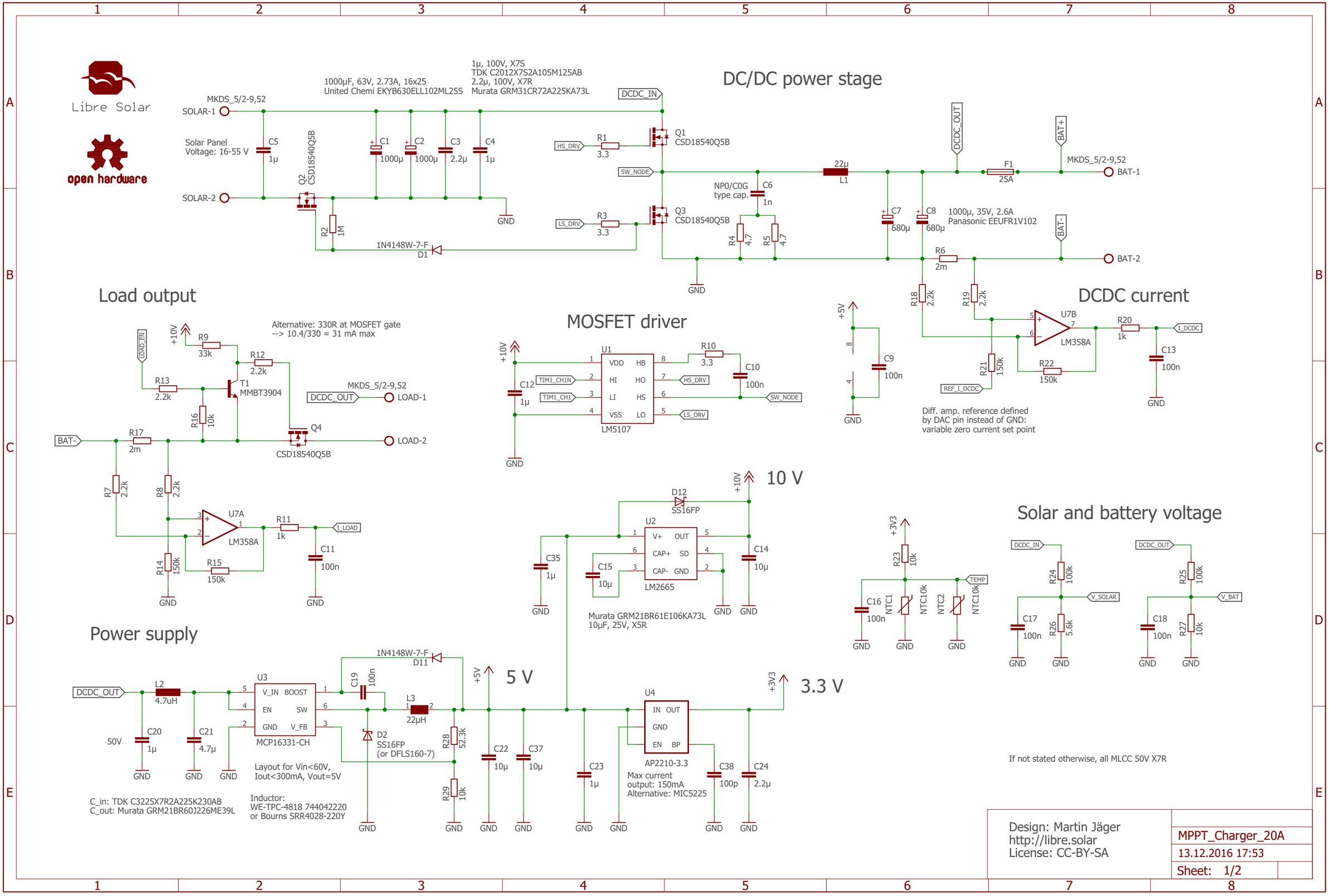
Libre Solar
open hardware
DC/DC power stage
MKDS_5/2-9,52
SOLAR-1
SOLAR-2
Solar Panel
Voltage: 16-55 V
C5
1µ
Q2
CSD18540Q5B
1000µF, 63V, 2.73A, 16x25
United Chemi EKYB630ELL102ML25S
C1
1000µ
C2
1000µ
C3
2.2µ
C4
1µ
1µ, 100V, X7S
TDK C2012X7S2A105M125AB
2.2µ, 100V, X7R
Murata GRM31CR72A225KA73L
R2
1M
1N4148W-7-F
D1
GND
DCDC_IN
HS_DRV
R1
3.3
Q1
CSD18540Q5B
SW_NODE
LS_DRV
R3
3.3
Q3
CSD18540Q5B
NP0/C0G
type cap.
