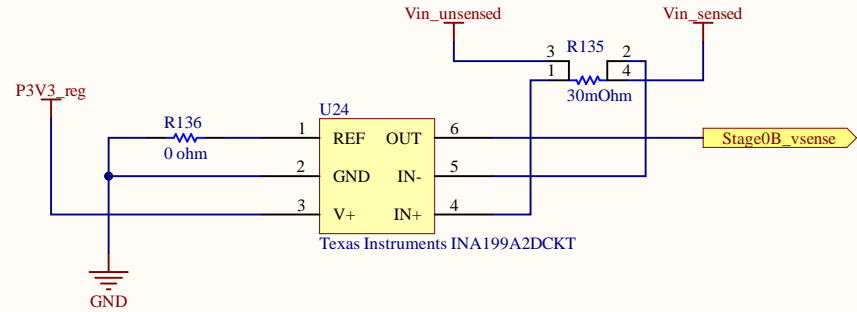


V_{in} ----> Stage0A
input protection ----> Stage0B
I sense ----> Stage1A
Boost ----> V_{boost}

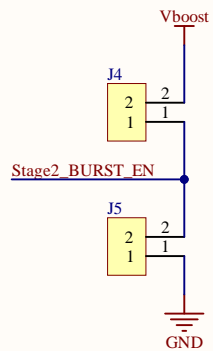
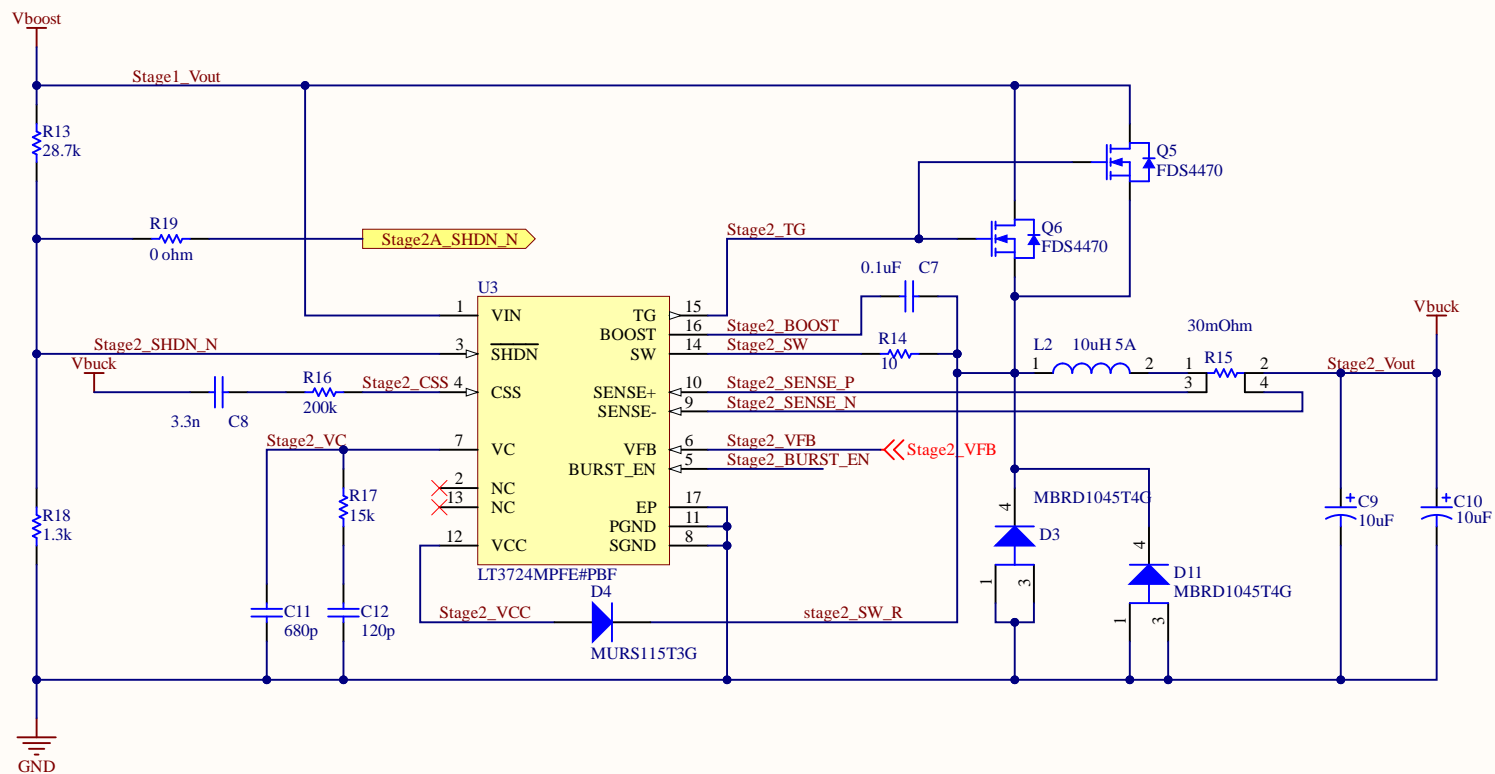
V_{boost} --> Stage2A
Buck ----> Stage3A
Regul ator ----> Stage3E
I sense ----> V_{out}

V_{boost} --> Stage2A
Buck ----> P5V0 buck ----> Stage3A
Regul ator ----> V_{out}

