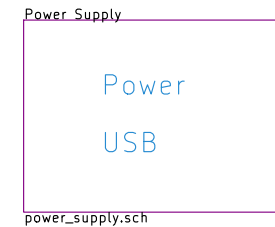
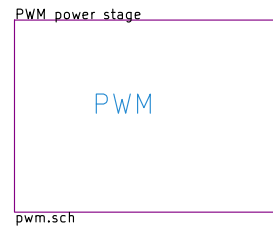
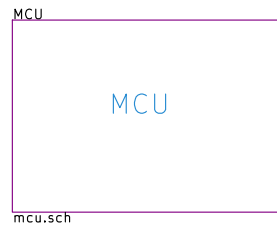
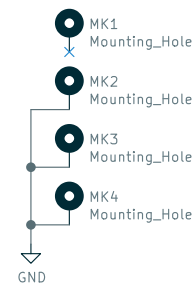


PWM Solar Charge Controller 20A



Main Specifications

- 12V/24V battery voltage
- 20A max. charge current (10A with cheaper MOSFETs possible)
- 55V max. solar input
- 32bit ARM MCU (STM32L072)
- Expandable via Olimex Universal Extension Connector (UEXT) featuring I2C, Serial and SPI interface (e.g. used for display, WIFI communication, etc.)
- USB charging (single port)
- Low-side load switching



PWM Solar Charge Controller

Libre Solar
Website: <https://libre.solar>

Sheet: /
File: pwm_charger_20a.sch

Author: Martin Jäger

Size: A4 | Date: 2019-03-05

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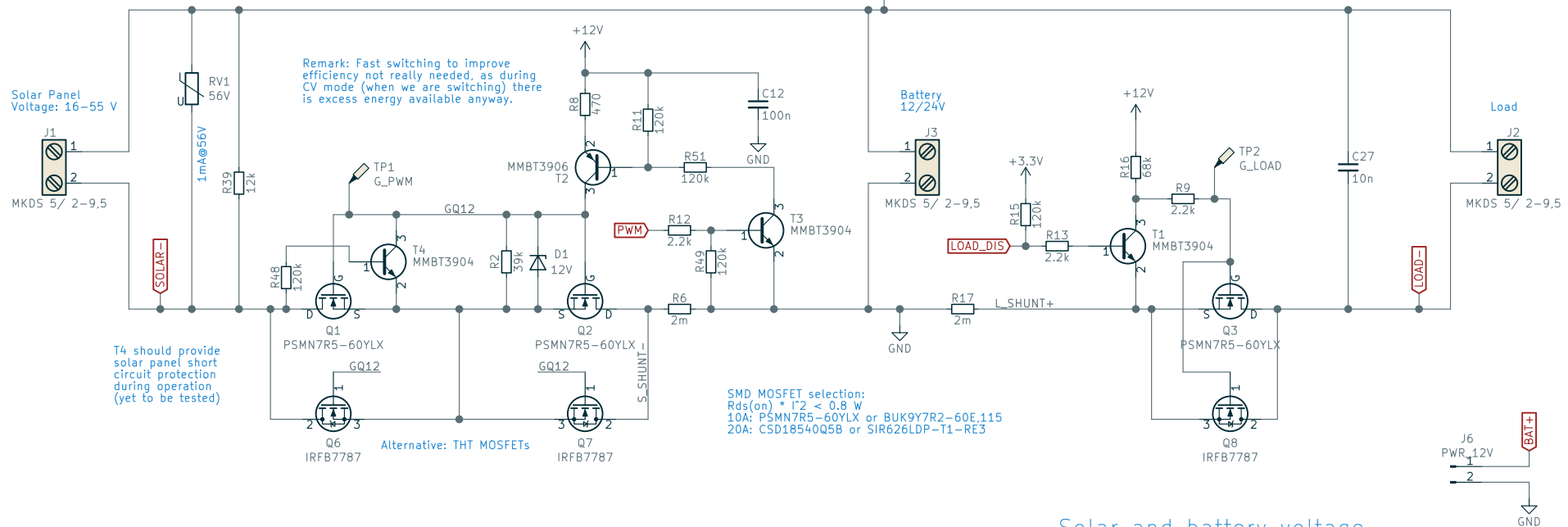


