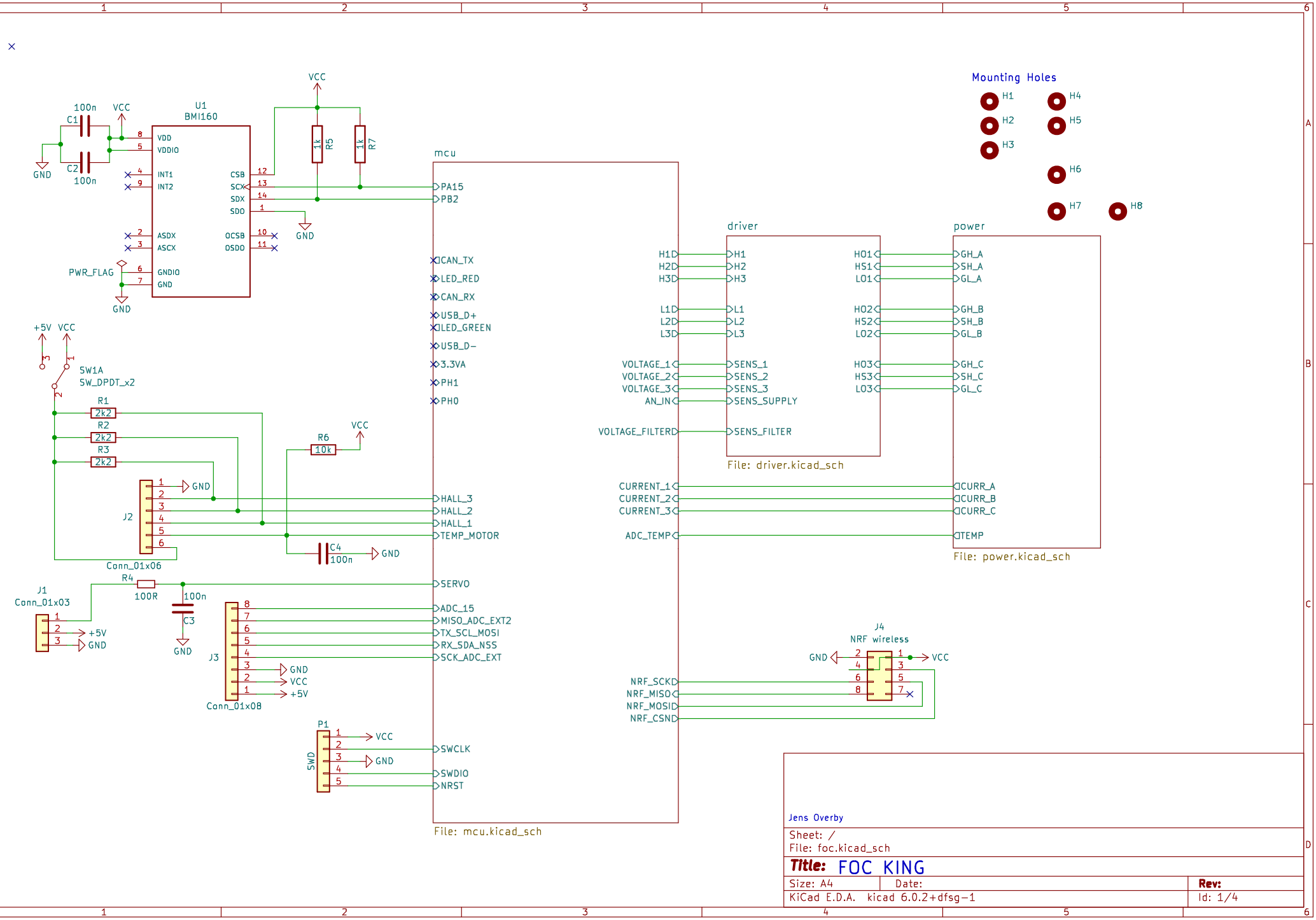
