

Valve driver ECU: STM32G474, CAN FD, 4 x 2.5 A low-side outputs, DEUTSCH DTM 12

6 sheets: this overview, then one sheet per function. Nets between sheets are global labels: power rails are power symbols.

Power supply

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 - Power supply: support parts

File: board-power-supply.kicad_sch

STM32G474CBT3 (U1) and 16MHz (Y1)

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 - STM32G474CBT3 (U1): decoupling
 - 16MHz (Y1)

File: board-stm32g474cbt3-u1-and-16mhz-y1.kicad_sch

STM32G474CBT3 (U1)

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- STM32G474CBT3 (U1): support parts

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Supply protection and more

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 - BUK9Y3R5-40E (Q3)
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 - BUK9Y3R5-40E (Q5)
 - UCC27524AQDRQ1 (U5): decoupling

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UCC27524AQDRQ1 (U5) and more

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 - UCC27524AQDRQ1 (U6)
 - UCC27524AQDRQ1 (U6): decoupling
 - CAN FD
 - Vehicle connector
 - Debug connector

File: board-ucc27524aqdrq1-u5-and-more.kicad_sch

Power tree
VPROT
-> U3 TPS54360DDAR -> +5V
-> U4 AMS1117-3.3 -> +3V3

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Sheet: Overview

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Sheet: /

File: board.kicad_sch

Title: Valve driver ECU: STM32G474, CAN FD, 4 x 2.5 A low-side outputs, DE

Size: A4

Date: 2026-10-15

Rev: 1

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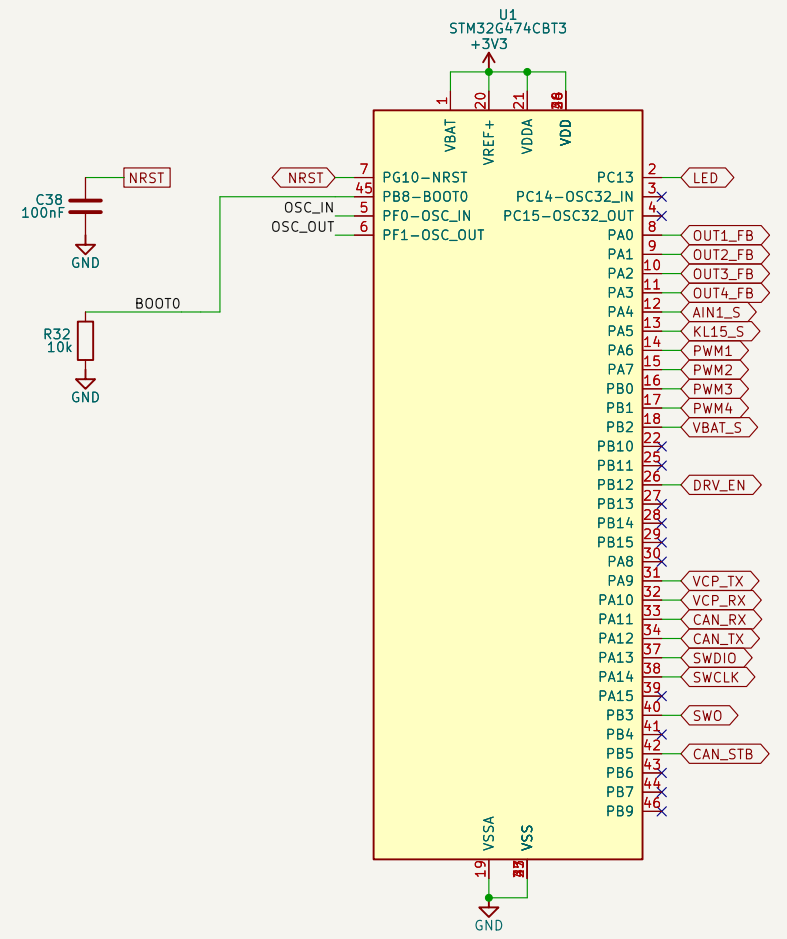
Id: 1/6

A 60 V step-down converter makes 5 V for the CAN transceiver and the gate drivers; an LDO makes 3.3 V for the MCU. TPS54360 at about 500 kHz, 52.3k / 10k feedback: 4.98 V; LP5907 3.3 V, 250 mA.

