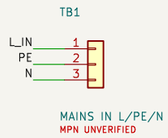
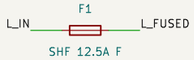
MAINS DOMAIN (hazardous, 100–240 VAC): L_IN, L_FUSED, L_SW, N, PE, TRIAC_G, OPTO_MT2, TCO_NODE, SENSE_N1..3, SENSE_AC

01 / MAINS INLET, FUSE, SURGE CLAMP, GATE-PATH THERMAL CUT-OFF

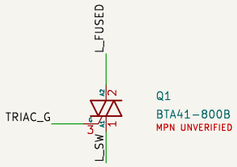




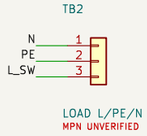


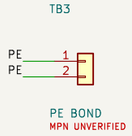


02 / TRIAC SWITCH IN THE LIVE CONDUCTOR, LOAD AND PE-BOND TERMINALS









03 / LOAD LIVE SENSE CHAIN (4 x 27k)

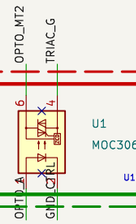


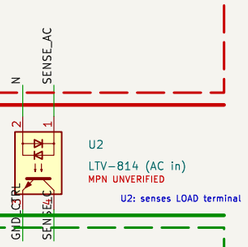
PWR_FLAG markers: L_IN, N, PE (mains inlet), GND_CTRL, VCTRL_IN (J1)



REINFORCED INSULATION BARRIER: 8.0 mm creepage / 5.5 mm clearance, board slot under U1 and U2

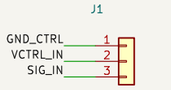
Mains above, control below. U1 and U2 are the only parts that cross it.





CONTROL DOMAIN (SELV): GND_CTRL, VCTRL_IN, SIG_IN, OPTO_A, LED1_A, LED2_A, SENSE_C

04 / CONTROL INPUT J1 (GND / 5–12V INDICATOR / SIG)





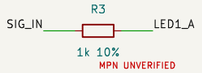
05 / SIG PATH: TVS, LED CURRENT LIMIT, REVERSE CLAMP, PULL-DOWN











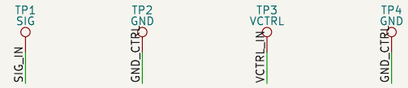


06 / LOAD LIVE INDICATOR





07 / TEST POINTS (control side only)



SINGLE-CHANNEL AC SOLID-STATE RELAY OUTPUT, v02 STUDY

UNSUITABLE FOR FABRICATION / USE UNTIL HUMAN MAINS-SAFETY REVIEW

DANGER: LETHAL MAINS VOLTAGE. ENCLOSURE REQUIRED. NOT A CERTIFIED PRODUCT.

Block diagram: TB1 (L,PE,N) -> F1 12.5A fast -> Q1 BTA41-800B (live switch) -> TB2 (N,PE,L_SW).

Gate path: L_FUSED -> TCO1 -> R5 360R -> U1 MOC3063 pin 6/4 -> Q1 gate; R6 360R gate-T1. Zero-cross opto-triac.

Sense path: L_SW -> R7..R10 (4 x 27k) -> U2 LTV-814 AC LED -> N; U2 phototransistor lights LED2 LOAD LIVE from J1 pin 2.

Neutral and PE pass straight through TB1 -> TB2; TB3 = two PE positions (heat-sink bond, chassis).

Insulation domains: mains and control are separate: U1 and U2 are the only barrier crossings (reinforced, 8 mm / 5.5 mm).

GND_CTRL is never joined to N or PE.

J1 (Molex KK 254, straight-through cable): 1 GND_CTRL (Ground), 2 VCTRL_IN (5–12V, LOAD LIVE indicator only, <= 6 mA), 3 SIG_IN (4.5–6V logic, active high, about 9–11 mA). Floating or low SIG = OFF (R2 10k pull-down). 3.3V logic is NOT supported.

Ratings: 10 A study target, UNQUALIFIED; 16 A / 240 VAC is the source target only after qualification.

F1 holder 500 VAC / 16 A UL: heat and fault coordination OPEN. Resistive loads only (heater, lamp). No inductive loads.

Leakage: OFF is NOT DISCONNECTED. Off-state triac leakage and ~2.2 mA through the sense chain flow while L_SW is live.

An unlit LOAD LIVE LED does not mean safe. Isolate upstream before touching the load.

Part data marked MPN UNVERIFIED / PART NOT SELECTED has no datasheet read in this attempt (contract open items U-1..U-11).

CERN-OHL-S-2.0 | KiCad only | black solder mask, white silkscreen | CAD study, not bench tested.

Hazard class mains-or-hazardous; v03 is a saved-copper thermal-interface study
UNSUITABLE FOR FABRICATION / USE UNTIL HUMAN MAINS-SAFETY REVIEW
Generated from design-contract.json by tools/create_schematic.py
Smoothieware / CERN-OHL-S-2.0

Sheet: /
File: ssr-ac-out.kicad_sch

Title: Single-channel AC solid-state relay output

Size: A3	Date: 2026-10-01	**Rev: v10**
KiCad E.D.A. 9.0.8		Id: 1/1