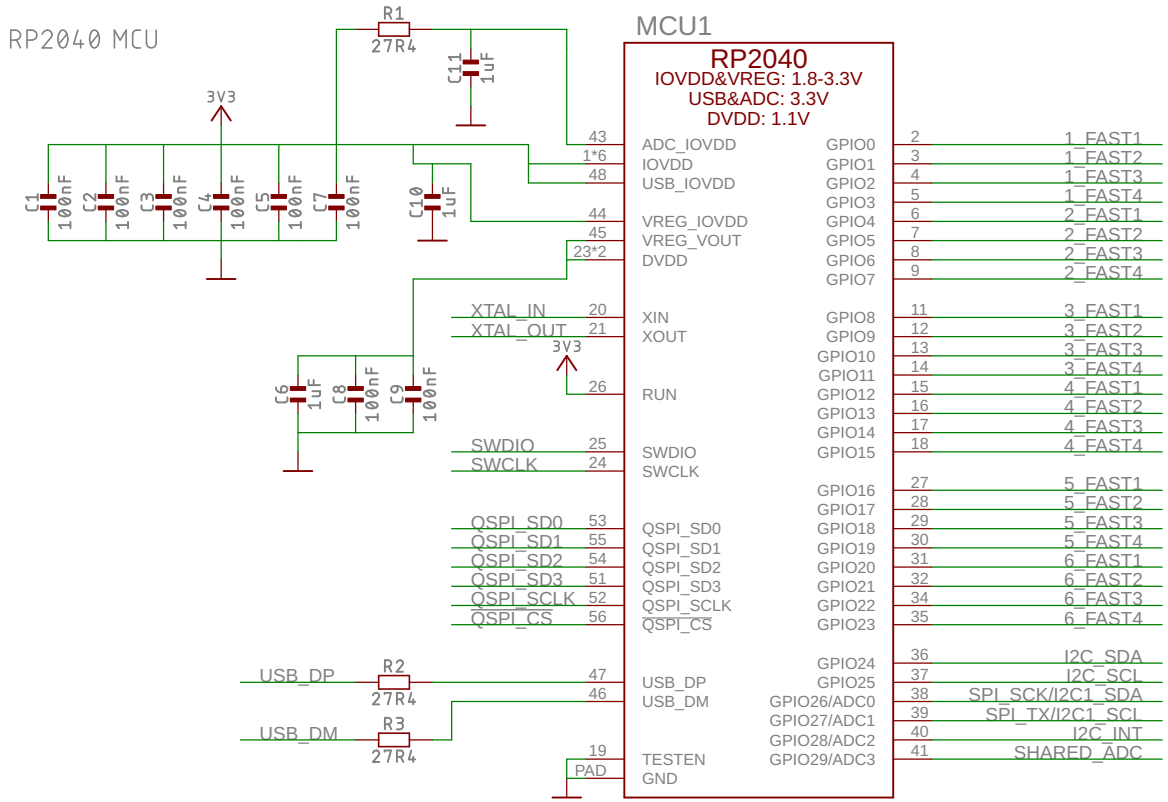
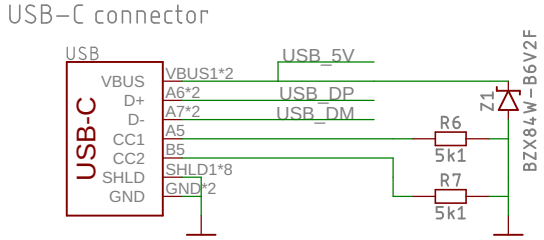
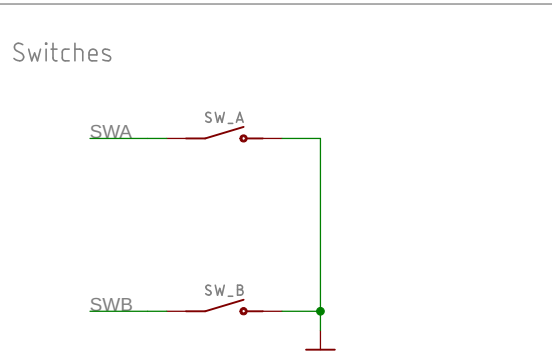
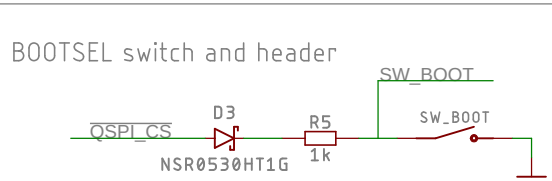
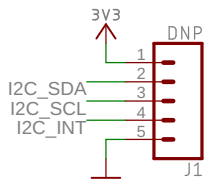
Yukon host (PIM687) – RP2040, Flash, Xtal, Signal Connectors

