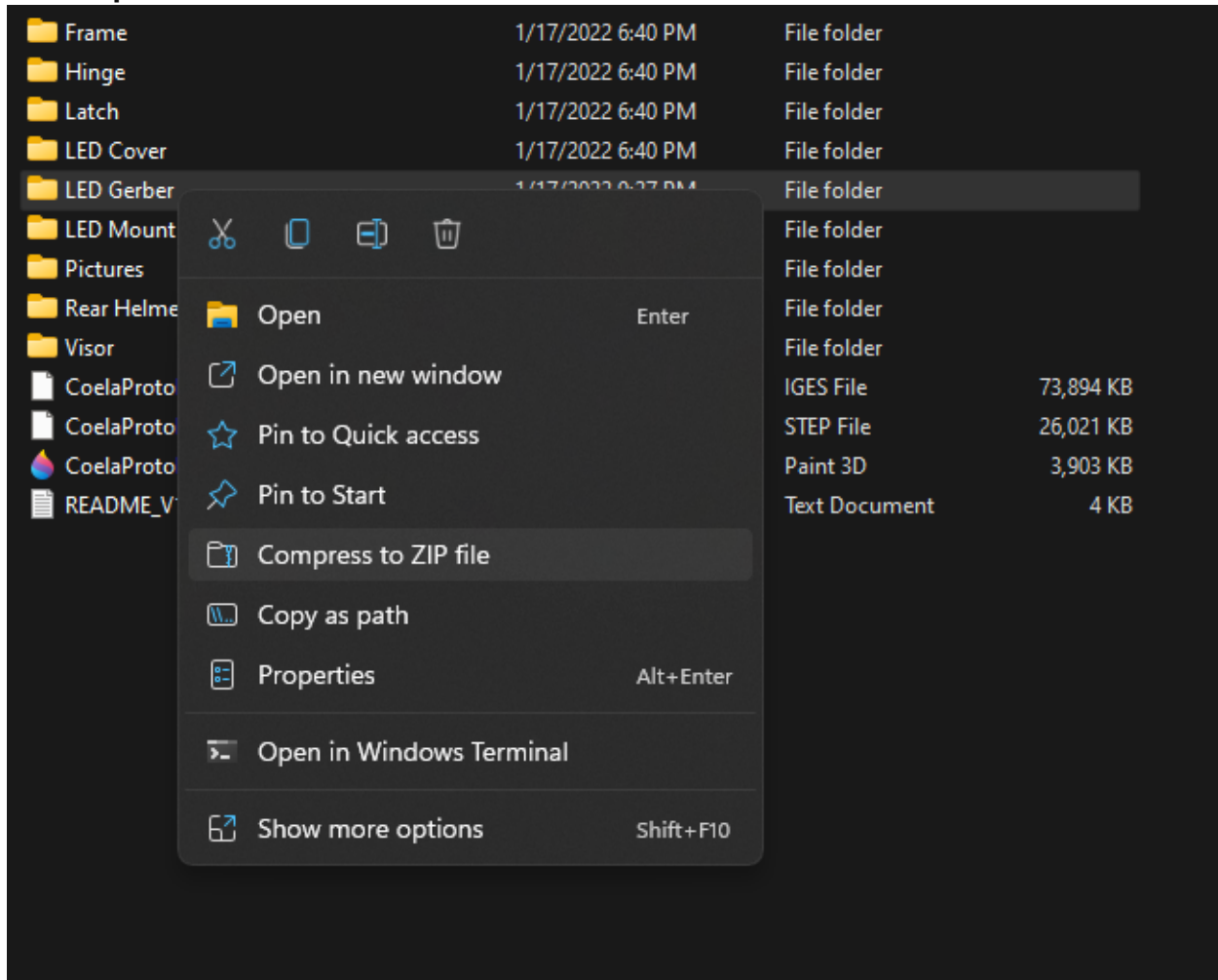

0.2 What's necessary?
To make a Protogen you will need two sides of this PCB populated, you will need to order the topside board with pick and place and order the bottomside board with pick and place.
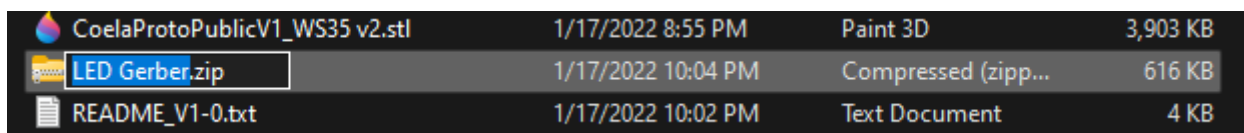
1 Ordering the LED Panels

