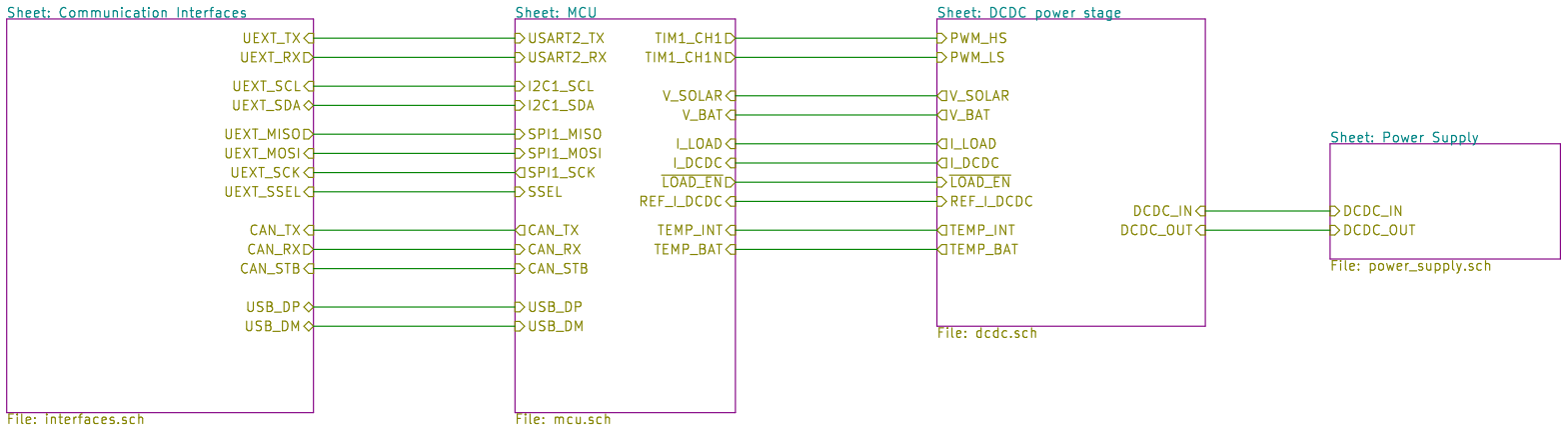
Libre Solar MPPT Charge Controller (20A)



Main Specification

- 20A max. charge current
- 55V max PV input
- 12V or 24V battery output
- External temperature sensor input
- 32bit ARM MCU (STM32F072)
- CAN communication interface RJ45 jacks or screw terminal
- Expandable via Olimex Universal Extension Connector (UEXT) featuring I2C, Serial and SPI interface (e.g. used for display, WIFI communication, etc.)
- DIN rail housing compatible (Phoenix Contact EH series)

