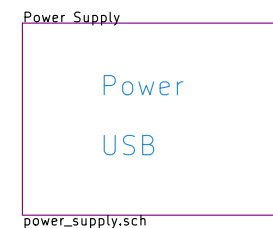
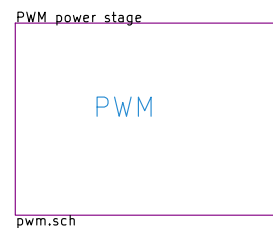
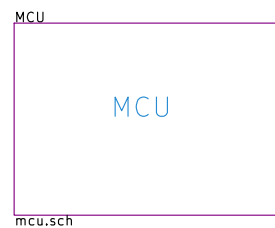


24V / 20A PWM Solar Charge Controller



Main Specifications

- 12V/24V battery voltage
- up to 20A max. charge current (depending on MOSFET selection)
- 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 2420 LUS

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

Sheet: /
File: pwm-2420-lus.sch

Author: Martin Jäger

Size: A4 Date: 2019-08-26

KiCad E.D.A. kicad 5.1.2

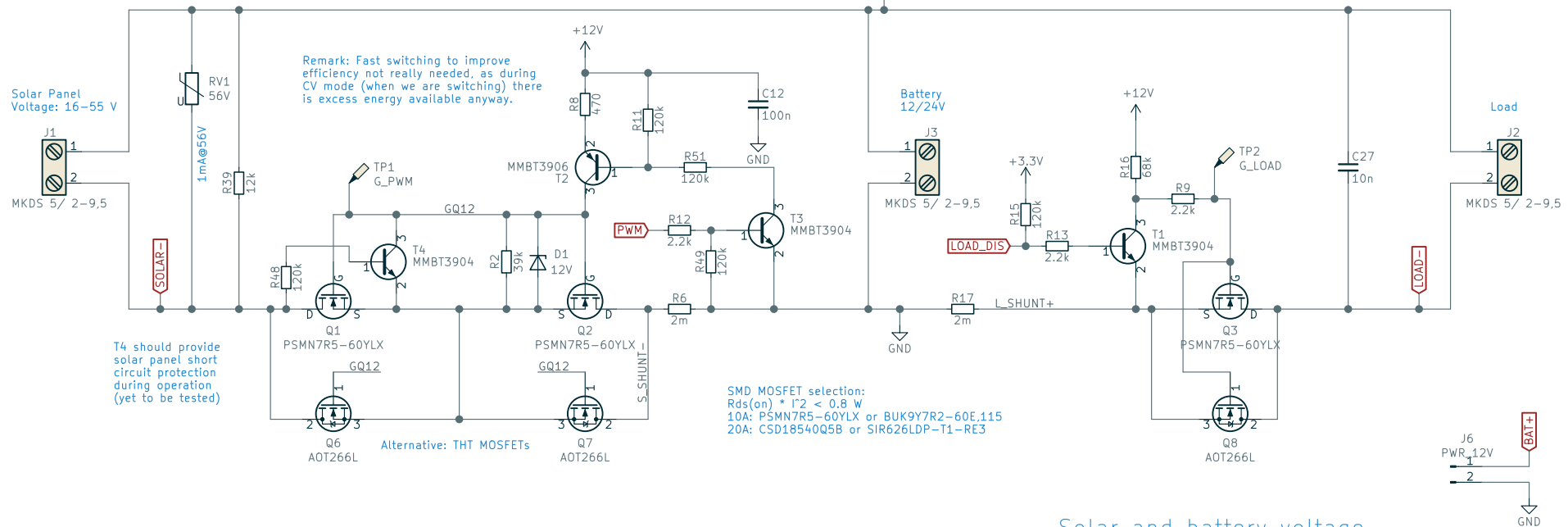


Rev: 0.3

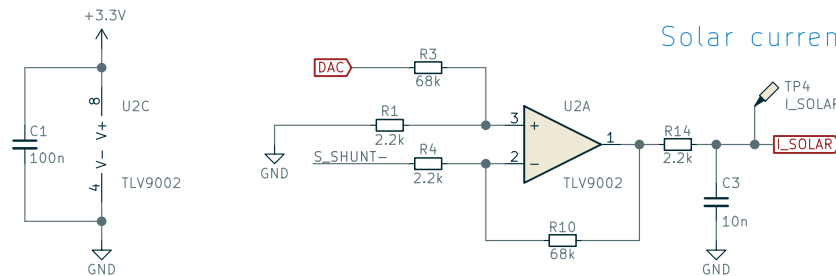
Page: 1/4

PWM power stage

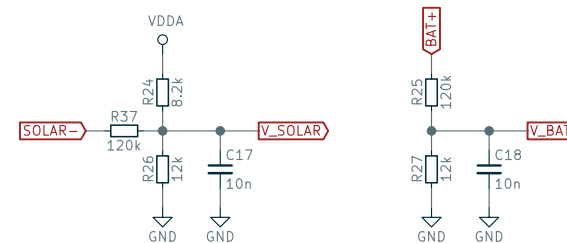
Load output



Solar current



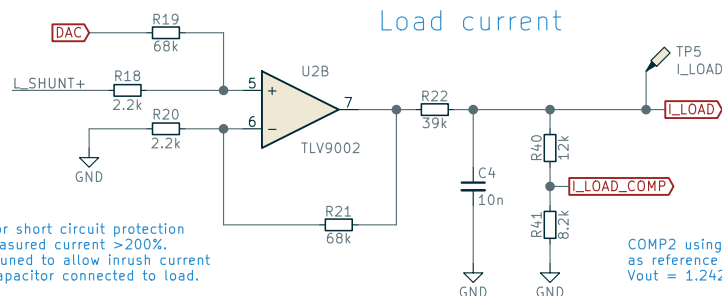
Solar and battery voltage



Negative voltage max:
 10V bat - 55V panel = -35V

If not stated otherwise,
 all MLCC 50V X7R

Load current



Comparator for short circuit protection
 triggers if measured current >200%.
 Output filter tuned to allow inrush current
 of 1000 uF capacitor connected to load.

COMP2 using $V_{ref_int} = 1.202 \dots 1.242 \text{ V}$
 as reference triggered latest at
 $V_{out} = 1.242 \text{ V} \cdot (12 + 8.2) / 8.2 = 3.06 \text{ V}$

PWM 2420 LUS

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

Sheet: /PWM power stage/
 File: pwm.sch

Author: Martin Jäger

Size: A4 Date: 2019-08-26

KiCad E.D.A. kicad 5.1.2



Rev: 0.3

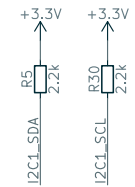
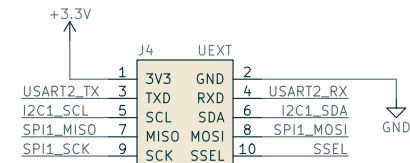
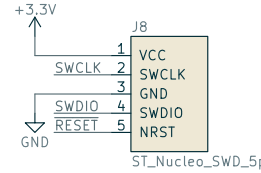
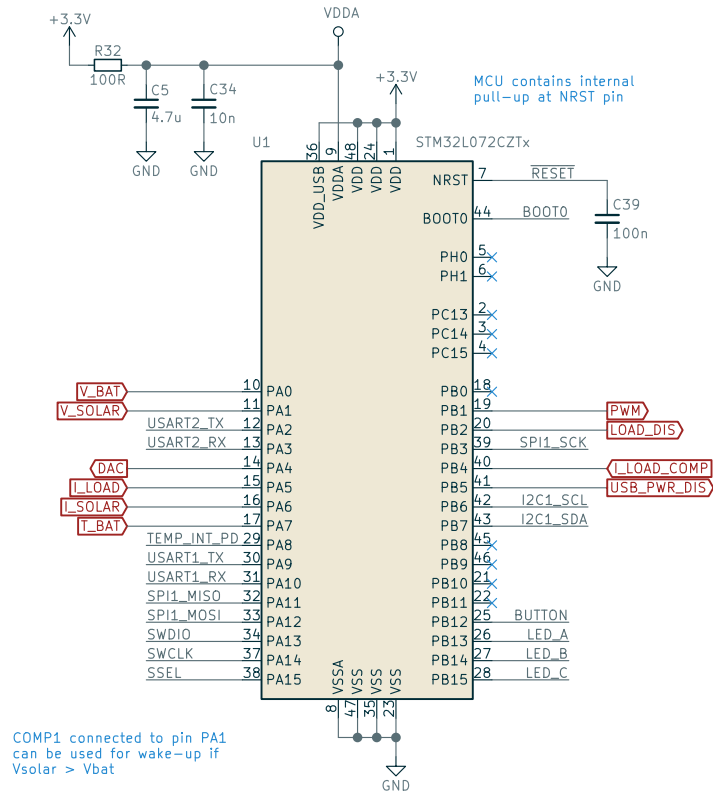
Page: 2/4

