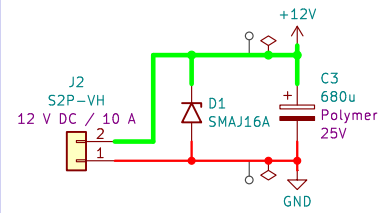


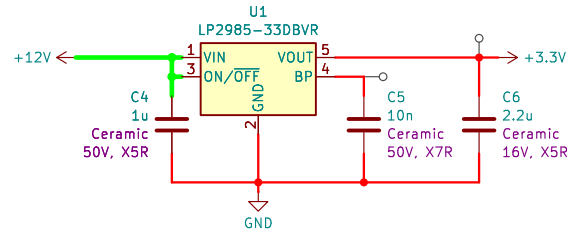
POWER INPUT

Input must be 9 to 16 V
Circuit protection
- External: 10 A fuse required, 16 AWG wire
- Internal: reverse polarity, overvoltage



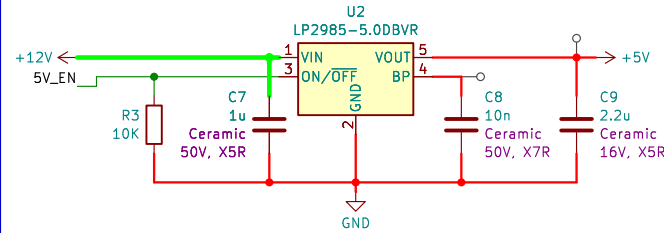
3.3 V POWER SUPPLY

Supplies 150 mA, ultra low quiescent current (microamps)
The whole system draws less than 5 mA while idle



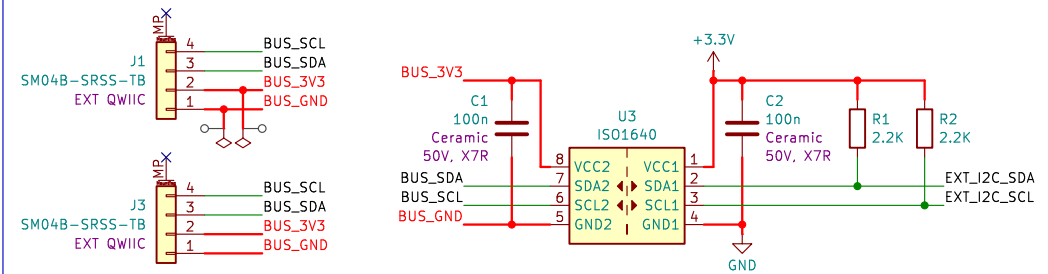
5 V POWER SUPPLY FOR HALL SENSORS

Supplies 150 mA, ultra low quiescent current (microamps)
Disabled when not needed to drive peripherals



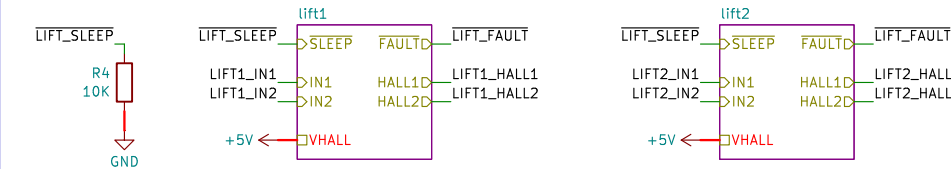
EXTERNAL QWIC INTERFACE

ISO1640 provides bidirectional isolation, hot swap, and ESD protection
- Side 1 drives the internal bus, intended for a low-capacitance node
- Side 2 drives the external bus, can withstand stronger ESD and short circuit events



