

Sheet: /MCU/  
File: MCU.kicad\_sch

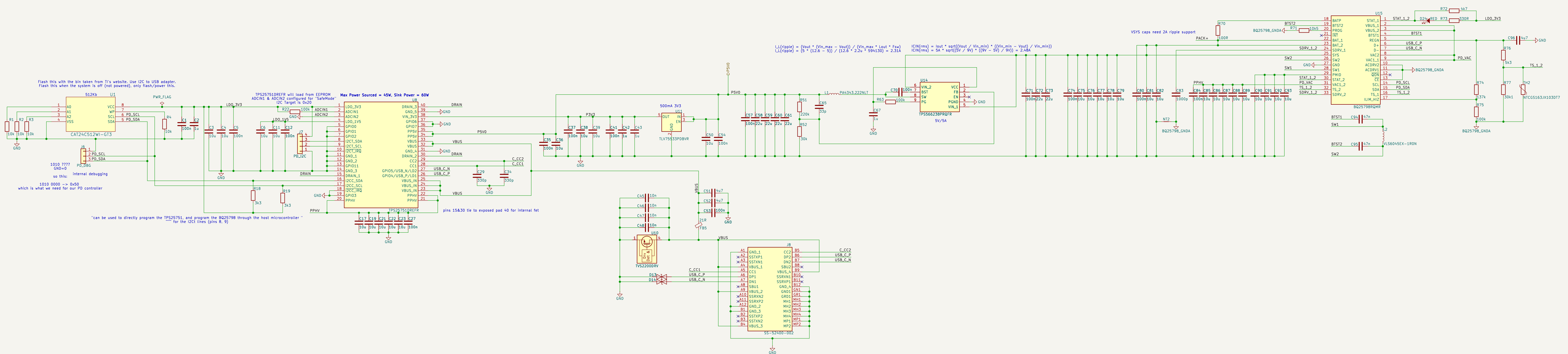
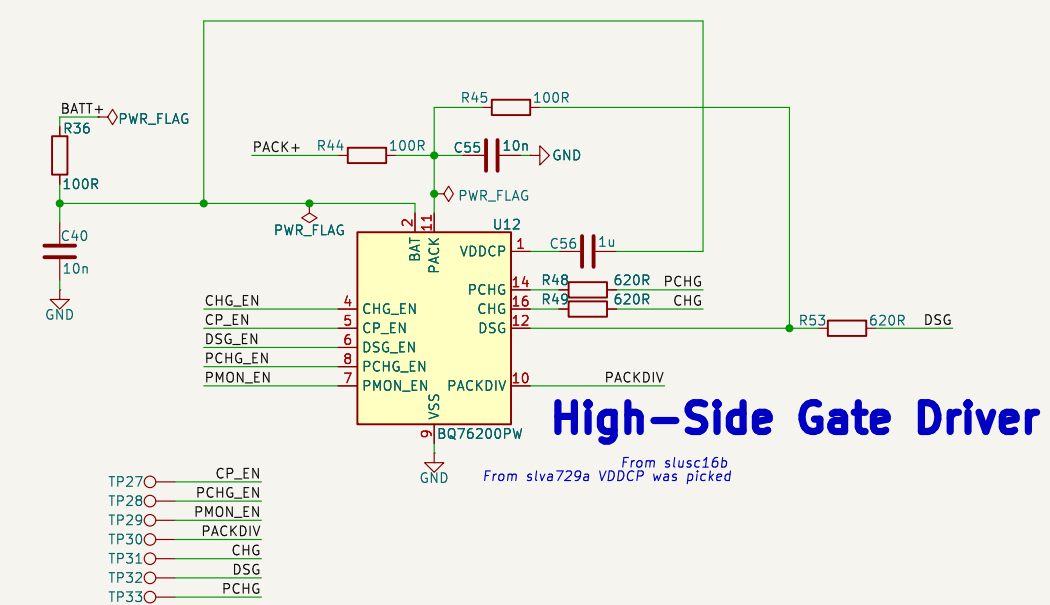