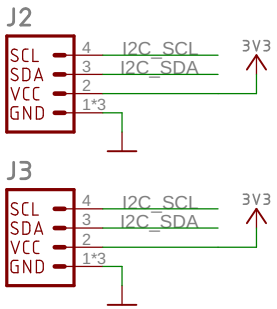


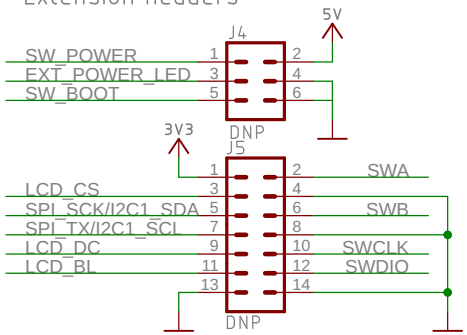


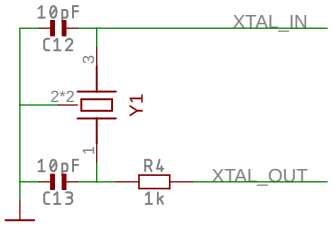


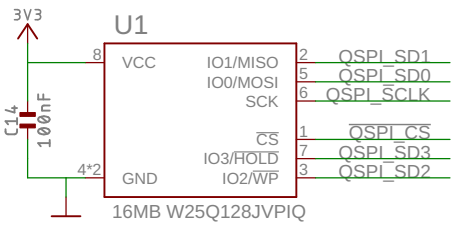












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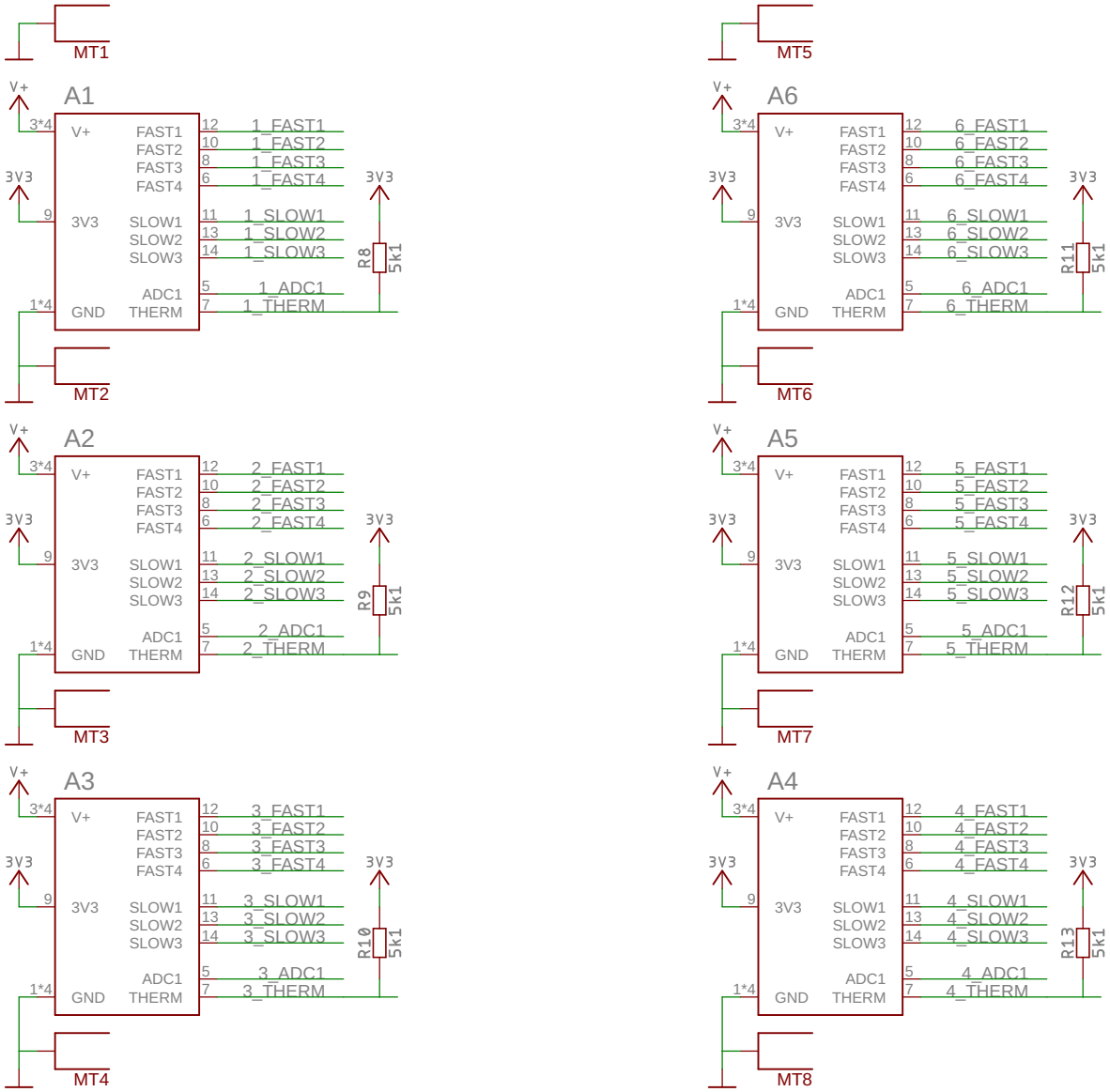
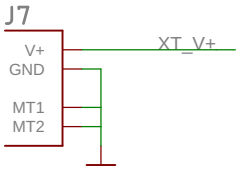
Yukon host (PIM687) – Module Connectors