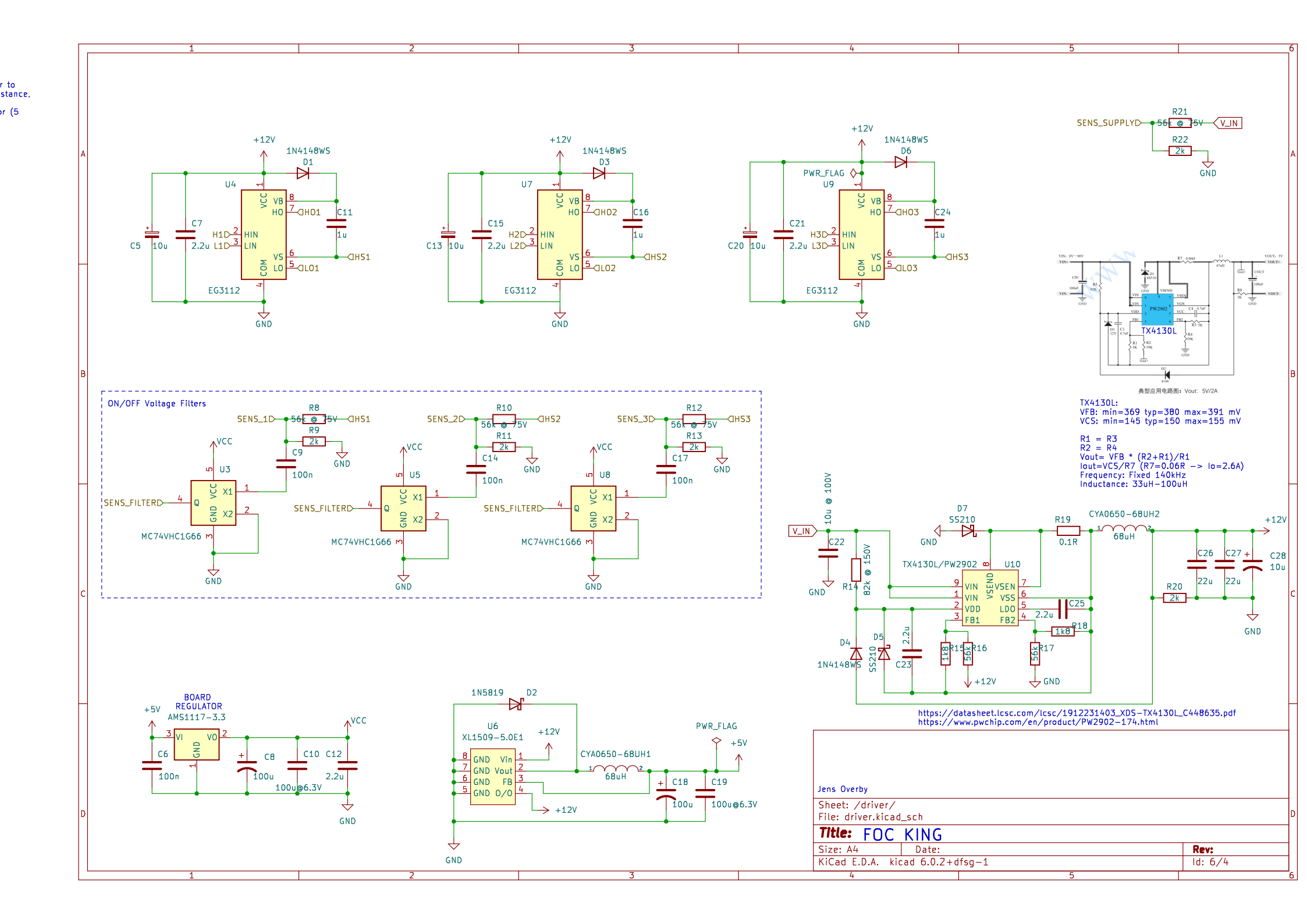

