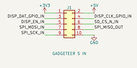
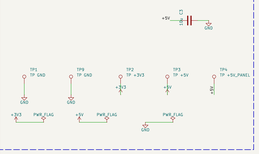
01 / HOST INPUT 5 IN (J1), host Prime J36: 1 +3V3, 2 +5V, 10 GND



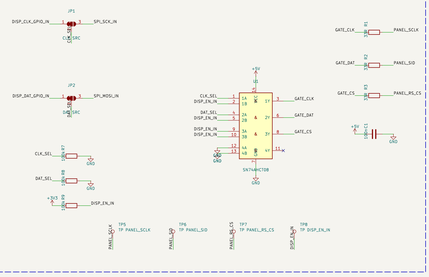
02 / HOST INPUT Y IN (J2), host Prime J37: 1 +3V3, 2 +5V, 10 GND



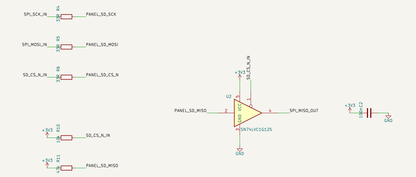
07 / PANEL 5 V FEED (F1, C3) + BOTTOM TEST PADS



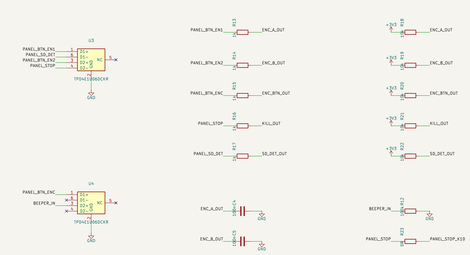
03 / DISPLAY GATE + 3.3 -> 5 V LEVEL SHIFT (U1, 5 V domain): SCLK = CLK AND EN, SID = DAT AND EN, CS = EN



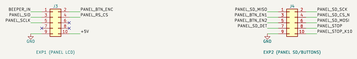
04 / PANEL SD SPI PASS-THROUGH + MISO RELEASE (U2, 3.3 V): MISO driven only while SD_CS_N_IN is low



05 / PANEL INPUT CONDITIONING + ESD: connector pin -> TVS (U3 at EXP2, U4 at EXP1) -> 1 k series -> 10 k pull-up to +3V3



06 / PANEL CONNECTORS: EXP1 (J3) = LCD, EXP2 (J4) = SD + buttons, RRD Smart Controller numbering, pin n to pin n



08 / NOTES (copied from design-contract.json: STUDY v10, CAD-checked intent only)

STUDY v10: first-cut schematic, NOT fabrication-ready; ERC/parity are CAD checks, not bench measurements. CERN-OHL-S-2.0 | KiCad only | black solder mask, white silkscreen.

Supported panel: original RepRapDiscount Full Graphic Smart Controller only (ST7920 serial mode). Clones are unsupported.

5 IN J1 (host 5 socket): 1 +3V3, 2 +5V, 3 DISP_DAT_GPIO_IN, 4 DISP_CLK_GPIO_IN, 5 DISP_EN_IN, 6 SD_CS_N_IN, 7 SPI_MOSI_IN, 8 SPI_MISO_OUT, 9 SPI_SCK_IN, 10 GND

Y IN J2 (host Y socket): 1 +3V3, 2 +5V, 3 ENC_A_OUT, 4 ENC_B_OUT, 5 BEEPER_IN, 6 ENC_BTN_OUT, 7 KILL_OUT, 8 -, 9 SD_DET_OUT, 10 GND

EXP1 J3 (panel LCD, key notch toward south edge): 1 BEEPER_IN, 2 PANEL_BTN_ENC, 3 PANEL_SID, 4 PANEL_RS_CS, 5 PANEL_SCLK, 6 -, 7 -, 8 -, 9 GND, 10 +5V_PANEL

EXP2 J4 (panel SD + buttons): 1 PANEL_SD_MISO, 2 PANEL_SD_SCK, 3 PANEL_BTN_EN1, 4 PANEL_SD_CS_N, 5 PANEL_BTN_EN2, 6 PANEL_SD_MOSI, 7 PANEL_SD_DET, 8 PANEL_STOP, 9 GND, 10 PANEL_STOP_X10

Variants: A (shipped) JP1+JP2 bridged 1–2 = display on GPIO SS/SA. R23 fitted, EN default enabled (works with the stock Smoothieware ST7920 driver).

Variant B (needs future firmware, none found): cut JP1 and JP2 bridge, bridge 2–3 = display from SPI SCK/MOSI, DISP_EN driven high only during display transfers. Changed together: JP1 + JP2.

Restore factory: JP1/JP2 bridged 1–2, R23 fitted. Power-off changes only. Remove R23 if a panel uses EXP2 pin 10 for anything but STOP.

Power-up reset = EN high (R9). CLK/DAT low (R7/R8). SD_CS high (R10, U2 !G->Z). BEEPER low (R12): display idle, buzzer silent, SD deselected. Hot-plug not supported.

Levels: ST7920 VIH = 0.7 x VDD = 3.5 V at 5 V, so U1 (SN74HCT08, VIH 2.0 V) shifts 3.3 -> 5 V. Panel SD side is 3.3 V (panel MCS200 + TMC4050): U2 runs from +3V3. ESD: U3/U4 on user-touchable lines only (SOS2 is a maintainer ruling, unresolved).

Timing (calculated, not measured): ST7920 SCLK period >= 400 ns at 4.5 V; Smoothieve2 bit-bangs about 1.67 MHz. SD SPI <= 4 MHz. Panel 5 V current UNVERIFIED (plan 0.15 A typ, 0.25 A peak); host header rail limit about 0.316 A shared.

Verification boundary: ERC/DRC, netlist and placement scripts, calculated electrical/timing bounds and datasheet readings are not bench measurements. Panel current, firmware behaviour, cable orientation, hot mating, ESD and power-order behaviour are unverified until G-* hardware tests.

CAD-clean is not release: the board is not fabrication-ready until the unverified items close.

Not fabrication-ready; see version-notes.md
GLCD-v10: 5 x Y host to EXP1/EXP2; qualified-panel contract only
Generated from design-contract.json by tools/create_schematic.py
Smoothieware / CERN-OHL-S-2.0
Sheet: /
File: glcd-breakout.kicad_sch

Title: Smoothie GLCD breakout

Size: A0	Date: 2026-10-01	Rev: v10
KiCad 8.0.4, 9.0.8		Id: 1/1