LOGO1 LIBRE_SOLAR

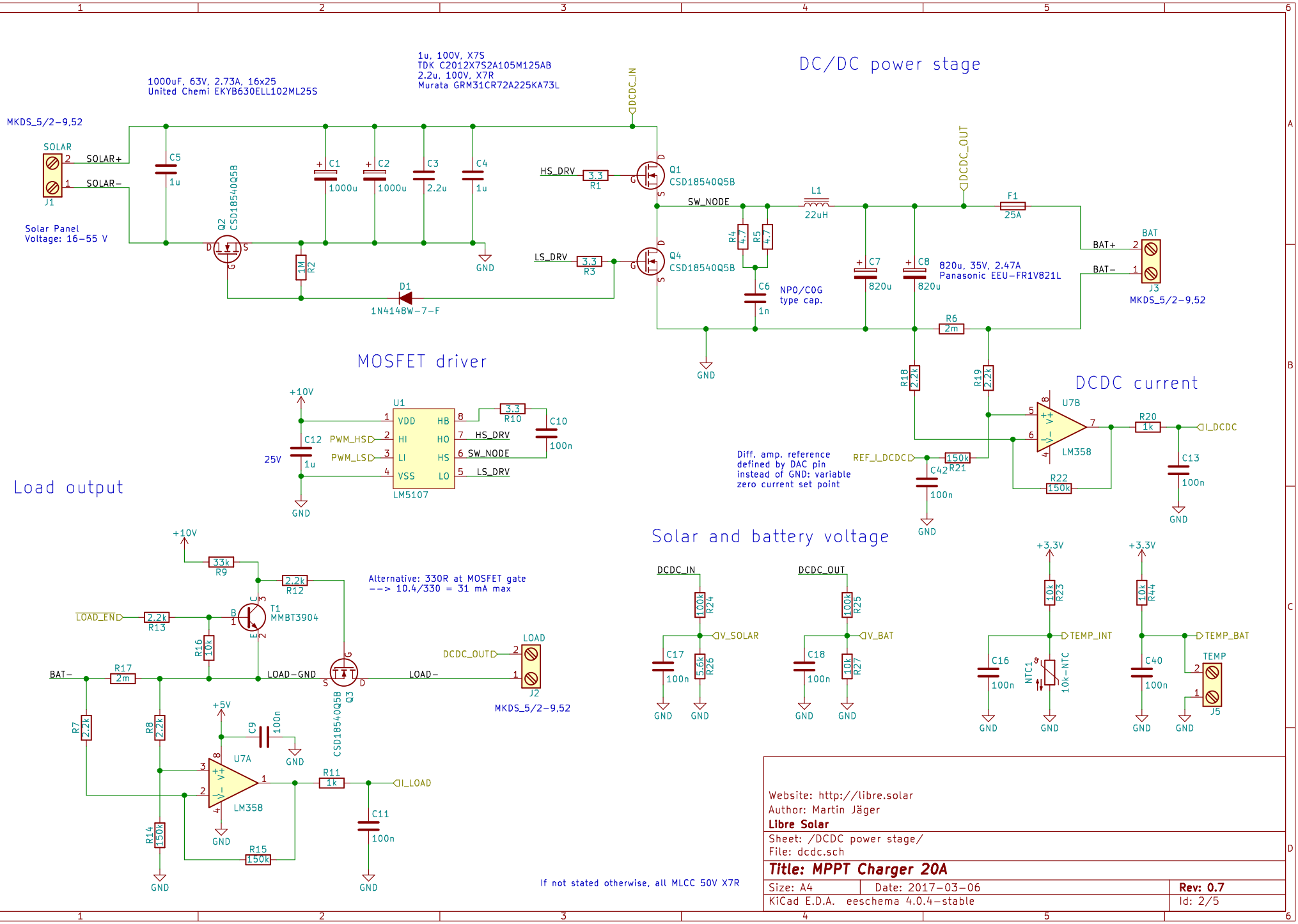
LOGO2 OPEN_HARDWARE

Website: http://libre.solar
Author: Martin Jäger
Libre Solar

Sheet: /
File: MPPT_charger_20A.sch

Title: MPPT Charger 20A

Size: A4	Date: 2017-03-06	**Rev: 0.7**
KiCad E.D.A. eeschema 4.0.4-stable		Id: 1/5


