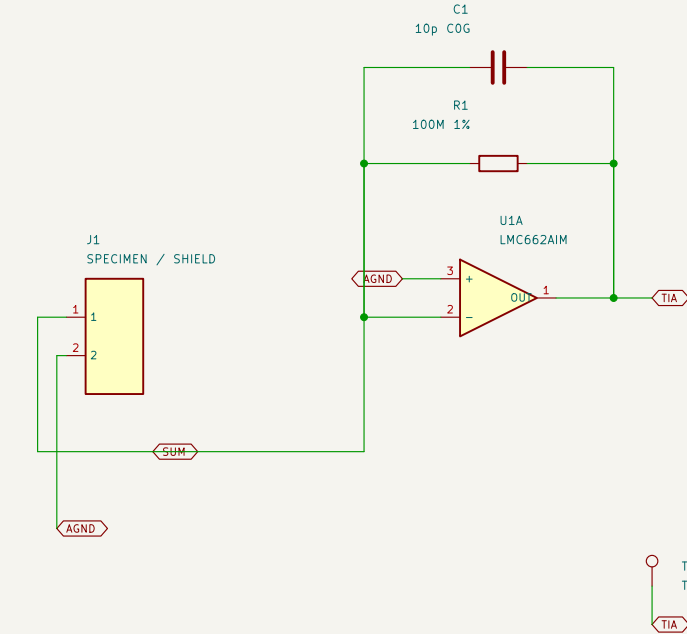


SPECIMEN CURRENT / LOW-VOLTAGE READOUT

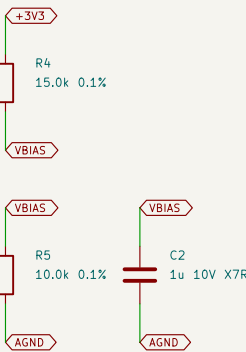
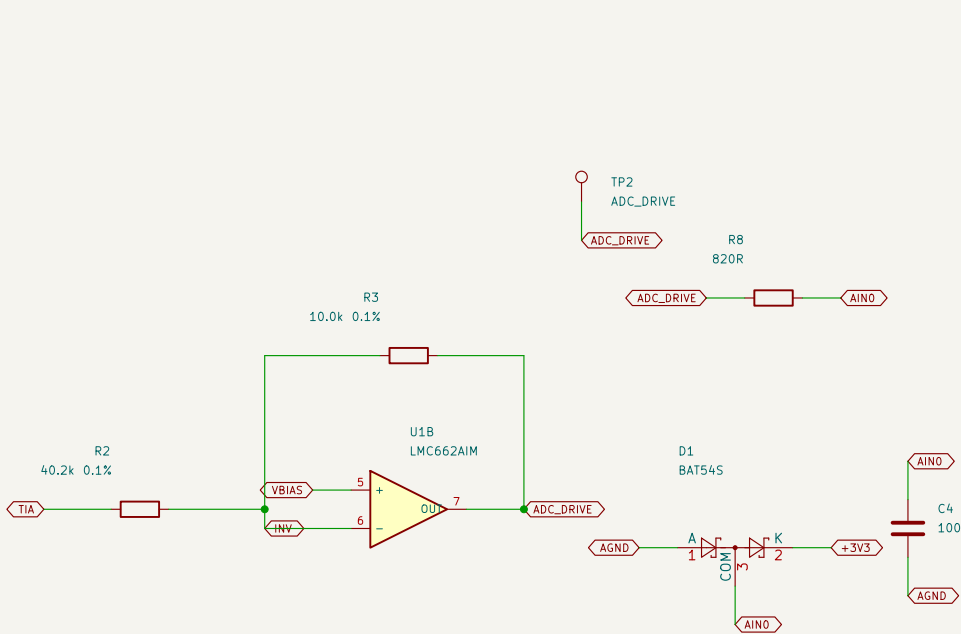
01 GUARDED TRANSIMPEDANCE

