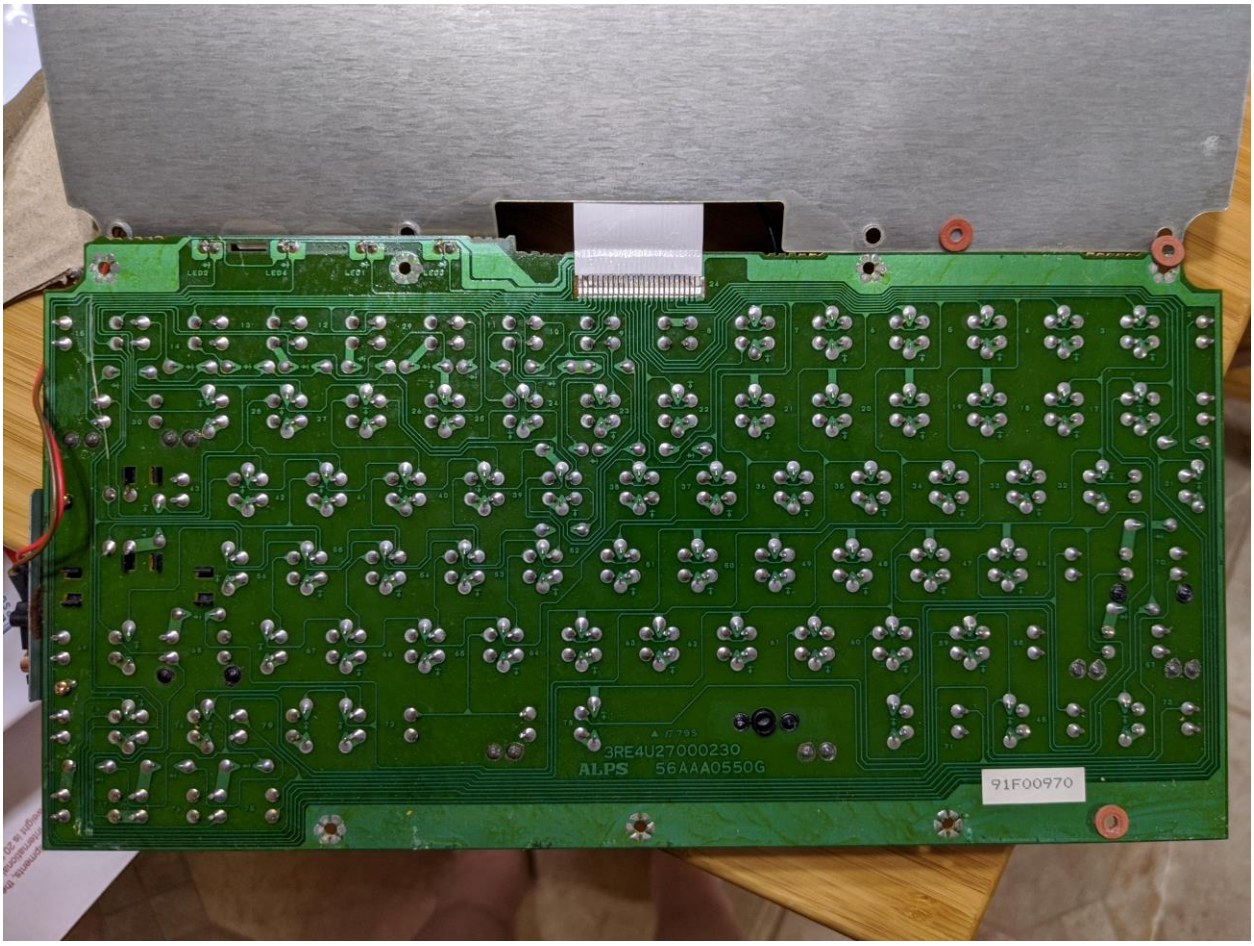
Zenith Supersport USB Keyboard Controller

