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ErgoDox Keyboard Assembly Instructions ([Configurator](https://www.massdrop.com/ext/ergodox) ([/web/20150214045516/https://www.massdrop.com/ext/ergodox](https://www.massdrop.com/ext/ergodox)))

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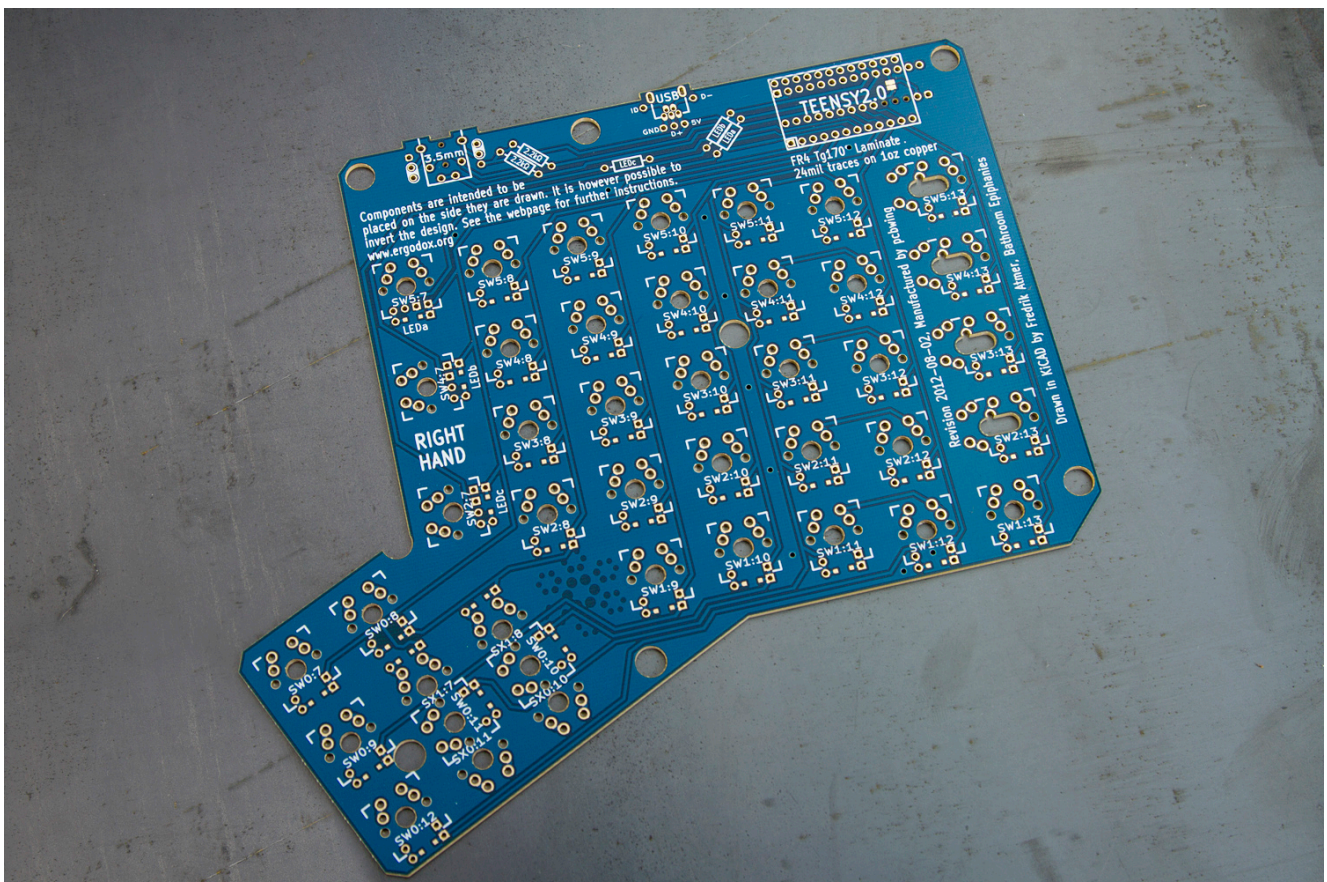
Step 1: Preparation

Prepare the components and tools for the assembly. We recommend a temperature-controlled soldering iron with a flat tip. Here is the list of included components required for the keyboard assembly; you'll find a few extras in the box.

NOTE: Check to make sure that the PCB fits inside [plate #2](#). You may have to do a little sanding of the PCB/case corners to make it fit.

- 2 x PCB
- 10 x Acrylic case Plates (see [this image](#) for layer ordering)
- 1 x Teensy USB Board, Version 2
- 1 x MCP23018 I/O expander
- 2 x 3.5mm TRRS connectors
- 1 x USB mini B plug
- 1 x 0.1uF ceramic capacitor
- 76 x 1N4148W-7-F diode (surface-mount)
- 1 x 2.2k ohm resistor
- 3 x 3mm T1 LED
- 2 x 220 ohm resistor
- 76 x Cherry MX switch
- 2 x USB cable Male A to male mini B
- 1 x TRRS cable
- 14 x Case screws/nuts (16 for Full cases)



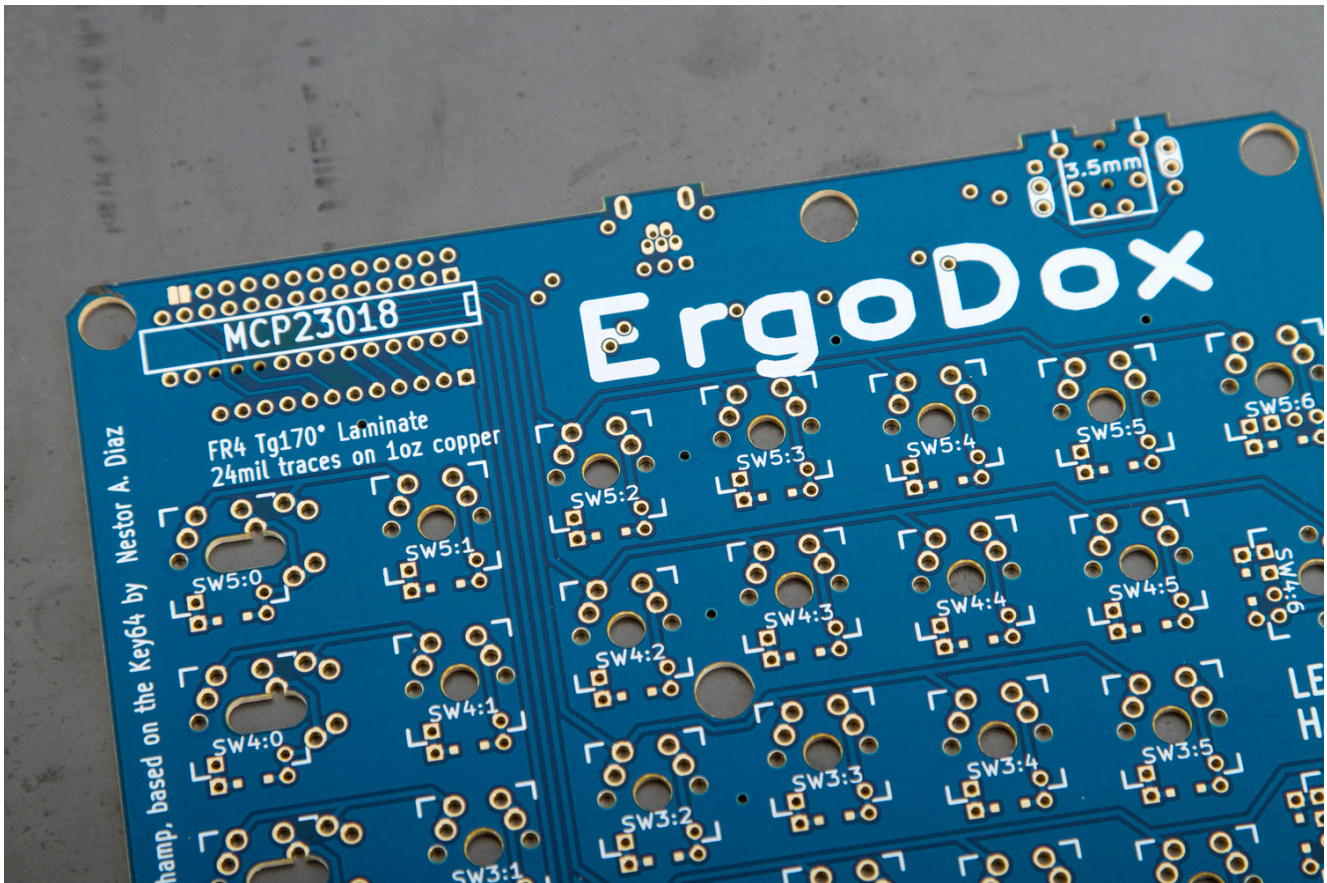
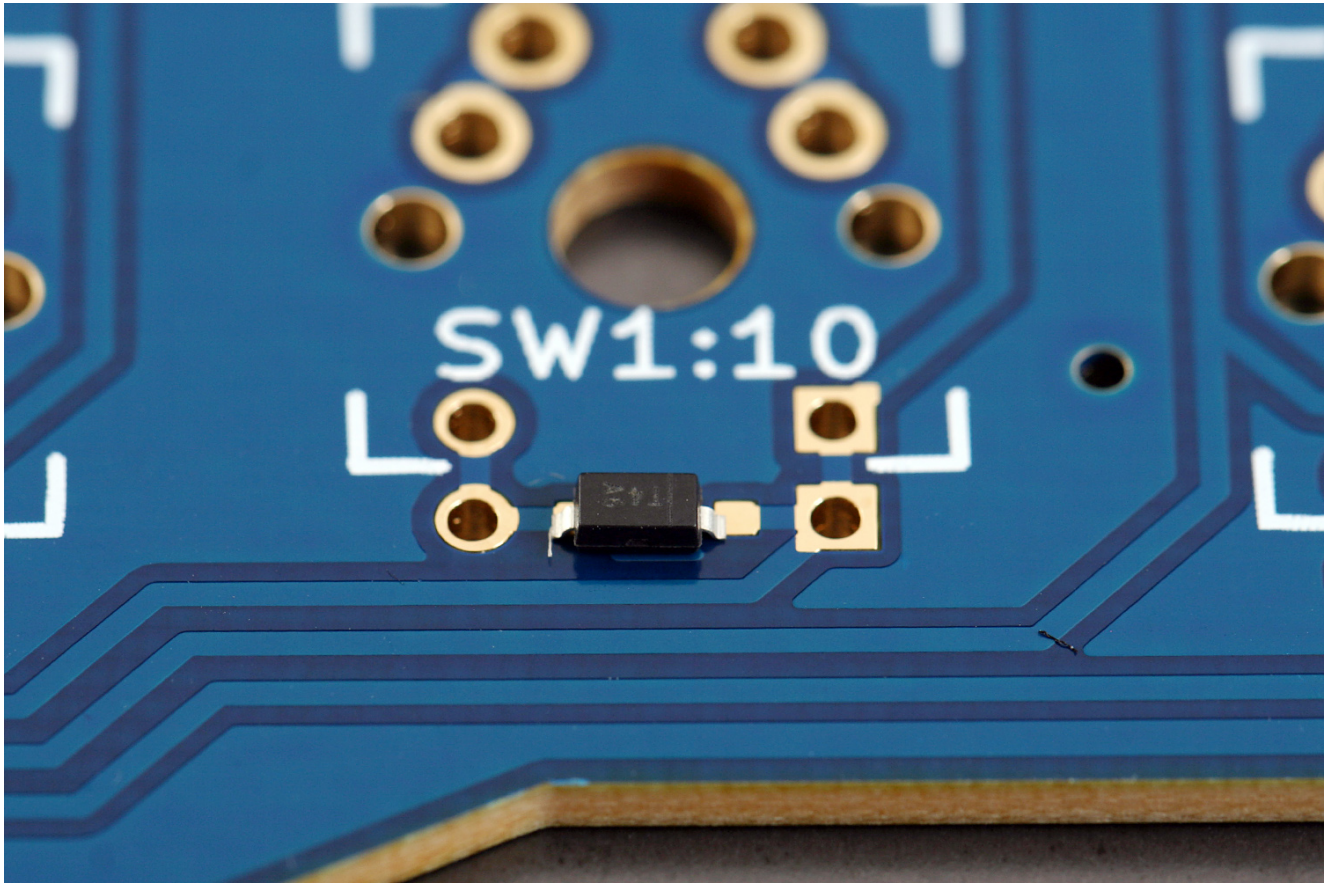