Module connectors



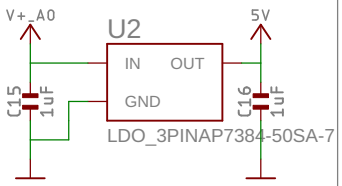
Yukon host (PIM687) – Power

Power input (XT30)



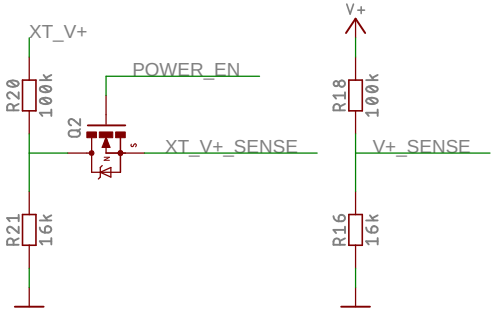
Max continuous current: 15A
Max peak current: 30A
Voltage range: 5V – 17V

5V LDO



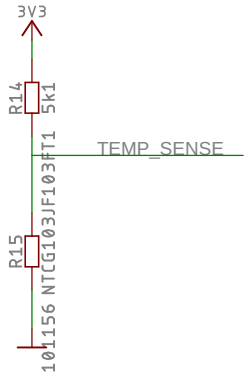
LDO max heat power:
(17V-5V)*10mA = 120mW

