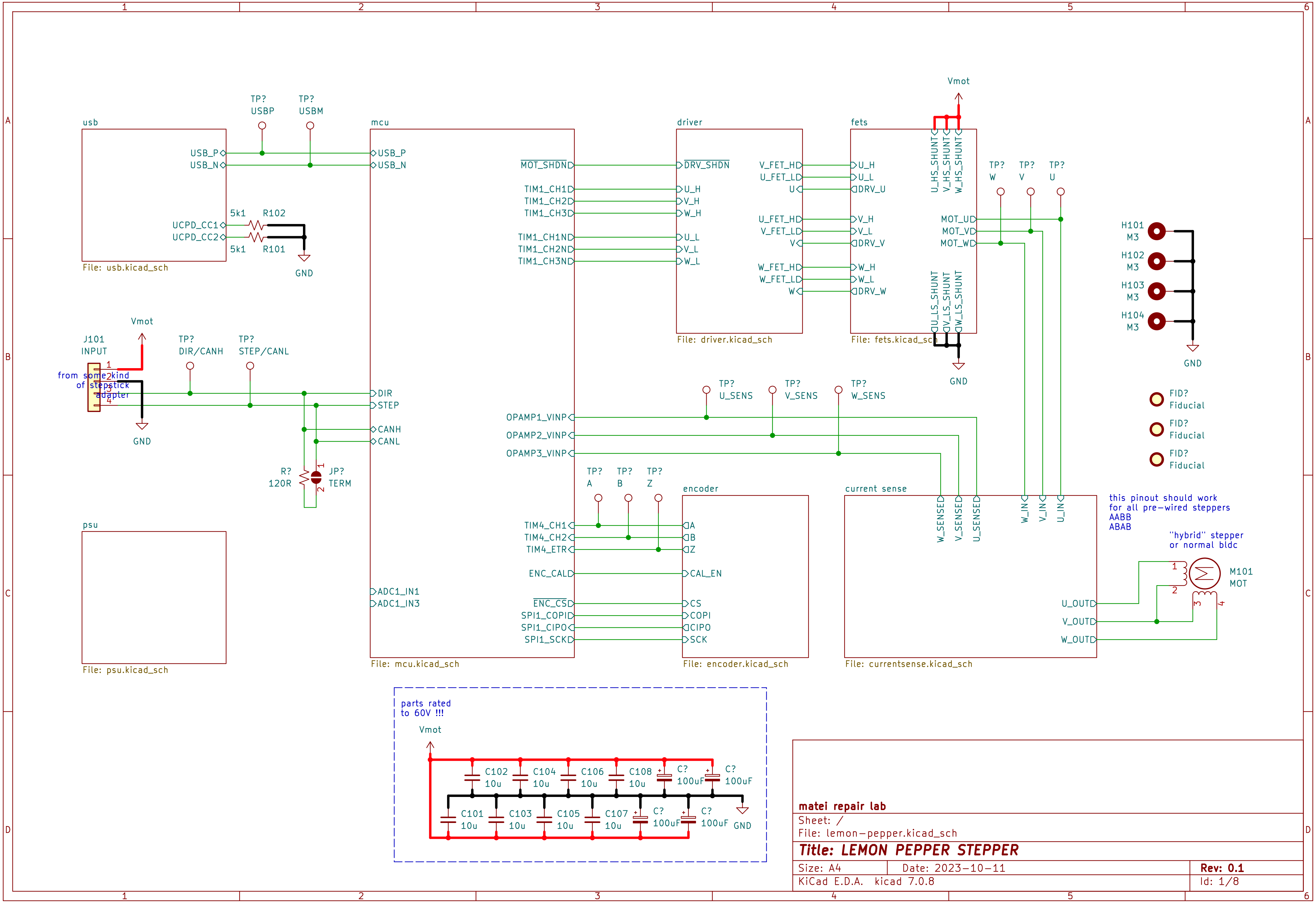
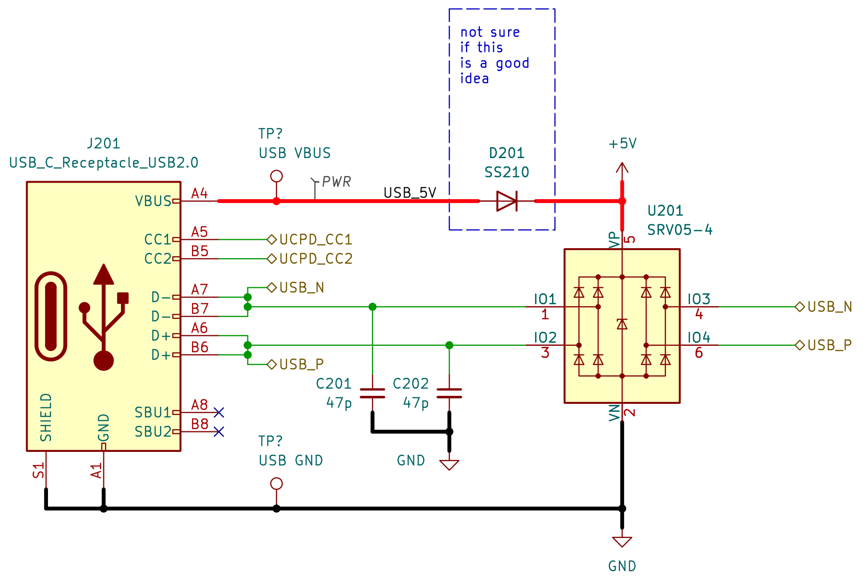