Step 2: Diodes

Solder the surface mount diodes onto the backside of the PCB for both the left hand side and right hand side PCB. Note the cathode of the diode (denoted with a line) connects to the square pad on the PCB.

Do that for all the keys.





Step 3: Resistors

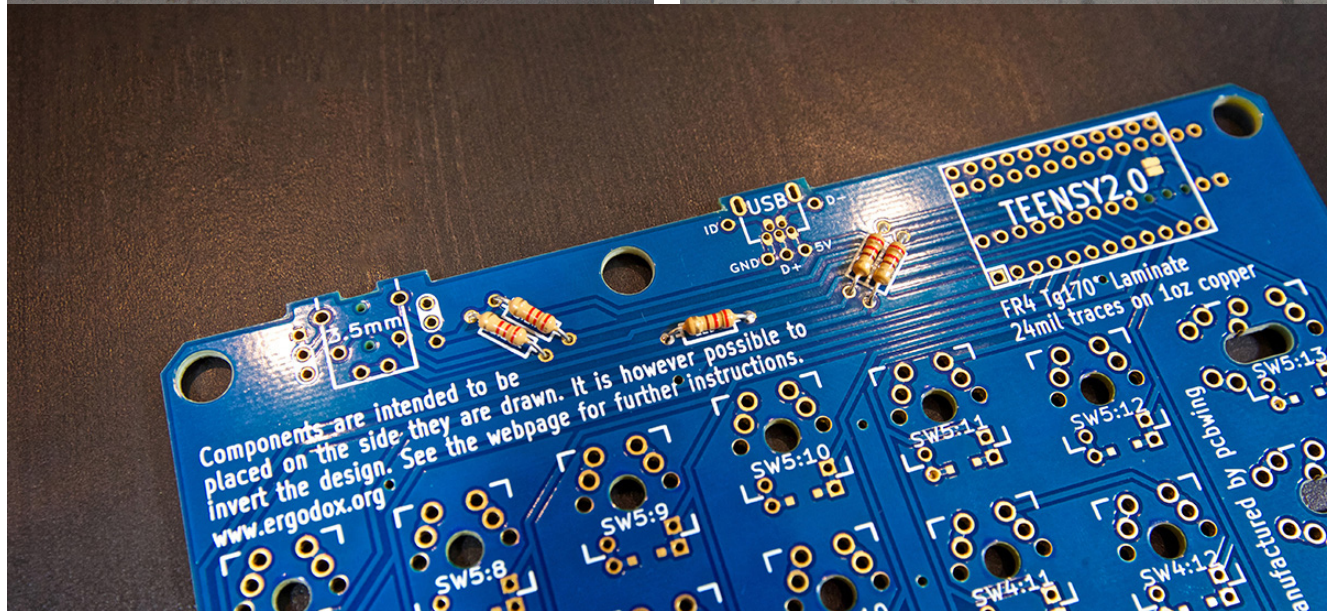
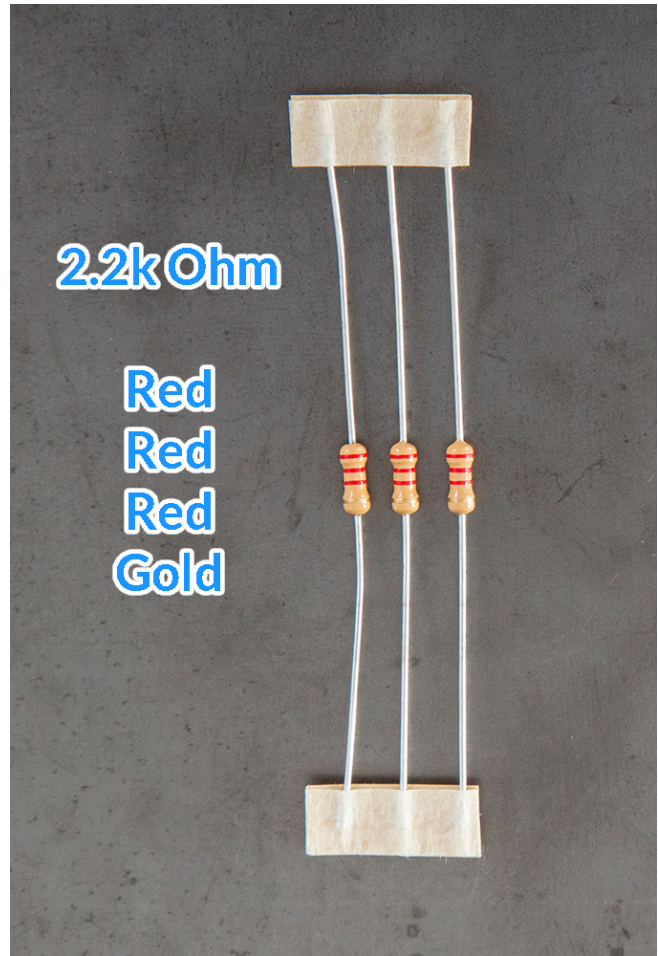
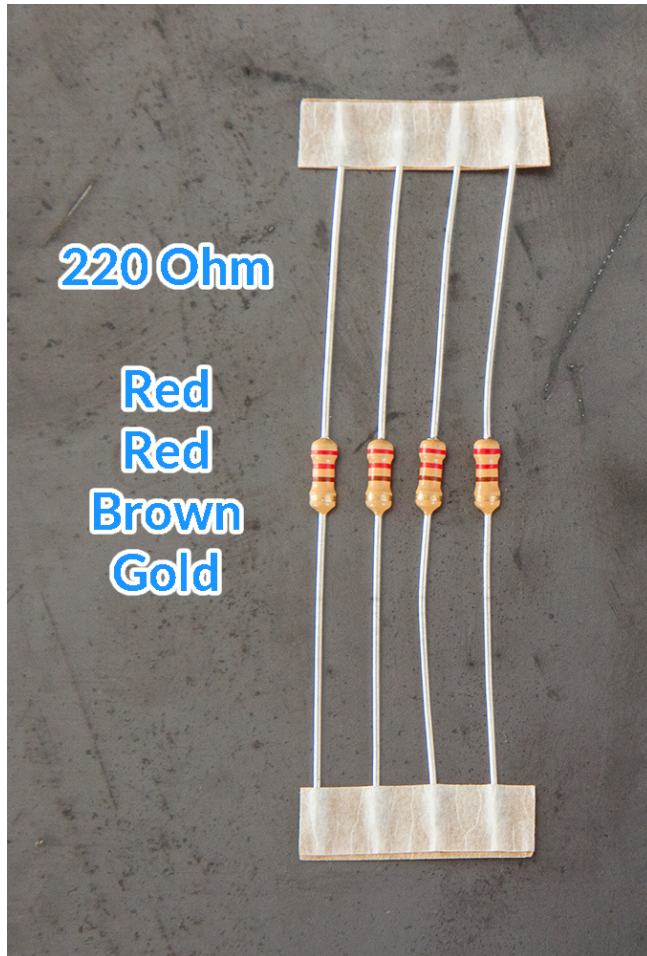
On the right hand side PCB, solder two 2.2k Ω resistors on the two resistor outlines on the PCB labeled "2.2k Ω ". And solder three 220 Ω resistors on the three resistor outlines on the PCB labeled "LEDa", "LEDb", and "LEDc".

You can use this site to determine which resistor is which.