Input & internal voltage sense

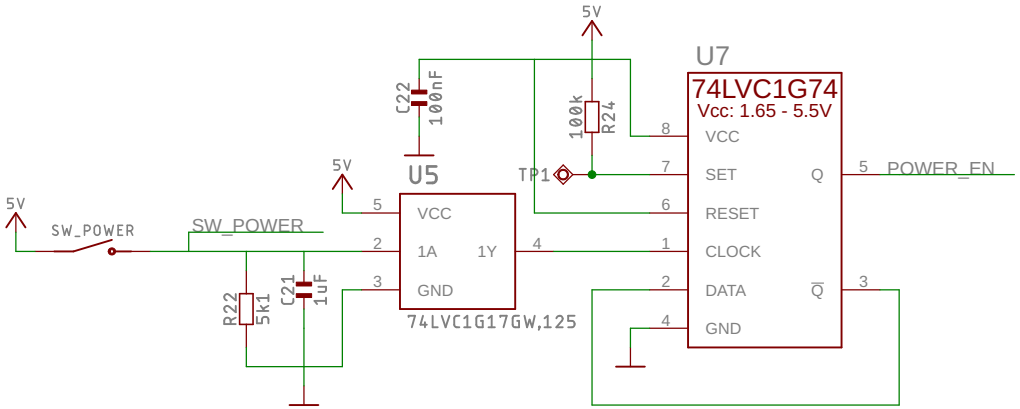


Resistor dividers divide 17V input to 2.345V output

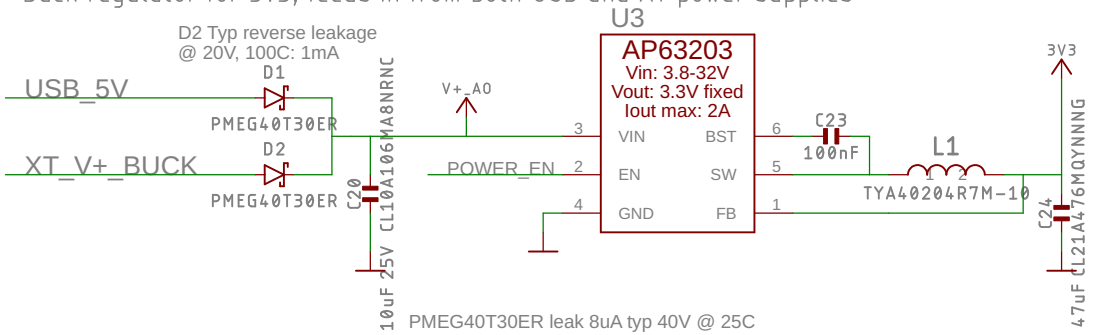
Thermistor placed near the high–current switch & XT30 connector



Low–voltage switching circuit for on–board and external power switch.

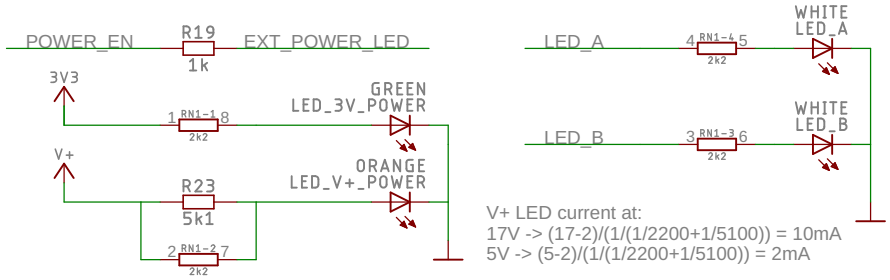


Buck regulator for 3v3, feeds in from both USB and XT power supplies



PMEG40T30ER leak 8uA typ 40V @ 25C

LEDs



V+ LED current at:
17V -> (17-2)/(1/(1/2200+1/5100)) = 10mA
5V -> (5-2)/(1/(1/2200+1/5100)) = 2mA

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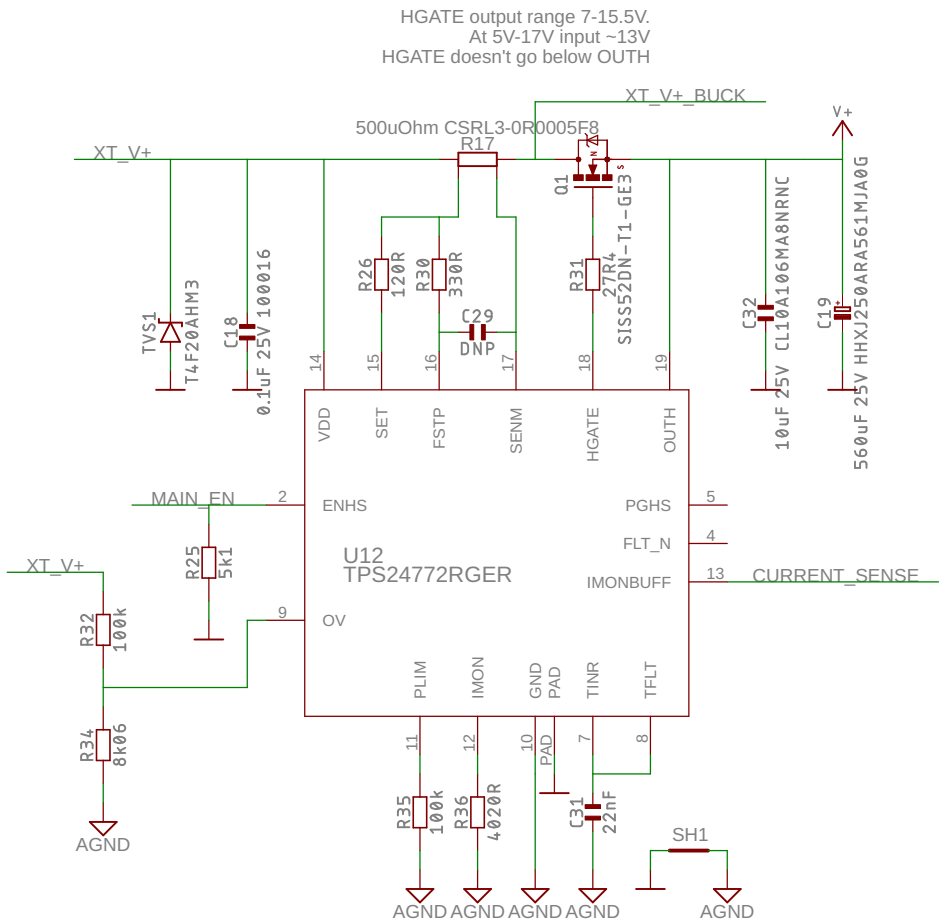
Yukon host (PIM687) – eFuse Protection