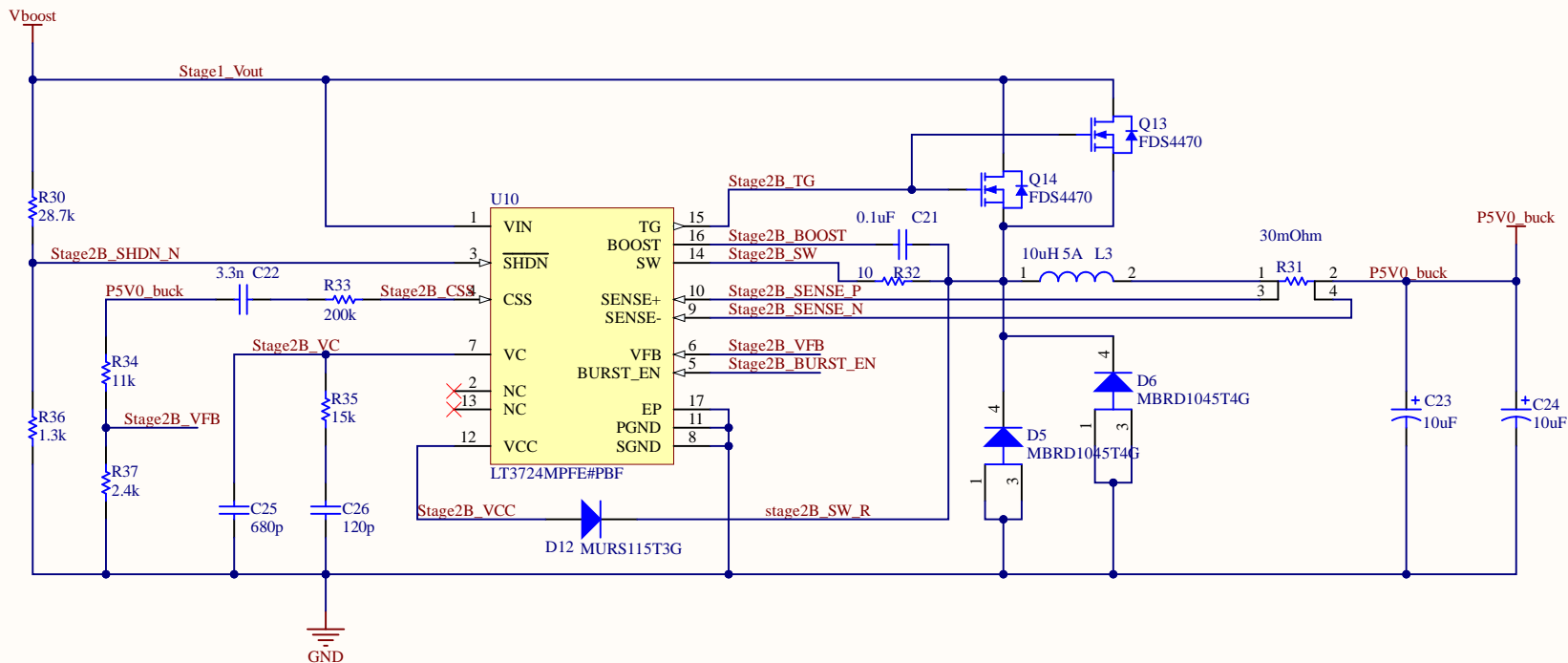
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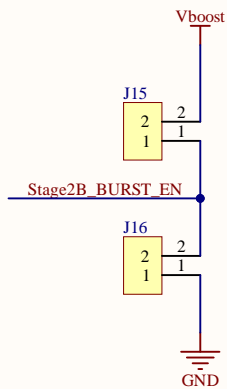
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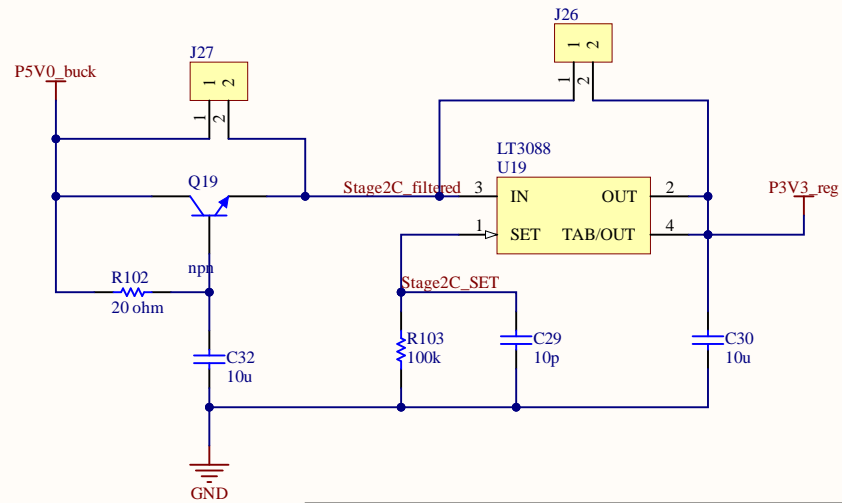
$V_{buck} = 5 \text{ Volts}$
 So,

$$5 * R_{bot} / (R_{top} + R_{bot}) = 1.185$$

 $R_{top} = 18k$
 $R_{bot} = 5.6k$



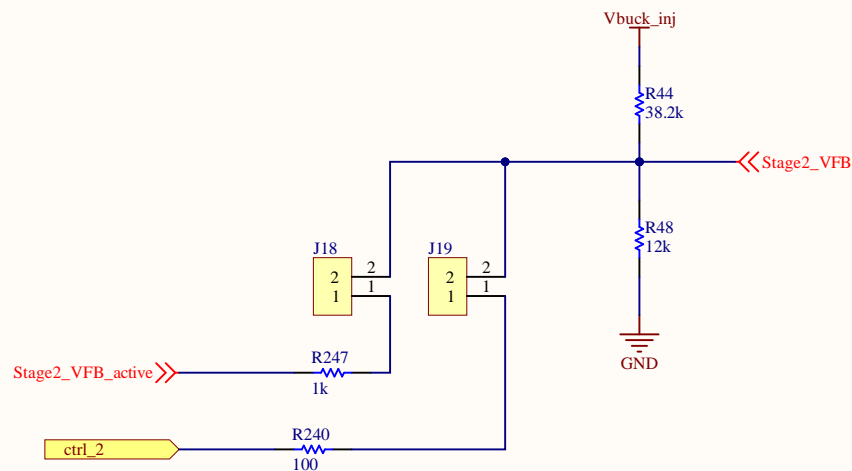
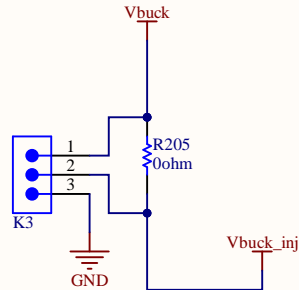
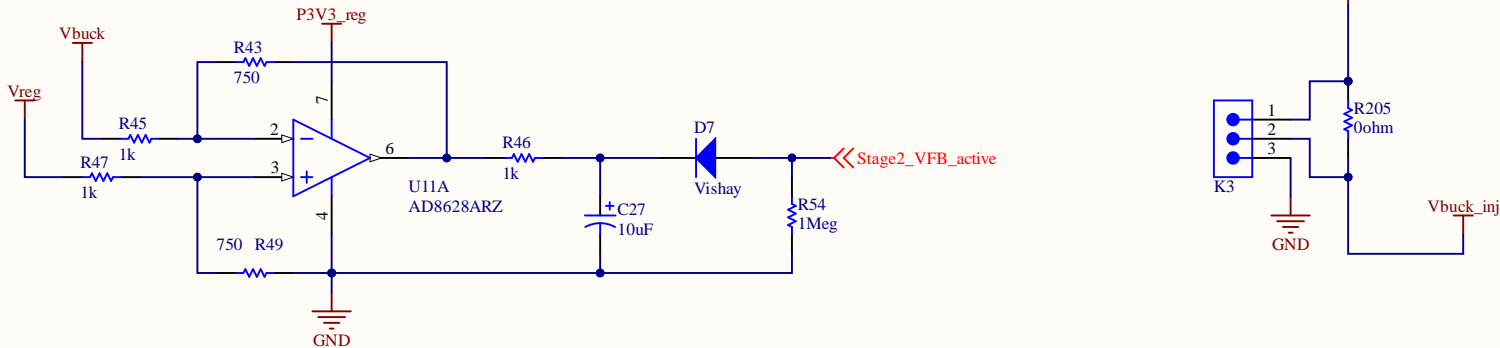
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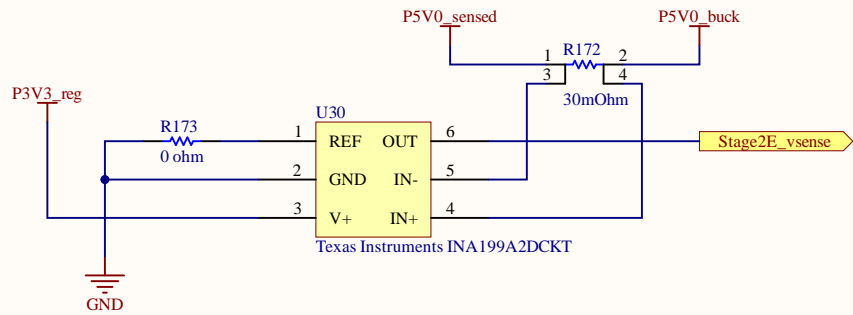
This should create a very clean P5V0 rail. However, the voltage drop needed will be 1.1 - 1.6 V for LDO and 0.7 V for filter

Total of 1.8 - 2.3 Volts. So if $V_{in} = 5V$ then $V_{out} = 3.2 - 2.7$. So if the pre filter is used the 5V0_buck voltage should be raised 0.3 Volts