<http://www.digikey.com/en/resources/conversion-calculators/conversion-calculator-resistor-color-code-4-band>

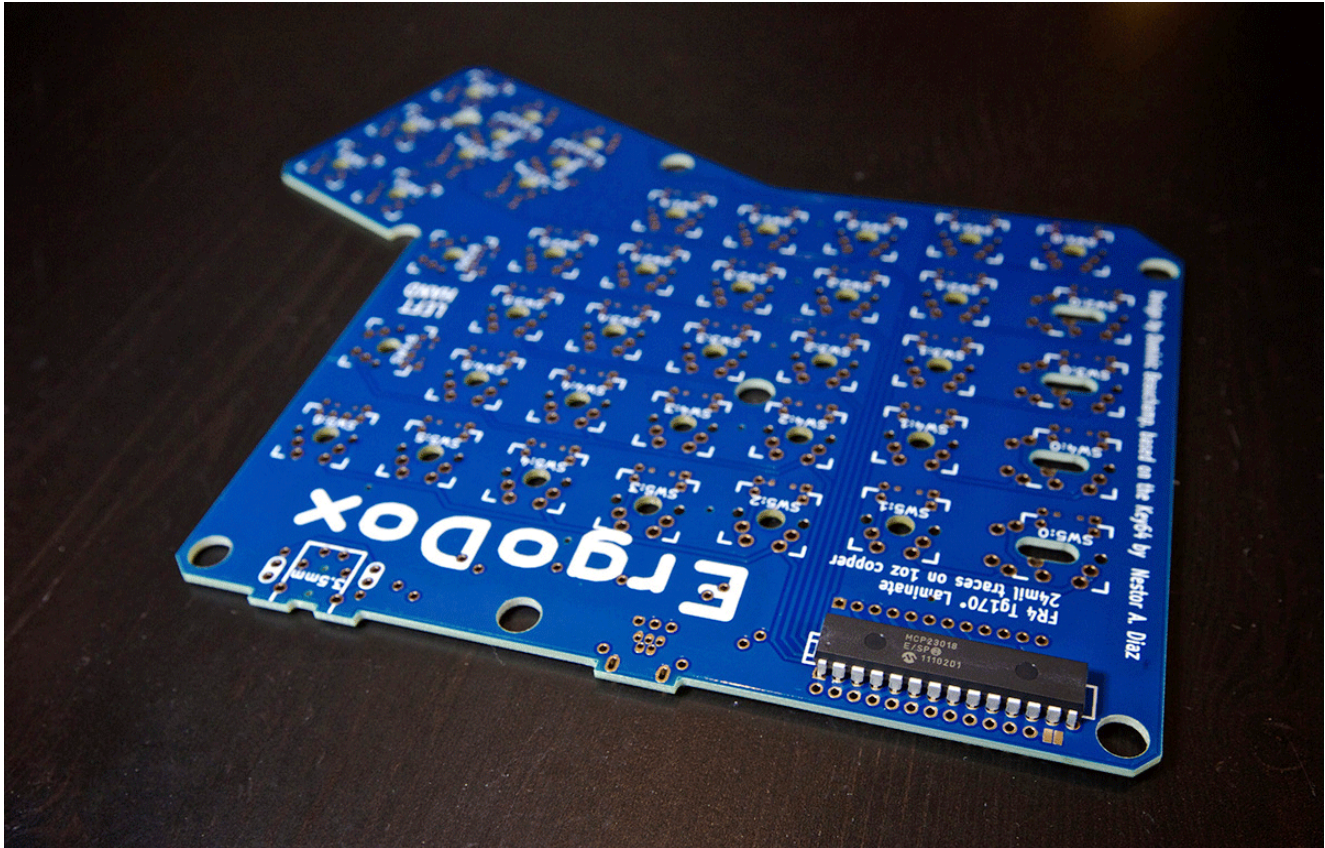
<http://web.archive.org/web/20150214045516/http://www.digikey.com/en/resources/conversion-calculators/conversion-calculator-resistor-color-code-4-band>

NOTE: These components (and the electronic components from subsequent steps) will be on the opposite side of the PCB from the diodes. This is so the PCB will sit flush against the sandwiched case plate, as well as allowing access to the diodes after the switches are soldered in place.



Step 4: I/O Expander

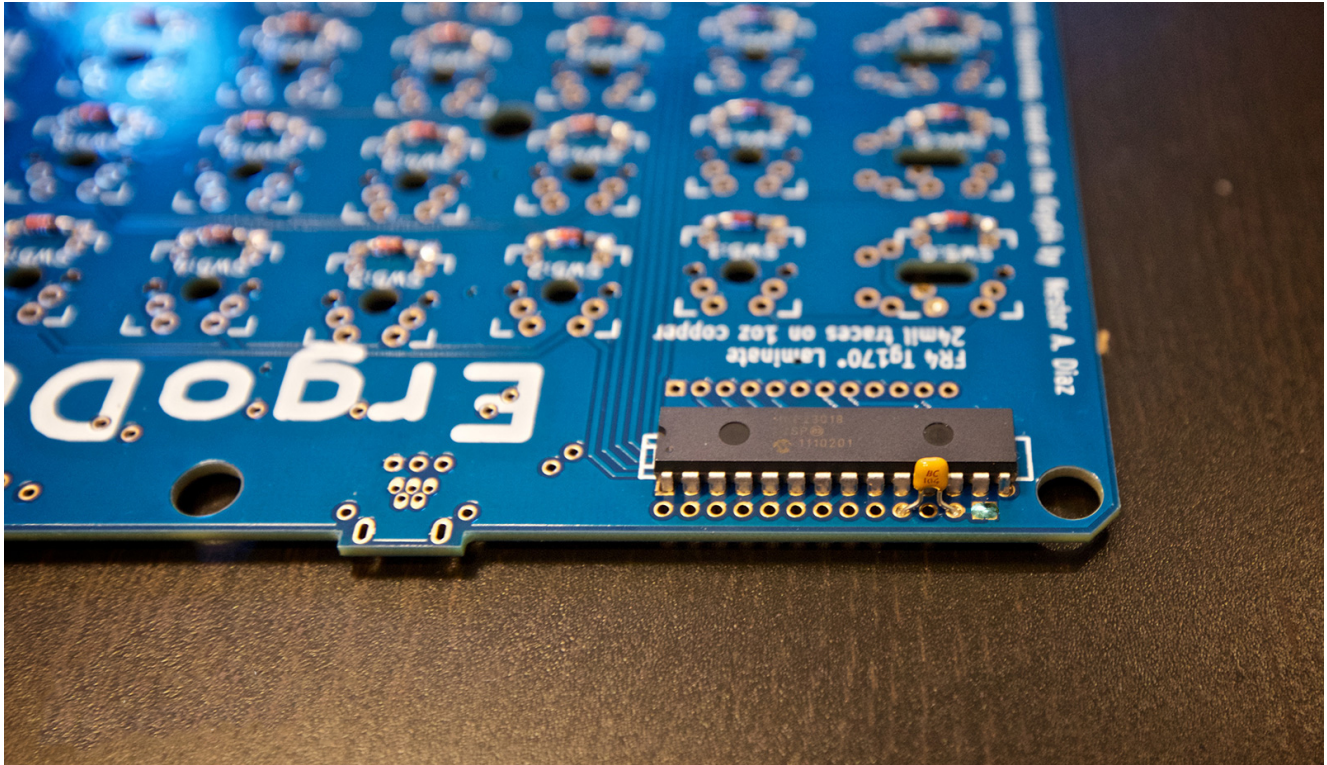
Solder the MCP23018 I/O expander on the left hand side PCB. Note the location of the ground on the chip.



Step 4.1 (optional).

Solder the ceramic capacitor as shown in the image, and bridge the two rectangular pads next to the capacitor. For keyboard with aluminum casing, it is recommended to double check the clearance between the PCB, capacitor connection points, and the solder points in case of potential short circuit.