Mounting Holes
H1
H2
H3
H4
H5
H6
H7
H8
U1
BMI160
VDD
VDDIO
INT1
INT2
CSB
SCX
SDX
SDO
ASDX
ASCX
OCSB
OSDO
GNDIO
GND
PWR_FLAG
C1
C2
100n
R5
R7
1k
mcu
PA15
PB2
CAN_TX
LED_RED
CAN_RX
USB_D+
LED_GREEN
USB_D-
3.3VA
PH1
PH0
driver
H1
H2
H3
L1
L2
L3
VOLTAGE_1
VOLTAGE_2
VOLTAGE_3
AN_IN
VOLTAGE_FILTER
SENS_1
SENS_2
SENS_3
SENS_SUPPLY
SENS_FILTER
HO1
HS1
LO1
HO2
HS2
LO2
HO3
HS3
LO3
File: driver.kicad_sch
power
GH_A
SH_A
GL_A
GH_B
SH_B
GL_B
GH_C
SH_C
GL_C
CURR_A
CURR_B
CURR_C
TEMP
File: power.kicad_sch
CURRENT_1
CURRENT_2
CURRENT_3
ADC_TEMP
+5V
SW1A
SW_DPDT_x2
R1
R2
R3
2k2
R6
10k
J2
Conn_01x06
HALL_3
HALL_2
HALL_1
TEMP_MOTOR
C4
J1
Conn_01x03
R4
100R
C3
SERVO
J3
Conn_01x08
ADC_15
MISO_ADC_EXT2
TX_SCL_MOSI
RX_SDA_NSS
SCK_ADC_EXT
P1
SWD
SWCLK
SWDIO
NRST
J4
NRF wireless
NRF_SCK
NRF_MISO
NRF_MOSI
NRF_CSN
File: mcu.kicad_sch
Jens Overby
Sheet: /
File: foc.kicad_sch
Title: FOC KING
Size: A4
Date:
Rev:
KiCad E.D.A. kicad 6.0.2+dfsg-1
Id: 1/4