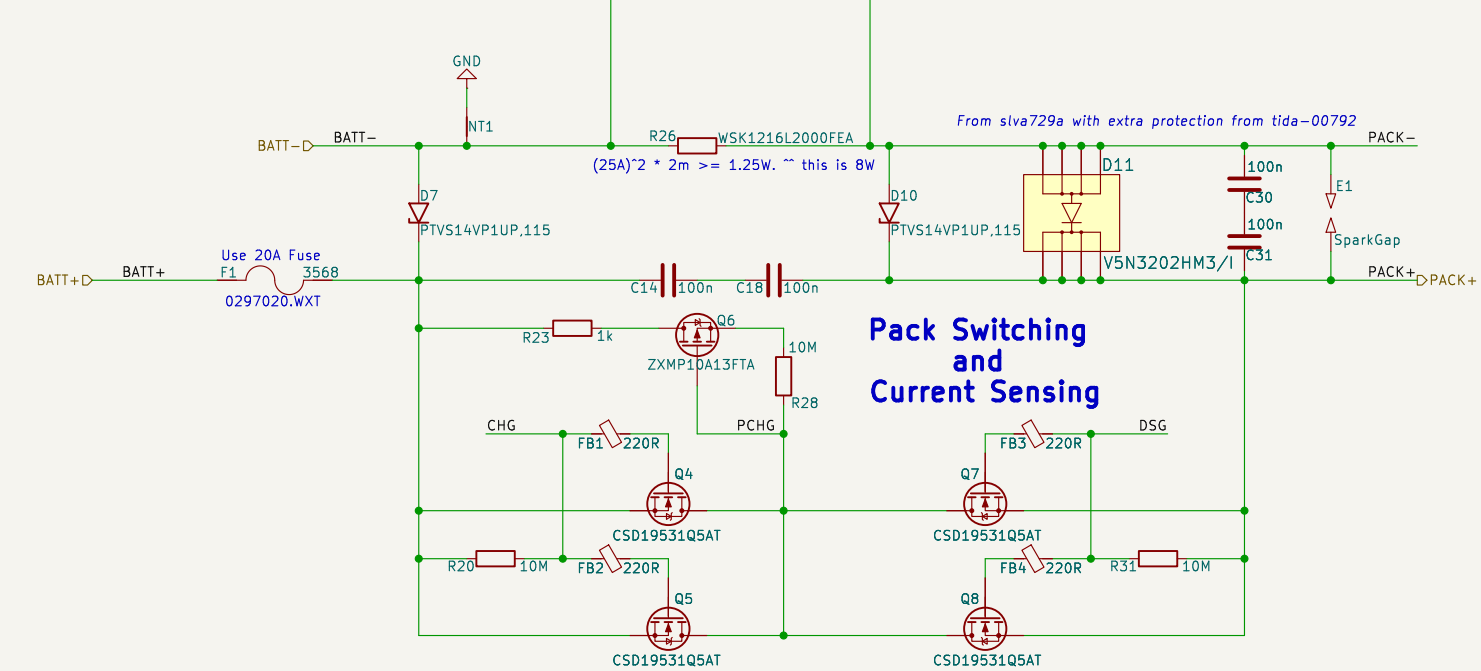
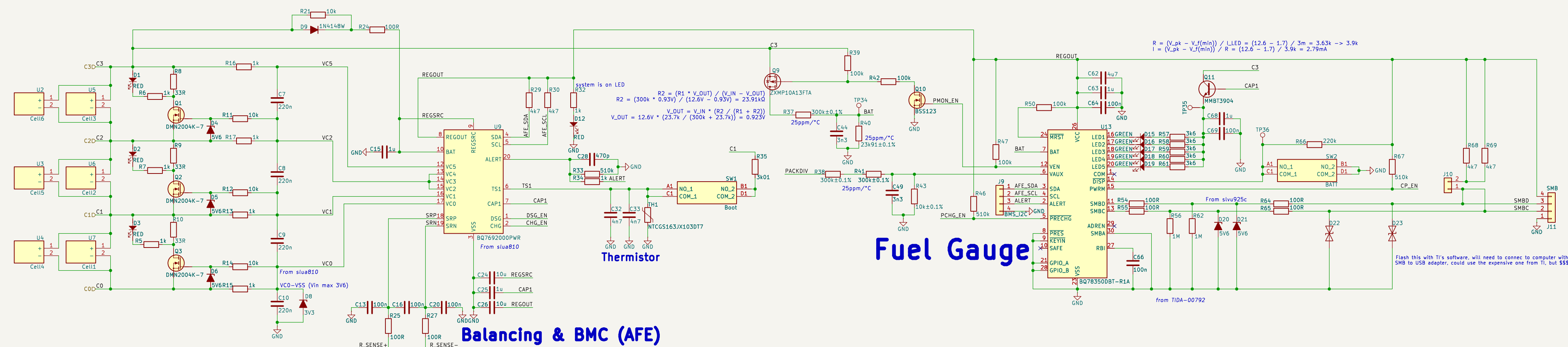
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