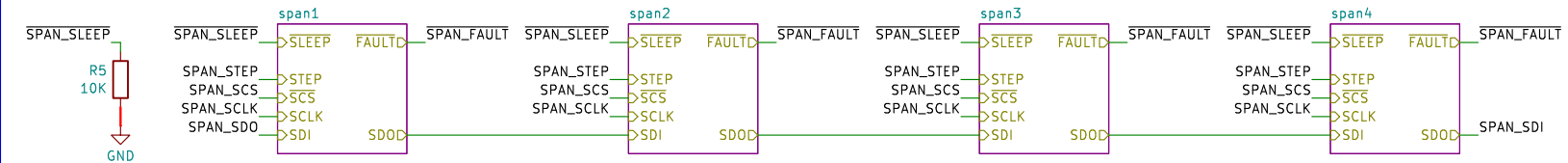
LIFT ACTUATORS

The lift actuators are synchronized with rotary encoder feedback



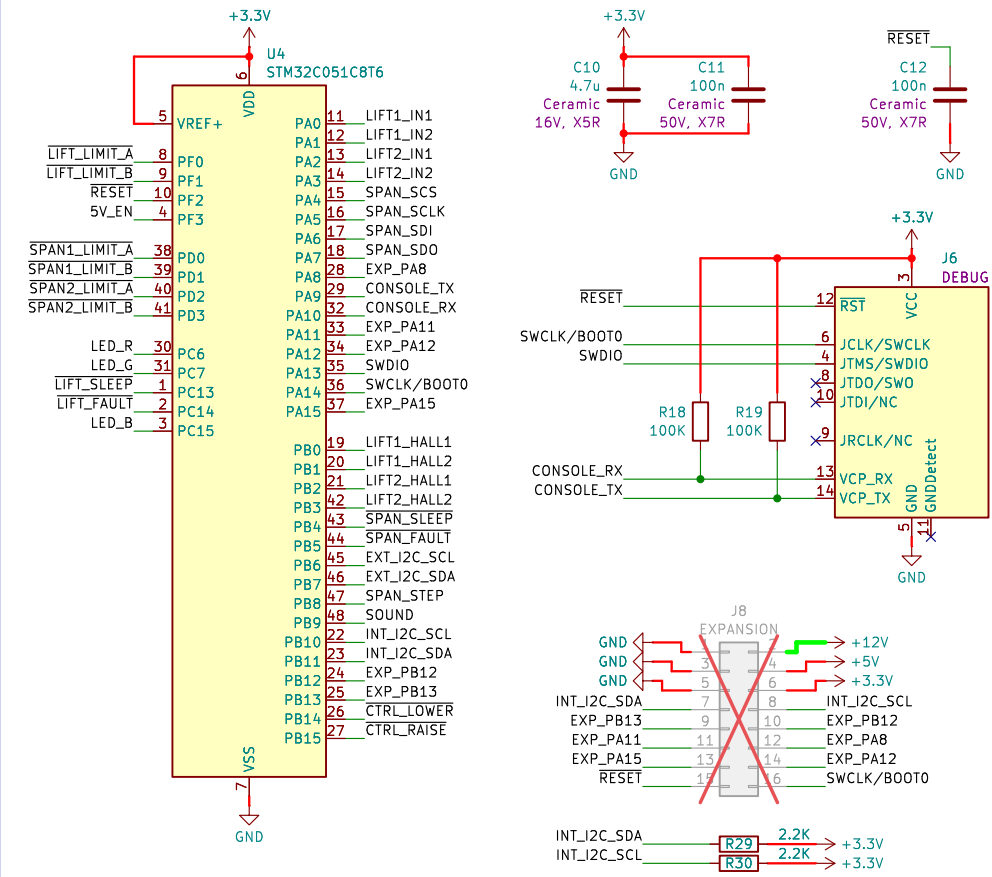
SPAN ACTUATORS

The drivers form an SPI daisy-chain and are driven in tandem by the same step pulse



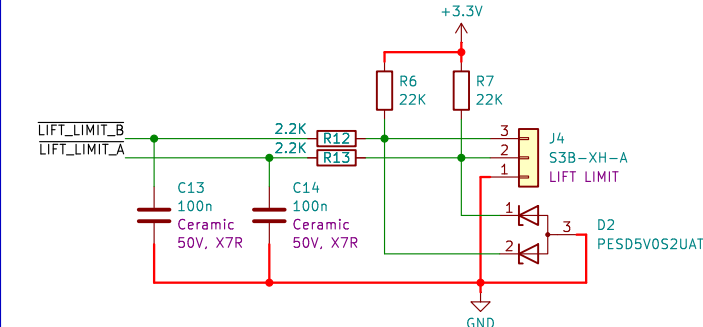
STM32C051 MICROCONTROLLER

Programmed via SWD with STLINK-V3 and an STDC14 cable
Can also access the system bootloader over I2C or UART by pulling BOOT0 low during RESET
Unused pins are exposed via an expansion port including an internal I2C port