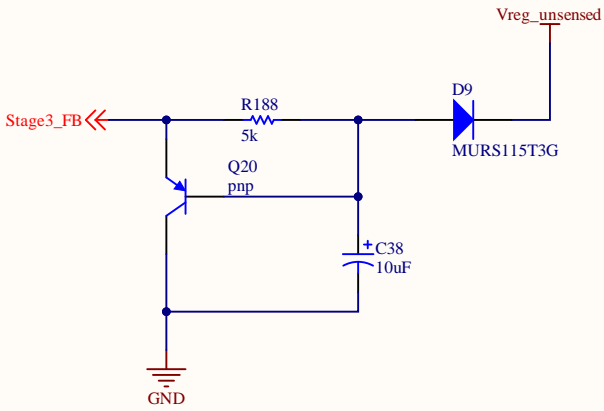
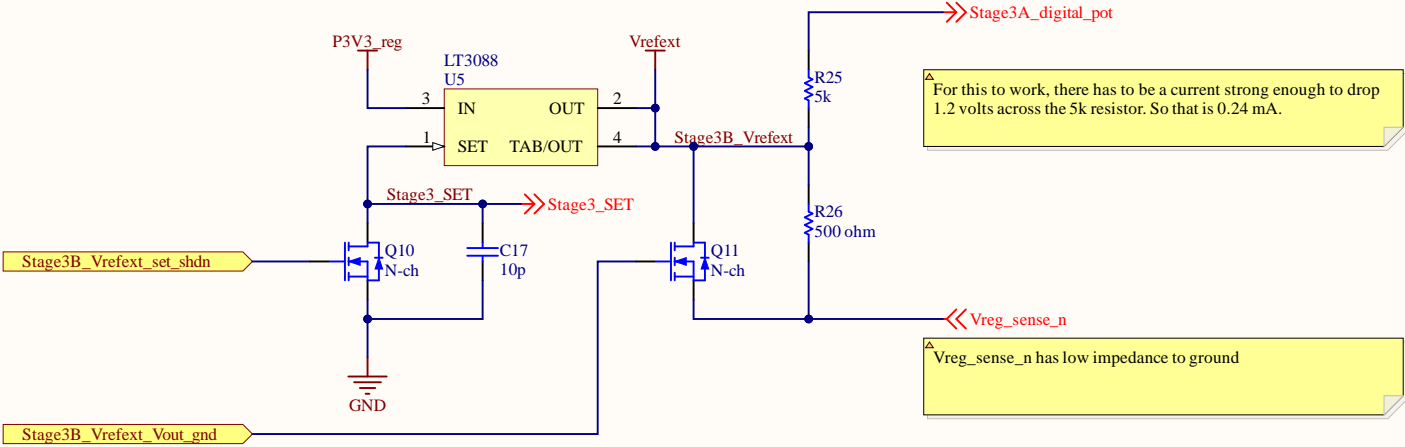
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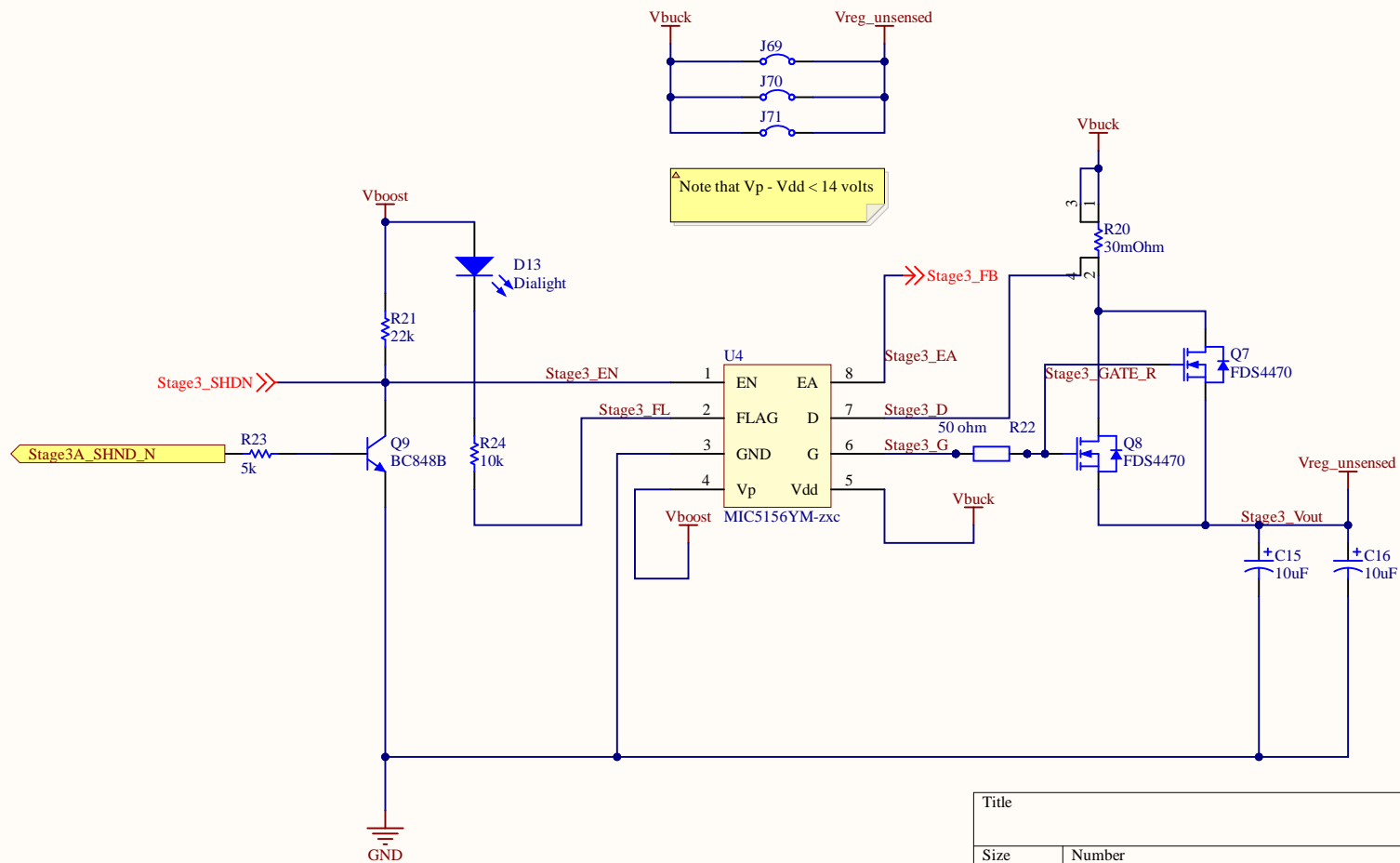
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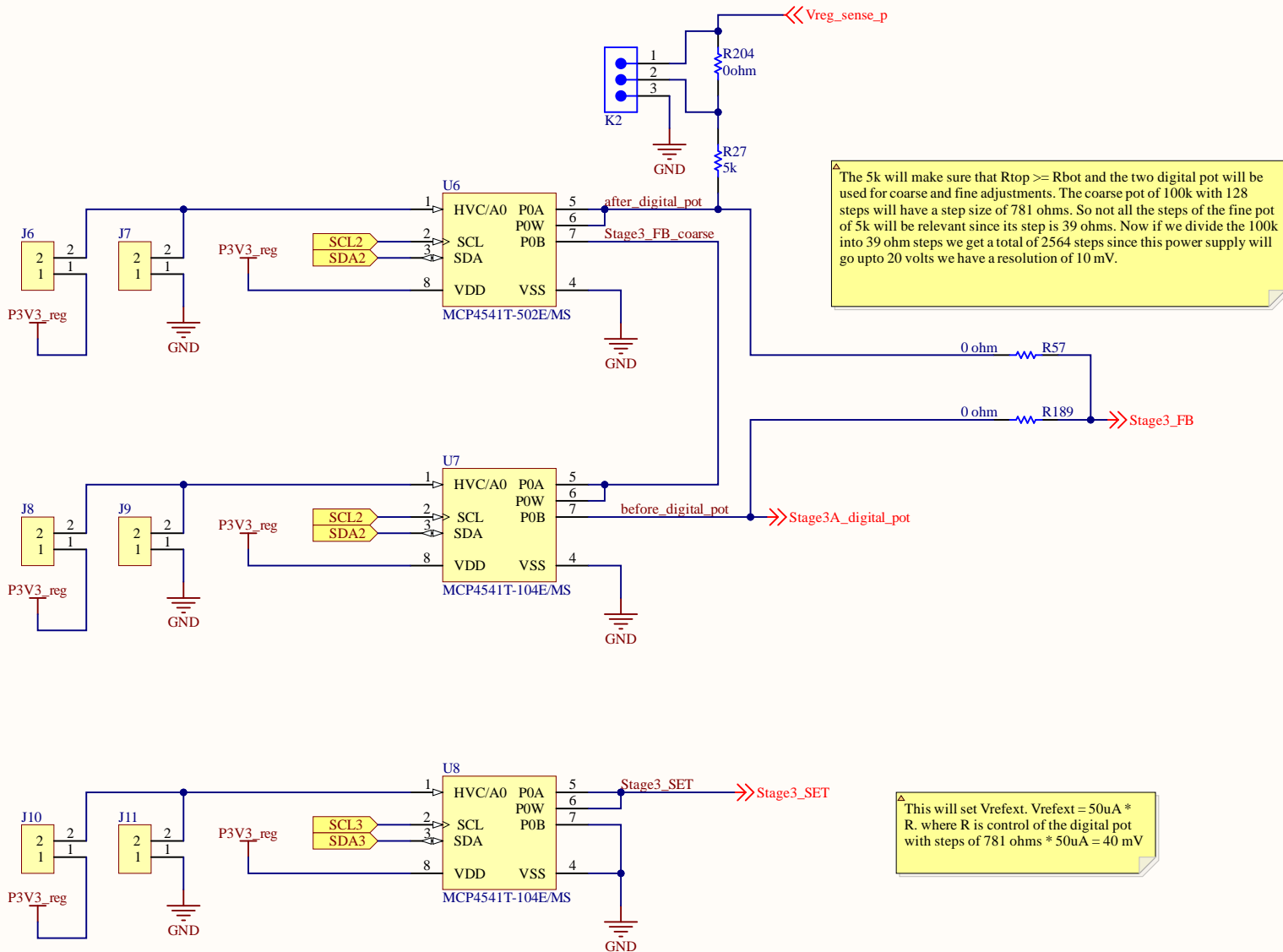
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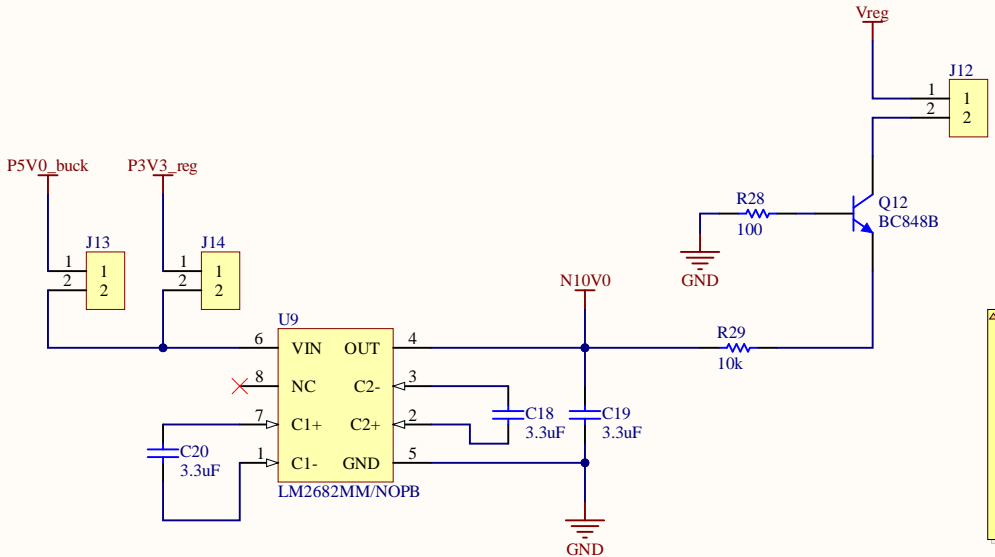
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The 5k will make sure that $R_{top} \gg R_{bot}$ and the two digital pot will be used for coarse and fine adjustments. The coarse pot of 100k with 128 steps will have a step size of 781 ohms. So not all the steps of the fine pot of 5k will be relevant since its step is 39 ohms. Now if we divide the 100k into 39 ohm steps we get a total of 2564 steps since this power supply will go upto 20 volts we have a resolution of 10 mV.

