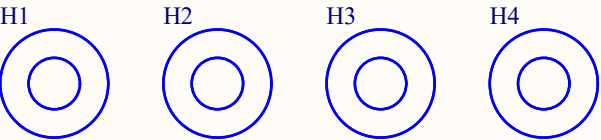
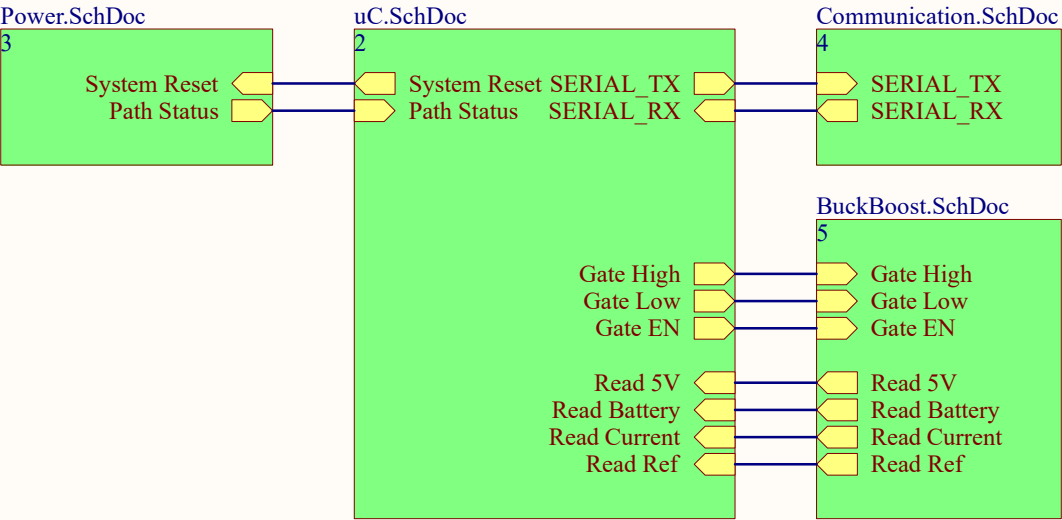


Mounting Holes



Sheet connections



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Internal 1.2-V LDO Voltage Regulator (VREG)

The internal VREG is supplied by the VDDIO rail and can generate the 1.2 V required to power the VDD pins. It is enabled by tying the VREGENZ pin low. Although the internal VREG eliminates the need to use an external supply for VDD, decoupling capacitors are still required on the VDD pins for VREG stability and transients. See the VDD Decoupling section for details.

-> Need to tie VREGENZ pin to low

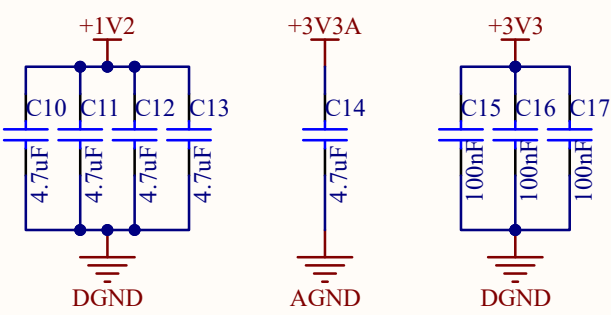
VDD Decoupling

Place a minimum amount of decoupling capacitance on VDD. See the CVDD TOTAL parameter in "Power Management Module Electrical Data and Timing."

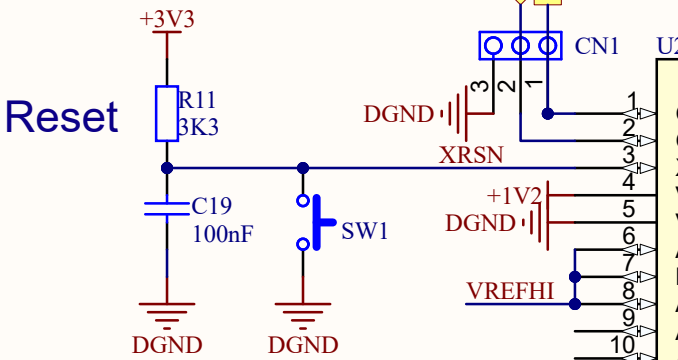
Divide CVDD TOTAL across the VDD pins OR
Install a single decoupling capacitor with value of CVDD TOTAL.