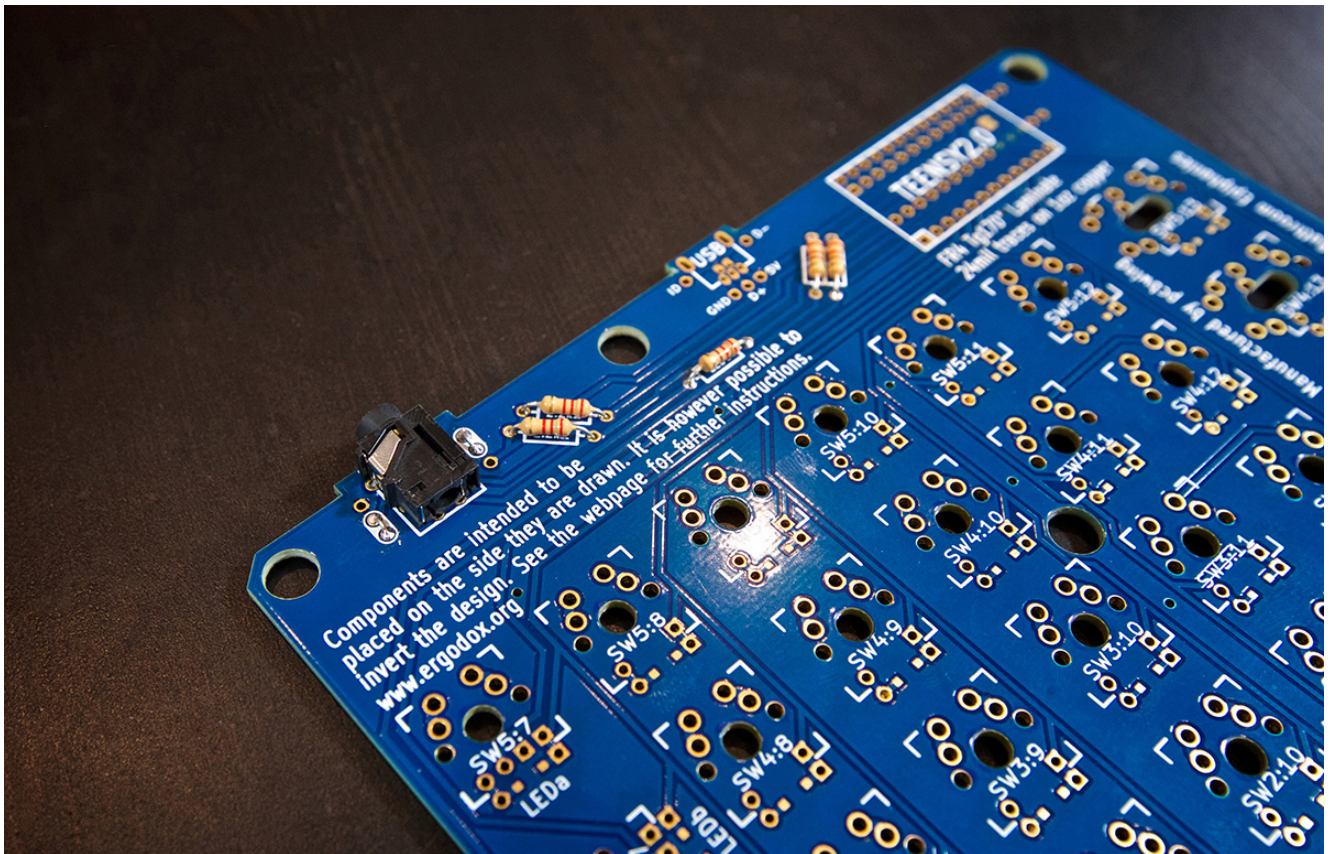
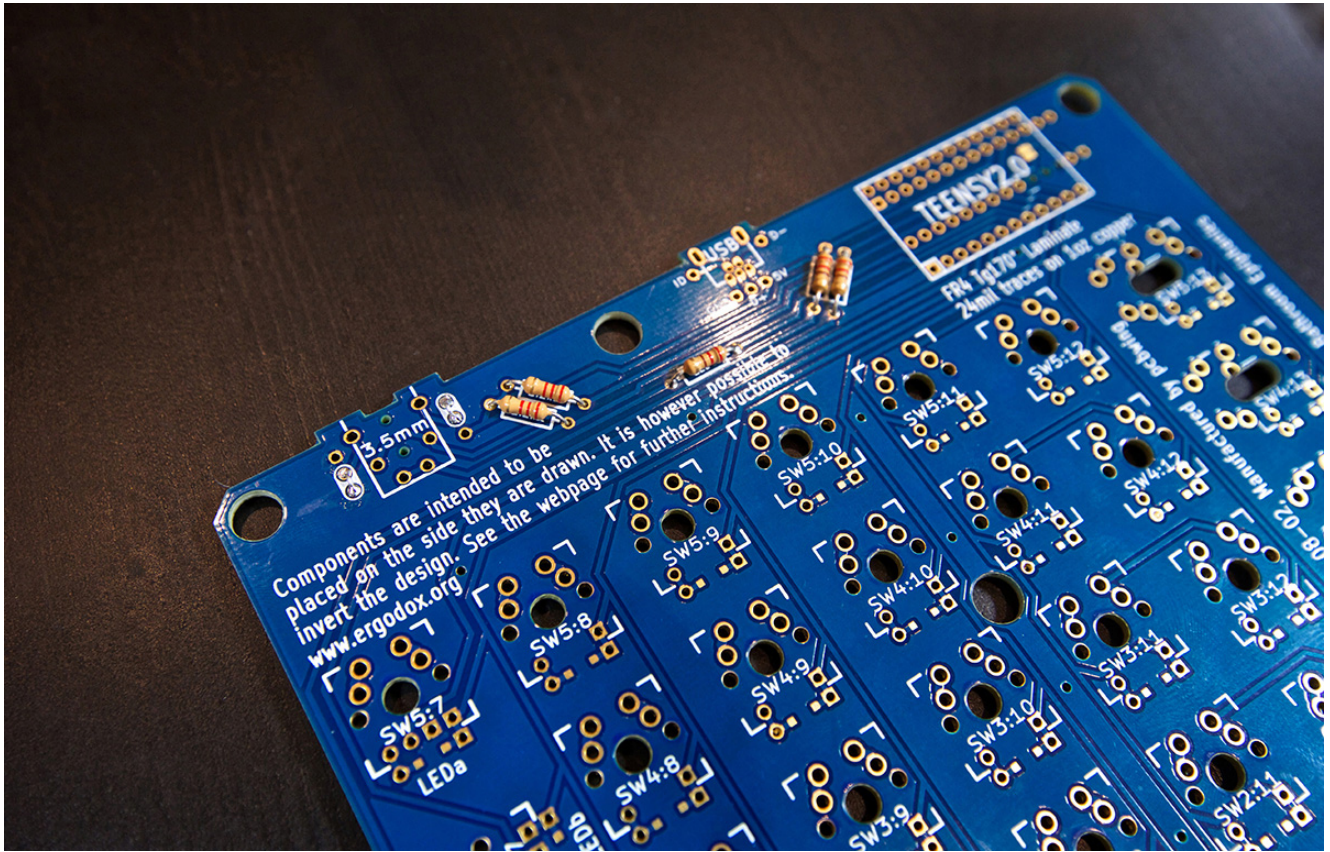
The capacitor is for cleaning the electric signal, and it's not required for the functionality of the keyboard.

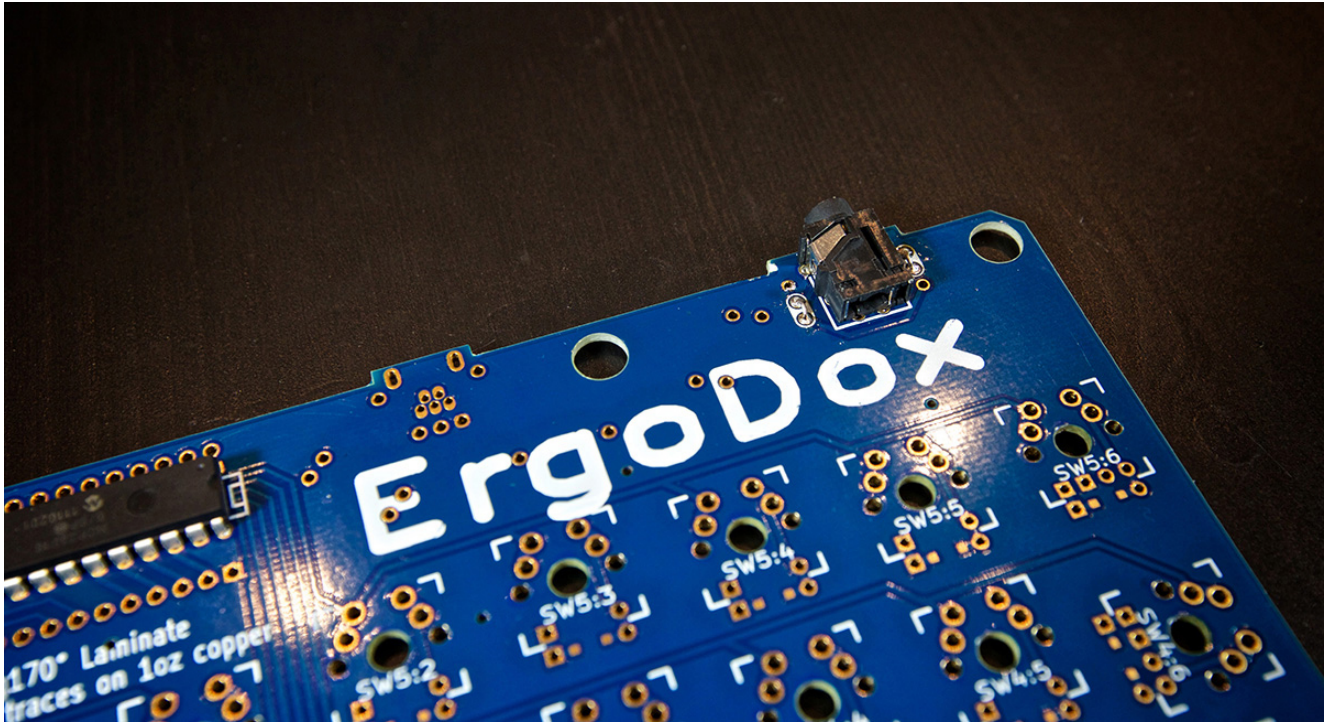


Step 5: TRRS Connector

First, jump wire and short the two sets of connections with white outline on both the left hand side and right hand side of PCB as shown in the first image. Then solder on the TRRS connectors.