usb
USB_P
USB_N
UCPD_CC1
UCPD_CC2
File: usb.kicad_sch
TP?
USBP
TP?
USBM
5k1
R102
5k1
R101
GND
mcu
USB_P
USB_N
MOT_SHDN
TIM1_CH1
TIM1_CH2
TIM1_CH3
TIM1_CH1N
TIM1_CH2N
TIM1_CH3N
DIR
STEP
CANH
CANL
OPAMP1_VINP
OPAMP2_VINP
OPAMP3_VINP
TIM4_CH1
TIM4_CH2
TIM4_ETR
ENC_CAL
ENC_CS
SPI1_COPI
SPI1_CIPO
SPI1_SCK
ADC1_IN1
ADC1_IN3
File: mcu.kicad_sch
driver
DRV_SHDN
U_H
V_H
W_H
U_L
V_L
W_L
V_FET_H
U_FET_L
U
U_FET_H
V_FET_L
V
W_FET_H
W_FET_L
W
File: driver.kicad_sch
fets
U_H
U_L
DRV_U
V_H
V_L
DRV_V
W_H
W_L
DRV_W
U_HS_SHUNT
V_HS_SHUNT
W_HS_SHUNT
U_LS_SHUNT
V_LS_SHUNT
W_LS_SHUNT
MOT_U
MOT_V
MOT_W
File: fets.kicad_sch
Vmot
GND
TP?
W
TP?
V
TP?
U
H101
M3
H102
M3
H103
M3
H104
M3
GND
J101
INPUT
Vmot
from some kind
of stepstick
adapter
GND
TP?
DIR/CANH
TP?
STEP/CANL
R?
120R
JP?
TERM
TP?
U_SENS
TP?
V_SENS
TP?
W_SENS
FID?
Fiducial
FID?
Fiducial
FID?
Fiducial
TP?
A
TP?
B
TP?
Z
encoder
A
B
Z
CAL_EN
CS
COPI
CIPO
SCK
File: encoder.kicad_sch
current sense
W_SENSE
V_SENSE
U_SENSE
W_IN
V_IN
U_IN
U_OUT
V_OUT
W_OUT
File: currentsense.kicad_sch
this pinout should work
for all pre-wired steppers
AABB
ABAB
"hybrid" stepper
or normal bldc
M101
MOT
psu
File: psu.kicad_sch
parts rated
to 60V !!!
Vmot
C102
10u
C104
10u
C106
10u
C108
10u
C?
100uF
C?
100uF
C101
10u
C103
10u
C105
10u
C107
10u
C?
100uF
C?
100uF
GND
matei repair lab
Sheet: /
File: lemon-pepper.kicad_sch
Title: LEMON PEPPER STEPPER
Size: A4
Date: 2023-10-11
Rev: 0.1
KiCad E.D.A. kicad 7.0.8
Id: 1/8