Internal VREG:
CVDD_TOTAL: 10uF to 26.8uF
-> 4.7uF per pin (4*4.7 = 18.8uF)

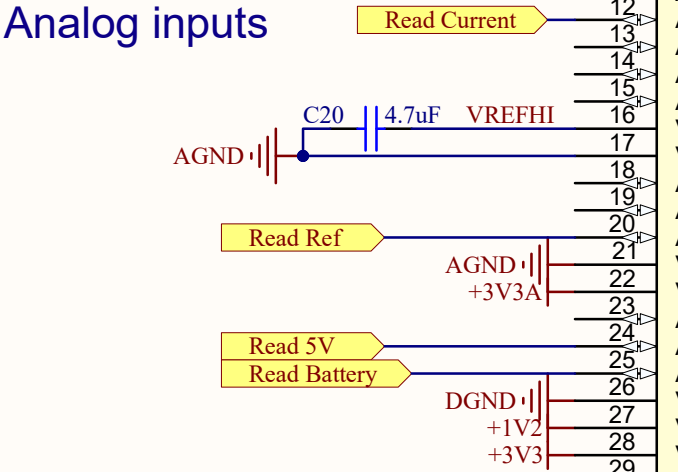
General:
VDDIO: 100nF per pin
VDDA: min 2.2uF per pin