Jens Overby

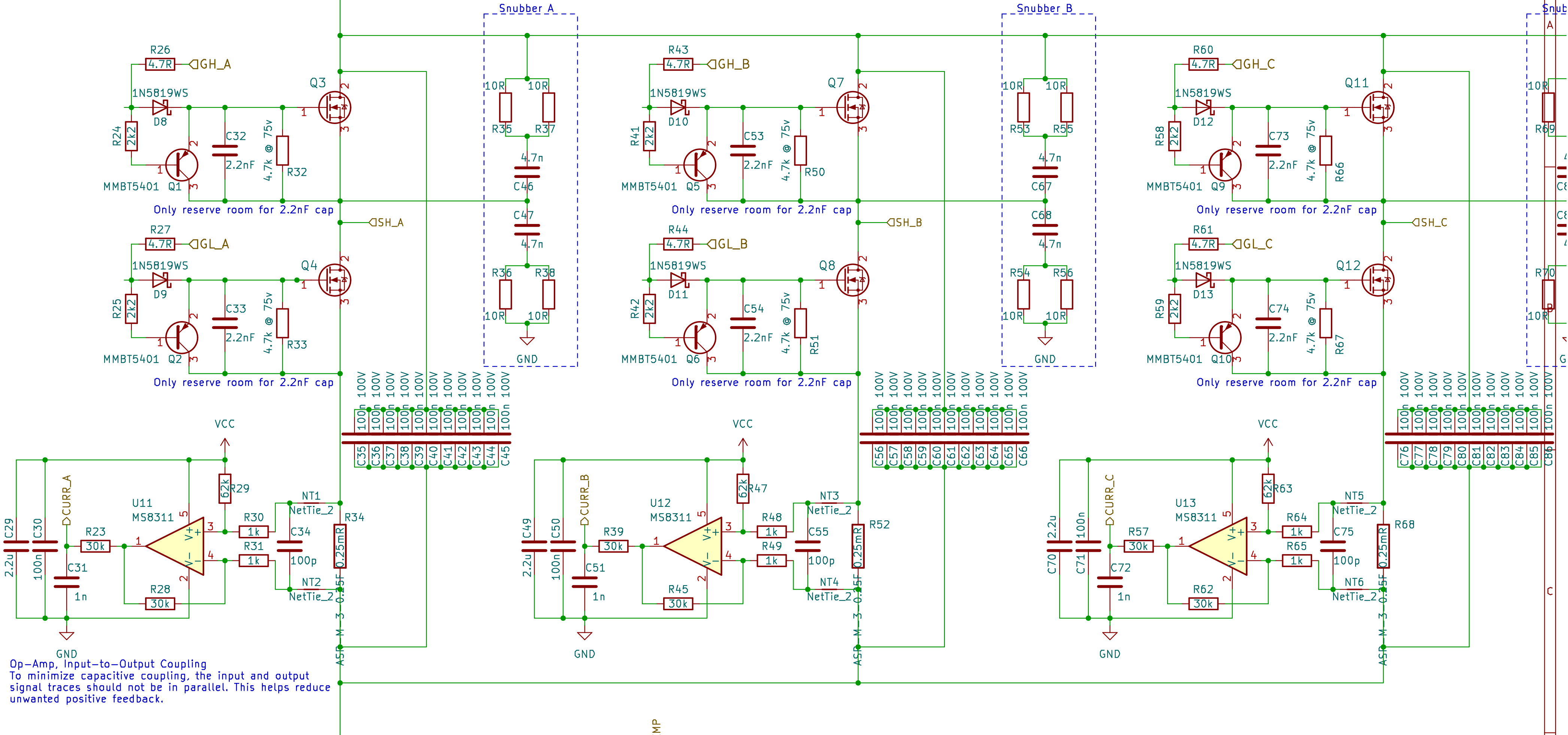
Sheet: /driver/
File: driver.kicad_sch

Title: FOC KING

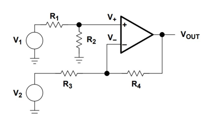
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad 6.0.2+dfsg-1		Id: 6/4

External booster drive:
https://www.infineon.com/dgdl/Infineon-External_booster_for_Driver_IC-ApplicationNotes-v01_06-EN.pdf?fileId=5546d46146d18cb40146ffb0461d3894

PNP turn-off circuit:
https://www.youtube.com/watch?v=6pp1jj2oDvo



Op-Amp, Input-to-Output Coupling
To minimize capacitive coupling, the input and output signal traces should not be in parallel. This helps reduce unwanted positive feedback.