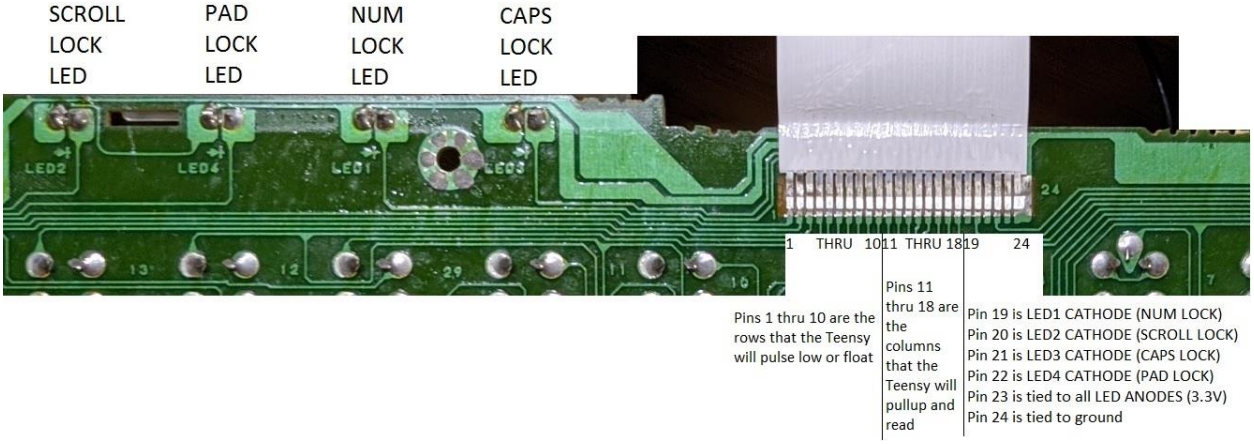
The keyboard removed from the case.

The keyboard backside.

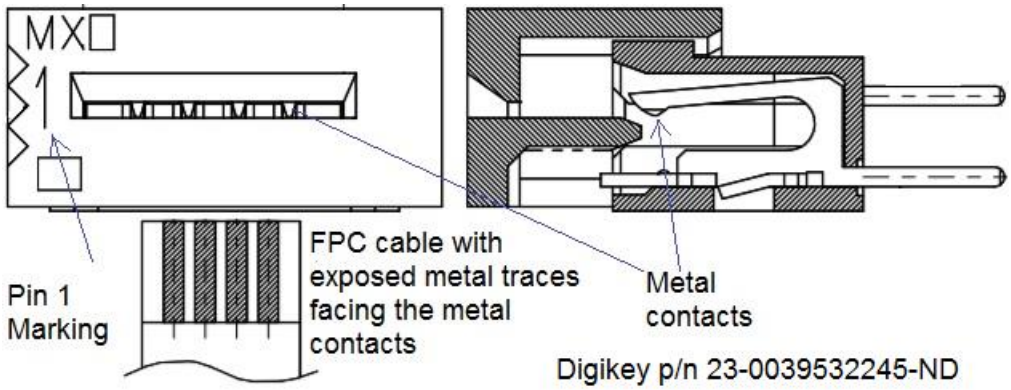


Close up of the FPC cable connections with descriptions.

Zenith Supersport SX Keyboard Connections as viewed from the backside



The FPC connector has a pin 1 marking on it but it may not coincide with the pin 1 position on the circuit board. Rotate the connector 180 degrees if necessary to make the exposed metal traces on the FPC cable coincide with the metal contacts inside the connector (see below).



The keyboard switches have diodes that must be hooked up with the cathodes on Teensy outputs and anodes on Teensy inputs with internal pullups.

FPC pin Description:

FPC24 = Ground

FPC23 = ALL LED ANODES (3.3V)

FPC22 = LED4 CATHODE (PAD LOCK)

FPC21 = LED3 CATHODE (CAPS LOCK)

FPC20 = LED2 CATHODE (SCROLL LOCK)

FPC19 = LED1 CATHODE (NUM LOCK)