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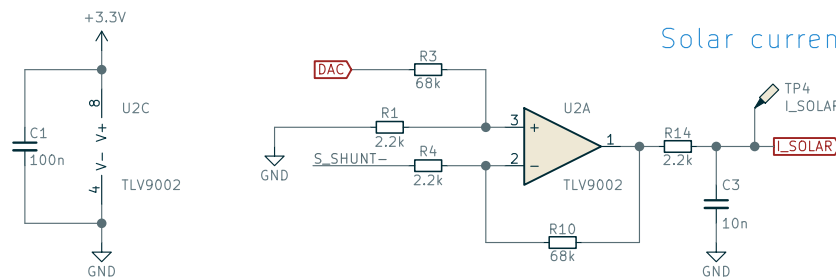
Page: 1/4

PWM power stage

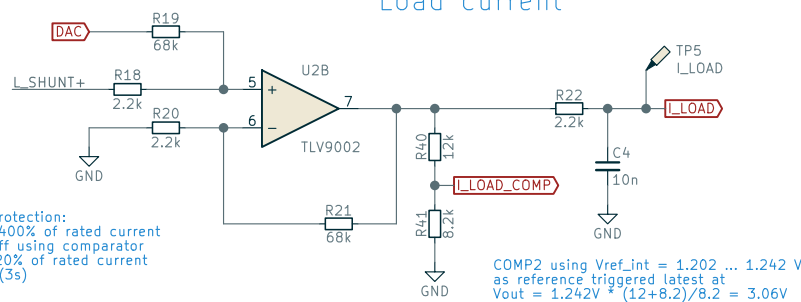
Load output



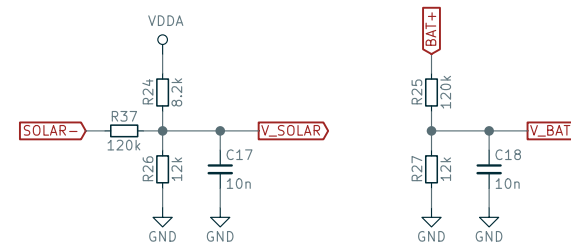
Solar current



Load current



Solar and battery voltage



Negative voltage max:
 $10 \text{ V bat} - 55 \text{ V panel} = -35 \text{ V}$

If not stated otherwise,
 all MLCC 50V X7R

PWM Solar Charge Controller

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 File: pwm.sch

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Page: 2/4

Solar Panel
 Voltage: 16-55 V

Battery
 12/24V

Load

T4 should provide
 solar panel short
 circuit protection
 during operation
 (yet to be tested)

Alternative: THT MOSFETs

SMD MOSFET selection:
 $R_{ds(on)} \cdot I^2 < 0.8 \text{ W}$
 10A: PSMN7R5-60YLX or BUK9Y7R2-60E.115
 20A: CSD18540Q5B or SIR626LDP-T1-RE3