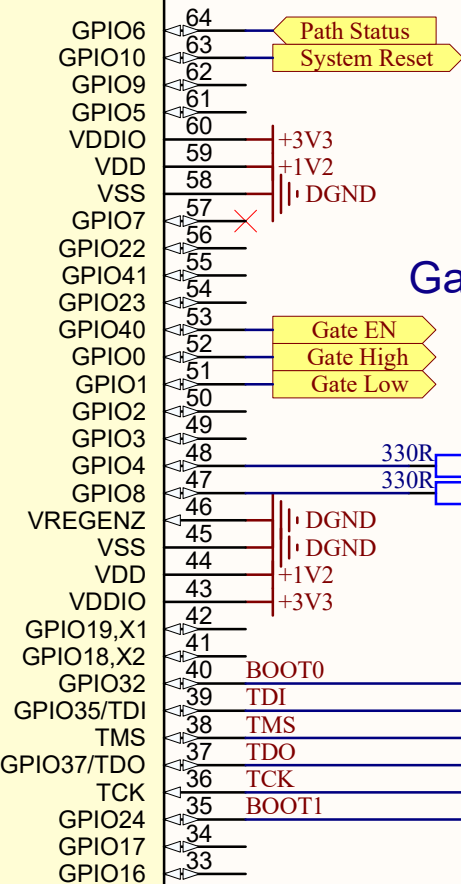
UART



Analog inputs

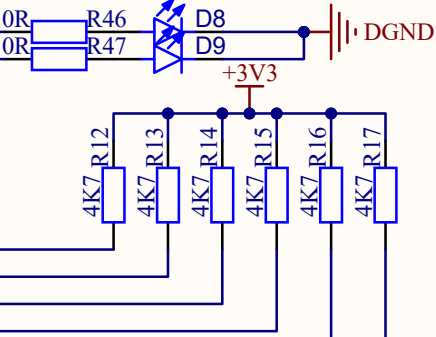


GPIO

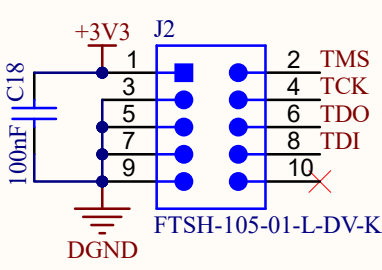


Gate Drive

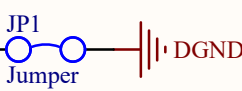
User LEDs



JTAG



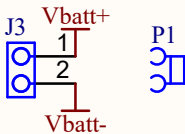
SCI Boot



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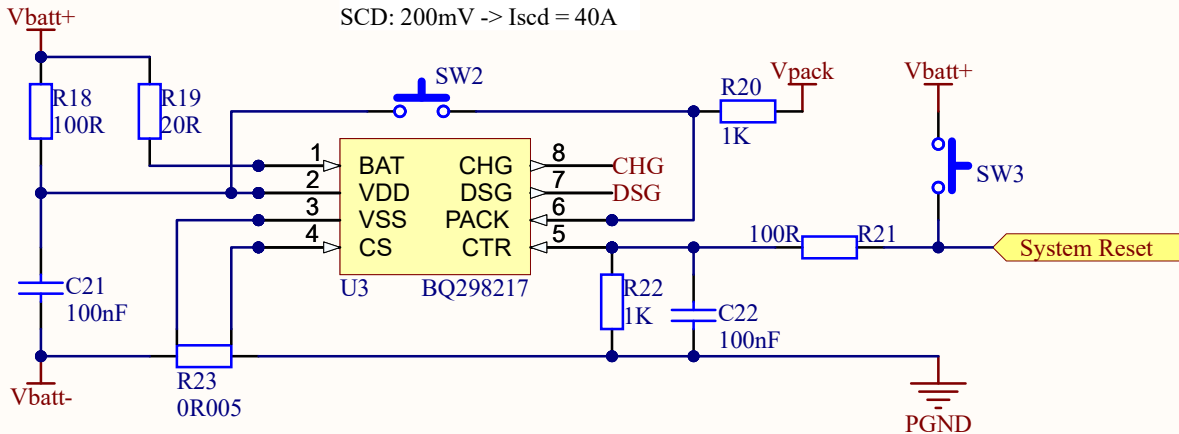
Battery

External 2P Battery Pack
Connector Battery In
(with plug)



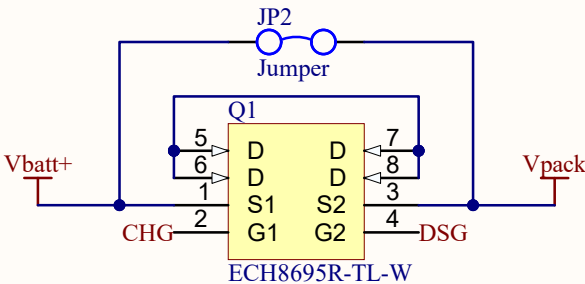
Battery Protection Circuit
VDD-PACK short to turn on
CTR high for 5s to turn off

BQ28217
Rsns = 5mOhm
 $I = V / Rsns$
OCC: -36mV -> Iocc = 7.2A
OCD: 60mV -> Iocd = 12A
SCD: 200mV -> Iscd = 40A



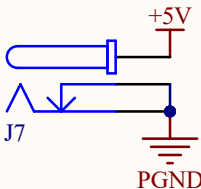
Battery Protector MOSFET

Low R_{GS(on)} even on low voltages
Jumper to bypass protection in case of malfunction

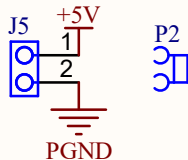


Connectors

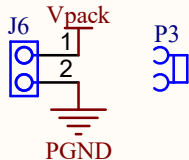
5V Barrel jack



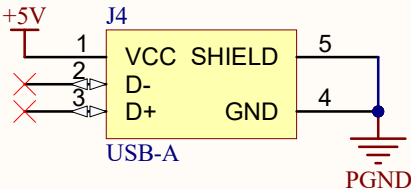
Connector High Side
(with plug)



Connector Low Side
(with plug)

