IRLML6244TRPbF was chosen as the driving MOSFT as it has a drain current of 5.1A, more than enough to drive the SCPs. It is logic level, and , which will allow it to be driven effectively by 5V logic.

Adding a gate resistor will reduce the gate charging current, which will reduce the possibility of damage to the MCU and help to dampen ringing with the trace parasitic capacitance. A high value pull down resistor is added to reduce capacitive coupling and inadvertent charging of the gate.

The transistor has a , using a , this gives a time constant of . Using four tau, this gives a gate charging time of and maximum operating frequency of , well within our PWM frequency of .

A 100k NTC with a B-value of 3950K was chosen as these are widely used on 3D printers (e.g. RepRap), and so are inexpensive and easily sourced. The 100k NTC will also exhibit lower self-heating than a 10k NTC. The average operation temperature of the SPCs is 70oC.

The corresponding JST XH-series connector was used for the NTC.

At this temperature the NTC’s resistance is , so a resistor of 18k was chosen to put the average temperature in the center of the voltage divider’s range.

A 0.1uF capacitor was added across the 18k resistor to help filter out high frequency noise from the NTC signal.

For quick connect/disconnect of the SCP fibers a pluggable, screw terminal block was chosen:

1. Male (board-side) CUI Devices [TBP02R1-381-02BE](https://www.digikey.com/product-detail/en/cui-devices/TBP02R1-381-02BE/102-6480-ND/10238457), Female (SCP-side) CUI Devices [TBP02P1-381-02BE](https://www.digikey.com/product-detail/en/cui-devices/TBP02P1-381-02BE/102-6468-ND/10238445).
2. Amphenol Anytek 381-series - Male (board-side) [OQ0232510000G](https://www.digikey.com/product-detail/en/amphenol-anytek/OQ0232510000G/609-3819-ND/2261255), Female (SCP-side) [TJ0231530000G](https://www.digikey.com/product-detail/en/amphenol-anytek/TJ0231530000G/609-3797-ND/2261289).

From option a) was chosen as the Anytek 381-series is older and appears as discontinued by some suppliers.

Red LED current-limiting resistor calculation. V\_F = 1.9V, and I\_F = 10mA for 130mcd.

Red LED current-limiting resistor calculation. V\_F = 2.0V, and I\_F = 11mA for 20mcd.