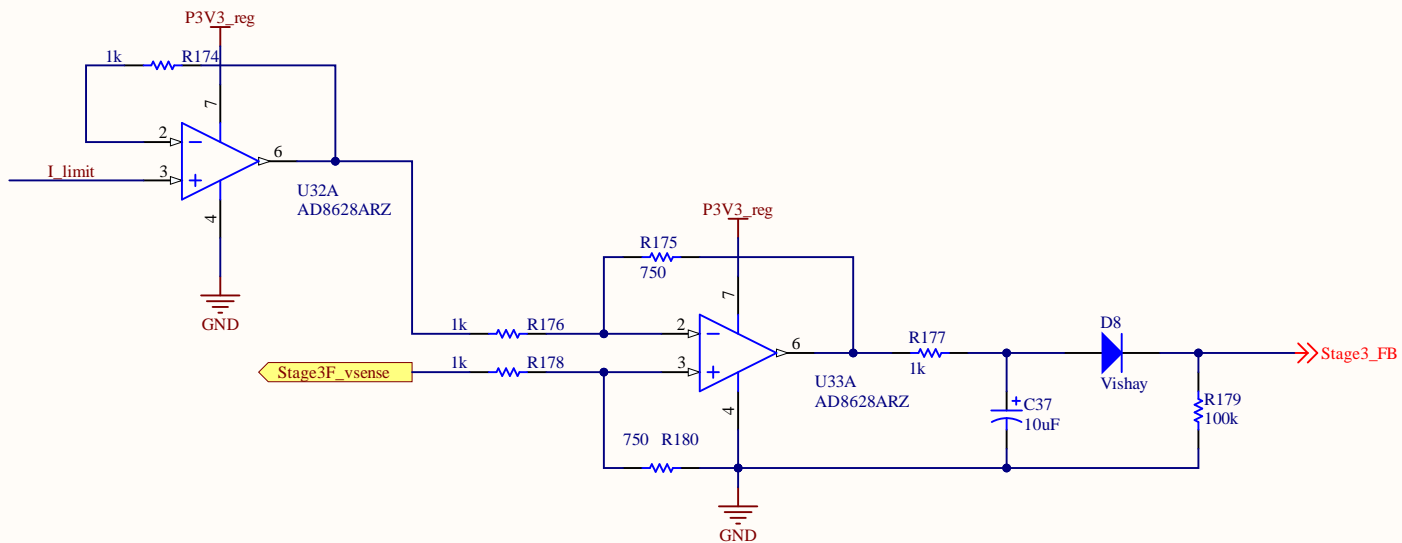
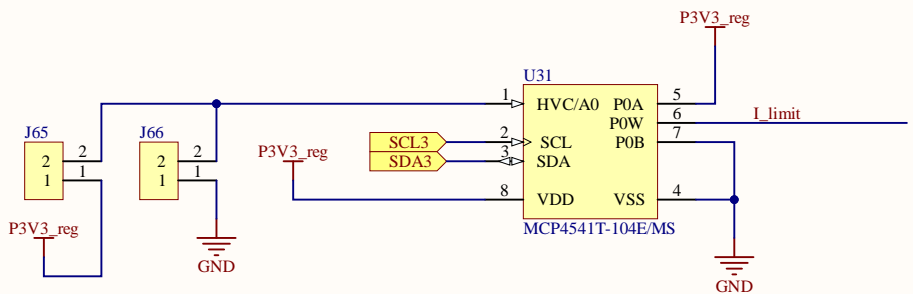
This will set Vrefext. $V_{refext} = 50\mu A * R$, where R is control of the digital pot with steps of 781 ohms * $50\mu A = 40$ mV