1.1 Ordering the Base LED Panel PCB

1.1.1 Zip the LED Gerber Files Folder

Rename the zip file if preferred:
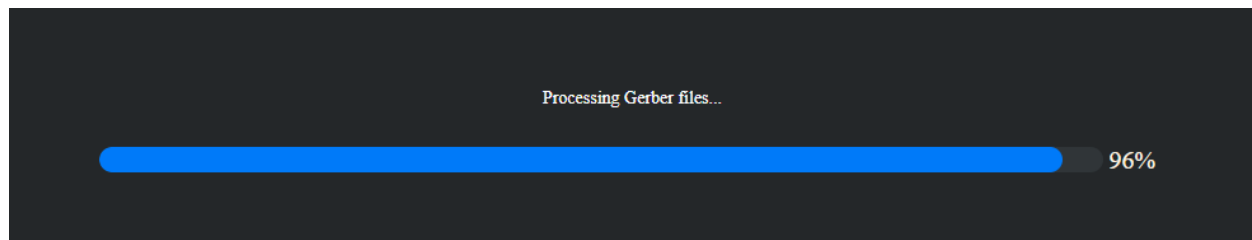
1.1.2 Upload the Gerber Zip to JLCPCB
Head to JLCPCB.com: https://cart.jlcpcb.com/quote

Click "Add gerber file" and upload your Zip file:

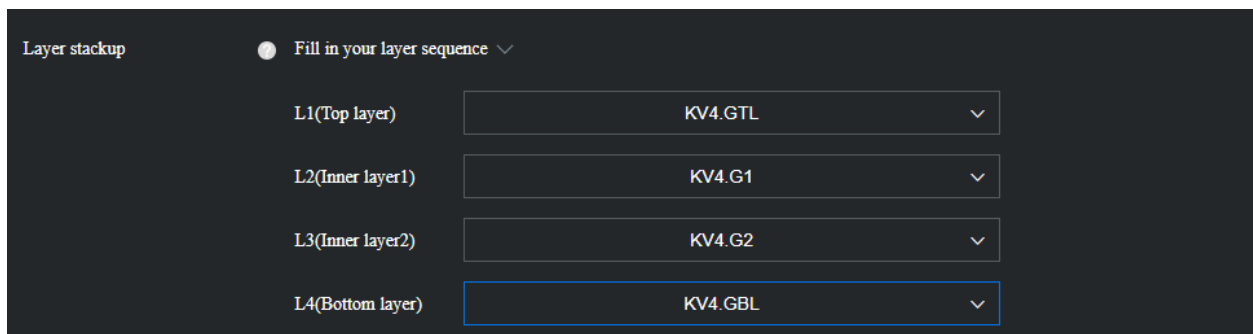Wait for the upload to complete, this may take a minute or two:

1.1.3 Configure the Board Specifications

Once uploaded you can configured different parameters about your board, leave most as default except for layer stack up:

Link the Layer stackup with the following settings:

1.2 Configuring the Topside SMT

1.2.1 Enable SMT Assembly

Enable SMT assembly by clicking the switch on the right near the bottom of the window:

Select the quantity of LED boards you would like assembled, 2 or 5. For more you will need to order one board first, test it, and then repurchase from the site with your confirmed files:

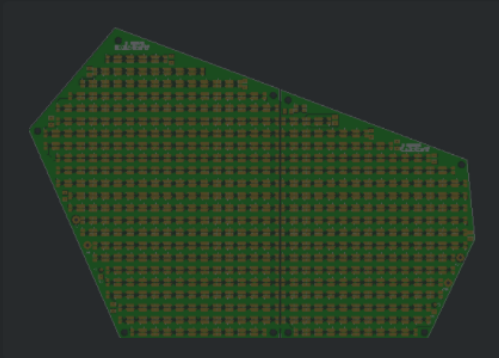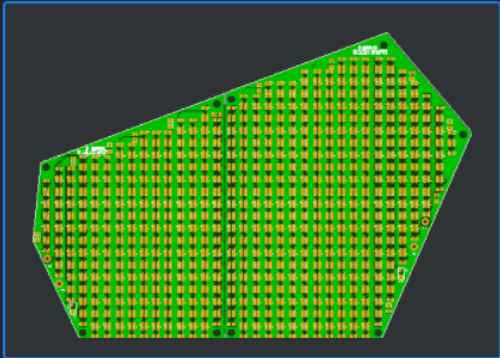Click confirm to continue to the rest of the process.

1.2.2 Add the Bill of Materials

On the next page, click "Add BOM File".
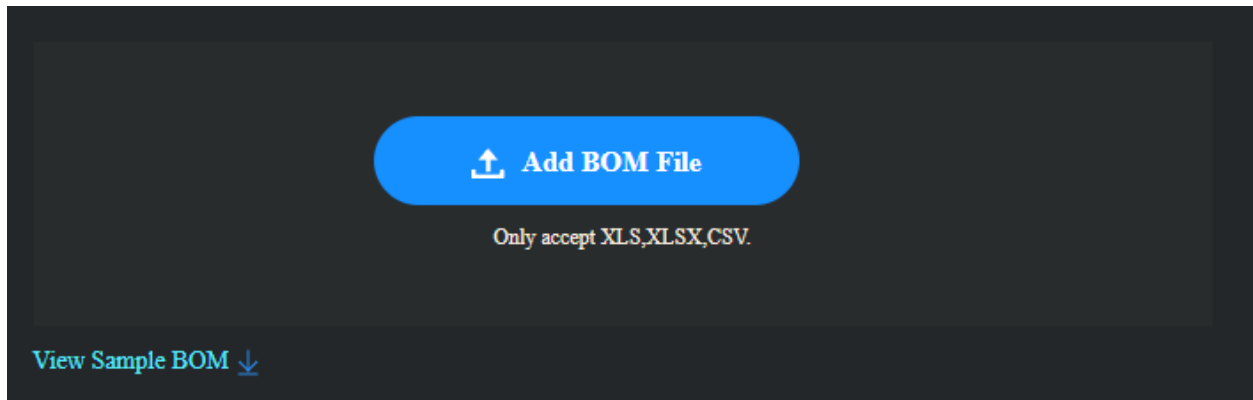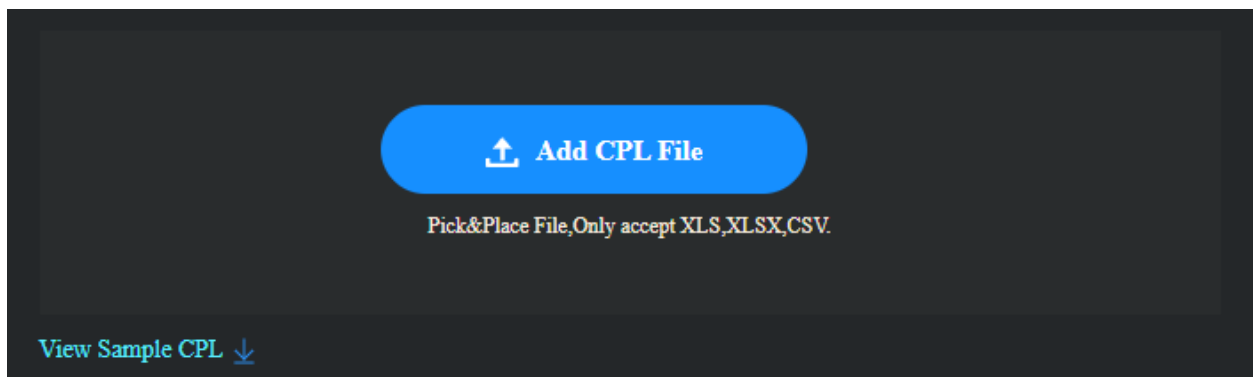

Select BOM_KV4.csv:

1.2.3 Add the Pick and Place File

Add the pick and place CPL file:

Select PickPlaceKV4_Top.csv:

Click next or manually search the Matched Part detail if the WS2812B-Mini or compatible does not show up:

1.2.4 Add Topside LED Panel to Cart

Add the panels to your cart and continue to order the bottom LED panels:

1.3 Configuring the Topside SMT

Repeat ALL the steps in section 1.1 and then continue at SMT assembly steps here:

1.3.1 Enable SMT Assembly

Click the switch on the left to enable SMT assembly:

Select Assemble Bottom side, select the quantity that you would like and then click confirm:
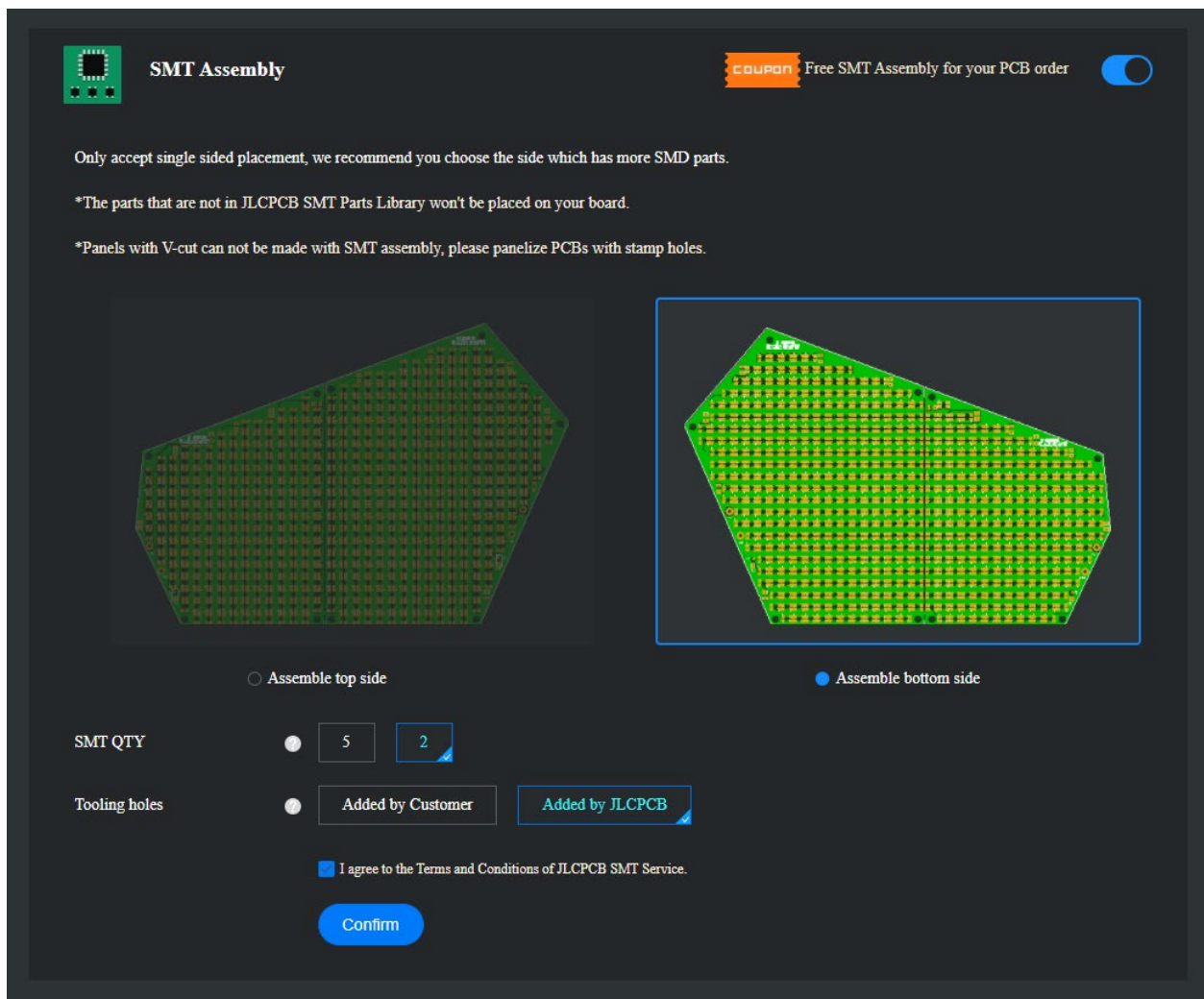
1.2.2 Add the Bill of Materials