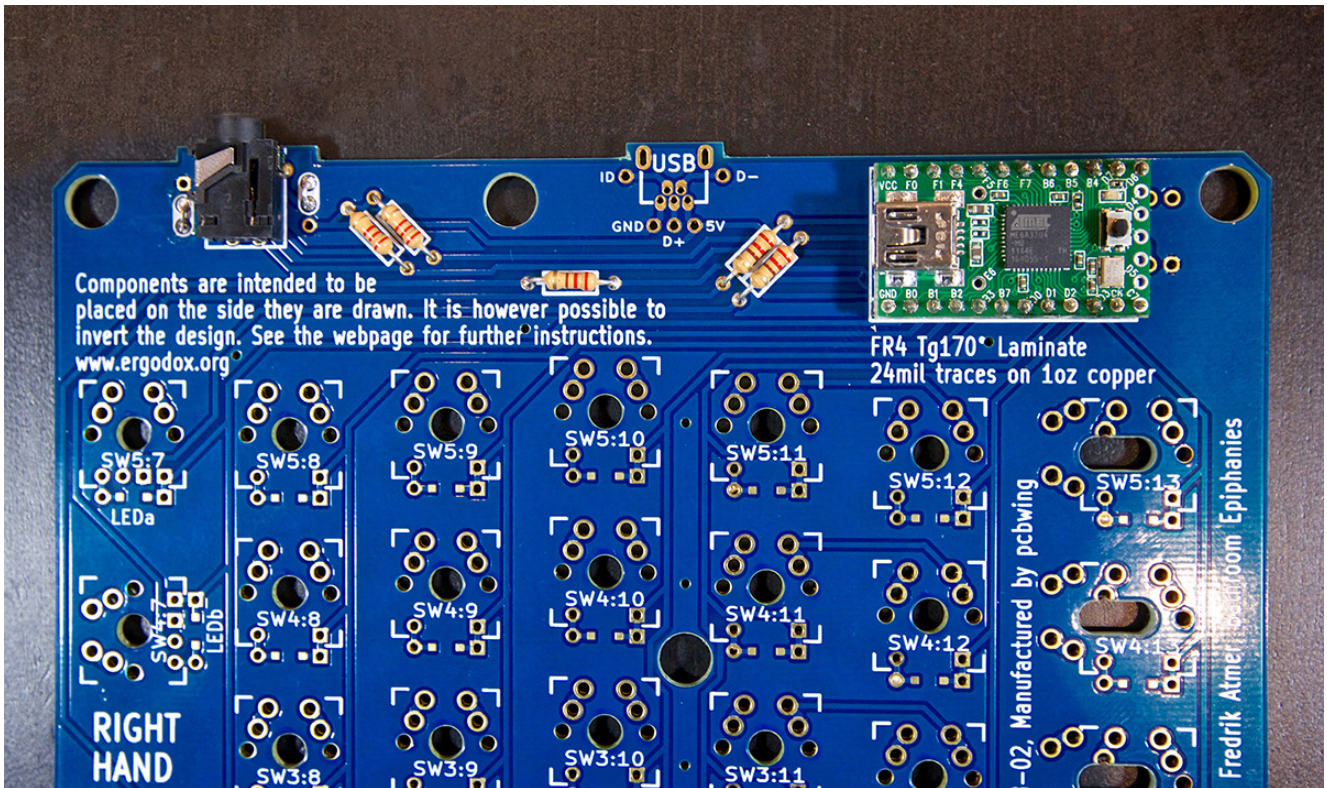






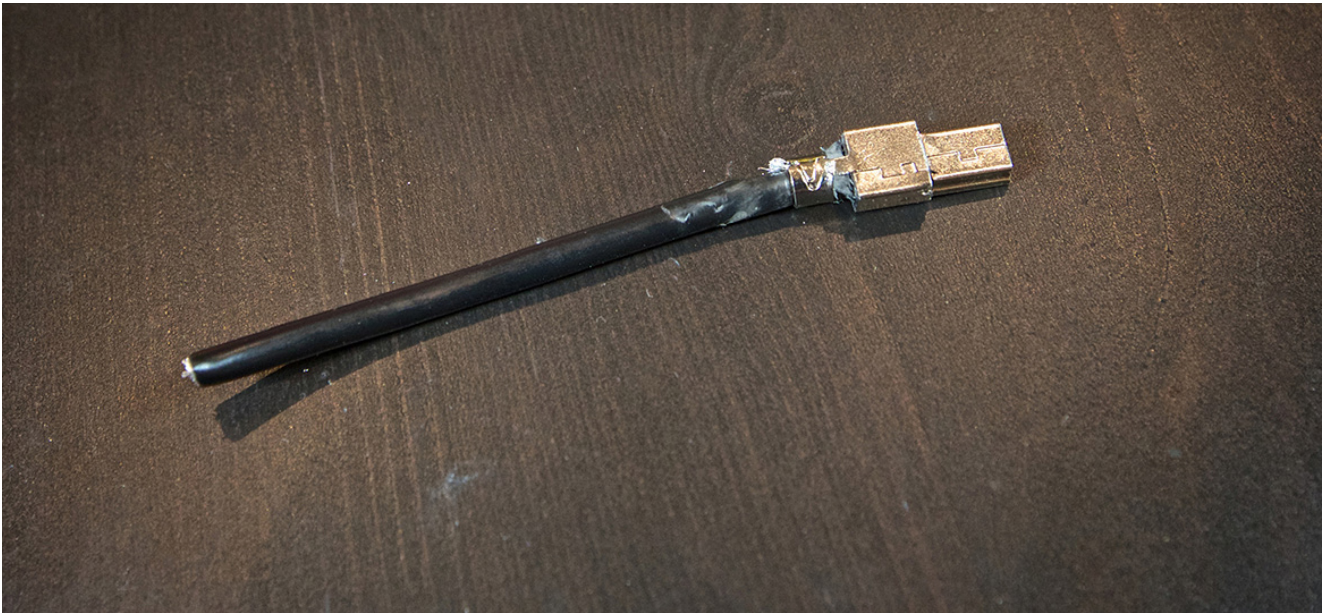
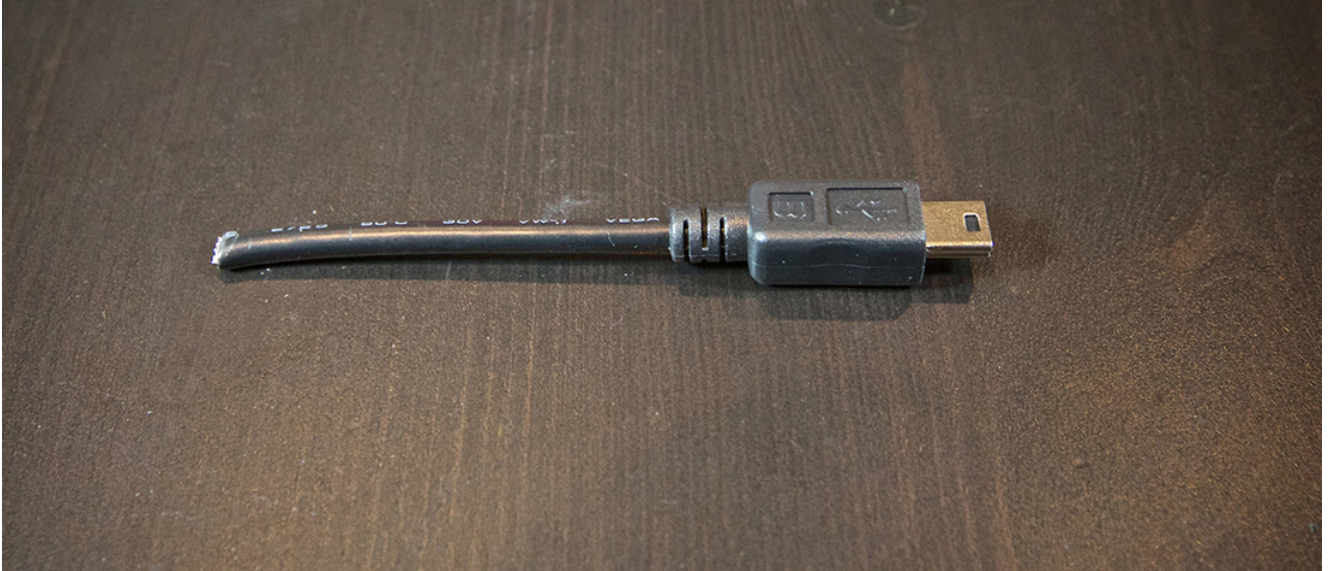
Step 6: Teensy

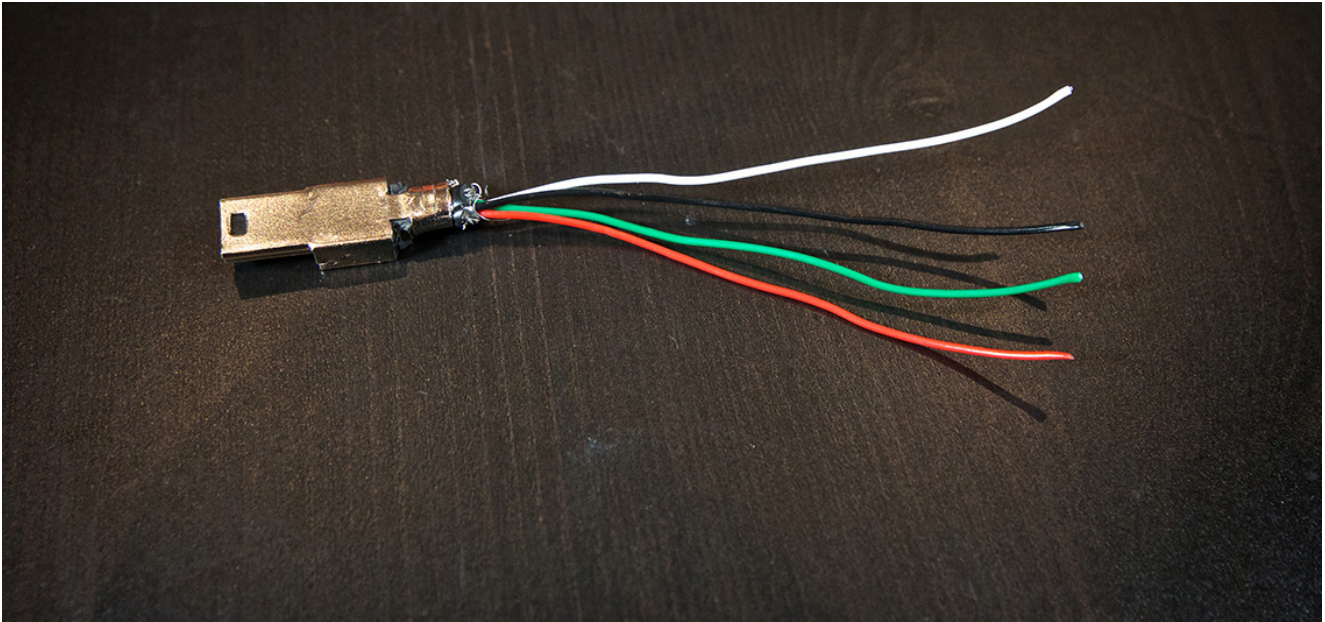
Solder on the Teensy board on the right hand side PCB.



Step 7: USB Connector

Cut off the USB cable and cut open the mini USB connector side of the cable.





Step 8: USB Connector Cont.