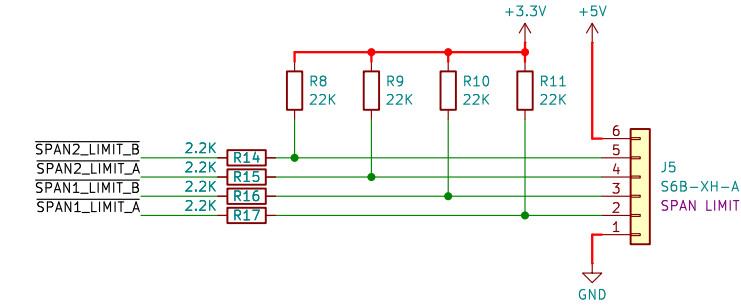


LIFT LIMIT SWITCHES

Debounce switch contacts, ESD protection

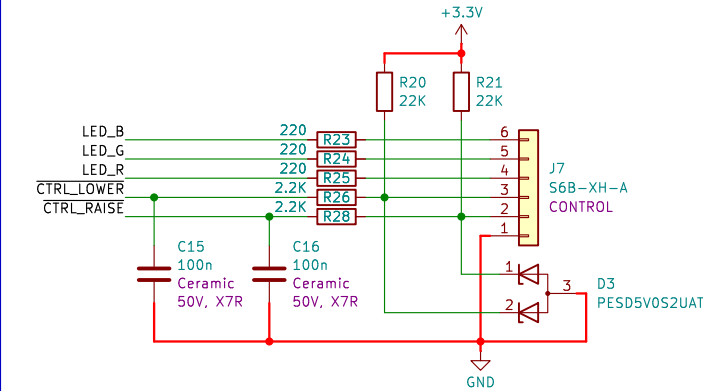


SPAN LIMIT HALL SENSORS



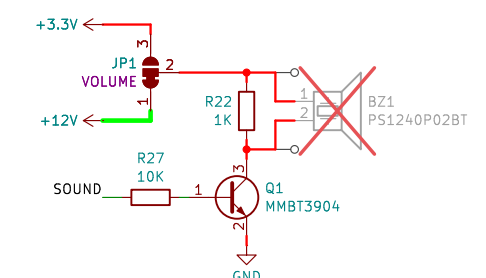
CONTROL INPUTS AND INDICATORS

Debounce switch contacts, ESD protection



PIEZO BUZZER

Can be disabled in software or by cutting the solder jumper



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Sheet: /
File: bed-lift.kicad_sch

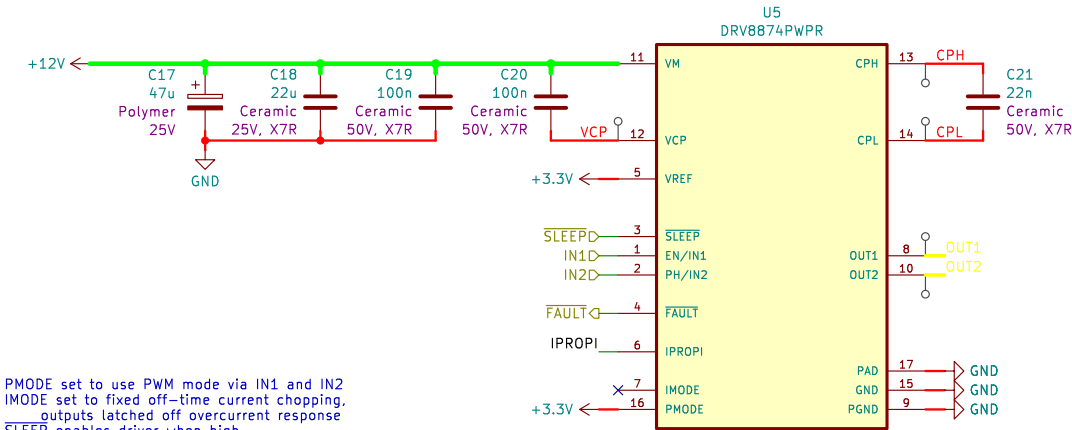
Title: Bed Lift Controller

Size: A3 Date: 2026-01
KiCad E.D.A. 9.0.6

Rev: v1.0
Id: 1/7

LIFT ACTUATOR MOTOR DRIVER

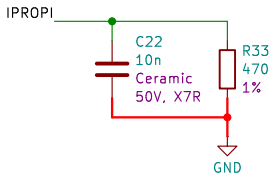
Designed for 12 V DC motor load up to 3 A (driver is rated for 6 A peak)