C6
1n
R4
4.7
R5
4.7
22µ
L1
DCDC_OUT
C7
680µ
C8
680µ
1000µ, 35V, 2.6A
Panasonic EEUFR1V102
F1
25A
BAT+
MKDS_5/2-9,52
BAT-1
BAT-
R6
2m
BAT-2
R18
2.2k
R19
2.2k
Load output
LOAD_EN
+10V
R9
33k
R12
2.2k
Alternative: 330R at MOSFET gate
--> 10.4/330 = 31 mA max
R13
2.2k
T1
MMBT3904
R16
10k
MKDS_5/2-9,52
DCDC_OUT
LOAD-1
Q4
CSD18540Q5B
LOAD-2
BAT-
R17
2m
R7
2.2k
R8
2.2k
U7A
LM358A
R11
1k
I_LOAD
C11
100n
R14
150k
R15
150k
MOSFET driver
U1
VDD
HB
HI
HO
LI
HS
VSS
LO
LM5107
TIM1_CH1N
TIM1_CH1
C12
1µ
R10
3.3
C10
100n
HS_DRV
SW_NODE
LS_DRV
DCDC current
+5V
C9
100n
U7B
LM358A
R20
1k
I_DCDC
C13
100n
R21
150k
R22
150k
REF_I_DCDC
Diff. amp. reference defined
by DAC pin instead of GND:
variable zero current set point
10 V
D12
SS16FP
U2
V+
OUT
CAP+
SD
CAP-
GND
LM2665
C35
1µ
C15
10µ
C14
10µ
Murata GRM21BR61E106KA73L
10µF, 25V, X5R
Solar and battery voltage
+3V3
R23
10k
TEMP
C16
100n
NTC1
NTC10k
NTC2
NTC10k
DCDC_IN
R24
100k
V_SOLAR
C17
100n
R26
5.6k
DCDC_OUT
R25
100k
V_BAT
C18
100n
R27
10k
Power supply
DCDC_OUT
L2
4.7uH
50V
C20
1µ
C21
4.7µ
U3
V_IN
BOOST
EN
SW
GND
V_FB
MCP16331-CH
1N4148W-7-F
D11
C19
100n
L3
22µH
D2
SS16FP
(or DFLS160-7)
R28
52.3k
R29
10k
5 V
C22
10µ
C37
10µ
C23
1µ