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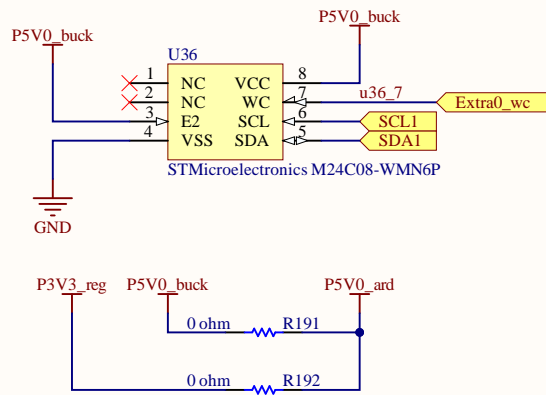
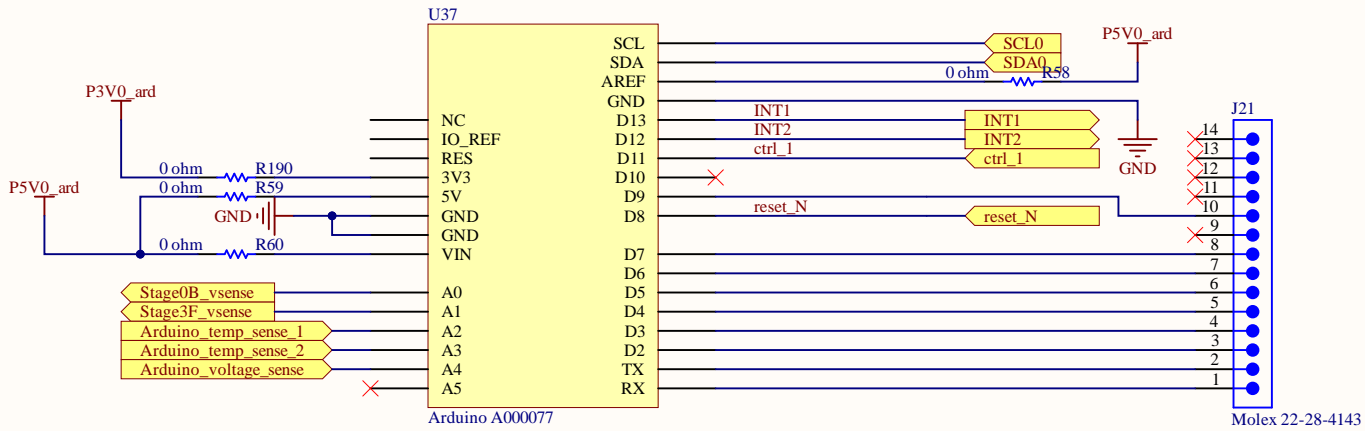


^ We just need a 0.25mA running on the output such that there is at least a 1.2V drop on a 5k resistor.

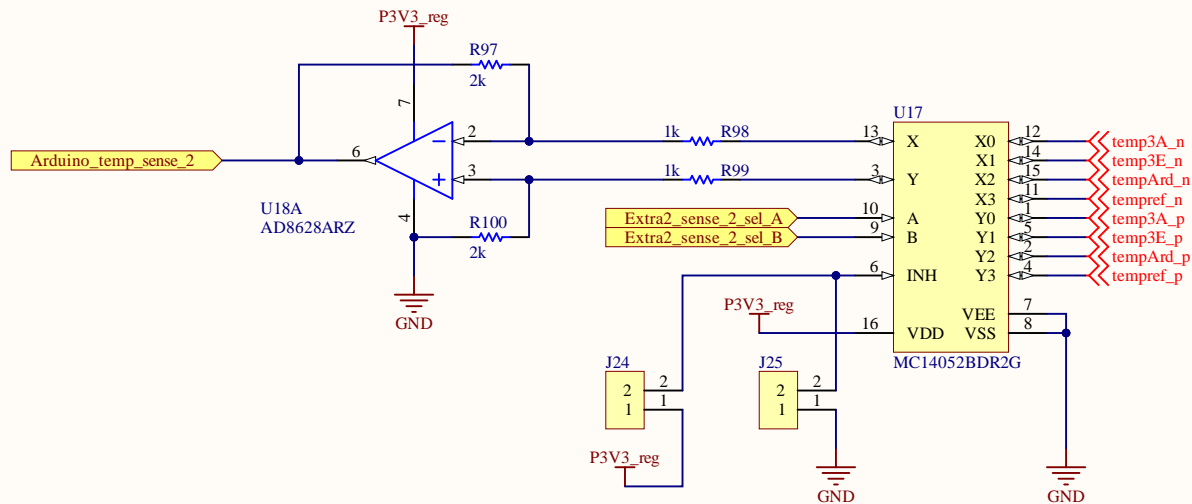
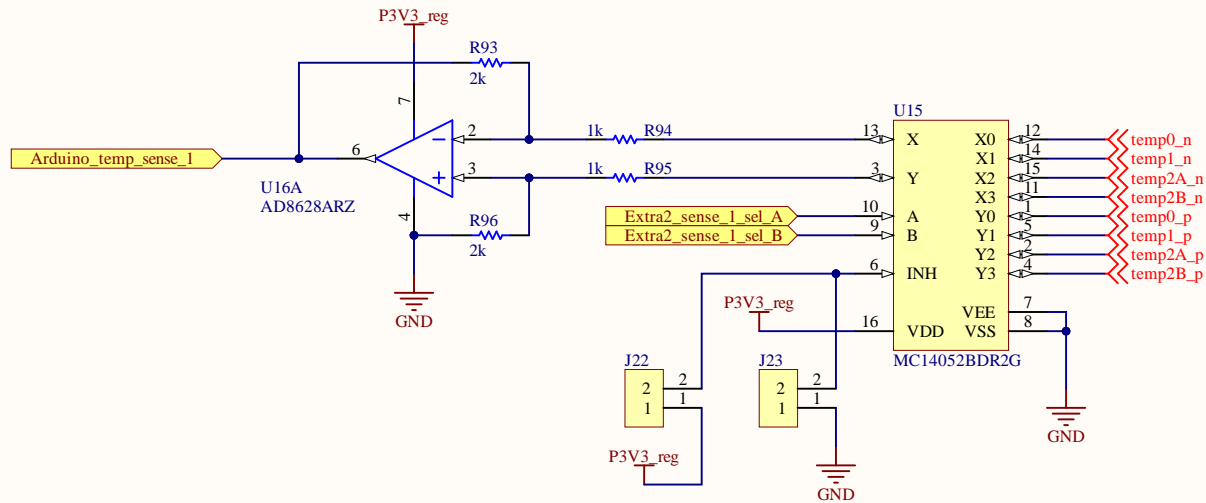
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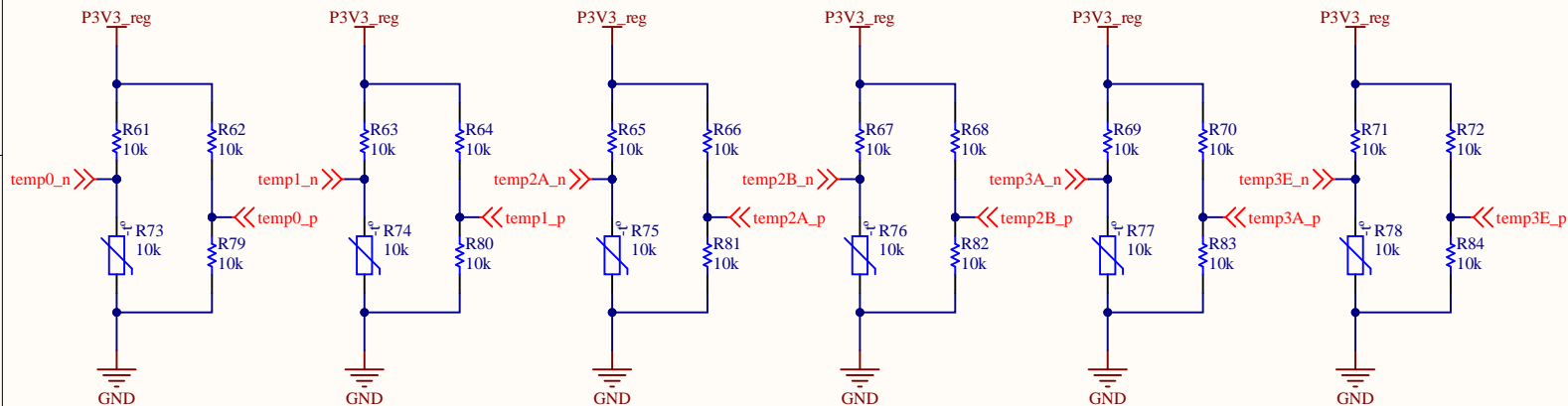
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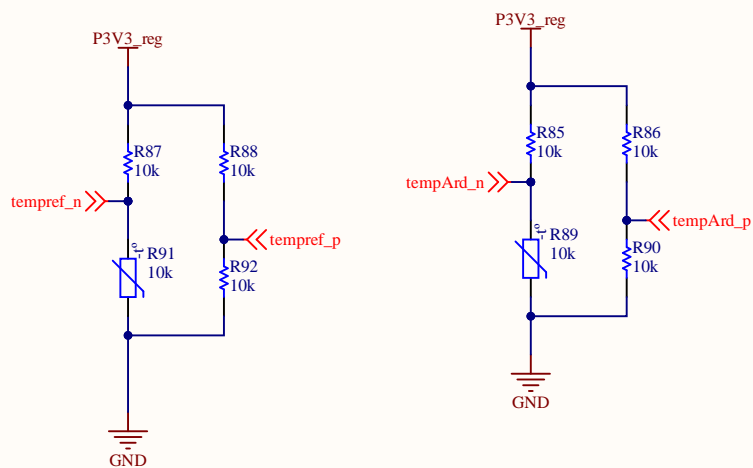