Click "Add BOM File" to upload the bill of materials:
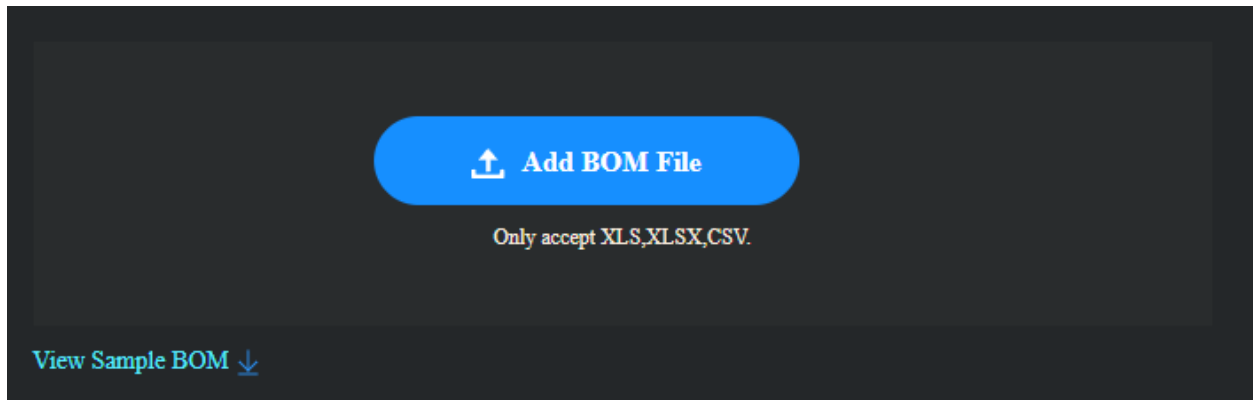
Select BOM_KV4.csv:

1.2.3 Add the Pick and Place File

Click "Add CPL File":

Select PickPlaceKV4_Bottom.csv:

Select next or set the Matched Part Detail to the WS2812B-Mini or equivalent:

1.2.4 Add Bottom Side LED Panel to Cart

Save this to your cart and proceed with purchasing the LED boards.

2 Using the LED Panels

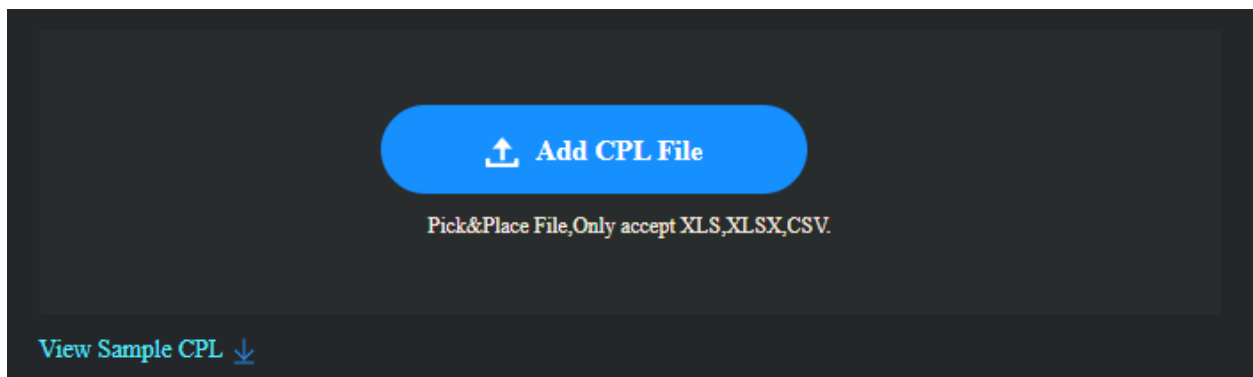These LED boards use WS2812B-Mini serialized LEDs, these are glorified LED strips and can be controlled with the same controller! Each board has 571 LEDs which need to be controlled. This can be done through several means; I would recommend using my ProtoTracer program which will ray trace a live 3D model of a Protogen face to the LED panel in real time! You can find this here:
https://github.com/coelacant1/ProtoTracer

An alternative is to use FastLED with Arduino and manually define the pixels in order.