FPC11 TO 18 = INPUTS TO TEENSY WITH BUILT IN PULLUPS

FPC1 TO 10 = OUTPUTS FROM TEENSY PULSED LOW OR FLOATING

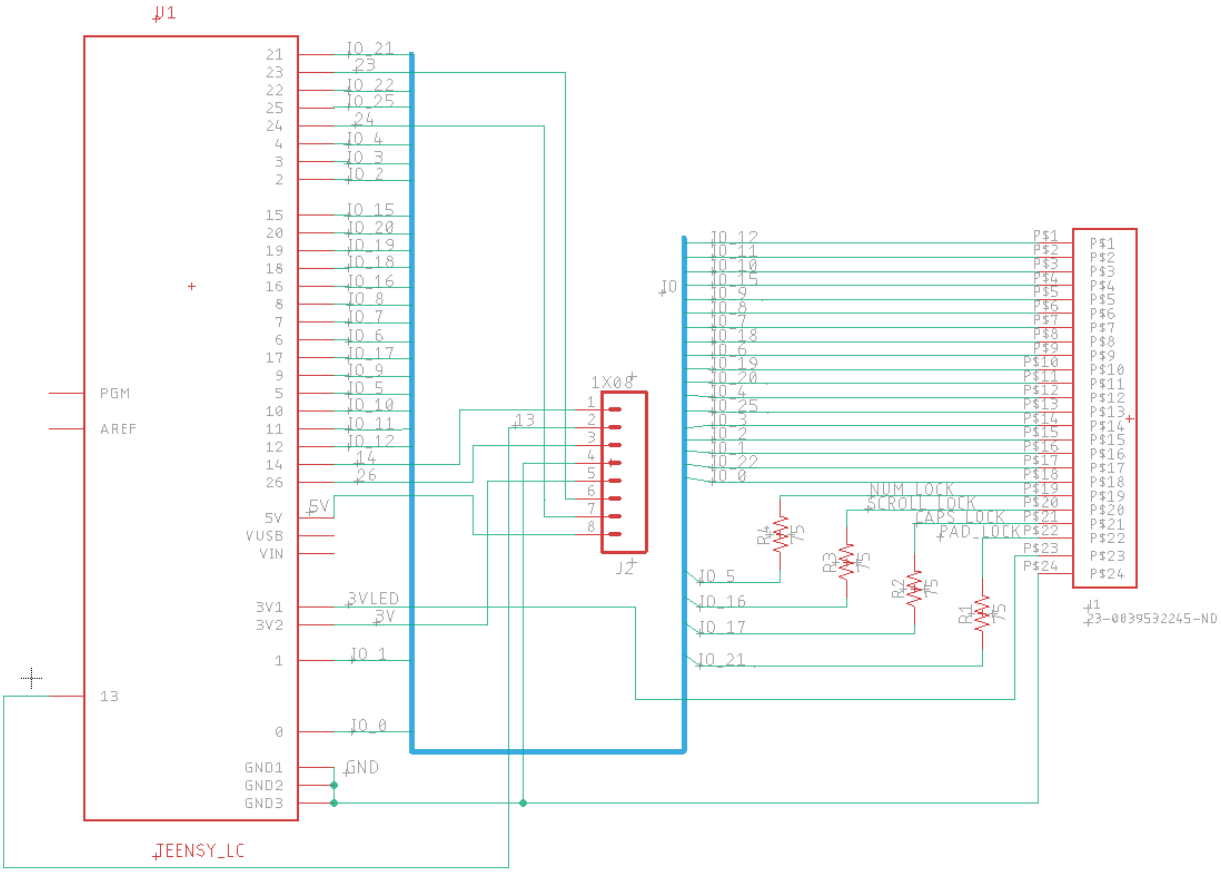
LEDs are assumed to be 20ma, 1.8 volt (test to confirm). Adjust resistor value if current is less.

LEDs are turned on by sending the Teensy LC output low. The Teensy LC has 4 I/O's (5, 16, 17, 21) that can source or sink 20ma and the rest of the I/O's can only source or sink 5ma. The LED anode voltage is 3.3 volts from the Teensy internal regulator that can source up to 100ma. If all 4 LEDs are turned on (not likely), the 80ma load is still within the 100ma limit. The current limit resistor for each LED is:

(3.3V – 1.8V)/.02A = 75Ω

Power is .02 x .02 x 75 = 30mW A standard 1/8 watt or 1/10 watt 75 Ω resistor will work fine.