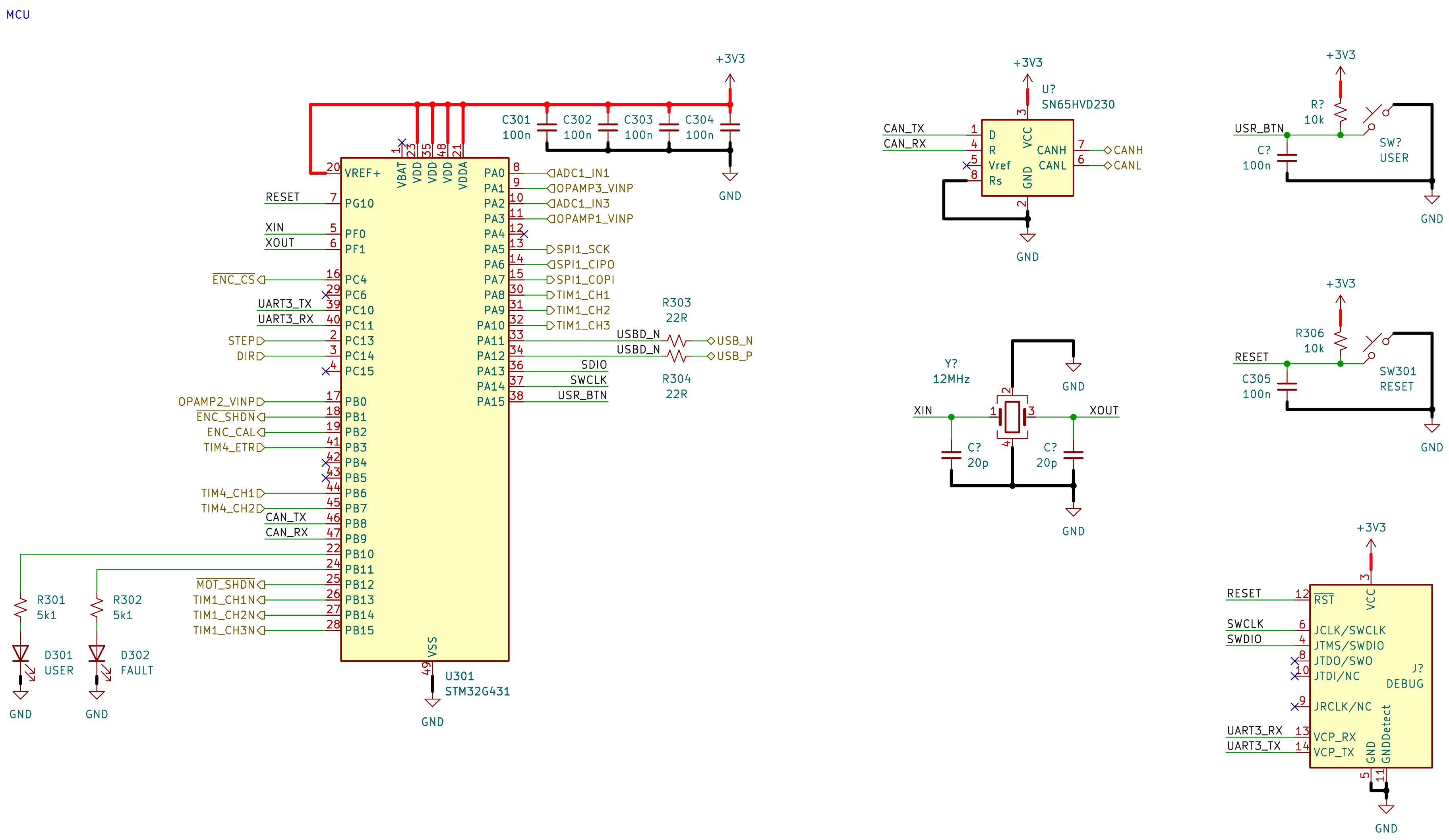
matei repair lab

Sheet: /usb/

File: usb.kicad_sch

Title: USB & ESD

Size: A4	Date: 2023-10-11	**Rev: 0.1**
KiCad E.D.A. kicad 7.0.8		Id: 2/8

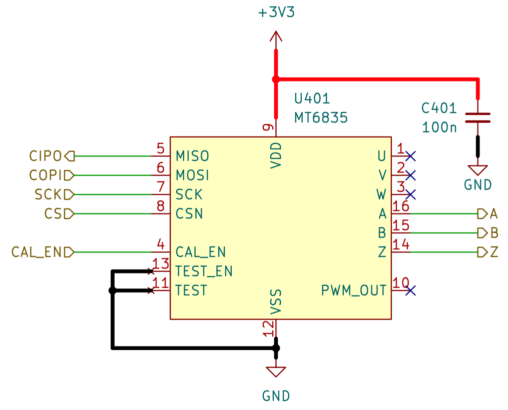


matei repair lab

Sheet: /mcu/
File: mcu.kicad_sch

Title: MICROCONTROLLER

Size: A4	Date: 2023-10-11	Rev: 0.1
