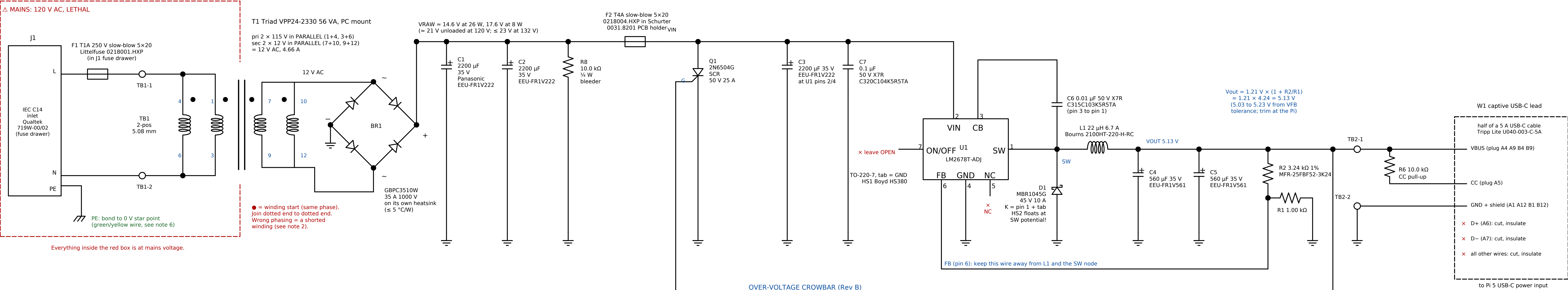


Raspberry Pi 5 supply, single port: 120 V AC in, 5.13 V / 5 A out on a captive USB-C lead

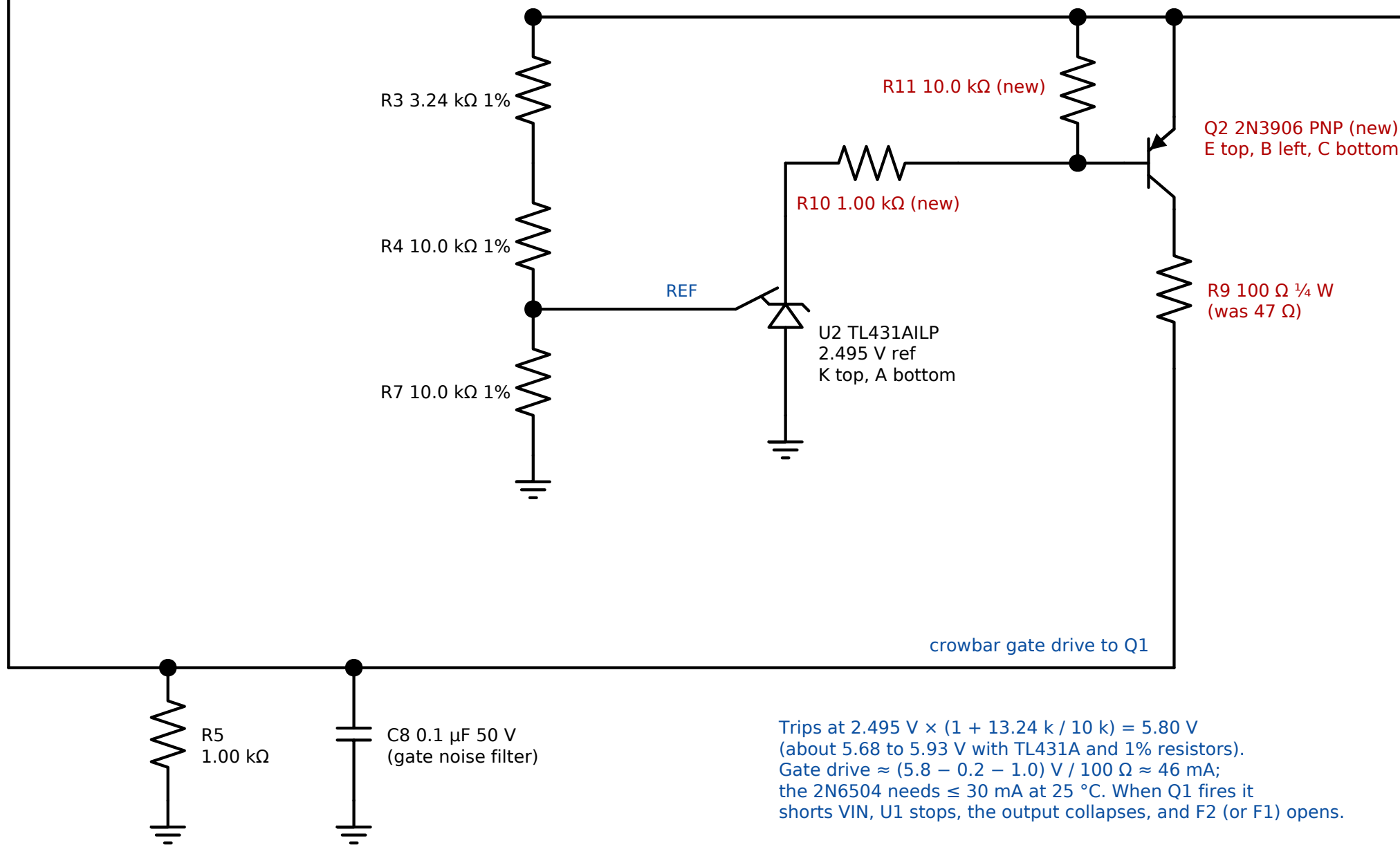
Schematic Rev B, 2026-10-11. Transformer > bridge > filter > LM2678 buck > crowbar > USB-C. Reference designators match the BOM (digikey-bom-single.md). Q2, R10, R11 are Rev B additions; R9 changed 47 Ω > 100 Ω.