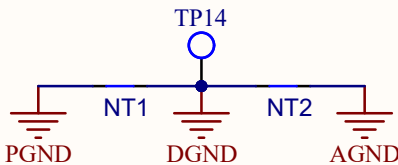


USB-A Output



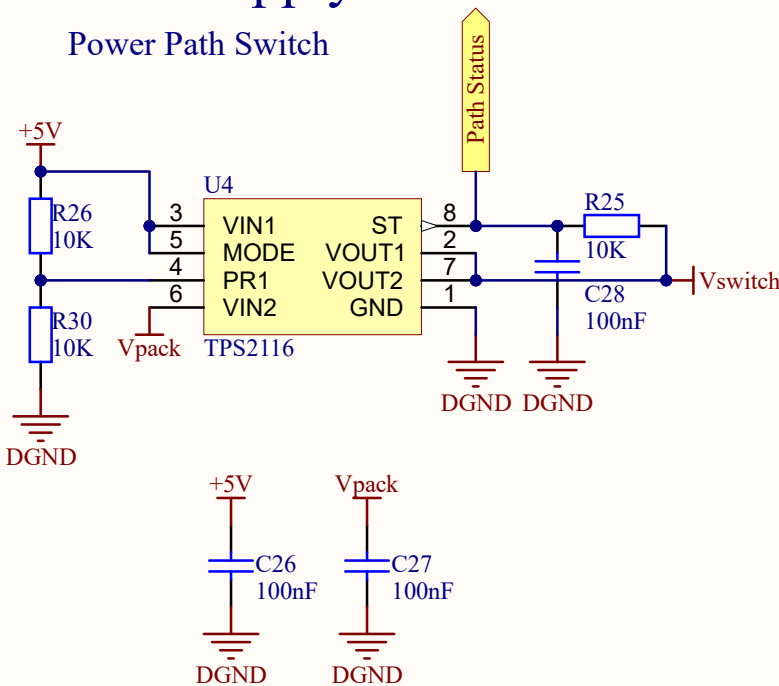
Net Ties

Connects separated grounds



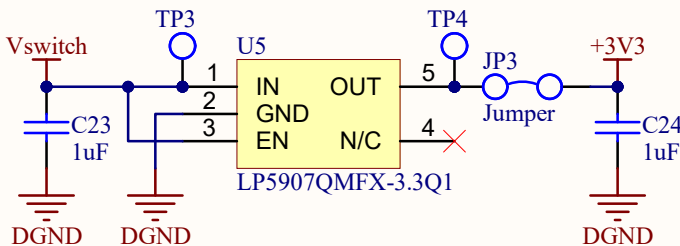
+3V3 Supply

Power Path Switch

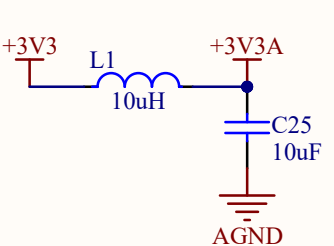


Switched voltage LDO

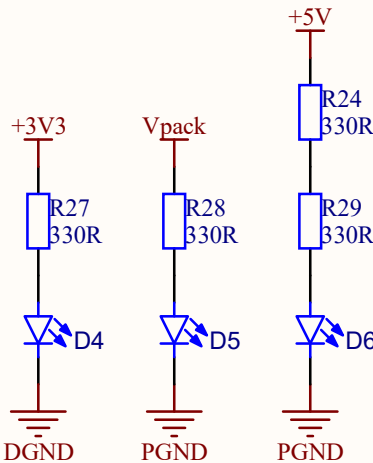
Auxiliary supply



Filtered analog 3V3 power supply



Power State LEDs



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A



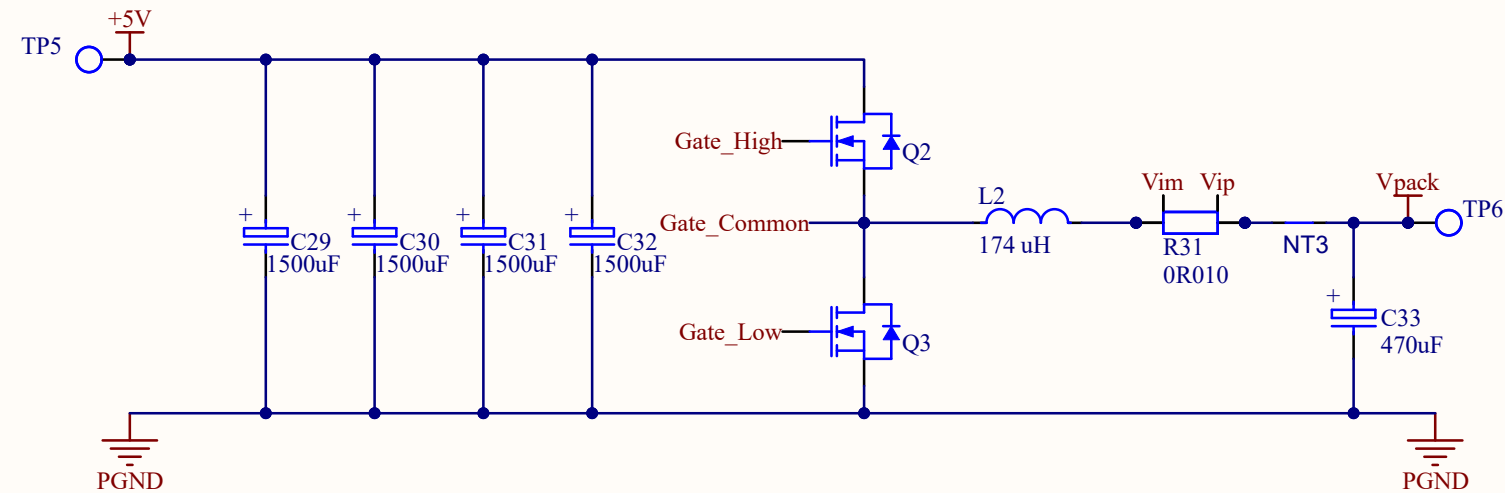