Eagle Schematic

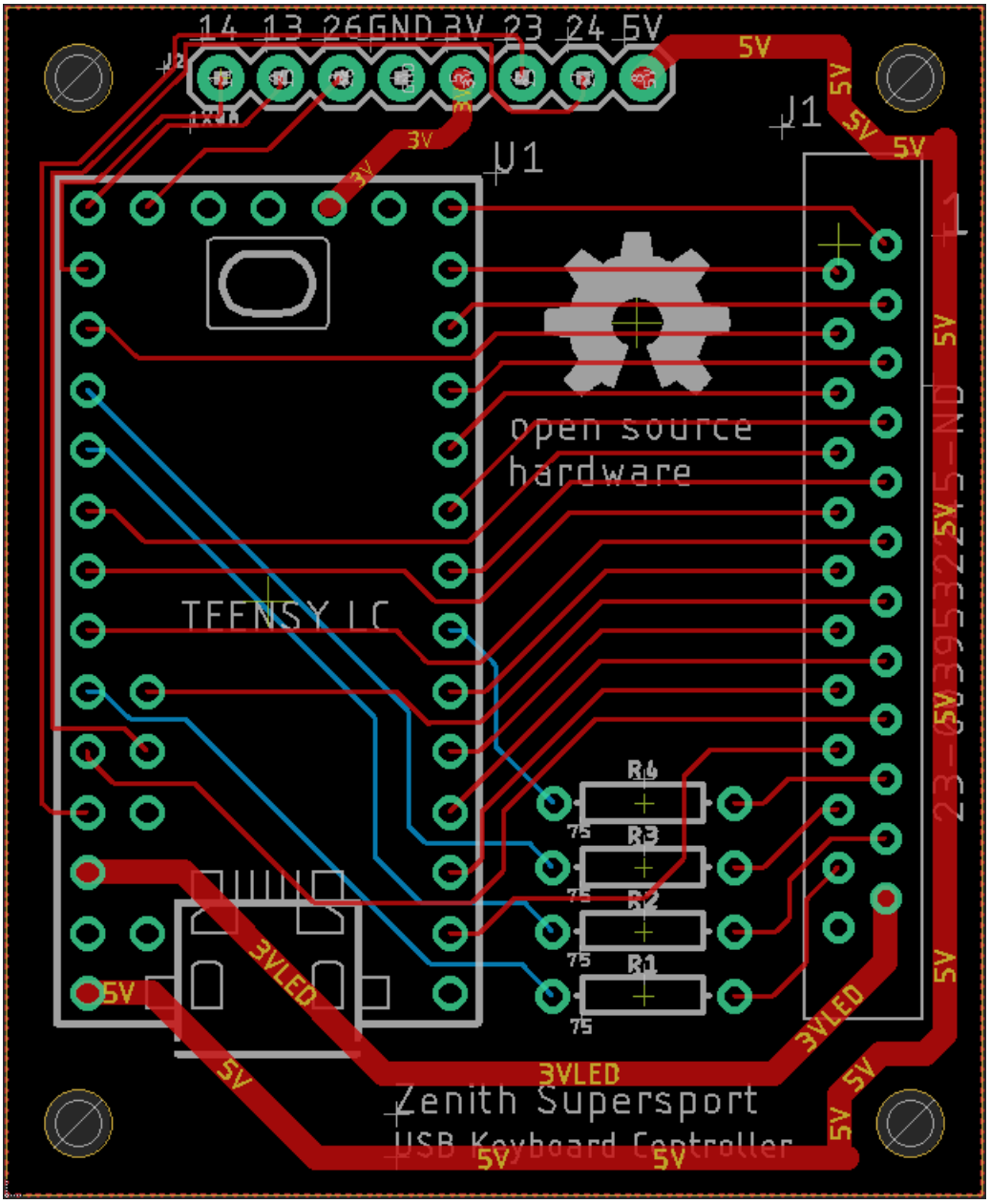


The unused I/O's, plus power and ground are brought to solder pads at J2 for future use. I/O 13 can drive up to 5ma. It currently drives the LED on the Teensy with 3ma.