PMODE set to use PWM mode via IN1 and IN2
IMODE set to fixed off-time current chopping,
outputs latched off overcurrent response
SLEEP enables driver when high
FAULT is open-drain

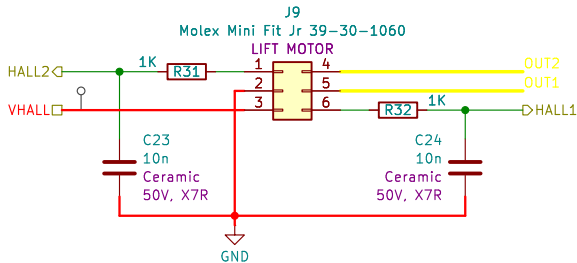
CURRENT LIMIT

Set overcurrent protection trip current
 $I_{trip} (A) = 450 * V_{ref} (V) / R_{ipropi} (\Omega)$
Given $V_{ref} = 3.3 V$, $R_{ipropi} = 470 \Omega$, $I_{trip} = 3.16 A$



CONNECTOR FOR PA-09 LINEAR ACTUATOR

The hall sensor outputs are push-pull at 5 V, RC filter for jitter



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Sheet: /lift1/
File: lift.kicad_sch

Title: Bed Lift Controller

Size: A4 Date: 2025-10

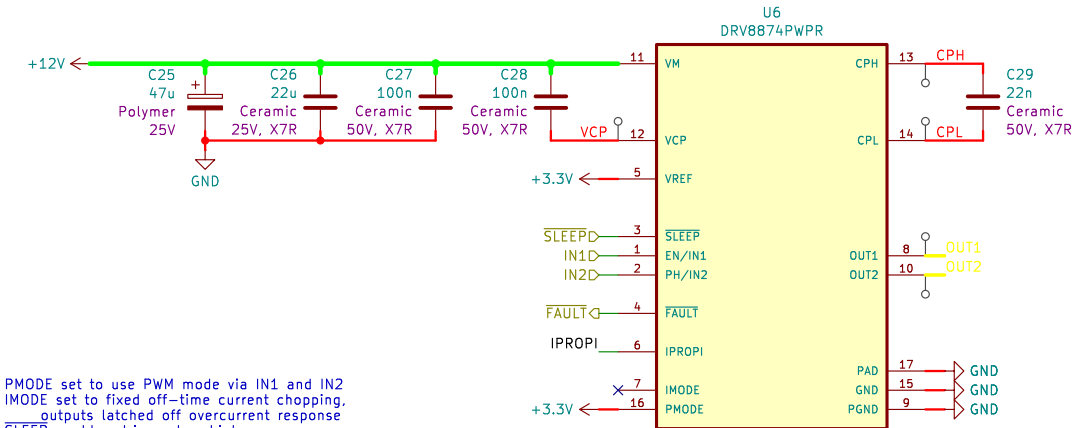
KiCad E.D.A. 9.0.6

Rev: v0.2.1

Id: 2/7

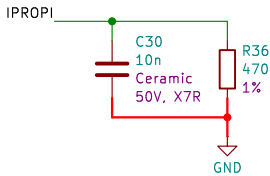
LIFT ACTUATOR MOTOR DRIVER

Designed for 12 V DC motor load up to 3 A (driver is rated for 6 A peak)



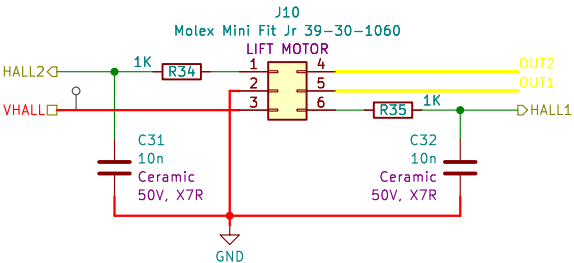
CURRENT LIMIT

Set overcurrent protection trip current
 $I_{trip} (A) = 450 * V_{ref} (V) / R_{ipropi} (\Omega)$
Given $V_{ref} = 3.3 V$, $R_{ipropi} = 470 \Omega$, $I_{trip} = 3.16 A$



