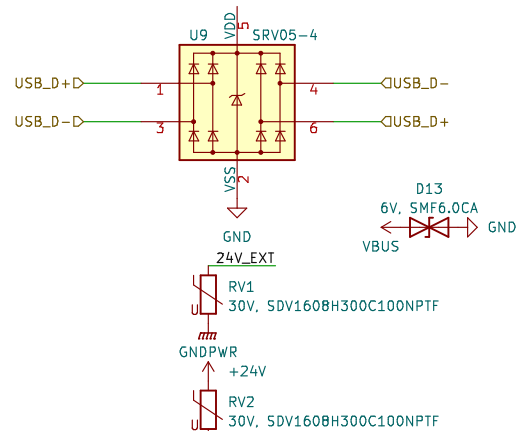
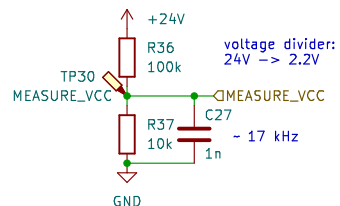
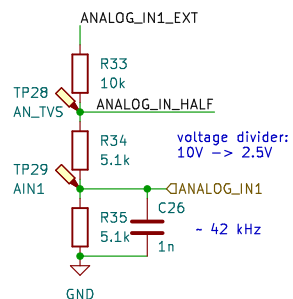
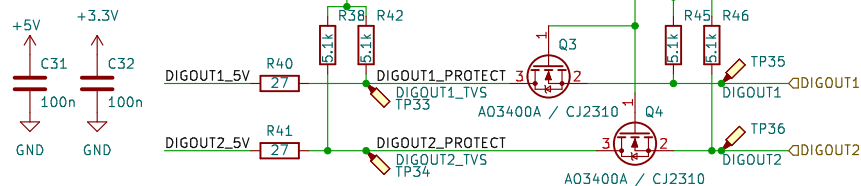
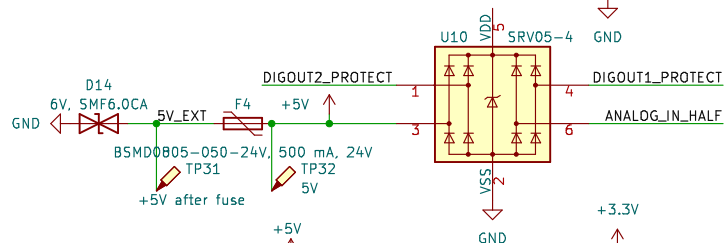
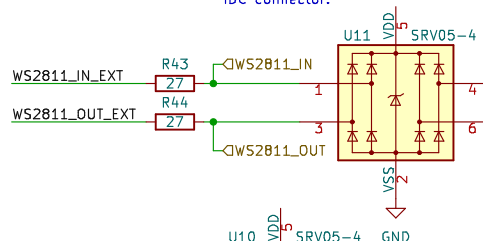


connect WS2811_IN and DIGOUT1_5V for first device



NOTE: no diode for polarity protection because back EMF from the heaters should be conducted into the power lines if necessary. (The LDO does have a diode so it won't die because of a short on the 24V power lines.)

old fuse: JK60-110, 60V, 1.1A (C369088)
This was upgraded because change to DCDC allows more current for external boards (e.g. 5V_EXT).
NOTE: The pitch is the same but the width is 18mm instead of 14mm so bending it upwards to make more room for cables may collide with the IDC connector.