DC/DC power stage
1u, 100V, X7S
TDK C2012X7S2A105M125AB
2.2u, 100V, X7R
Murata GRM31CR72A225KA73L
1000uF, 63V, 2.73A, 16x25
United Chemi EKYB630ELL102ML25S
MKDS_5/2-9,52
SOLAR
SOLAR+
SOLAR-
J1
Solar Panel
Voltage: 16-55 V
C5
1u
C1
1000u
C2
1000u
C3
2.2u
C4
1u
Q2
CSD18540Q5B
1M
R2
GND
DCDC_IN
HS_DRV
3.3
R1
Q1
CSD18540Q5B
LS_DRV
3.3
R3
Q4
CSD18540Q5B
SW_NODE
L1
22uH
DCDC_OUT
F1
25A
R4
4.7
R5
4.7
C6
1n
NPO/C0G
type cap.
C7
820u
C8
820u
820u, 35V, 2.47A
Panasonic EEU-FR1V821L
BAT+
BAT-
BAT
J3
MKDS_5/2-9,52
D1
1N4148W-7-F
R6
2m
MOSFET driver
+10V
U1
VDD
HI
LI
VSS
HB
HO
HS
LO
PWM_HS
PWM_LS
HS_DRV
SW_NODE
LS_DRV
LM5107
C12
1u
25V
3.3
R10
C10
100n
DCDC current
R18
2.2k
R19
2.2k
U7B
LM358
R20
1k
I_DCDC
C13
100n
R22
150k
Diff. amp. reference
defined by DAC pin
instead of GND: variable
zero current set point
REF_I_DCDC
150k
R21
C42
100n
Load output
+10V
33k
R9
2.2k
R12
Alternative: 330R at MOSFET gate
--> 10.4/330 = 31 mA max
LOAD_EN
2.2k
R13
T1
MMBT3904
R16
10k
BAT-
R17
2m
LOAD-GND
Q3
CSD18540Q5B
LOAD-
DCDC_OUT
LOAD
J2
MKDS_5/2-9,52
+5V
C9
100n
U7A
LM358
R11
1k
I_LOAD
C11
100n
R7
2.2k
R8
2.2k
R14
150k
R15
150k
Solar and battery voltage
DCDC_IN
R24
100k
V_SOLAR
C17
100n
5.6k
R26
DCDC_OUT
R25
100k
V_BAT
C18
100n
10k
R27
+3.3V
R23
10k
TEMP_INT
C16
100n
NTC1
10k-NTC
+3.3V
R44
10k
TEMP_BAT
C40
100n
TEMP
J5
If not stated otherwise, all MLCC 50V X7R
Website: http://libre.solar
Author: Martin Jäger
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Sheet: /DCDC power stage/
File: dcdc.sch
Title: MPPT Charger 20A
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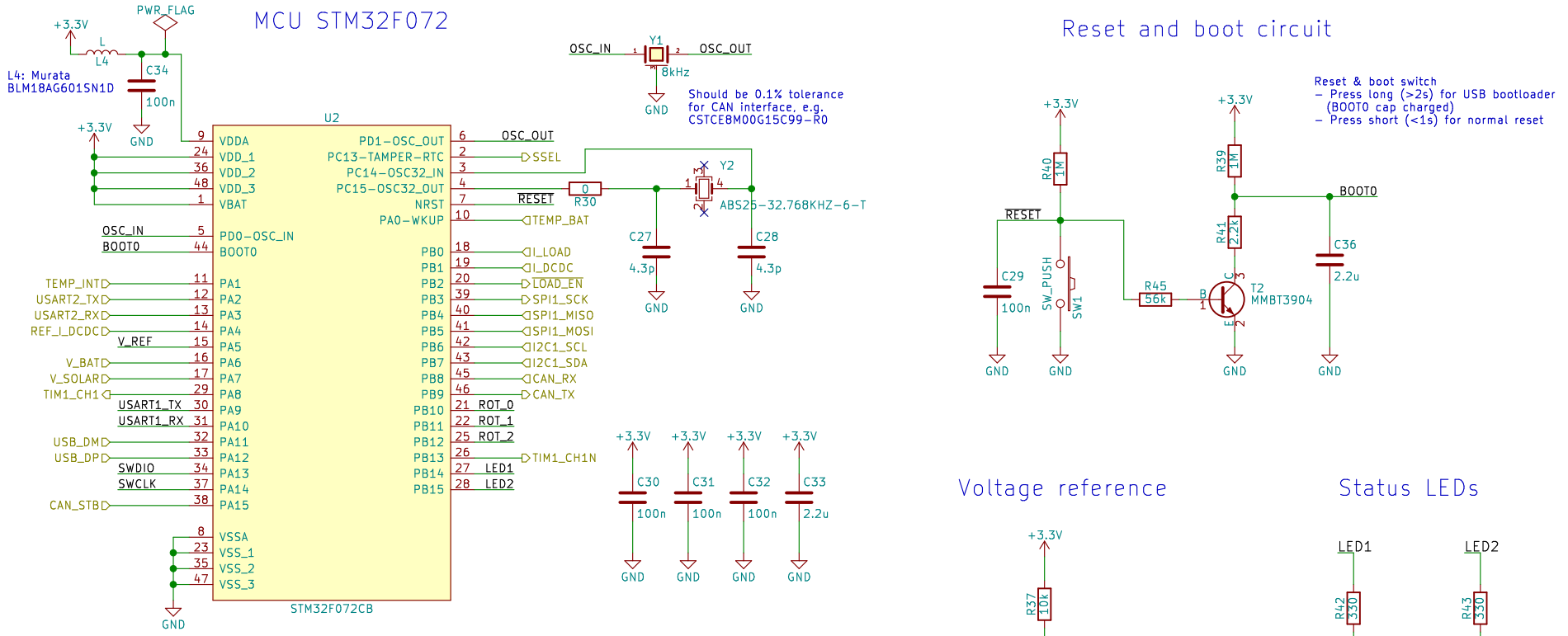