KiCad E.D.A. kicad 7.0.8		Id: 3/8



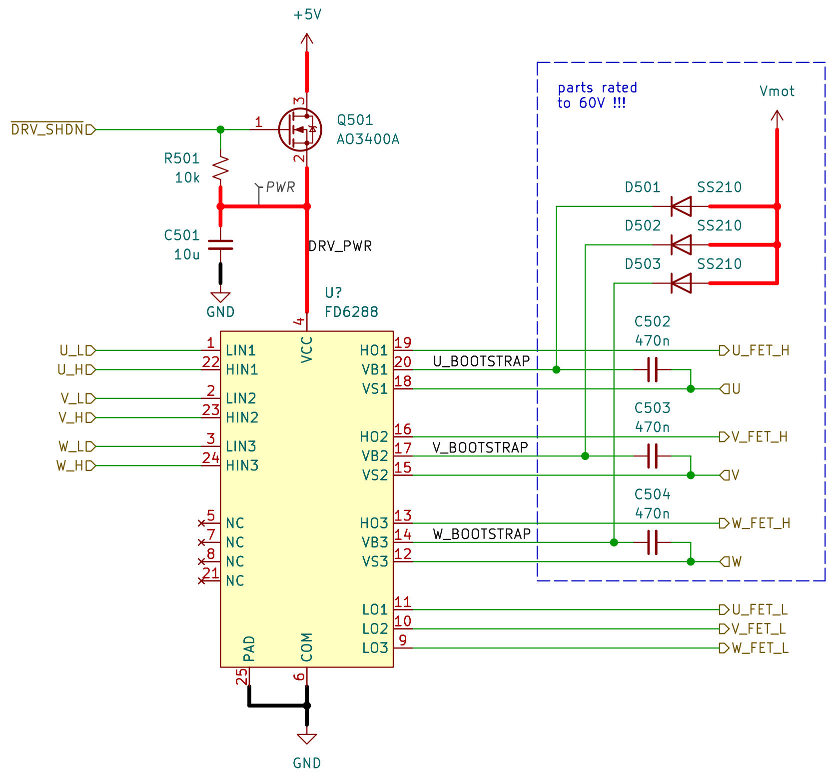
matei repair lab

Sheet: /encoder/

File: encoder.kicad_sch

Title: MAGNETIC ENCODER 14 BIT

Size: A4	Date: 2023-10-11	**Rev: 0.1**
KiCad E.D.A. kicad 7.0.8		Id: 4/8

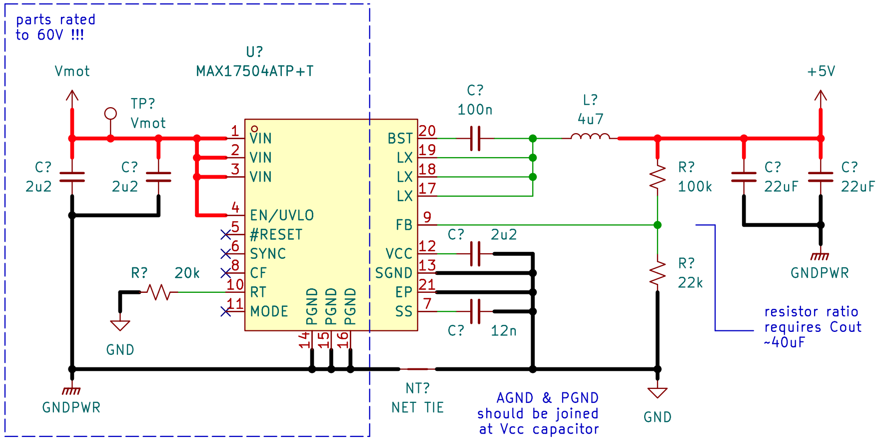


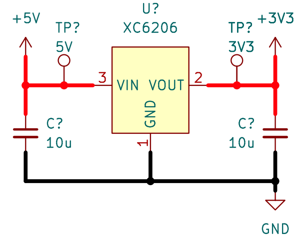
matei repair lab

Sheet: /driver/