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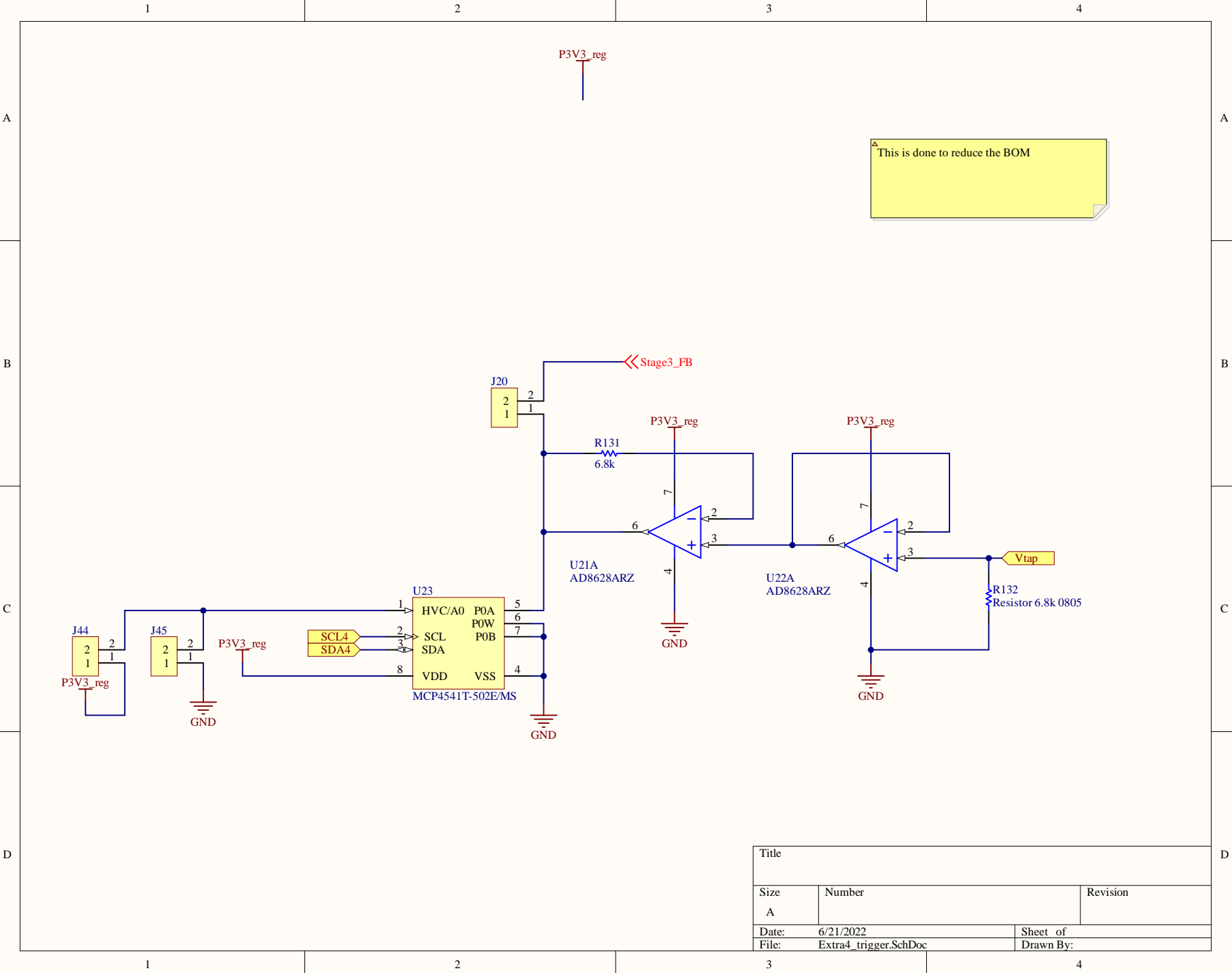
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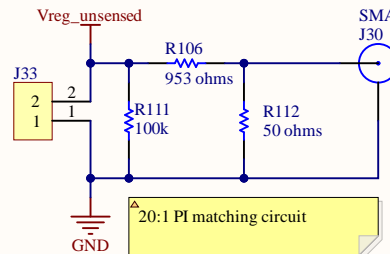
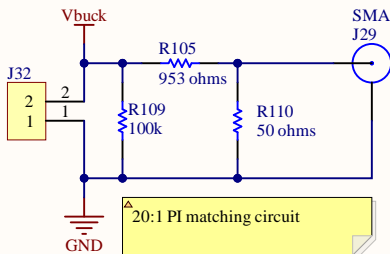
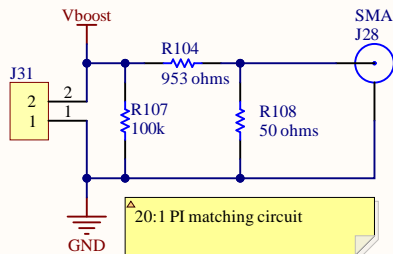
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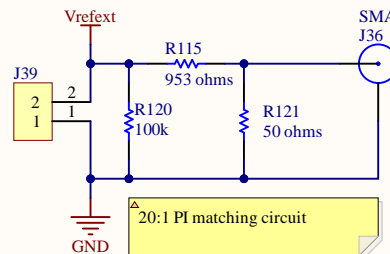
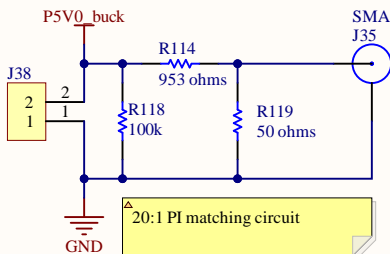
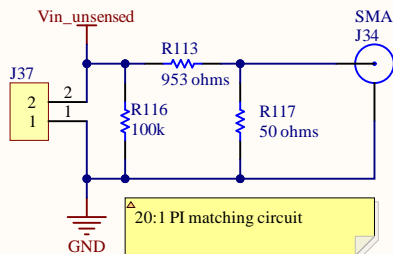