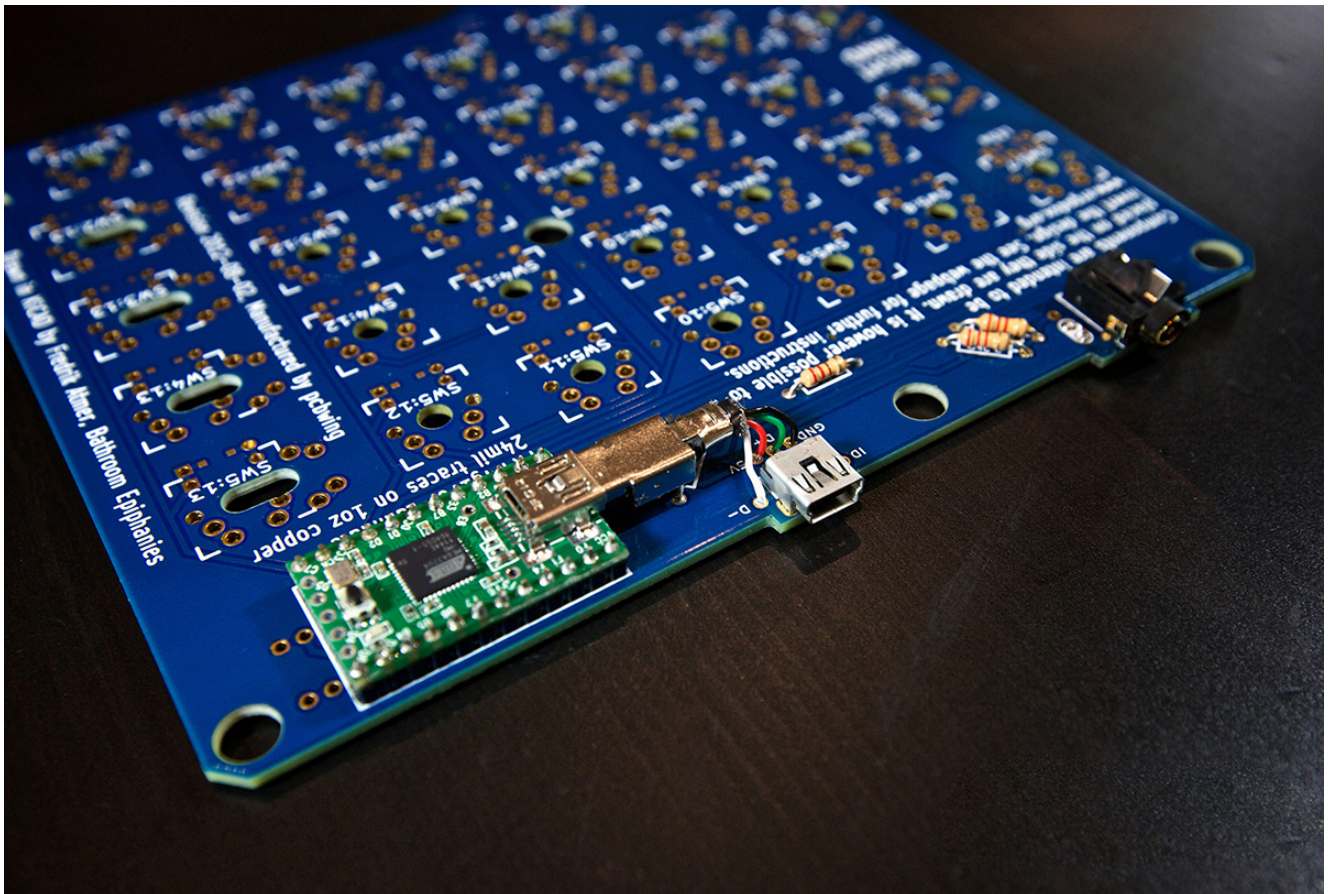
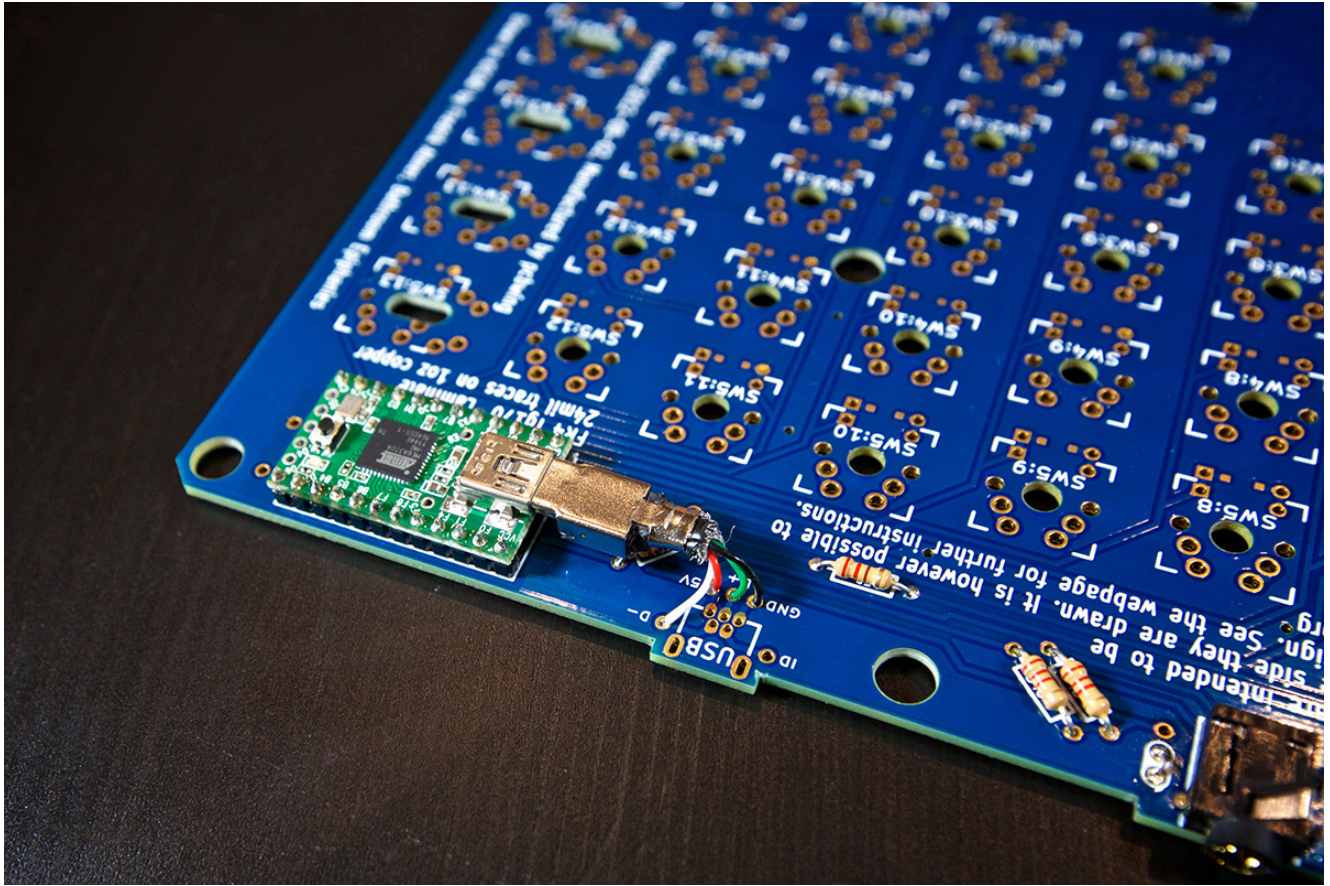
Connect mini USB male connector to the Teensy board, and solder the black, white, green, and red wires onto the board.