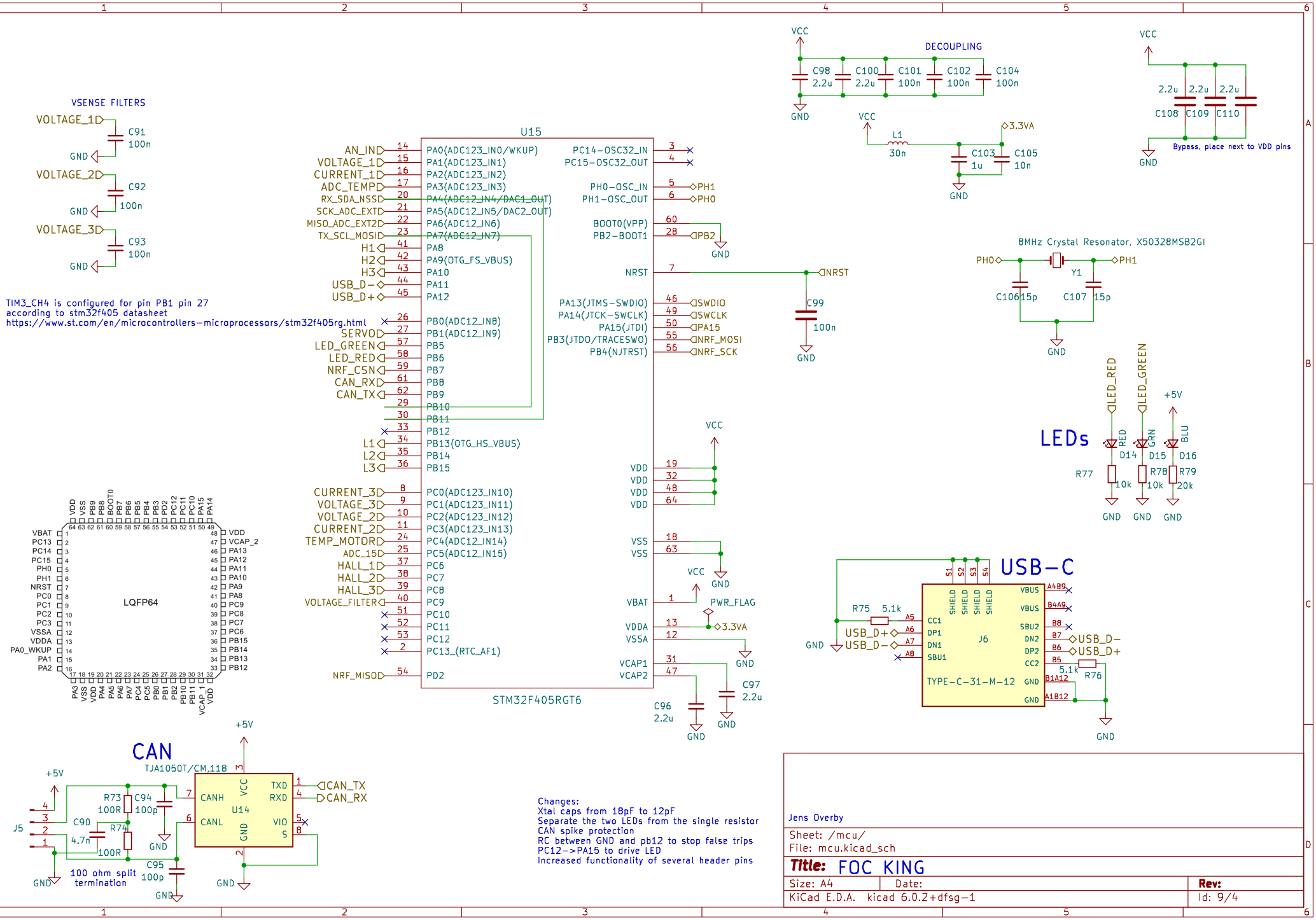
Rshunt	0,00025		
	output offset	Imax	Imax
R1	1000	1000	1000
R2	62000	62000	62000
R3	1000	1000	1000
R4	30000	30000	30000
V1	0	0,028	-0,0265
V2	0	-0,028	0,0265
Vref	3,3	3,3	3,3
Amp	0	**224**	**-212**
V+	0,05238095238	0,07993650794	0,0263015873
Vout	**1,623809524**	3,318031746	0,02034920635
dif_gain	30,25396825		

Vplus = (Vref-V1) * (R2 / R1 + R2) + V1
Vout = Vplus*(1 + (R4 / R3)) - V2*(R4 / R3)

Calculate cut-off freq of low pass filter, pg 3:
https://www.st.com/resource/en/application_note/an4304-how-to-filter-the-input-of-a-highside-current-sensing-stmicroelectronics.pdf

Current sensing:
https://www.ti.com/lit/eb/slyy154a/slyy154a.pdf?ts=1678787132262&ref_url=https%253A%252F%252Fwww.startpage.com%252F
pg 4, pg 15

Jens Overby
Sheet: /power/
File: power.kicad_sch
Title: FOC KING
Size: A4 Date: Rev:
KiCad E.D.A. kicad 6.0.2+dfsg-1 Id: 7/4