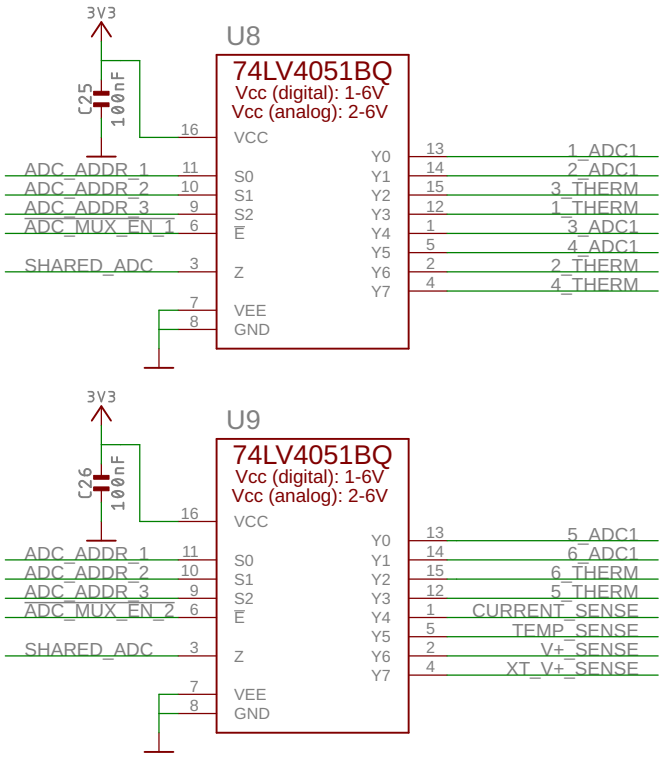
Rsense recommended range: 10mV to 67.5mV. 500uOhm resistor at 30A: 0.0005ohm*30A = 15mV and 40A: 20mV
For 40A overcurrent slow trip Rimon / Rset ratio should be 0.675V/20mV = 33.75. Using 120R and 4020R resistors leads to (0.675V*120ohm) / (4020ohm*0.0005ohm) = 40.3A slow trip current.
ImonBuf output would then be 2.99 * 4020ohm * 0.0005ohm / 120ohm = 50.08mV/A, so at 40A the output would read 2.0V
A 330R Rfstp sets the fast trip current limit to 0.1*330/.5 = 66A
Power limit is set to 17V/.5mOhm*1.5mV = 51W, as the datasheet recommends a min Vsns of 1.5mV. Rplim is set to (84375 * 120ohm) / (0.5mOhm * 4020ohm * 51W) = 98.77k ohm ~ 100k ohm

Cold start short circuit protection should not trip due to the inrush current to the large capacitor:
tStartMax = (560uF/2) * ((17V^2)/51W + 51W/(40.3A^2)) = 1.6ms. Doubling this to 3.2ms give a bit of tolerance.
As Tinr and Tflt are wired together, this formula is used:
Cinr = 6.11 uF/s * 3.2ms = 19.5nF. Using a standard value 22nF cap instead leads to a 3.6ms delay. The MOSFET can survive 51W for 3.6ms.

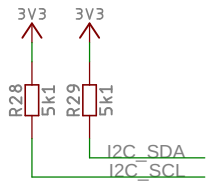
Overvoltage trip is at Vovr = 1.35V (1.3-1.4V). 100k and 8k06 resistors lead to a 18.1V overvoltage level (17.4V - 18.8V)

Yukon host (PIM687) – Slow IO Expanders and ADC Muxes

Two Analog Switches for Demux



I2C pull-ups



IO expanders for slow IO