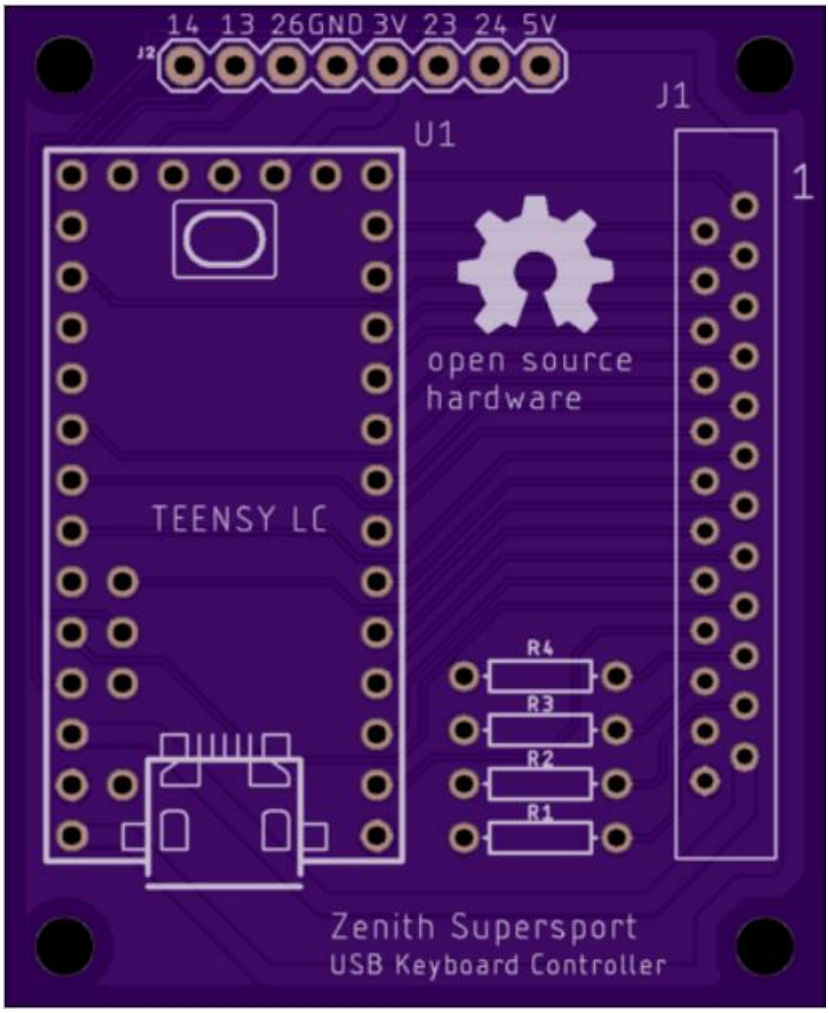
The translation from FPC pin numbers to Teensy LC I/O numbers is given below. Use the Teensy code “Matrix_Decoder_LC_Zenith” to produce a connection pin list.

FPC Pin #	Teensy I/O #
1	12
2	11
3	10
4	15
5	9
6	8
7	7
8	18
9	6
10	19
11	20
12	4
13	25
14	3
15	2
16	1
17	22
18	0
19	Num Lock 5
20	Scroll Lock 16
21	Caps Lock 17
22	Pad Lock 21
23	3.3 Volts
24	Ground

Eagle Board Layout



OSH Park's purple board is shown below with the "area fill" ground plane. JLCPCB will produce a similar green board.



Parts List:

U1 - Teensy LC with pins from PJRC $14.65

R1, R2, R3, R4 – 75Ω, 1/8Watt. Digikey Part Number RNF18FTD75R0CT-ND $0.10 x 4

J1 - 24 pin 1.25mm pitch vertical FPC connector. Digikey Part Number 23-0039532245-ND $2.24

PCB – Two possible sources to fabricate the printed circuit board are OSH Park and JLCPCB.

OSH Park - Load the Eagle file "Zenith.brd" on their website, use all the default settings. Cost is $15.90 for 3 boards and delivery is under 2 weeks. The board quality is better than JLCPCB and the surface finish is ENIG.

JLCPCB – Load the zip file "Zenith_2020-06-06.zip" on their website. When you get to the shipping menu, select "more" to show the Yunexpress Direct Line Economy option. This will bring the price for 5 boards down to $8.37 but it will take a month for delivery. Surface finish is HASL which is not as good as ENIG but still works fine.