CONNECTOR FOR PA-09 LINEAR ACTUATOR

The hall sensor outputs are push-pull at 5 V, RC filter for jitter



Brown Studios LLC

Sheet: /lift2/
File: lift.kicad_sch

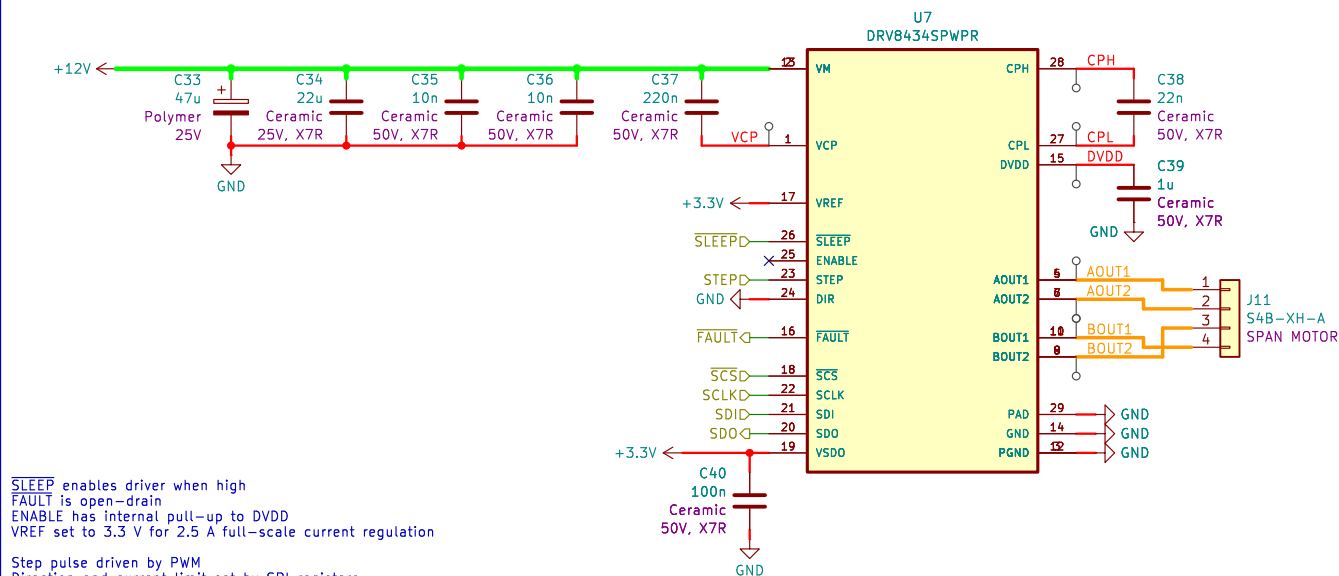
Title: Bed Lift Controller

Size: A4 Date: 2025-10
KiCad E.D.A. 9.0.6

Rev: v0.2.1
Id: 3/7

SPAN ACTUATOR MOTOR DRIVER

Designed for 12 V DC stepper motor load up to 1.8 A rms



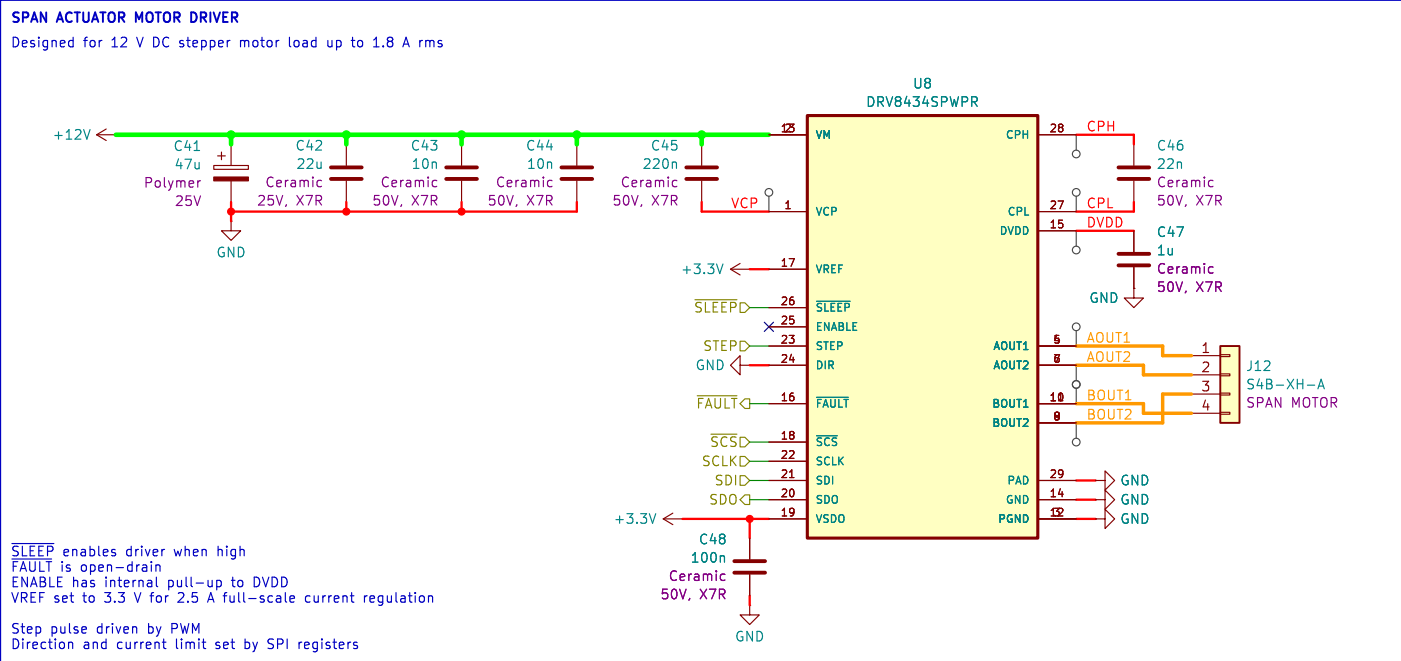
