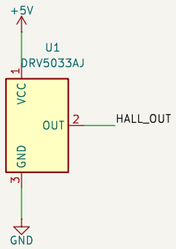
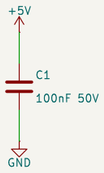
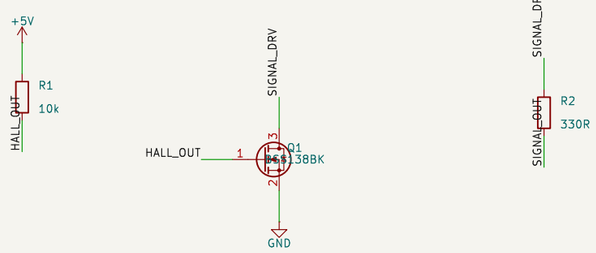
01 / HALL SENSOR: DRV5033AJ OMNIPOLAR OPEN-DRAIN SWITCH, VCC BYPASS

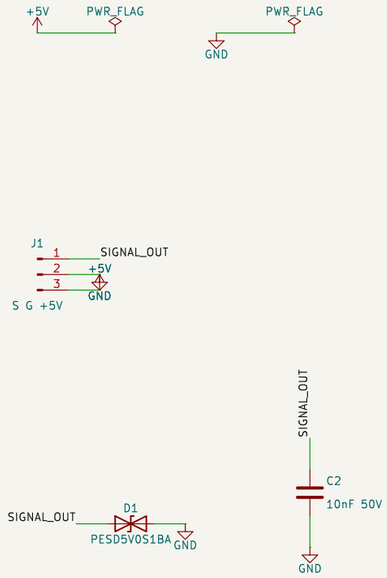




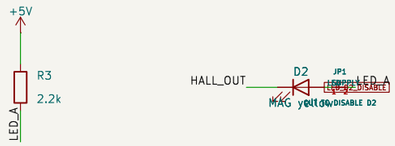
02 / INVERTER: Q1 BSS138BK SINKS SIGNAL_OUT LOW WHILE CLEAR; R1 PULL-UP; R2 SERIES



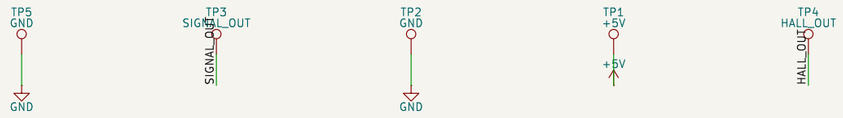
03 / FIELD CONNECTOR J1 (KK 3-pin), ESD CLAMP D1, NOISE FILTER C2



04 / MAGNET INDICATOR: R3 + D2 (cathode on HALL_OUT, 1.5 mA, live state)



05 / BOTTOM-SIDE OBSERVATION PADS (OBS ONLY, NO INJECTION)



Hall endstop: DRV5033AJ (omnipolar, BOP 3/6.9/12 mT, BRP 1/3.5/5 mT) -> Q1 inverter -> SIGNAL_OUT (open-drain, never sources).

Truth table (contract.fail_safe_truth_table): powered, no magnet = SIGNAL_OUT LOW = CLEAR. Magnet near (either pole), cable open, +5V open or unpowered = HIGH via host pull-up = TRIGGERED.

NOT detected: SIGNAL shorted to GND, dead U1 with Hi-Z output, Q1 short, 5 V brownout between 1 V and 2.5 V. Not a safety interlock: keep machine-level limits.

HOST PULL-UP REQUIRED: 4.7 k to 100 k to the host 3.3 V logic rail (MCU internal about 40 k qualifies). No pull-up on this board (D4). Firmware: pin = PXn^ without "!", retract >= 10 mm for the 4 x 2 mm N42 magnet.

J1 pinout, viewed from the top, pin 1 left: 1 SIGNAL (SIGNAL_OUT), 2 GND, 3 +5V (host 5 V, 5.6 mA max, self-imposed cap 10 mA). Board limit about 12 V continuous on +5V (R3 power, Q1 gate).

Adapter to Gadgeteer X (host end): KK1 SIGNAL -> X pin 3; KK2 GND -> X pin 10; KK3 +5V -> X pin 2; X pin 1 (+3.3V) and pins 4-9 not connected.

Exceptions (contract): no Gadgeteer socket, no chain port, no 12-24 V input or 5V-source jumper, no fuse/TVS/reverse stage on +5V, no LED-disable option, no fiducials (hand assembly), elongated outline.

TP1 +5V, TP2 GND, TP3 SIGNAL_OUT, TP4 HALL_OUT, TP5 GND: bottom-side observation pads, excluded from the BOM. Mounting holes H1/H2 are board-only (no symbol), M3 NPTH, no net.

Magnetic clean zone: no ferromagnetic part within 2.5 mm of U1 courtyard (Q1 leadframe is Alloy 42, kept >= 5.5 mm away); non-ferrous (nylon/brass) M3 screws required.

ERC note: U1 pin 2 carries the stock library type (output) because DRV5033AJxDBZ derives from a linear sensor symbol; electrically it is open-drain with pull-up R1 (contract.schematic_rules).

CERN-OHL-S-2.0 | KiCad only | v13 metadata-only study: installed v13 circuit retained; native/CAM checks are not hardware qualification.

Source v13: installed repair; v13 metadata: prepare_candidate.py
Omnipolar Hall switch + BSS138BK inverter; NC-equivalent endstop output
Smoothieware / CERN-OHL-S-2.0

Sheet: /
File: hall-endstop.kicad_sch

Title: Smoothie Hall endstop

Size: A3	Date: 2026-10-03	**Rev: v13**
KiCad E.D.A. 9.0.8		Id: 1/1