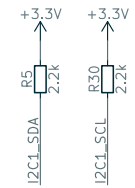
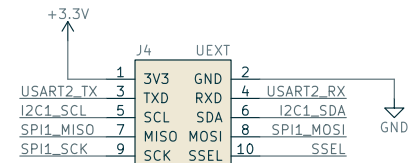
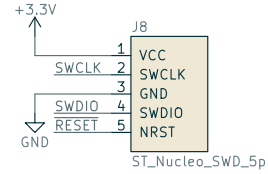
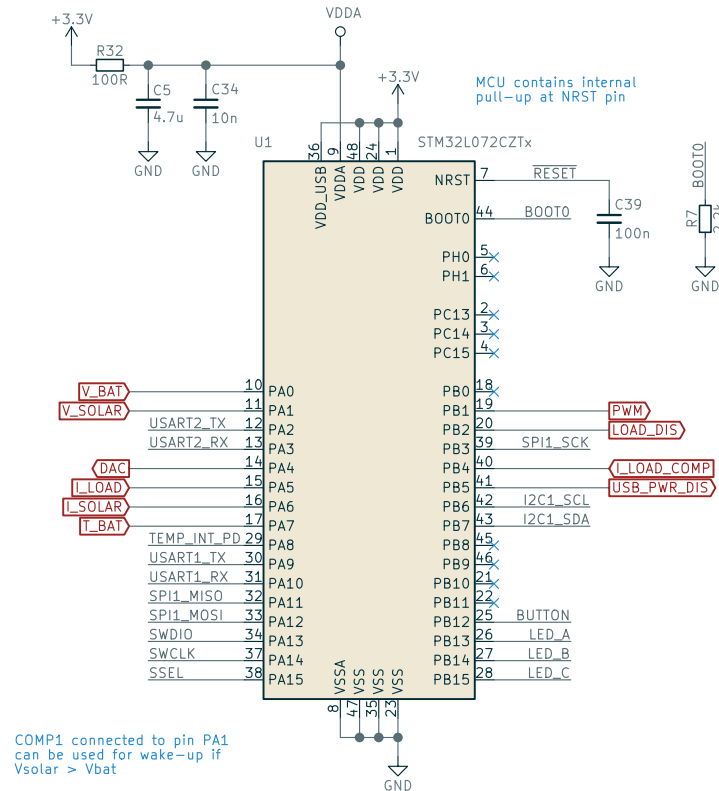
Load overcurrent protection:
 - Short-circuit: >400% of rated current
 Immediate cut-off using comparator
 - Overcurrent: >120% of rated current
 Delayed cut-off (3s)

MCU STM32L072

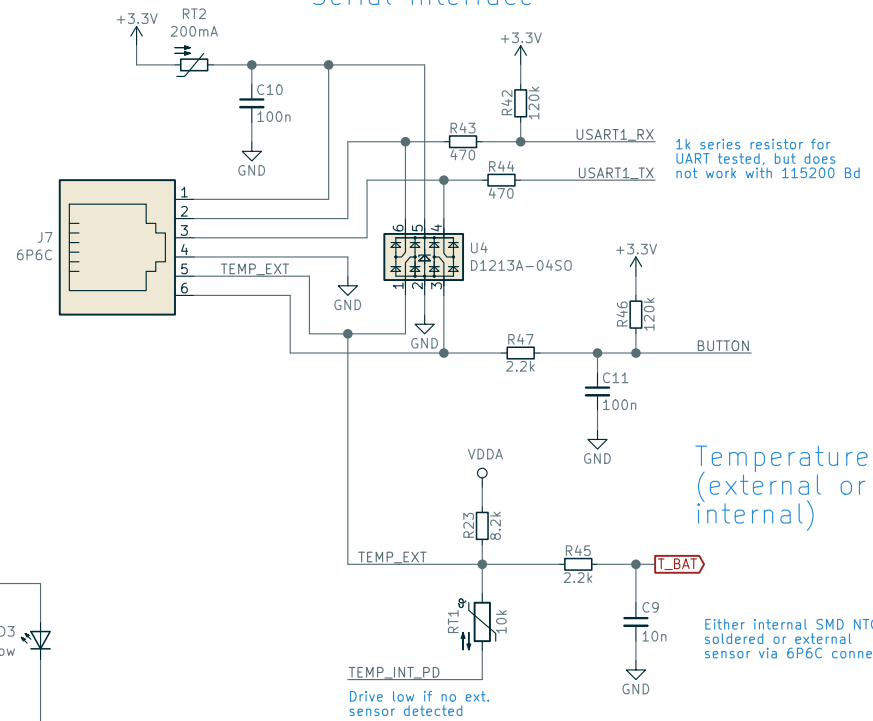
STM Nucleo SWD

UEXT connector

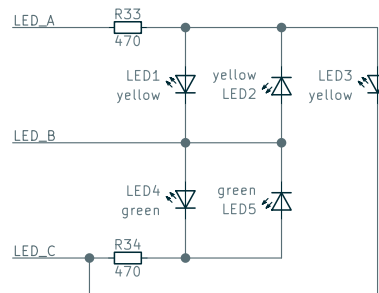
I2C pull-ups



Serial interface



Status LEDs with Charlieplexing



If not stated otherwise, all MLCC 50V X7R

PWM Solar Charge Controller

Libre Solar
Website: <https://libre.solar>
Sheet: /MCU/
File: mcu.sch

Author: Martin Jäger

Size: A4 Date: 2019-03-05

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