Black - GND

White - D-

Green - D+

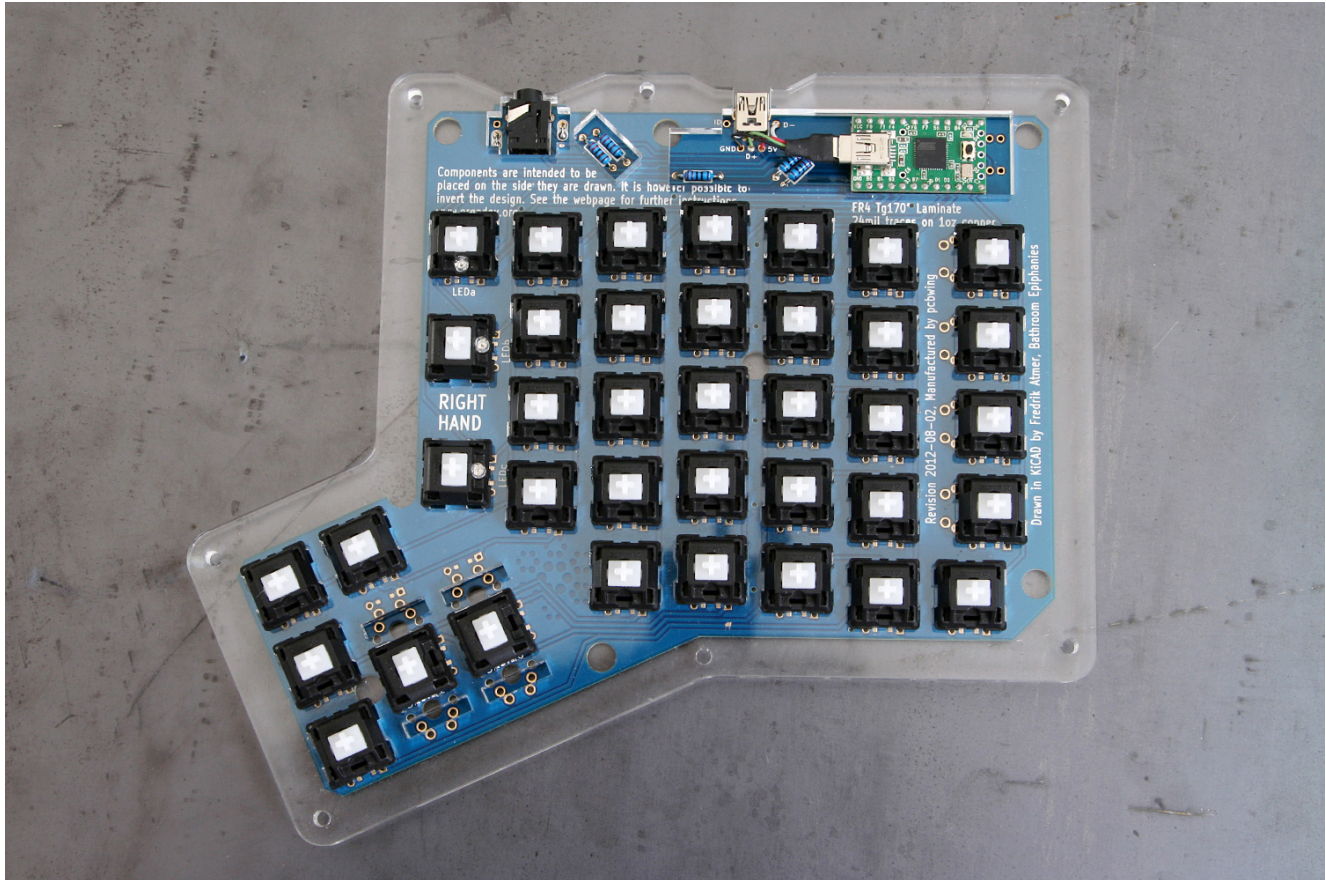
Red - 5V

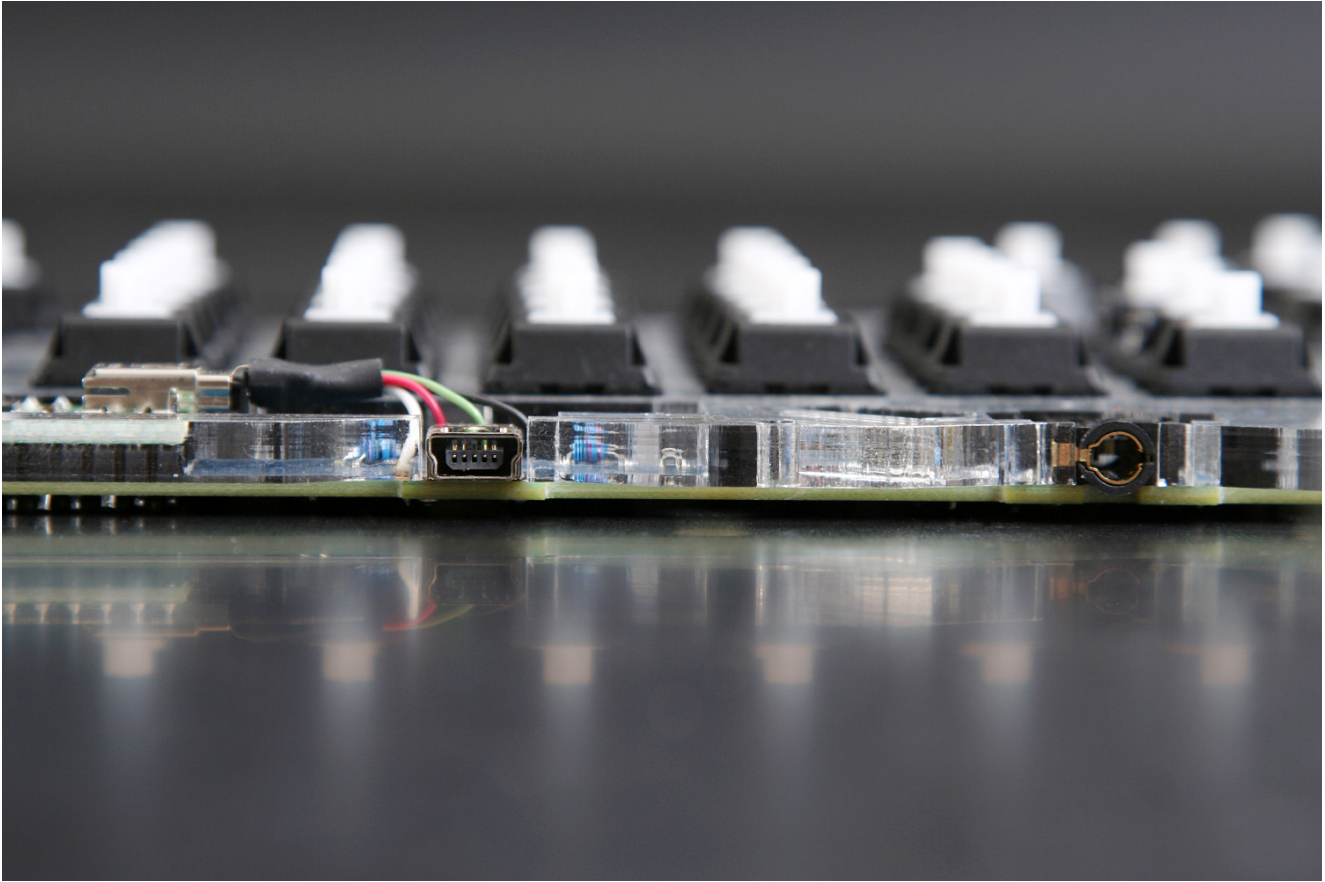


Step 9: Switches

Finally, start soldering the key switches on to the PCB with case plate layer #3 sandwiched in the middle.

For SW2:7, SW4:7, and SW5:7, also solder LEDs. Note the polarity of the LED. The long end of the LED connection goes to the square pad on the PCB.





Step 10: Teensy Firmware

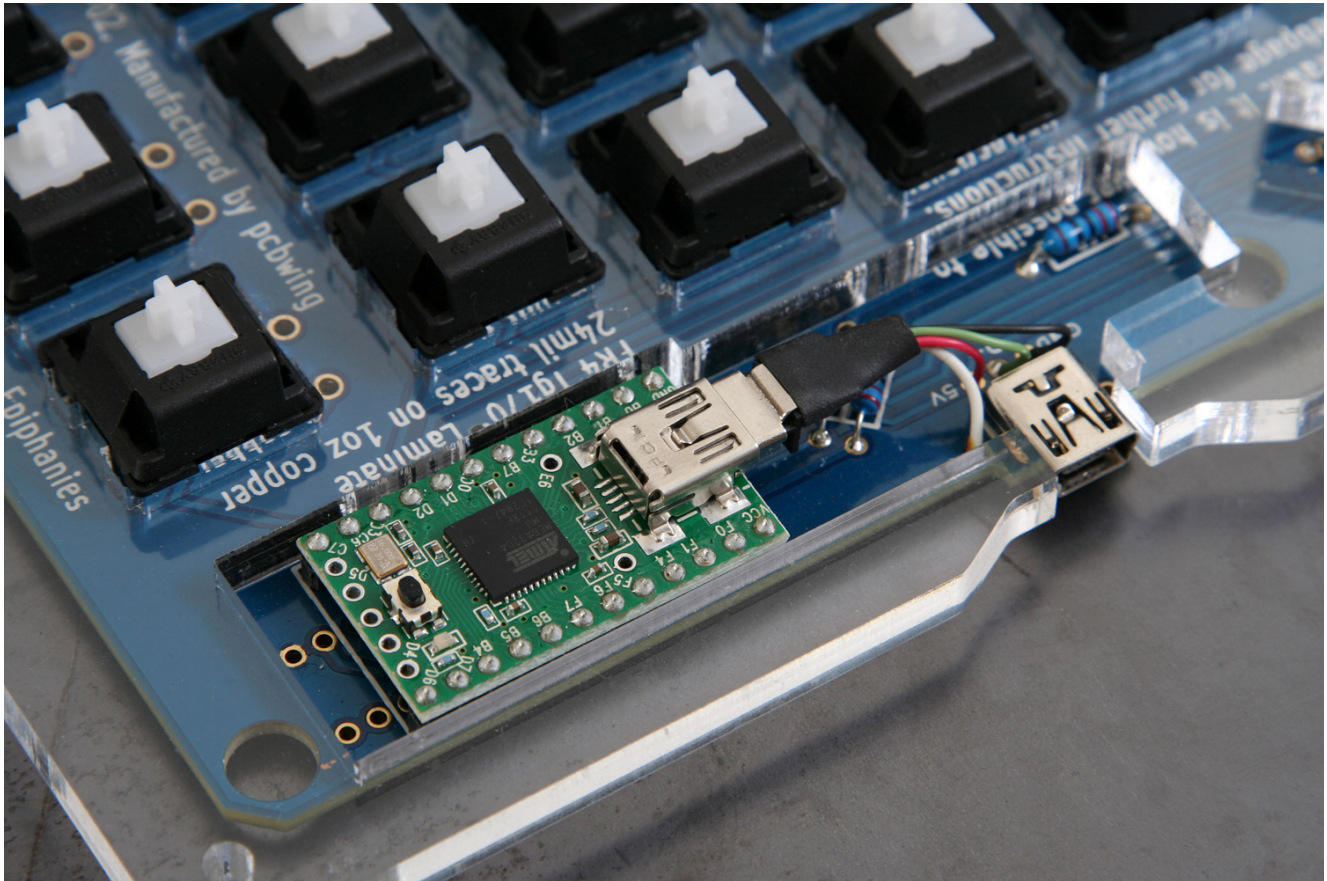
Updating the firmware on the Teensy board.

Required files

- Teensy Loader Application - <http://www.pjrc.com/teensy/loader.html>
(<http://web.archive.org/web/20150214045516/http://www.pjrc.com/teensy/loader.html>)
- Ergodox Firmware - <https://github.com/benblazak/ergodox-firmware#downloading-binaries>
(<http://web.archive.org/web/20150214045516/https://github.com/benblazak/ergodox-firmware#downloading-binaries>)

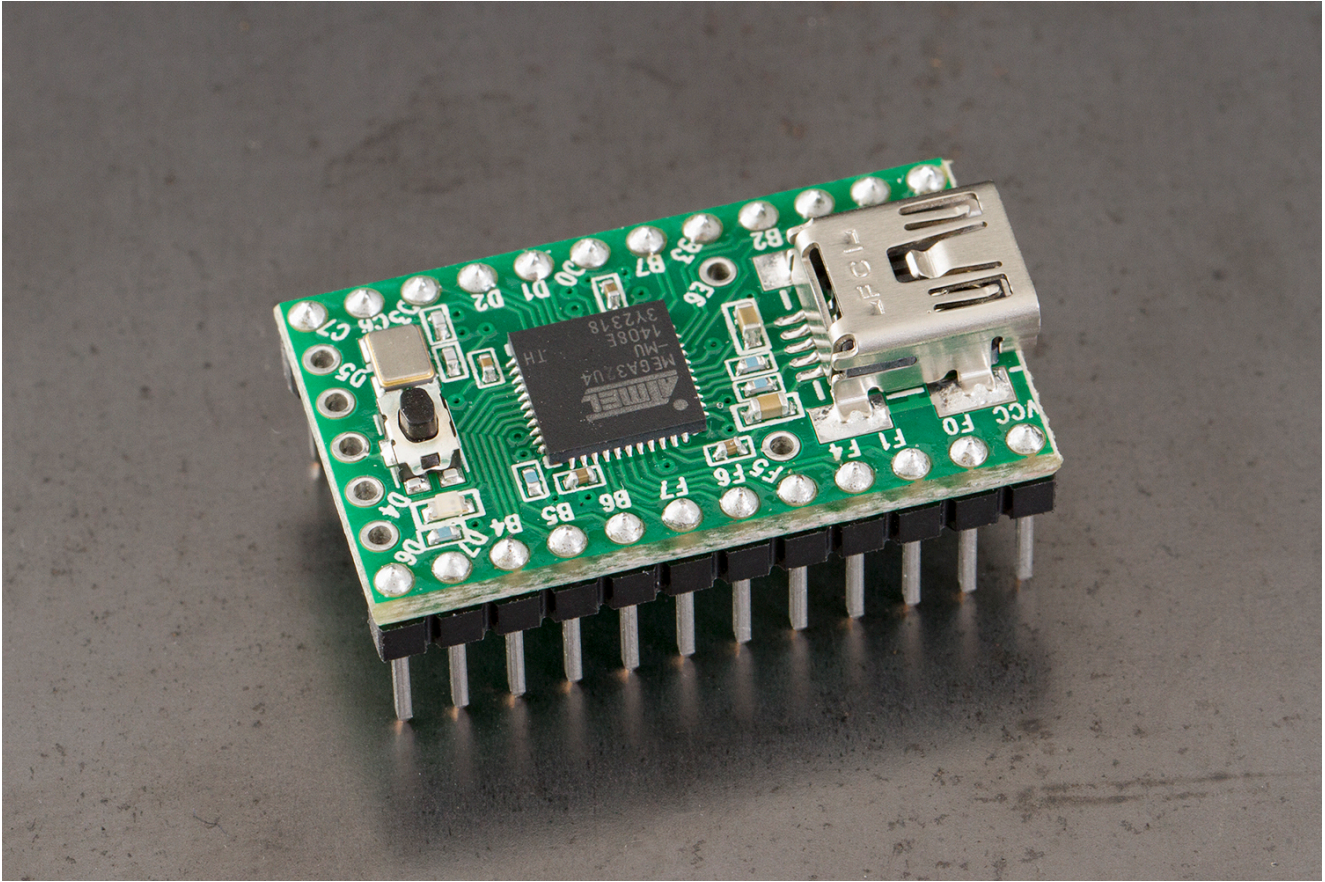
For the firmware, you only need to download the file with the keyboard layout you want. If you are unfamiliar with different keyboard layouts, [here is one you can download](#) (<http://web.archive.org/web/20150214045516/https://d3jqoivu6qpygv.cloudfront.net/downloads/ergodox/20121220--qwerty-kinesis-mod.zip>).