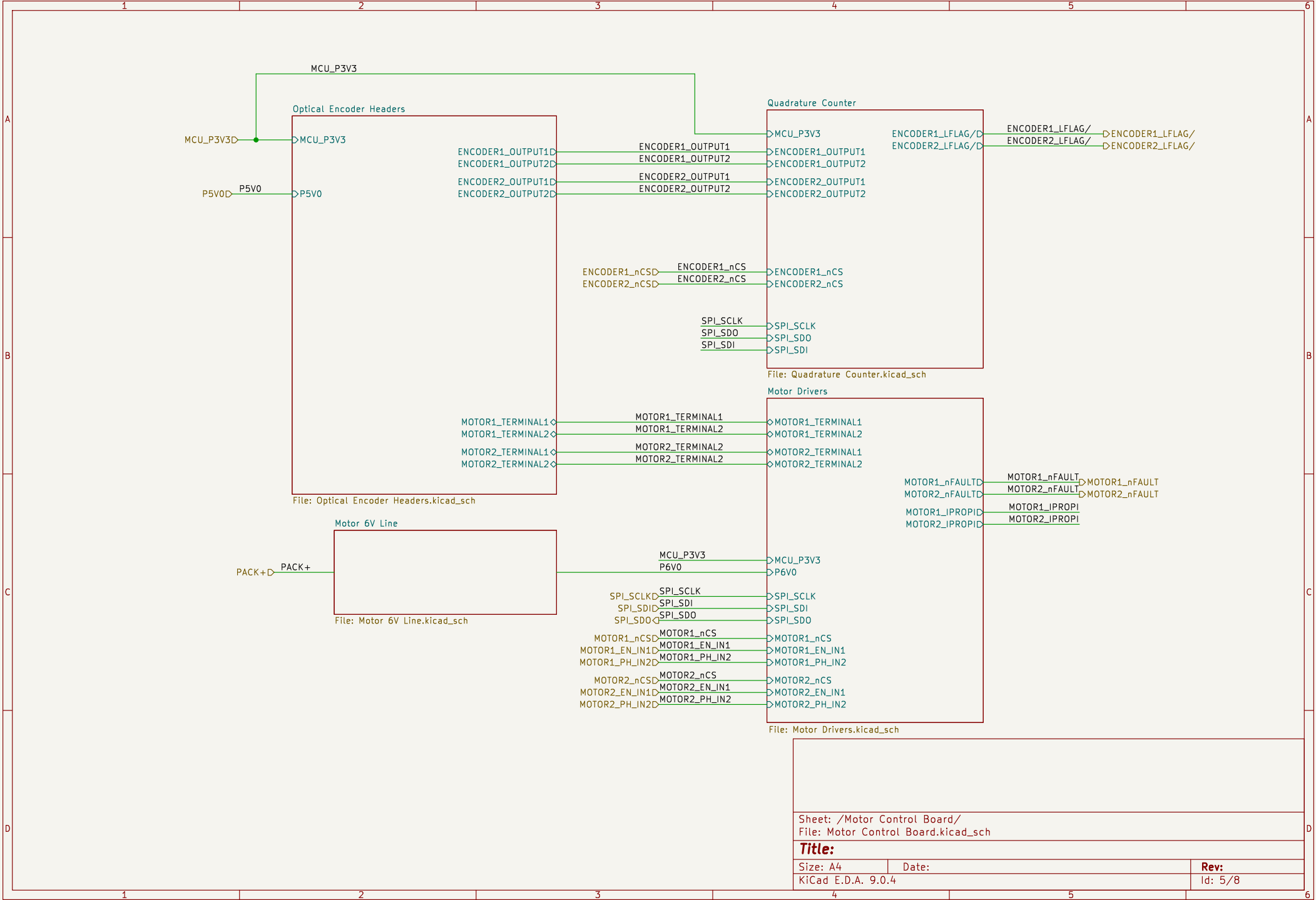
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KiCad E.D.A. 9.0.4