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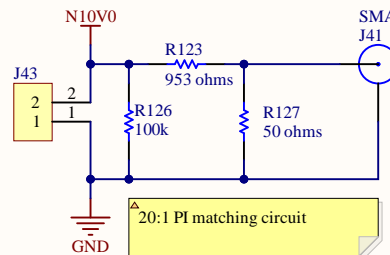
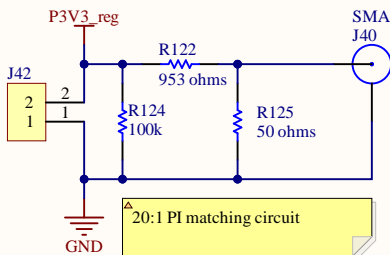
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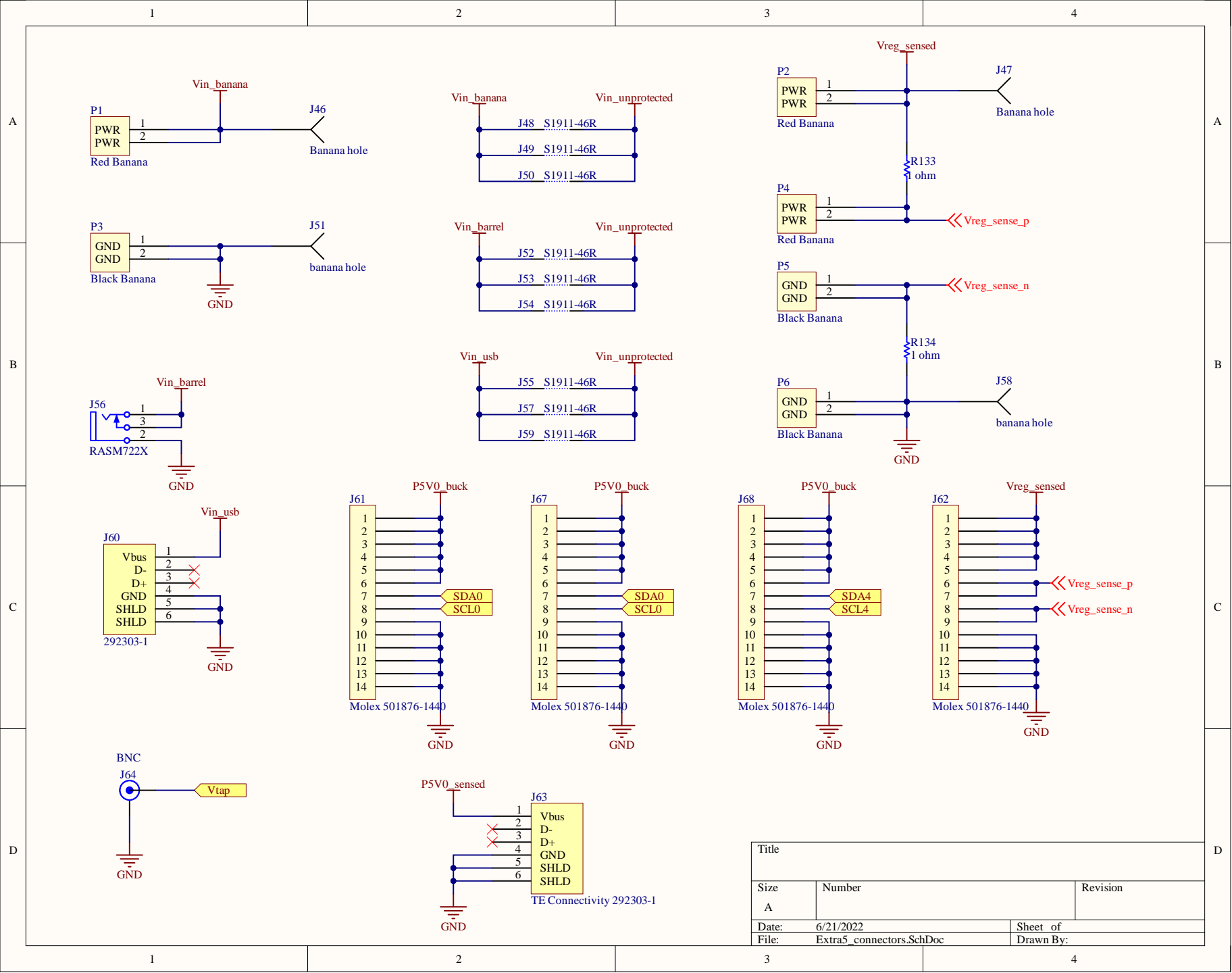