Full credit for developing this firmware goes to Ben Blazak and contributors to the [Github project](#) (<http://web.archive.org/web/20150214045516/https://github.com/benblazak/ergodox-firmware>).



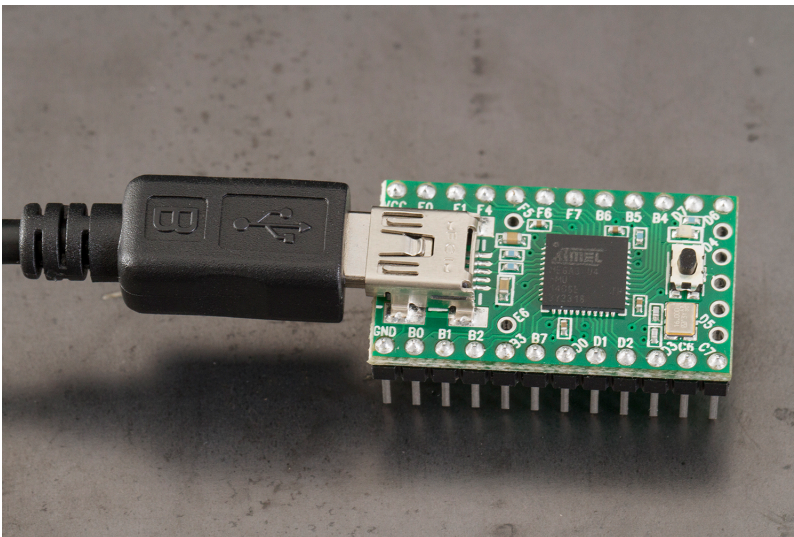
Step 11: Teensy Firmware

Ensure you have access to the pushbutton on the Teensy board (requires the top acrylic sheet of the keyboard to be removed).



Step 12: Teensy Connection

Connect the keyboard to your computer via a USB (A/Mini-B) cable. If the keyboard is using a fresh Teensy board, the LED on the board should blink on and off every two seconds. This is the default program loaded on the board.



Step 13: Teensy Loader App

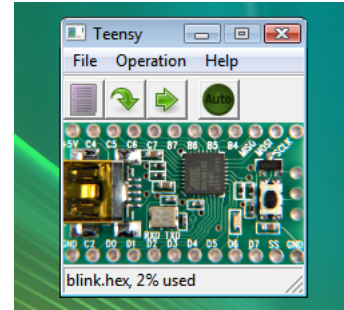
Run the Teensy Loader Application.



Mac



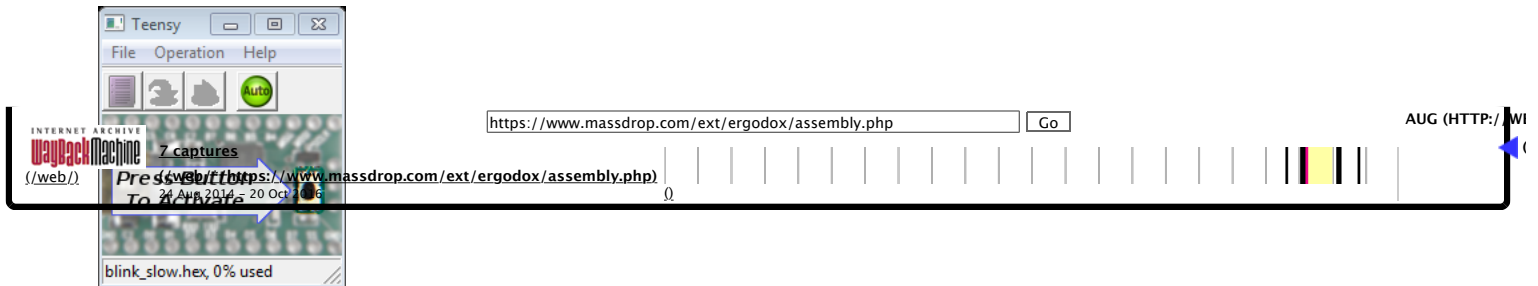
Linux



Windows

Step 14: Push Teensy Button

Click the Auto button (right-most button in the toolbar). It should light up to a brighter green and instructs the program to load the current file onto the Teensy board.

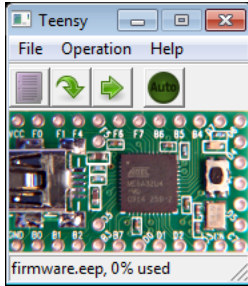


Step 15: Teensy Firmware

Extract the Ergodox Firmware binaries from the .zip file.

Step 16: Teensy Loader Files

Drag and drop the .eep file onto the Teensy Loader. The bottom bar should now read "firmware.eep", followed by the percentage of the memory used by the program.

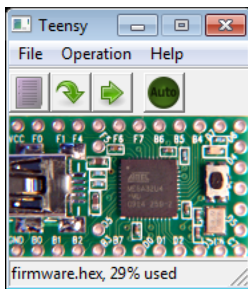


Step 17: Teensy Reset Button

Press and release the Teensy reset button ([see Step 12](#)). A Reboot OK message should flash on the Teensy Loader, and you may get the following warning (everything is fine, don't worry).

Step 18: Load Firmware Hex File

Drag and drop the .hex file onto the Teensy Loader. The bottom bar should now read "firmware.hex", followed by the percentage of the memory used by the program.



Step 19: Click Auto Button

Click the Auto button. Wait for the loader to complete programming and rebooting.

Step 20: Final Teensy Firmware Reset

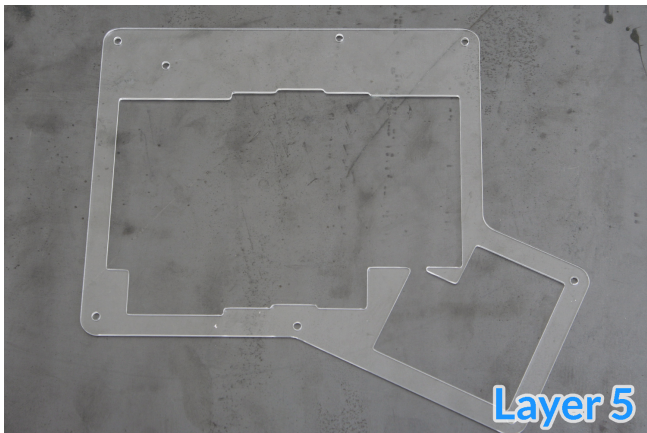
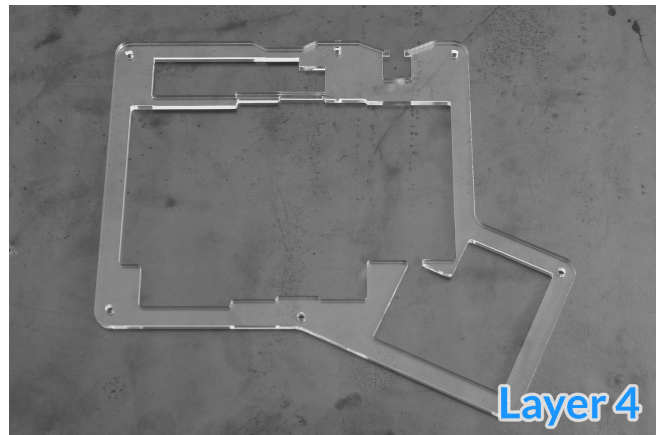
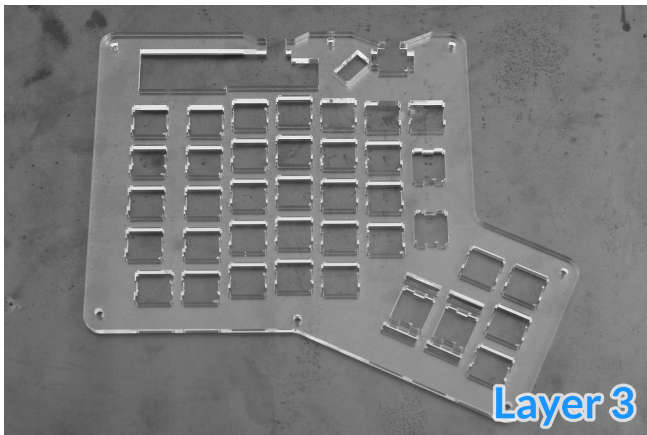
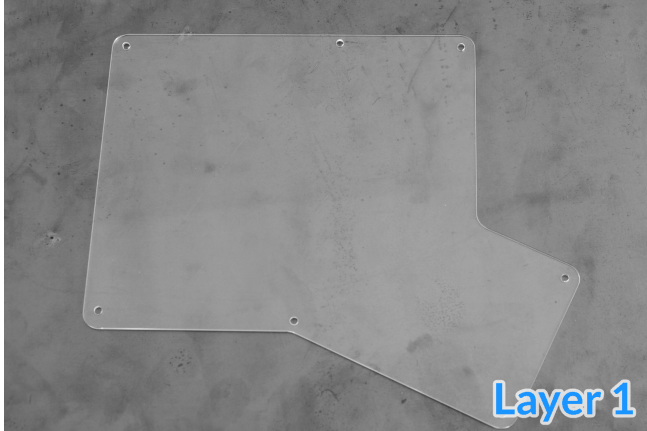
Press and release the Teensy reset button (see Step 1). Your keyboard should now be accepting inputs!

Complete!

Stack up the acrylic case plates as illustrated in the image below (left hand pictured), and secure it with appropriate screws.

Enjoy your new awesome keyboard! Don't forget to configure it using our [ErgoDox Layout Configurator](https://www.massdrop.com/ext/ergodox) ([/web/20150214045516/https://www.massdrop.com/ext/ergodox](https://www.massdrop.com/ext/ergodox)).

Acrylic Layer Ordering Gallery







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