Sheet: /IO Protection/
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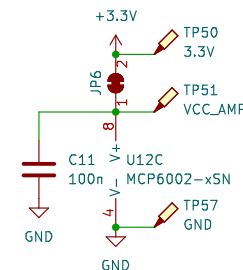
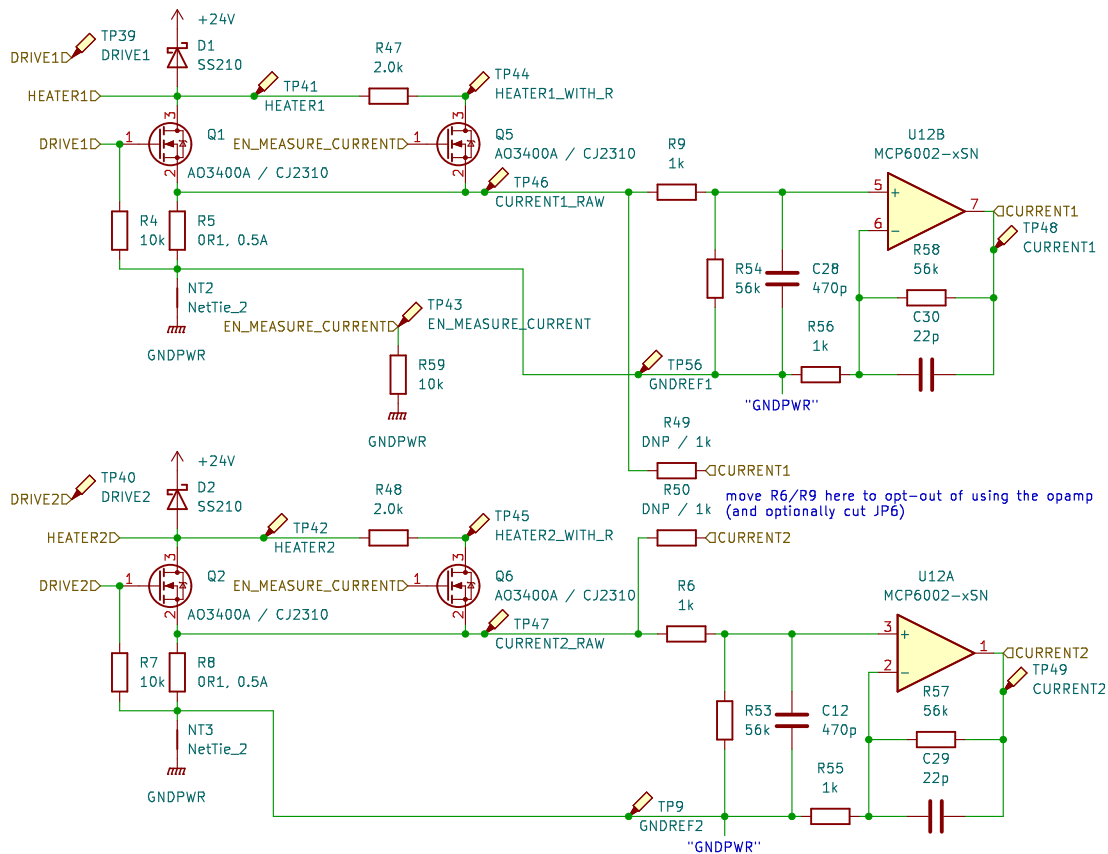
Current in wax motor will be between
300 mA / 80 ohms (datasheet) resp.
220 mA / 110 ohms (measured) when cold
and 50 mA / 480 ohms (measured) when hot.

CJ2310 is preferred because it can handle 60V.
Both can handle 0.5 A at $V_{GS}=2.5V$.
However, we are limited to 30V anyway due to the LDO.

see <https://www.ti.com/lit/an/sbaa353a/sbaa353a.pdf>
but we are not using a low-offset or zero drift
amplifier because of price (mostly JLC basic parts here)

TI example has the same caps in both branches
but different caps make a more useful filter,
it seems (tested in LTspice).

The -3 dB point is at 30 kHz. This is lower than
necessary for our ADC but way more than we need
(but it does mean that we have to enable the
measurement current for longer). However, this is
chosen to be a bit lower than what the opamp would
achieve (again: according to LTspice) so our filter
is dominated by the external components rather than
GBW variations.



use GNDPWR here: The amplifier will see the
shunt voltage without any offset between GND
and GNDPWR. We will get the offset between
amplifier and ADC but that will be relative to
the amplified voltage, i.e. much less significant.

GNDPWR should usually be higher than GND so this
is fine. The amplifier supports input voltages of
0.3V below so negative rail so the other way around
is also fine.

We want a dedicated connection to each shunt so any
ground offsets between the shunts will be compensated,
as well. We use net ties to make sure that we don't
accidentally combine the signals on the way to the
amplifier.

Sheet: /Heaters/
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