Layout for Vin<60V,
Iout<300mA, Vout=5V
C_in: TDK C3225X7R2A225K230AB
C_out: Murata GRM21BR60J226ME39L
Inductor:
WE-TPC-4818 744042220
or Bourns SRR4028-220Y
3.3 V
U4
IN
OUT
GND
EN
BP
AP2210-3.3
Max current
output: 150mA
Alternative: MIC5225
C38
100p
C24
2.2µ
If not stated otherwise, all MLCC 50V X7R
Design: Martin Jäger
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MPPT_Charger_20A
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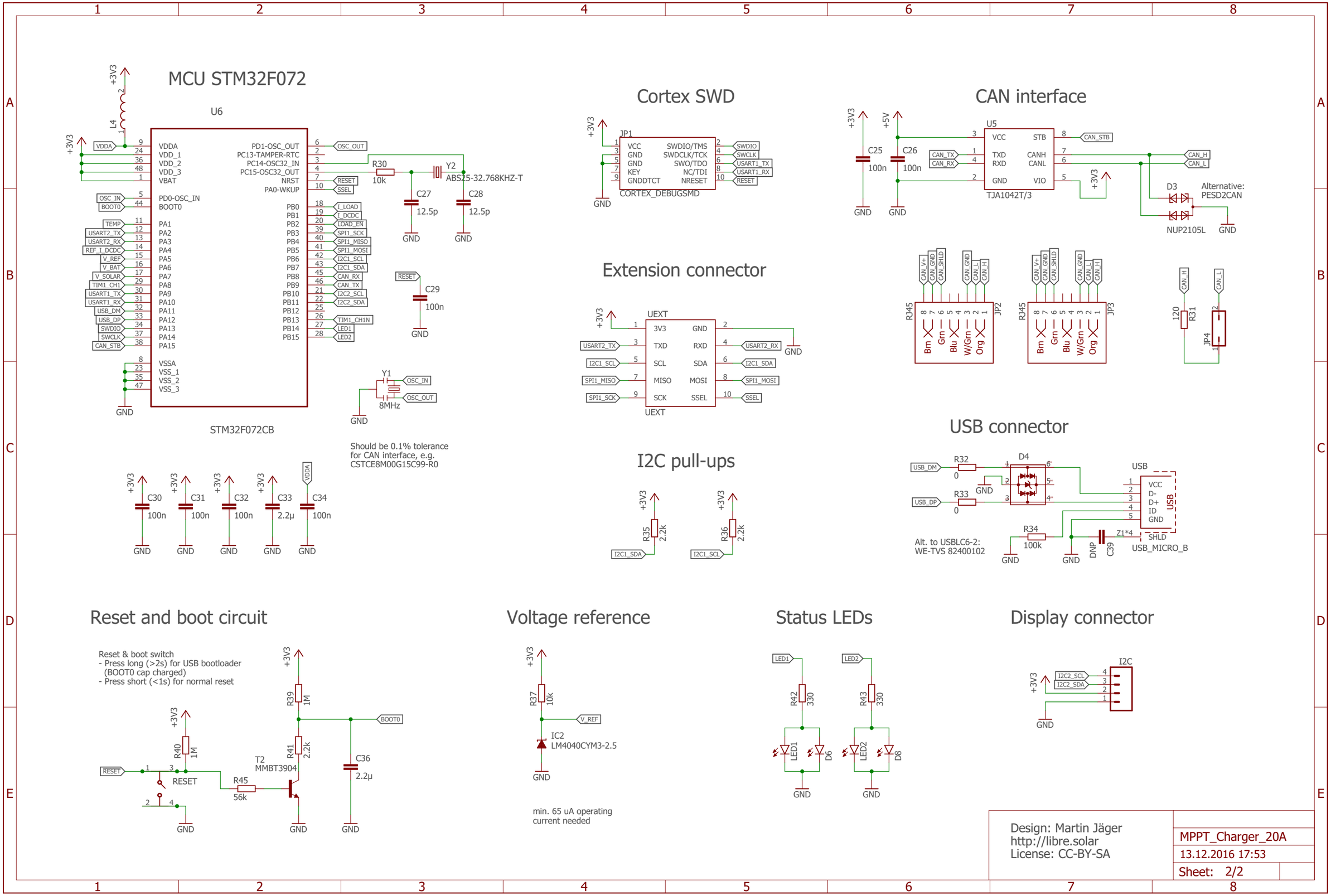
Sheet: 1/2


MCU STM32F072
U6
STM32F072CB
Cortex SWD
JP1
CORTEX_DEBUGSMD
CAN interface
U5
TJA1042T/3
NUP2105L
Alternative: PESD2CAN
Extension connector
UEXT
USB connector
USB
USB_MICRO_B
Alt. to USBLC6-2: WE-TVS 82400102
I2C pull-ups
Should be 0.1% tolerance for CAN interface, e.g. CSTCE8M00G15C99-R0
Reset and boot circuit
Reset & boot switch
- Press long (>2s) for USB bootloader (BOOT0 cap charged)
- Press short (<1s) for normal reset
Voltage reference
IC2 LM4040CYM3-2.5
min. 65 uA operating current needed
Status LEDs
Display connector
I2C
Design: Martin Jäger
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MPPT_Charger_20A
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Sheet: 2/2