MCU STM32L072

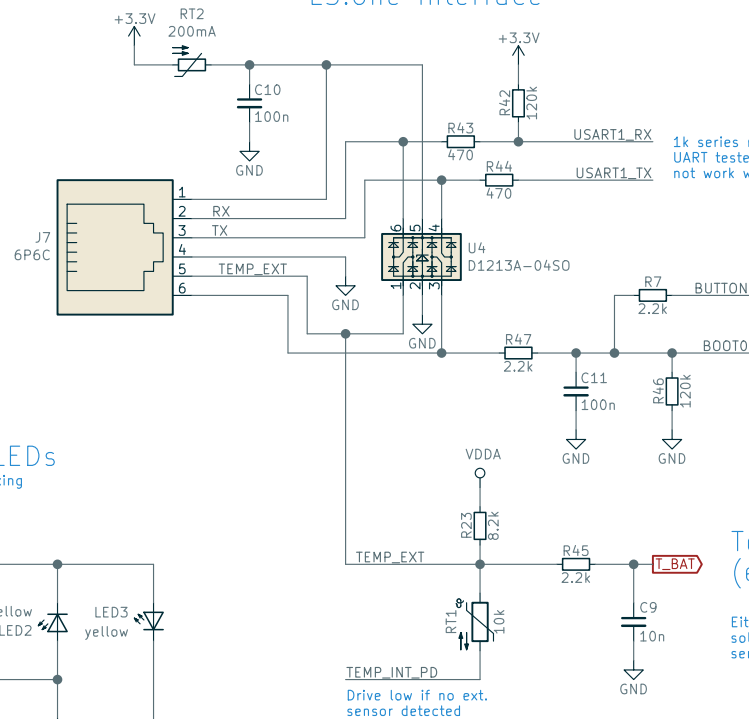
STM Nucleo SWD

UEXT connector

I2C pull-ups



LS.one interface



1k series resistor for UART tested, but does not work with 115200 Bd

BUTTON can trigger bootloader if pulled high before reset. Duration of high input on BOOT0:

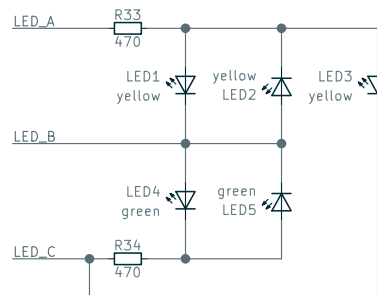
$$\tau = R35 * C43$$

$$V(t) = V_{max} * (1 - \exp(-t/\tau))$$

$$\rightarrow t = -\tau * \ln(1 - V/V_{max})$$

$V > 0.7 * V_{DD} = 2.31V$ necessary
 $\rightarrow t = 12 \text{ ms}$

Status LEDs with Charlieplexing



Temperature (ext. or int.)

Either internal SMD NTC soldered or external sensor via 6P6C connector

PWM 2420 LUS

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

Author: Martin Jäger

Size: A4 Date: 2019-08-26

KiCad E.D.A. kicad 5.1.2



Rev: 0.3

Page: 3/4

If not stated otherwise, all MLCC 50V X7R