VSENSE FILTERS
VOLTAGE_1
C91 100n
GND
VOLTAGE_2
C92 100n
GND
VOLTAGE_3
C93 100n
GND
TIM3_CH4 is configured for pin PB1 pin 27
according to stm32f405 datasheet
https://www.st.com/en/microcontrollers-microprocessors/stm32f405rg.html
U15
AN_IN
VOLTAGE_1
CURRENT_1
ADC_TEMP
RX_SDA_NSS
SCK_ADC_EXT
MISO_ADC_EXT2
TX_SCL_MOSI
H1
H2
H3
USB_D-
USB_D+
SERVO
LED_GREEN
LED_RED
NRF_CSN
CAN_RX
CAN_TX
L1
L2
L3
CURRENT_3
VOLTAGE_3
VOLTAGE_2
CURRENT_2
TEMP_MOTOR
ADC_15
HALL_1
HALL_2
HALL_3
VOLTAGE_FILTER
NRF_MISO
PA0(ADC123_IN0/WKUP)
PA1(ADC123_IN1)
PA2(ADC123_IN2)
PA3(ADC123_IN3)
PA4(ADC12_IN4/DAC1_OUT)
PA5(ADC12_IN5/DAC2_OUT)
PA6(ADC12_IN6)
PA7(ADC12_IN7)
PA8
PA9(OTG_FS_VBUS)
PA10
PA11
PA12
PB0(ADC12_IN8)
PB1(ADC12_IN9)
PB5
PB6
PB7
PB8
PB9
PB10
PB11
PB12
PB13(OTG_HS_VBUS)
PB14
PB15
PC0(ADC123_IN10)
PC1(ADC123_IN11)
PC2(ADC123_IN12)
PC3(ADC123_IN13)
PC4(ADC12_IN14)
PC5(ADC12_IN15)
PC6
PC7
PC8
PC9
PC10
PC11
PC12
PC13_(RTC_AF1)
PD2
PC14-OSC32_IN
PC15-OSC32_OUT
PH0-OSC_IN
PH1-OSC_OUT
BOOT0(VPP)
PB2-BOOT1
NRST
PA13(JTMS-SWDIO)
PA14(JTCK-SWCLK)
PA15(JTDI)
PB3(JTDO/TRACESWO)
PB4(NJTRST)
VDD
VSS
VBAT
VDDA
VSSA
VCAP1
VCAP2
STM32F405RGT6
C99 100n
C96 2.2u
C97 2.2u
PWR_FLAG
3.3VA
DECOUPLING
C98 2.2u
C100 2.2u
C101 100n
C102 100n
C104 100n
L1 30n
C103 1u
C105 10n
C108 2.2u
C109 2.2u
C110 2.2u
Bypass, place next to VDD pins
8MHz Crystal Resonator, X50328MSB2GI
Y1
C106 15p
C107 15p
LEDs
D14 RED
D15 GRN
D16 BLU
R77 10k
R78 10k
R79 20k
USB-C
J6
TYPE-C-31-M-12
R75 5.1k
R76 5.1k
CC1
DP1
DN1
SBU1
SBU2
DN2
DP2
CC2
VBUS
GND
SHIELD
CAN
TJA1050T/CM,118
U14
CANH
CANL
TXD
RXD
VIO
S
R73 100R
R74 100R
C90 4.7n
C94 100p
C95 100p
J5
100 ohm split termination
Changes:
Xtal caps from 18pF to 12pF
Separate the two LEDs from the single resistor
CAN spike protection
RC between GND and pb12 to stop false trips
PC12->PA15 to drive LED
Increased functionality of several header pins
Jens Overby
Sheet: /mcu/
File: mcu.kicad_sch
Title: FOC KING
Size: A4
Date:
Rev:
KiCad E.D.A. kicad 6.0.2+dfsg-1
Id: 9/4