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Sheet: /MCU/
File: mcu.sch

Title: MPPT Charger 20A

Size: A4	Date: 2017-03-06	**Rev: 0.7**
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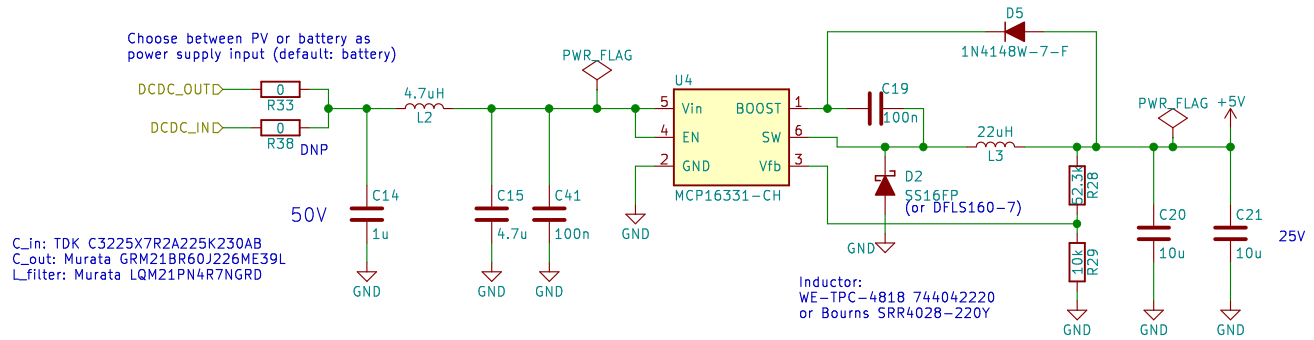
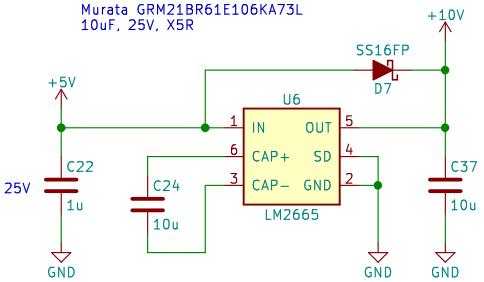
Power supply

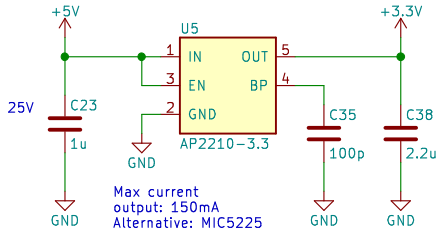
Battery to 5V (SMPS)



5V to 3.3V (LDO)



5V to 10V (charge pump)



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Sheet: /Power Supply/
File: power_supply.sch

Title: MPPT Charger 20A

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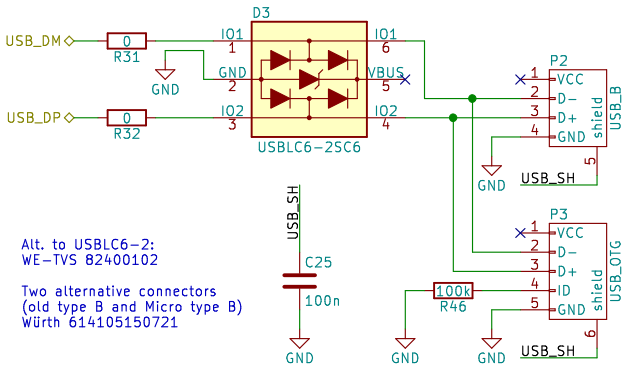
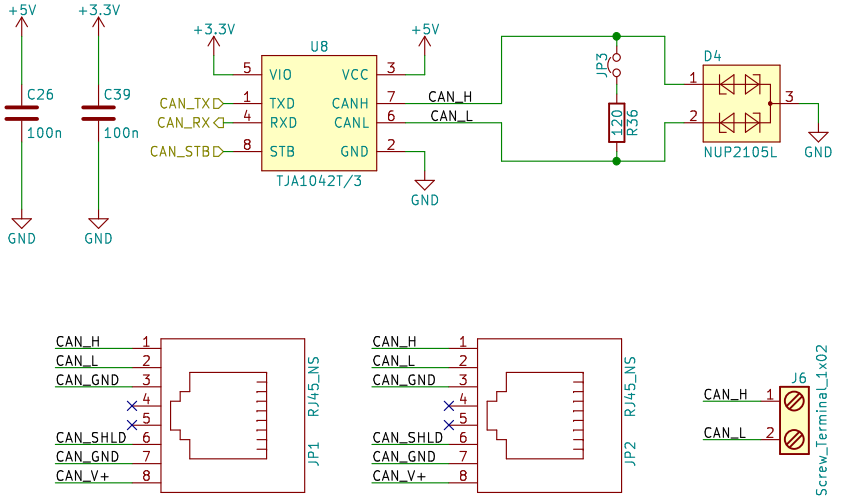
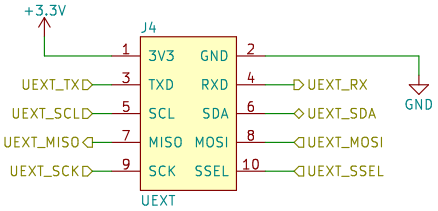
USB connector



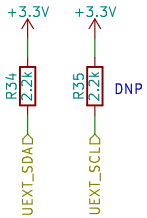
CAN interface



Extension connector



I2C pull-ups



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Sheet: /Communication Interfaces/
File: interfaces.sch

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