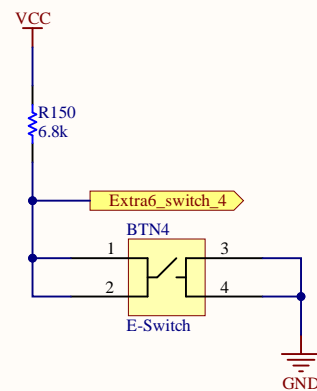
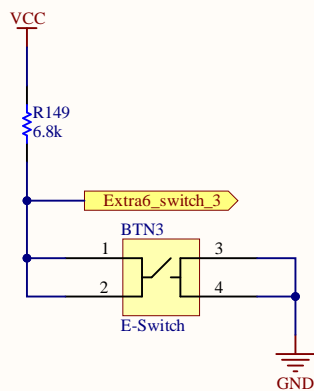
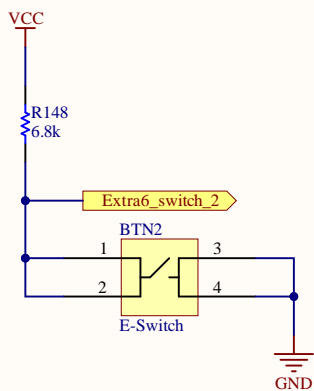
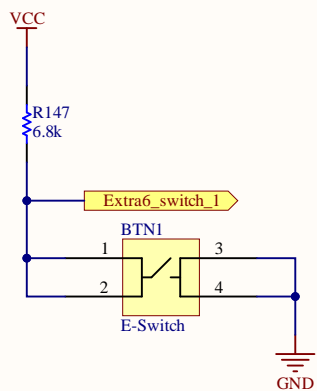
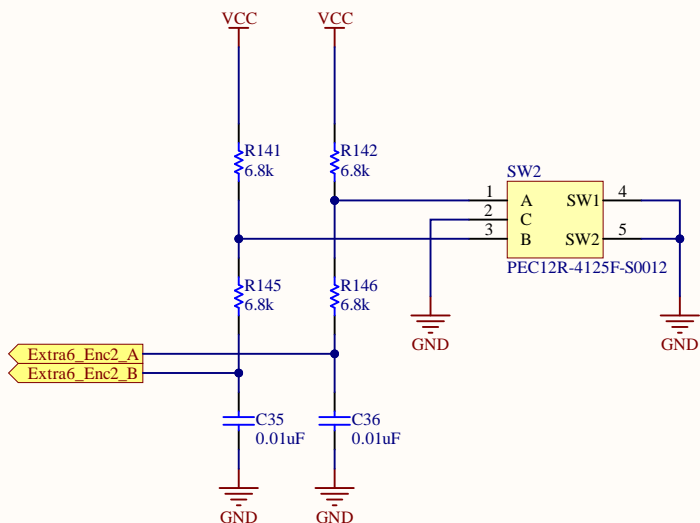
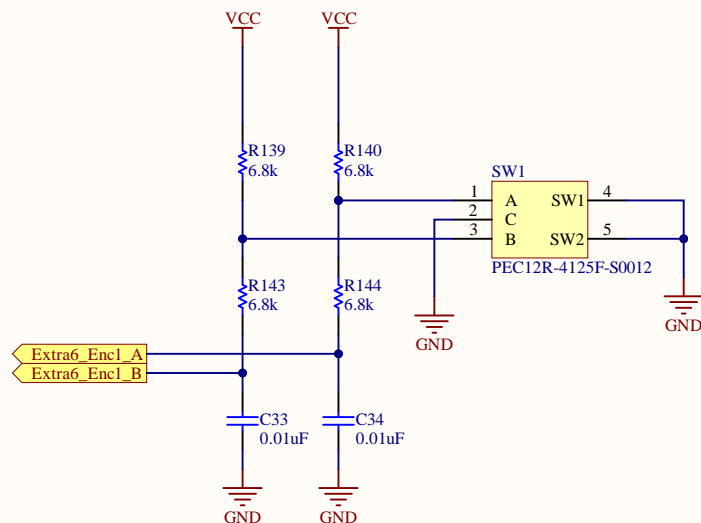
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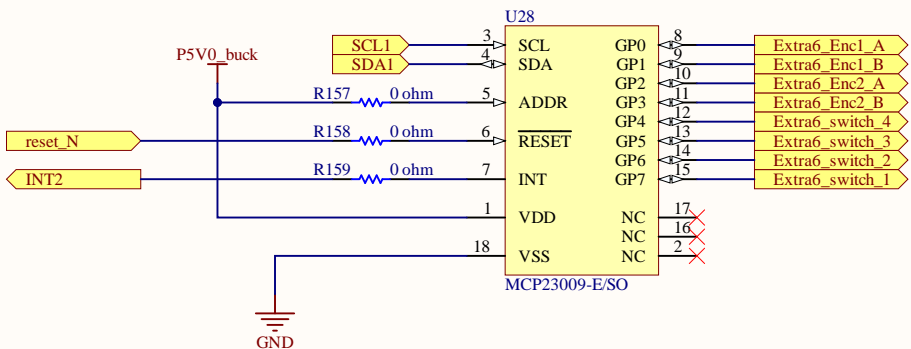
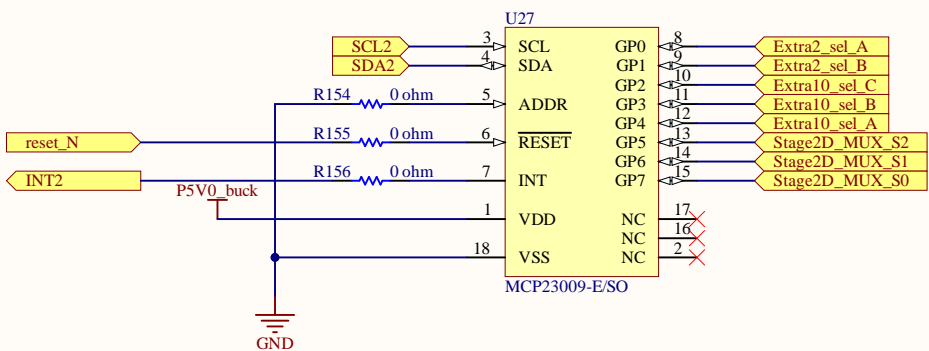
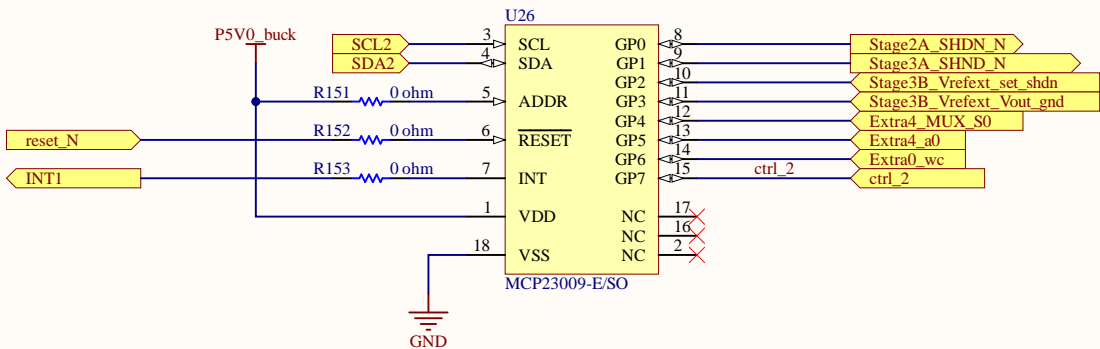
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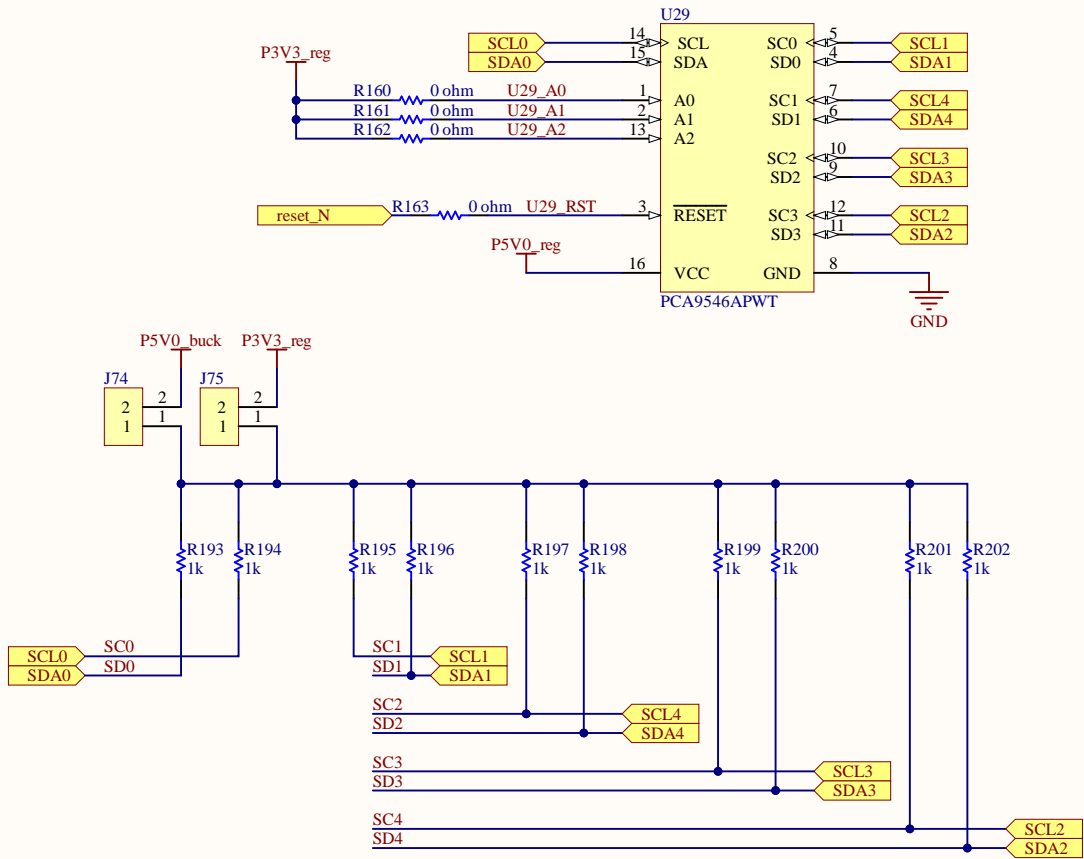




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