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**Rev:**  
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**BMS Protection Board for 3S Battery Pack**  
**In/Out: min voltage: 9.6 V, nominal voltage: 11.1 V, max voltage: 12.6 V**  
**Output: 20A continuous discharge current**  
**Min Each Cell set to 3.2 V, Max Each Cell set to 4.2 V**





Sheet: /Motor Control Board/  
File: Motor Control Board.kicad\_sch

**Title:**

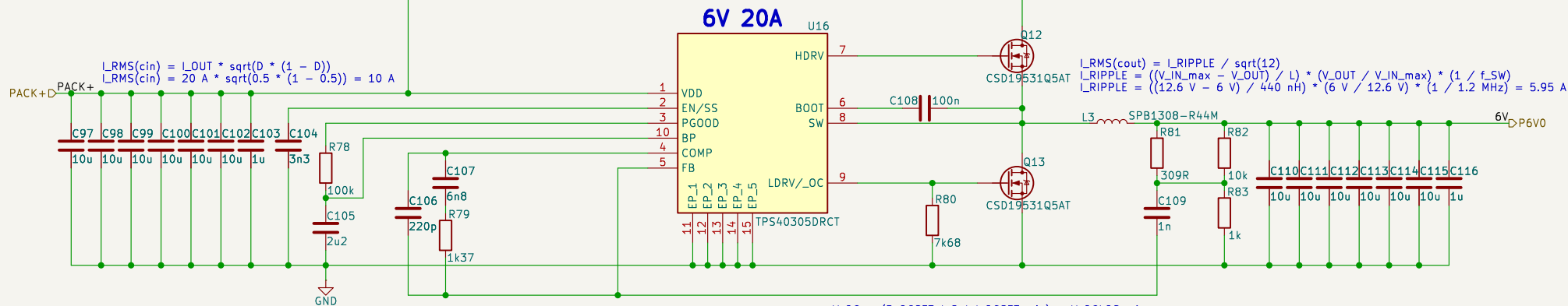
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$$V_{OC} = (R_{OCSET} * 2 * I_{OCSET\_min}) + V_{OCLOS\_min}$$

$$V_{OC} = (7.68 \text{ k}\Omega * 2 * 9.5 \text{ }\mu\text{A}) + (-8 \text{ mV})$$