C



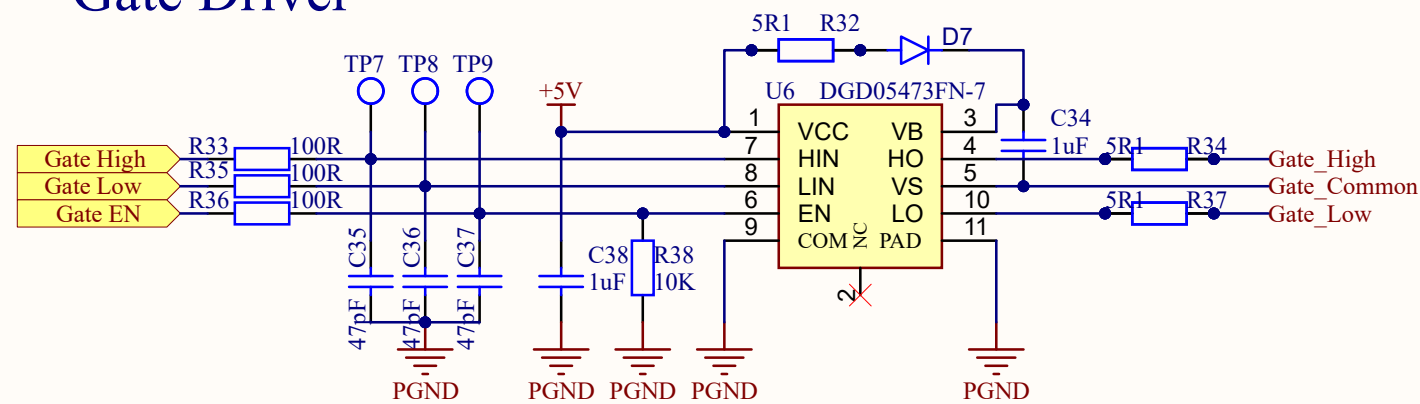
1

3

Bidirectional Converter



Gate Driver



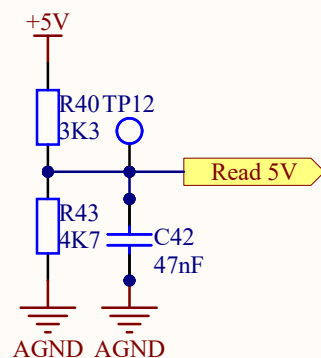
Measurement

+5V measurement

$$V_{out} = V_{in} * R1/(R1 + R2)$$

$$V_{out(max)} = 5V * 4.7 / (4.7 + 3.3) = 2.94V$$

$$dU_{5Vmin} = 1.37mV$$

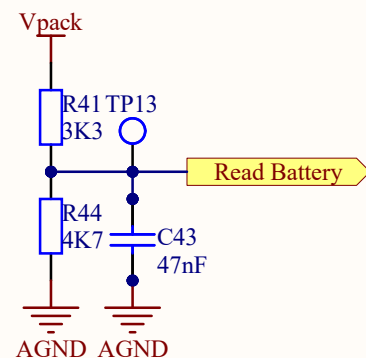


Battery measurement

$$V_{out} = V_{in} * R1/(R1 + R2)$$

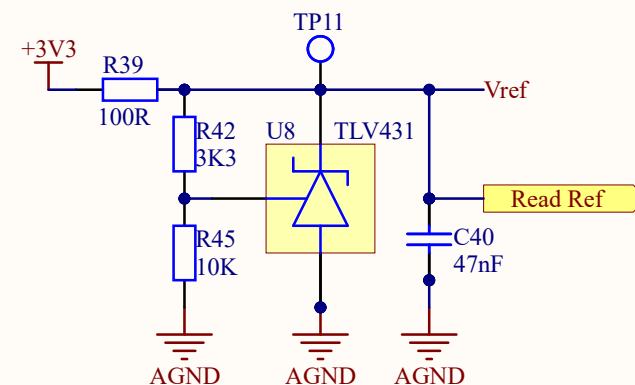
$$V_{out(max)} = 4.2V * 4.7 / (4.7 + 3.3) = 2.47V$$