File: driver.kicad_sch

Title: GATE DRIVER

Size: A4	Date: 2023-10-11	**Rev: 0.1**
KiCad E.D.A. kicad 7.0.8		Id: 5/8





matei repair lab

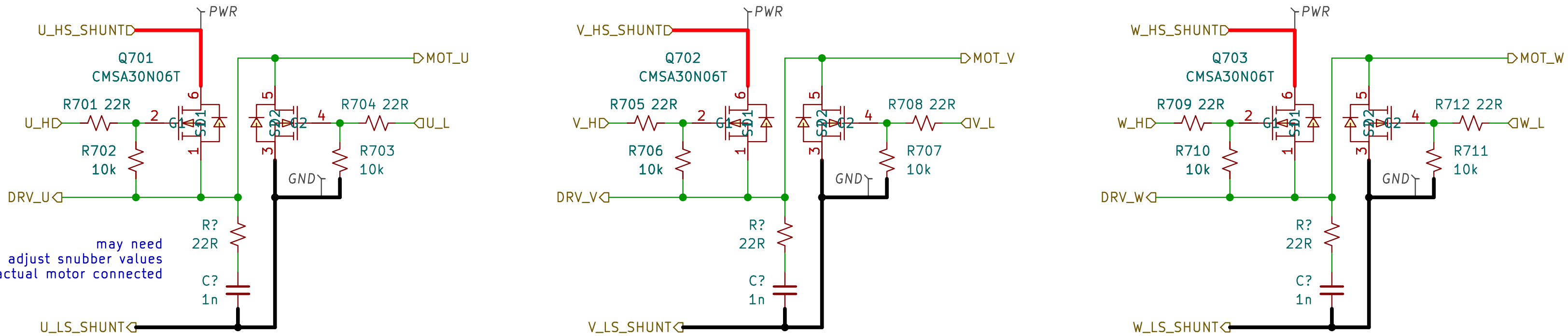
Sheet: /psu/

File: psu.kicad_sch

Title: POWER SUPPLY & FILTERING

Size: A4	Date: 2023-10-11	**Rev: 0.1**
KiCad E.D.A. kicad 7.0.8		Id: 6/8

parts rated
to 60V !!!