The hardware necessary to controller the panels is a Teensy 4.0 microcontroller:
https://www.pjrc.com/store/teensy40.html and an OctoWS2811 LED controller:
https://www.pjrc.com/store/octo28_adaptor.html

To use this, include the ProtoV2Controller.h as the primary controller and pick the animation to display on the face from the animations class. Use the KaiborgV1 animation as a default Protogen face.

To increase the framerate the boards can be split in two with the perforation in the middle.

2.1 Top-Side LED Panel

As stated, before these panels are essentially LED strips, the order of the LEDs follows the pattern as below. The exact positions of each LED can be found in the PickPlace files in the Gerber folder.

2.2 Bottom-Side LED Panel

Bottom VIEW

Data In Split

Data Out

Data In

Data Out Split
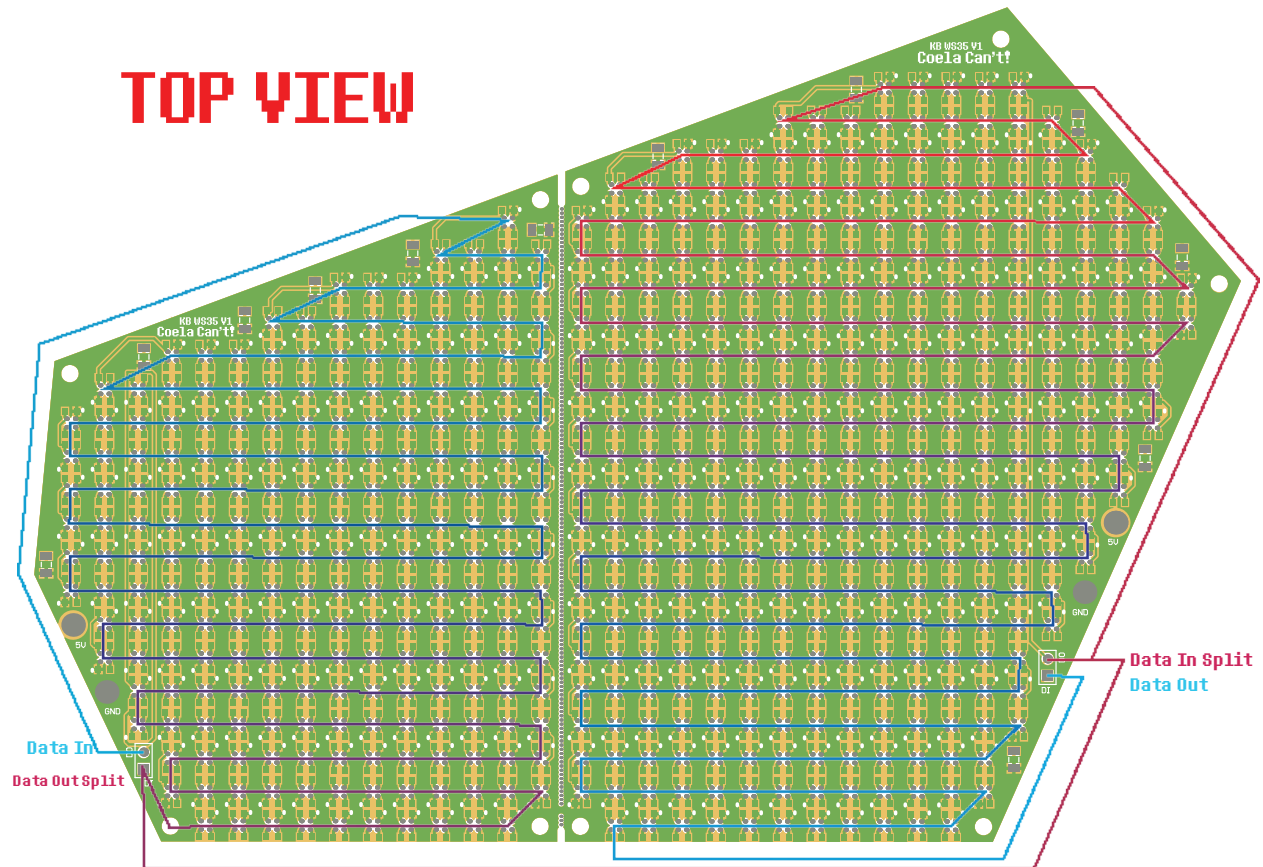
3 Troubleshooting

3.1 Manufacturing Issues

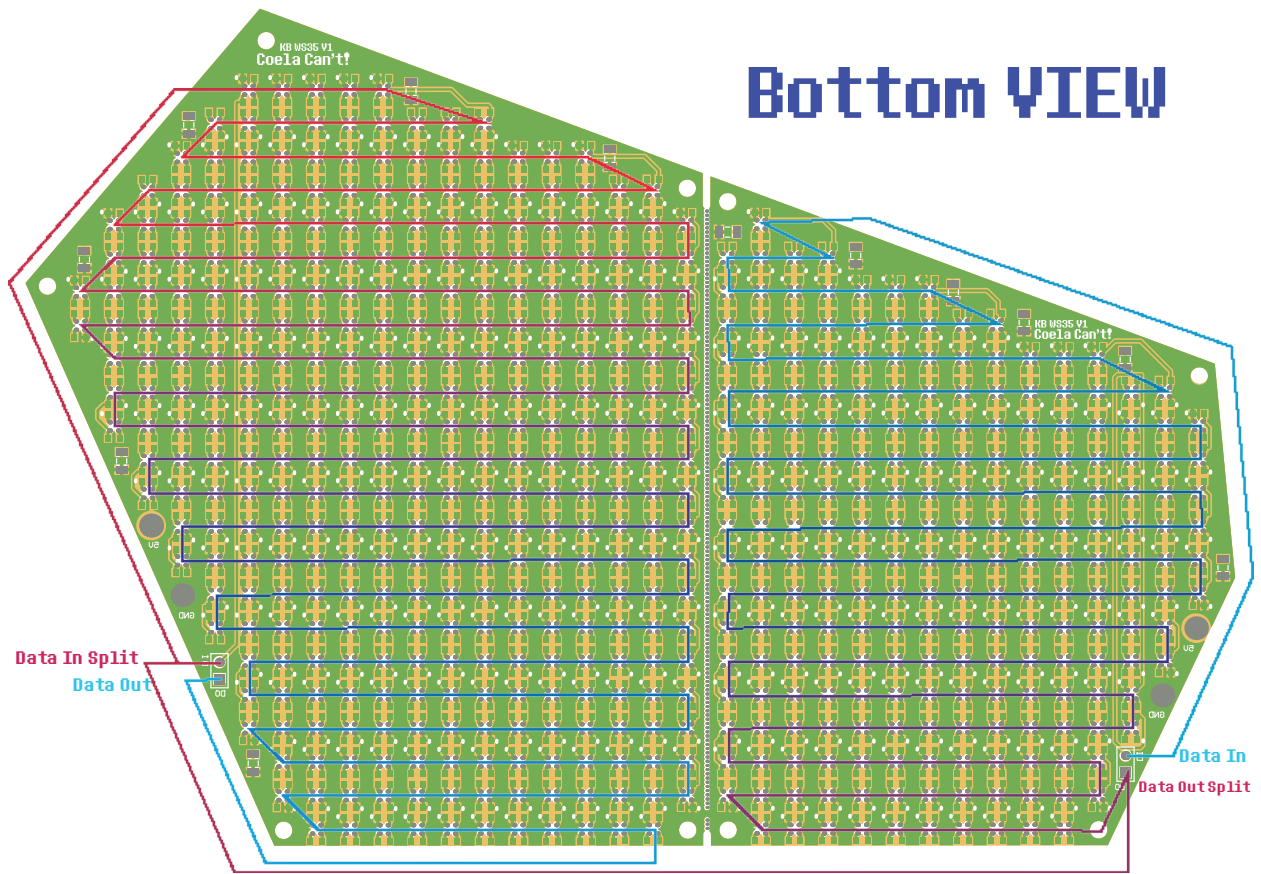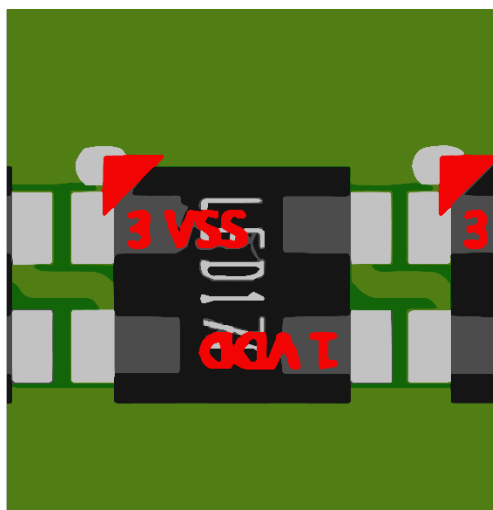If asked by the manufacturing engineer about the polarity of the LEDs, ensure their uploaded diagrams match the following images:
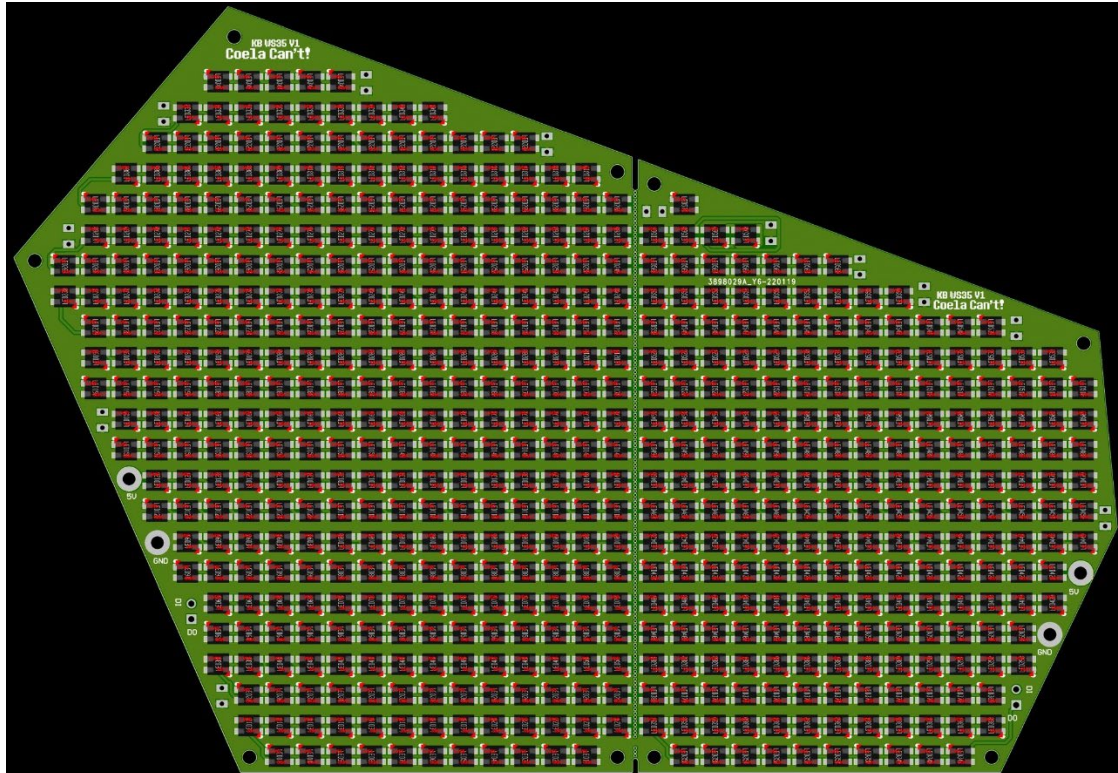
If the dot marker on the board is not aligned with the arrow on the LED, then request that they flip the polarity. If the boards are populated in the incorrect polarity, they will still function. But +5V will switch with GND and DIN will switch with DOUT.

4 Contact Information

If you have any questions that this document did not answer, or have recommendations please let me know at any of my messaging platforms here: https://linktr.ee/coelacant1

For easiest and quickest responses, use Telegram: @coelacant1, Twitter: @coelacant1, or Discord: @Coelacanth#1250