Brown Studios LLC

Sheet: /span1/
File: span.kicad_sch

Title: Bed Lift Controller

Size: A4 Date: 2025-10
KiCad E.D.A. 9.0.6

Rev: v0.2
Id: 4/7



Brown Studios LLC

Sheet: /span2/
File: span.kicad_sch

Title: Bed Lift Controller

Size: A4 Date: 2025-10

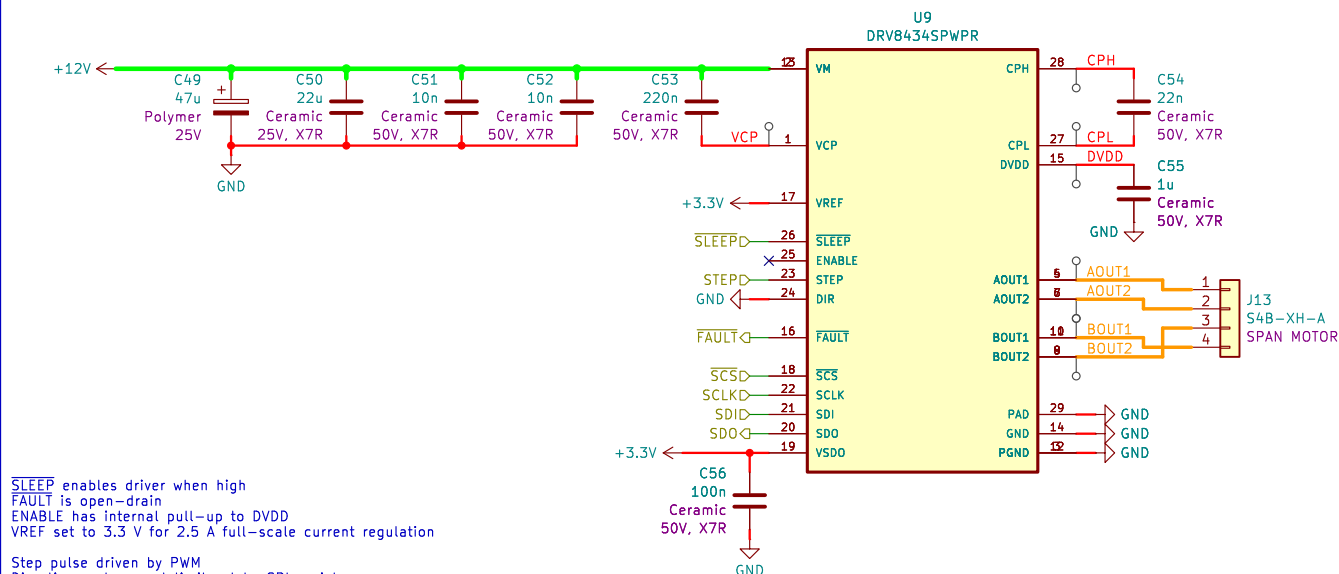
KiCad E.D.A. 9.0.6

Rev: v0.2

Id: 5/7

SPAN ACTUATOR MOTOR DRIVER

Designed for 12 V DC stepper motor load up to 1.8 A rms