02 ADC CONDITIONING

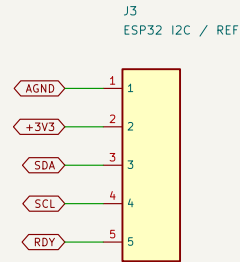
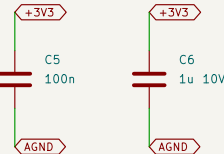
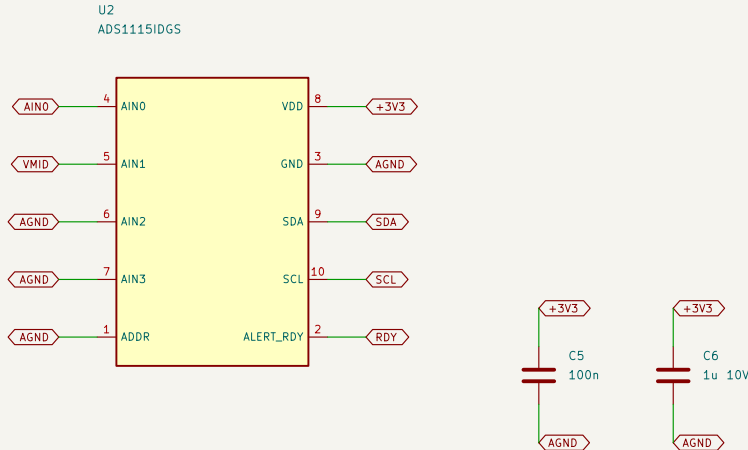
03 DIFFERENTIAL ADC / ESP32



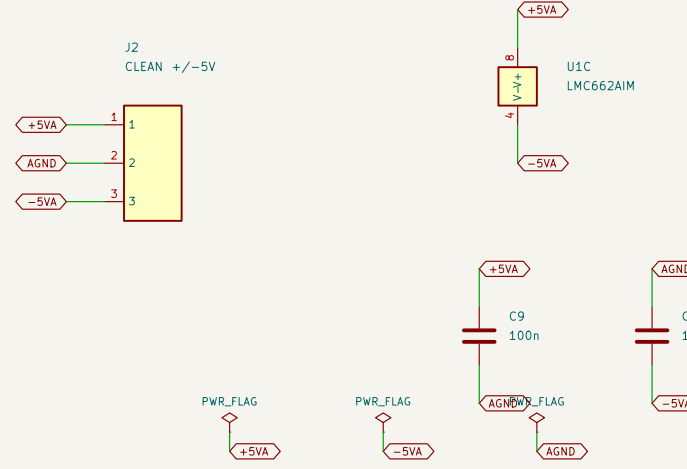
V_TIA = +Labs R1 for net electron deposition
R1 || C1: tau = 1ms, pole = 159Hz (nominal)
Guard SUM on both sides at chamber 0V.
No clamp or test probe on picoampere node.



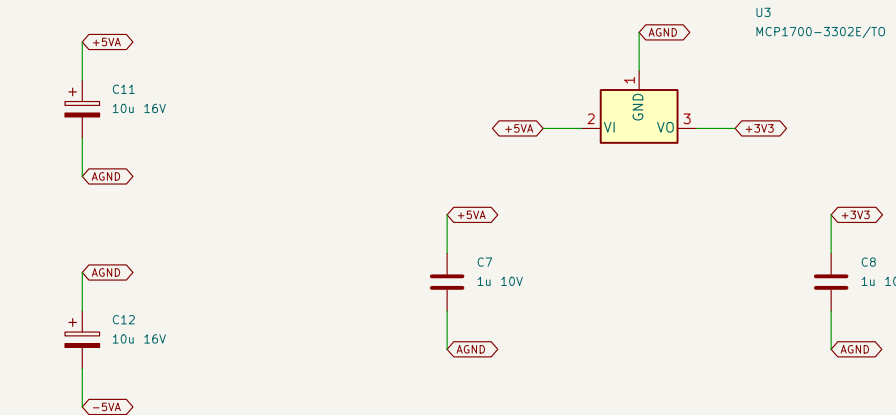
V_A0 = 1.648358 - (10 / 40.2) V_TIA
V_A1 = 1.650V nominal; dark-zero is mandatory.
PGA +/-256mV; 0.3141pA per raw code at 100M.
Measure gain; this is not measured sensitivity.



04 QUIET POWER / BYPASS



J2 external clean +/-5V; each rail magnitude 4.5..5.5V.
Two floating regulated sources in series; midpoint = chamber ground.
ADC supply follows +5V via U3. Power and check rails before attaching specimen.



J3: 1 GND, 2 REF3V3 OUT, 3 SDA/GPIO21,
4 SCL/GPIO22, 5 RDY (leave unconnected by default).
Power ESP32 separately; common ground.
REF3V3 is not an ESP32 power output.

UNBUILT PROTOTYPE - no measured leakage/noise/stability/resolution claim.
Specimen insulated from chamber mechanically, held near 0V by U1A.
Electronics in shielded atmospheric box at feedthrough. NEVER connect to gun HV.