NOTES

- Mains (red box): 120 V AC can kill. Unplug before touching; sleeve every mains joint; first power-up through a dim-bulb tester.
- T1 phasing: wire pins 1+4 together and 3+6 together (primaries), 7+10 together and 9+12 together (secondaries), per the Triad VPP24-2330 datasheet. Before joining the second winding of a pair, measure across the open joint: about 0 V AC = correct. About 230 V (primary) or 24 V (secondary) = reversed; swap that winding's two ends. Never parallel windings without checking.
- Pin numbers: U1 TO-220-7 (1 SW, 2 VIN, 3 CB, 4 GND/tab, 5 NC, 6 FB, 7 ON/OFF); Q1 TO-220AB (1 K, 2 A, 3 G, tab A); D1 TO-220AC (1 K, 3 A, tab K); U2 TO-92 facing the flat: REF, A, K from left; Q2 TO-92 facing the flat: E, B, C. See pinout-reference.png. TL431 pin NUMBERS differ by maker (TI: 1 K, 2 A, 3 REF); the physical order does not.
- Grounds: every ground symbol is the same 0 V net. Wire them as a star at C1's negative lead; the buck loop C3-U1-D1 returns to U1 pin 4 with short, heavy wire. Heavy bus wire on BR1, C1-C3, F2, U1 pins 1/2/4, D1, L1, C4/C5 and TB2.
- U1's tab is GND, so HS1 is at 0 V. D1's tab is its cathode = the switching node: HS2 carries a 0 to ≈ 23 V square wave at 260 kHz. Keep HS2 at least 3 mm from everything, or mount D1 on an insulating pad and bushing.
- The case is 3D-printed PETG (no metal box): bond PE from J1 to the 0 V star point so a mains-to-secondary fault blows F1. BR1 needs its own aluminum heatsink plate (about 4 W at full load); its metal base is isolated from the leads.
- W1 CC wire: find it by continuity to plug pin A5. 10 kΩ to VBUS tells the Pi 5 the supply can give 3 A, so the Pi needs `usb_max_current_enable=1` in `config.txt` to allow its full 1.6 A USB budget. D+/D- and all data pairs stay unconnected.
- Rev B changes from DESIGN-single.md: crowbar now uses Q2 + R10 + R11 (the TL431 anode is at 0 V, so the trip is not raised by the SCR gate voltage); R9 changed from 47 Ω to 100 Ω; C8 moved to Q1 gate; PE bond and BR1 heatsink because of the plastic case.

OVER-VOLTAGE CROWBAR (Rev B)



Solder R5 and C8 right at Q1, G (pin 3) to K (pin 1).