$$dU_{\text{Battmin}} = 1.37 \text{ mV}$$



Voltage reference for current measurement

$$V_o = V_{ref} * (1 + R_1/R_2) = 1.24V * (1 + 3.3/10) = 1.65V$$



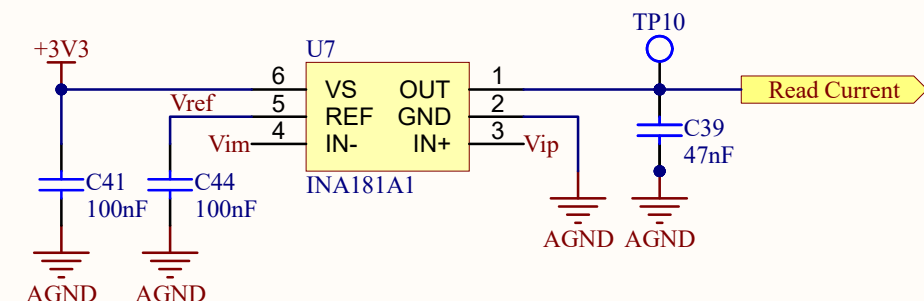
Coil current measurement

$V_{ref} = 1.65V$

$$V_{\text{current}} = 8\text{A} * 10\text{mOhm} * 20\text{V/V} = 1.6\text{V}$$

$$V_{out} = V_{ref} \pm V_{current} = 1.65V \pm 1.6V = [0.05V, 3.25V]$$

$$dI_{min} = 4.11 \text{ mA}$$



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