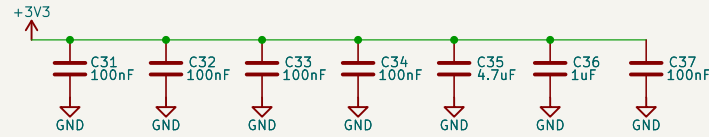


STM32G474CBT3 (U1)

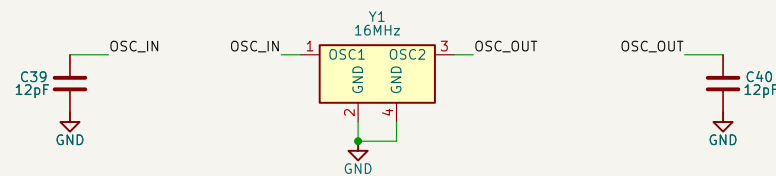
STM32G474: FDCAN, the valve PWM, the ADC readings and the diagnostics; 16 MHz crystal for CAN timing.



STM32G474CBT3 (U1): decoupling



16MHz (Y1)



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Sheet: STM32G474CBT3 (U1) and 16MHz (Y1)

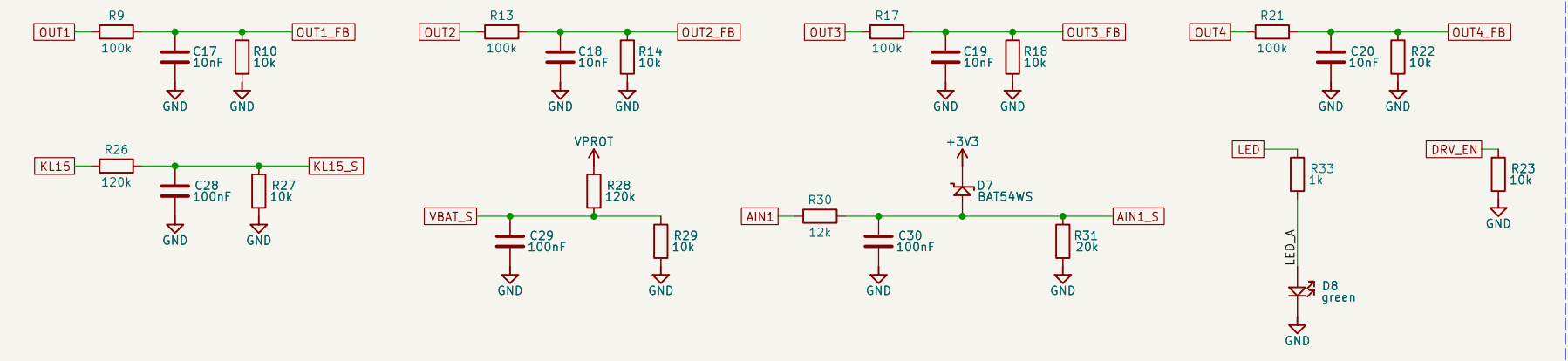
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Sheet: /STM32G474CBT3 (U1) and 16MHz (Y1)/
File: board-stm32g474cbt3-u1-and-16mhz-y1.kicad_sch

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STM32G474CBT3 (U1): support parts



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Sheet: STM32G474CBT3 (U1)