Seven steps to calculate R-C Snubber (with Example)

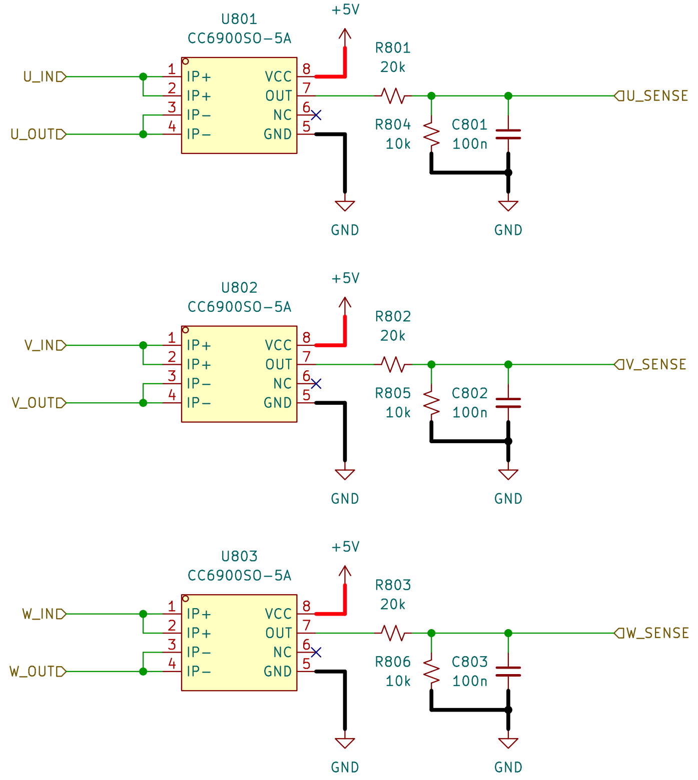
Steps	Description	Example
Step 1	Measure the oscillation frequency (f_o) of the V_{DS} ringing with no RC snubber. See Figure 3.	$f_0 = \frac{1}{82ns} = 12.2\ MHz$
Step 2	Add a capacitor (C_1) in parallel with the rectifier or FET and measure the shifted oscillation frequency (f_1). Select a C_1 value that is several times larger than the rectifier's stated typical capacitance at full-reverse voltage in the datasheet. In this example, the rectifier's capacitance is 22pF, so I chose a 100pF value for C_1. A frequency shift of at least 50% is reasonable. See Figure 4.	$C_1 = 100pF$ $f_1 = \frac{1}{90ns} = 11.1MHz$
Step 3	Calculate the frequency shift ratio: $m = \frac{f_0}{f_1}$	$m = \frac{12.2\ MHz}{11.1\ MHz} = 1.1$
Step 4	Calculate the circuit's parasitic capacitance: $C_0 = \frac{C_1}{(m^2-1)}$	$C_0 = \frac{100pF}{(1.1^2-1)} = 0.48nF$
Step 5	Calculate the circuit's parasitic inductance: $L = \frac{(m^2-1)}{(2\pi f_0)^2 C_1}$	$L = \frac{(1.1^2-1)}{(2\pi * 12.2MHz)^2(100pF)} = 0.36\mu H$
Step 6	Calculate the starting snubber capacitor value: $C_{snub} = 3C_0$	$C_{snub} = 3(0.48nF) = 1440pF$
Step 7	Calculate the starter snubber resistor value: $R_{snub} = \sqrt{\frac{L}{C_0}}$	$R_{snub} = \sqrt{\frac{0.36\mu H}{0.48nF}} = 27\Omega$

matei repair lab

Sheet: /fets/
File: fets.kicad_sch

Title: POWER STAGE

Size: A4 | Date: 2023-10-11 | **Rev: 0.1**
KiCad E.D.A. kicad 7.0.8 | Id: 7/8



5A model
410mV/A sensitivity

expected current +-1A (2A peak)
820mV range -> 3.3V
need gain of ~4 at G431 OP-AMP input
for full resolution

due to "hybrid" phase connection, it may be possible
to have 8x gain on the independent phases, and
just this 4x gain on the center tap.

matei repair lab

Sheet: /current sense/
File: currentsense.kicad_sch

Title: HALL CURRENT SENSING

Size: A4	Date: 2023-10-11	**Rev: 0.1**
KiCad E.D.A. kicad 7.0.8		Id: 8/8