$$V_{OC} = 137.9 \text{ mV}$$

$$I_{valley} = V_{OC} / R_{DS(on)}$$

$$I_{valley} = 137.9 \text{ mV} / 7.8 \text{ m}\Omega$$

$$I_{valley} = 17.68 \text{ A}$$

$$I_{SCP} = I_{valley} + (I_{RIPPLE} / 2)$$

$$I_{SCP} = 17.68 \text{ A} + (5.95 \text{ A} / 2)$$

$$I_{SCP} = 20.66 \text{ A}$$

Sheet: /Motor Control Board/Motor 6V Line/  
File: Motor 6V Line.kicad\_sch

**Title:**

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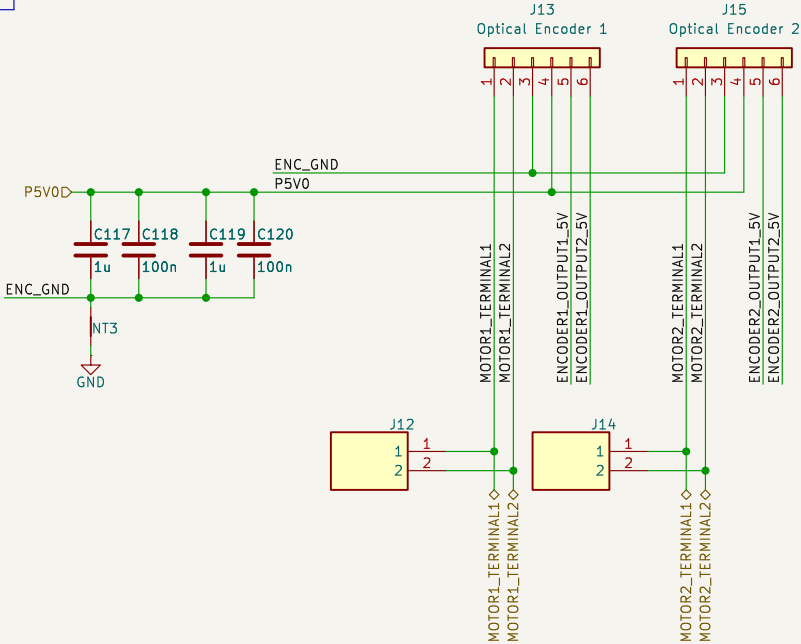
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**Rev:**

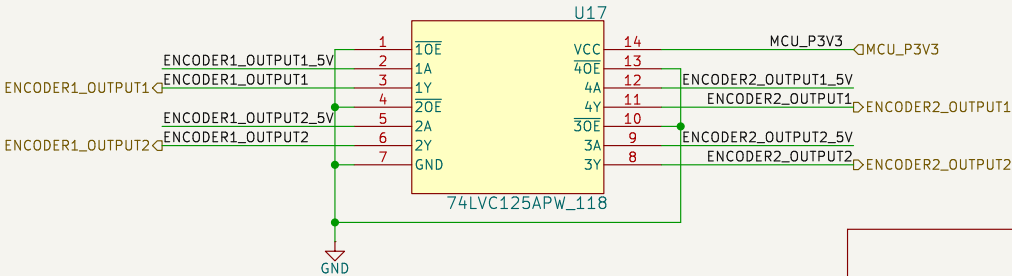
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(1) Red	motor power (connects to one motor terminal)
(2) Black	motor power (connects to the other motor terminal)
(3) Green	encoder GND
(4) Blue	encoder Vcc (3.5 – 20 V)
(5) Yellow	encoder A output
(6) White	encoder B output

- TP37○ ENC\_GND
- TP38○ MOTOR1\_TERMINAL1
- TP39○ MOTOR1\_TERMINAL2
- TP40○ ENCODER1\_OUTPUT1\_5V
- TP41○ ENCODER1\_OUTPUT2\_5V
- TP42○ MOTOR2\_TERMINAL1
- TP43○ MOTOR2\_TERMINAL2
- TP44○ ENCODER2\_OUTPUT1\_5V
- TP45○ ENCODER2\_OUTPUT2\_5V
- TP46○ ENCODER1\_OUTPUT1
- TP47○ ENCODER1\_OUTPUT2
- TP48○ ENCODER2\_OUTPUT1
- TP49○ ENCODER2\_OUTPUT2



Input has to be 5V, output has to be 3V3



Sheet: /Motor Control Board/Optical Encoder Headers/  
 File: Optical Encoder Headers.kicad\_sch

Title:

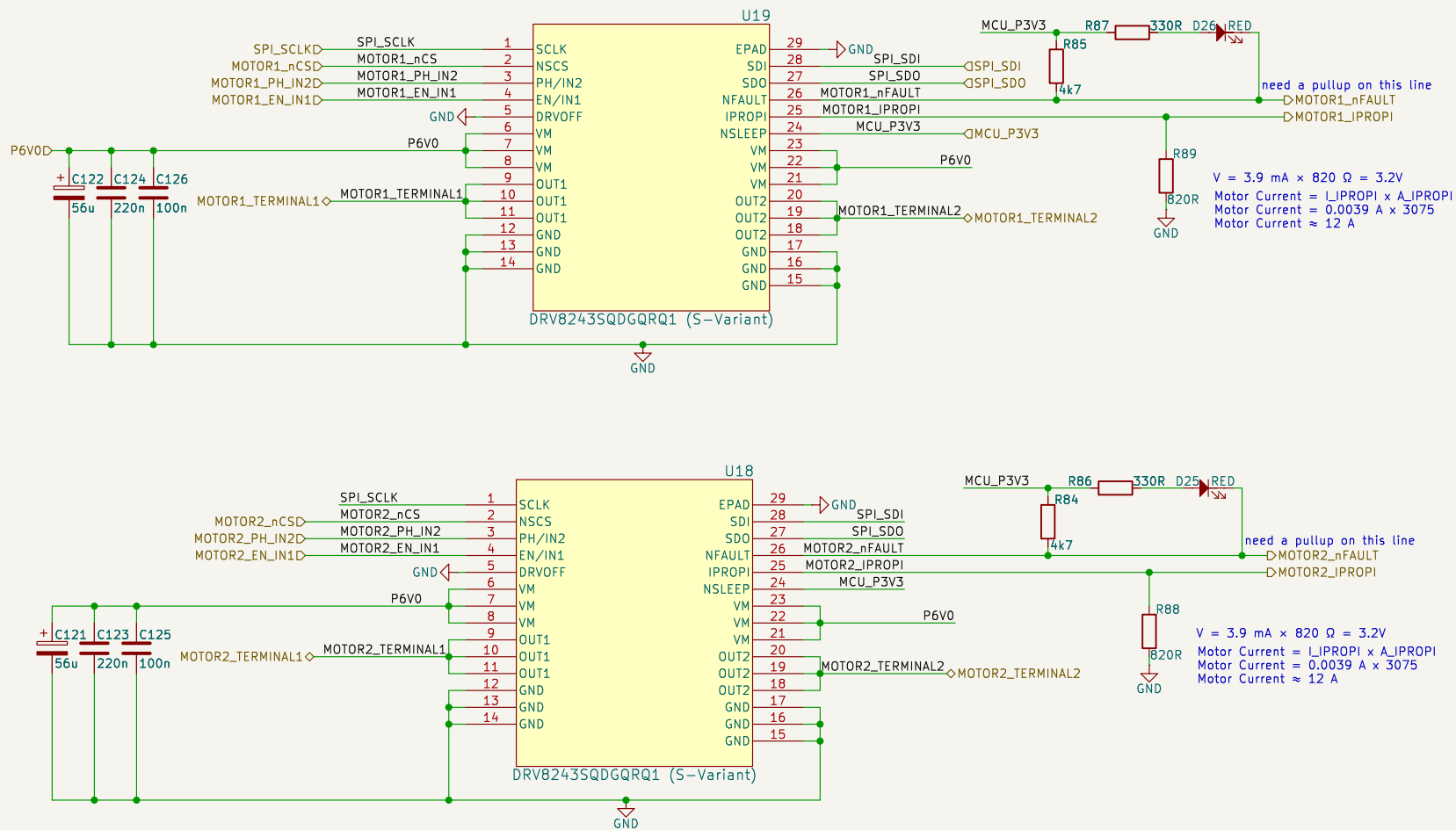
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Sheet: /Motor Control Board/Motor Drivers/  
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