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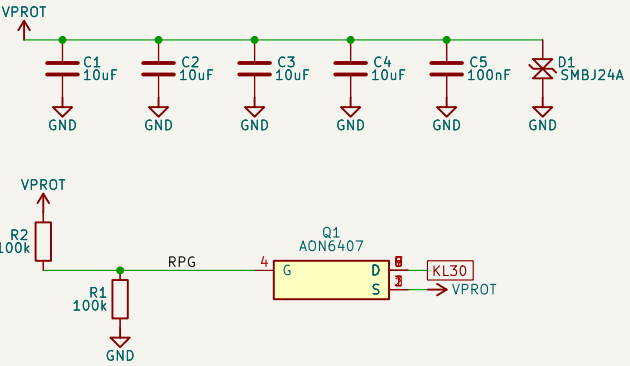
Sheet: /STM32G474CBT3 (U1)/
File: board-stm32g474cbt3-u1.kicad_sch

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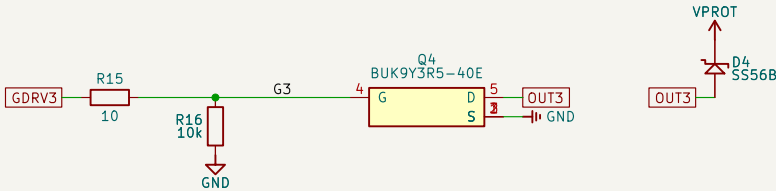
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Supply protection

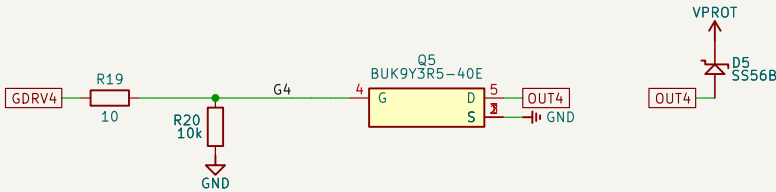
A P-channel switch blocks a reversed battery; a 600 W TVS clamps load-dump spikes below what the parts behind it tolerate.
AON6407 with its gate halfway between the protected rail and GND ($V_{GS} = -V_{PROT}/2$): fully on from 9 V, inside its ± 20 V up to the clamp.
SMBJ24A: passes a 24 V jump start, clamps at 38.9 V – under the 40 V of the output FETs and the 60 V of the buck.



BUK9Y3R5-40E (Q4)

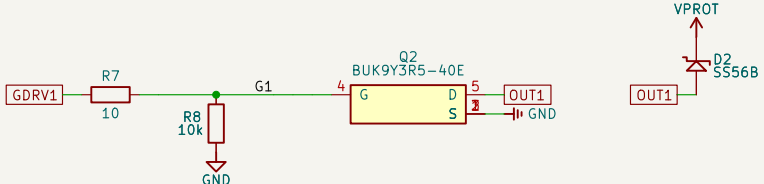


BUK9Y3R5-40E (Q5)

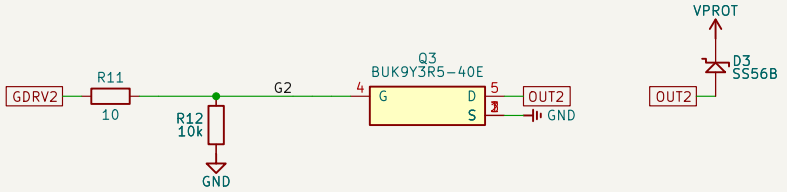


BUK9Y3R5-40E (Q2)

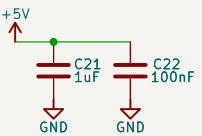
Four low-side switches for solenoid valves, 2.5 A each, with freewheeling diodes and output-voltage feedback for open-load and short detection.
BUK9Y3R5-40E (40 V, AEC-Q101, 3.8 mOhm) driven at 5 V by two UCC27524A-Q1 gate drivers; both drivers off while the MCU is in reset (DRV_EN pulled low).
PWM from TIM3 (PA6, PA7, PB0, PB1); each output's voltage goes to an ADC pin through 100k / 10k.



BUK9Y3R5-40E (Q3)



UCC27524AQDRQ1 (U5): decoupling



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