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Sheet: /span3/
File: span.kicad_sch

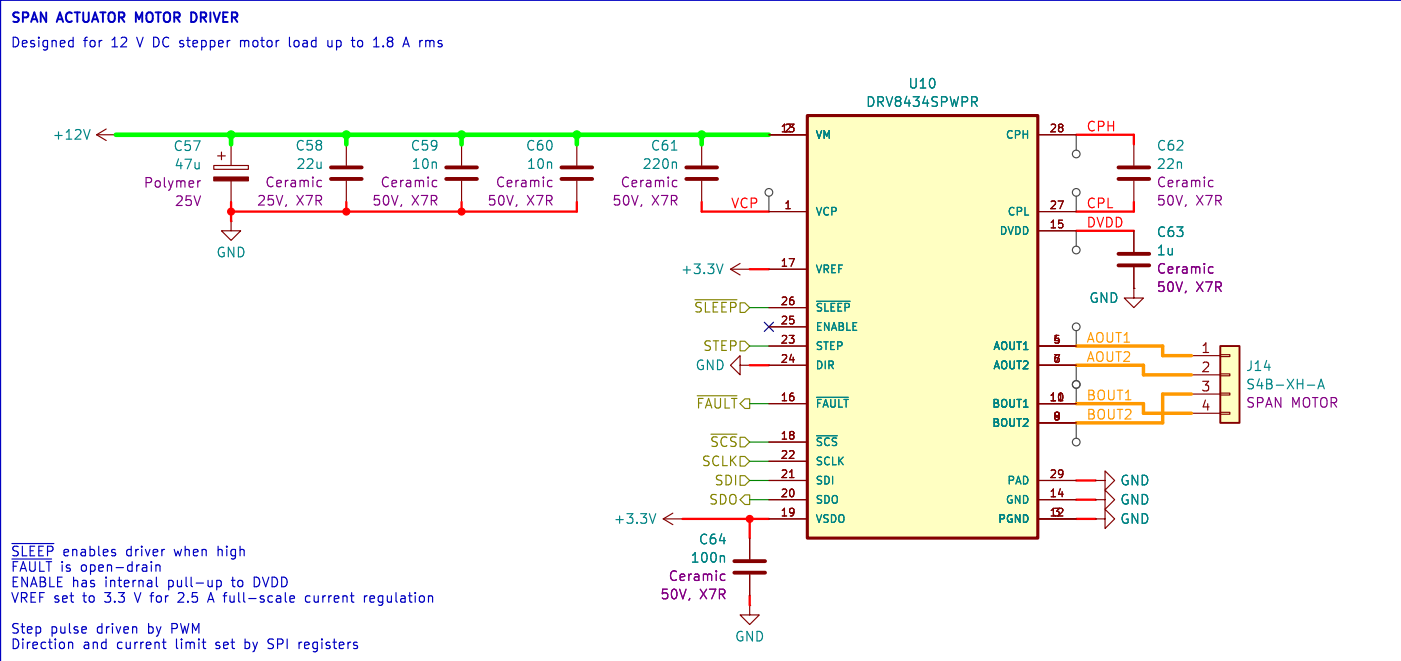
Title: Bed Lift Controller

Size: A4 Date: 2025-10

KiCad E.D.A. 9.0.6

Rev: v0.2

Id: 6/7



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Sheet: /span4/
File: span.kicad_sch

Title: Bed Lift Controller

Size: A4 Date: 2025-10

KiCad E.D.A. 9.0.6

Rev: v0.2

Id: 7/7