Arduino_Power_Supply

Revision B1

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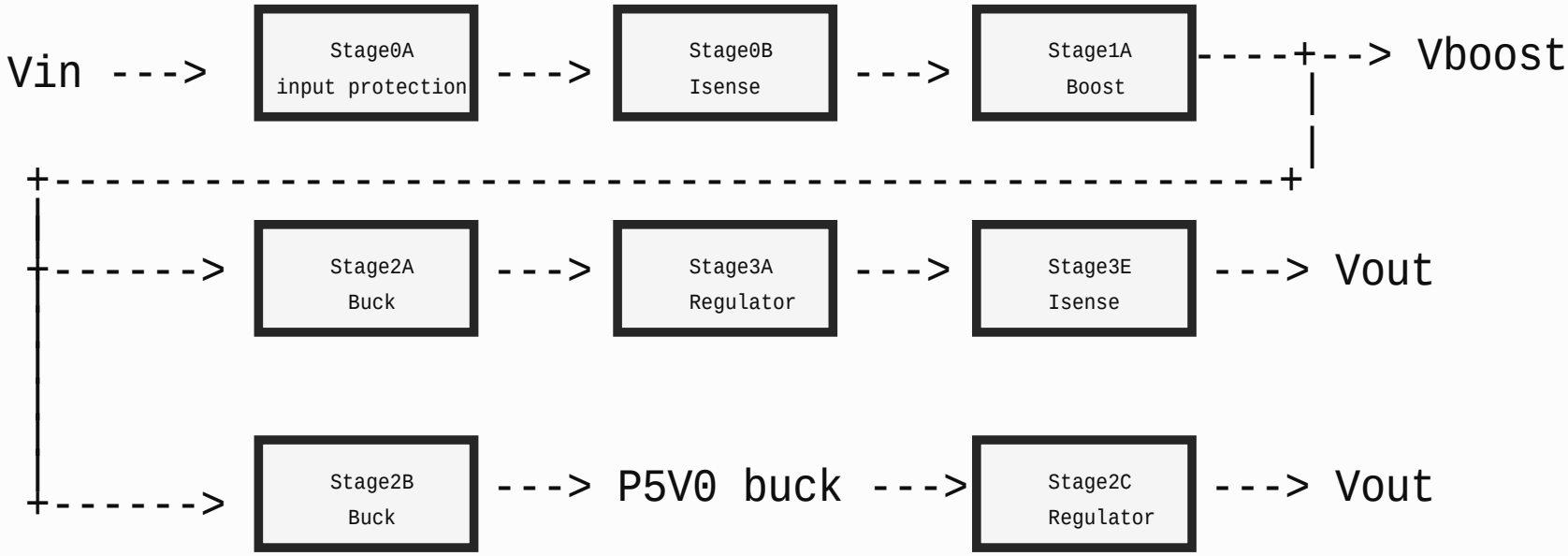
Title		
Size: A	Number	Revision
Date: 8/04/2022		Sheet of
File: Title.SchDoc		Drawn By:

Stage_Diagram



Title test		
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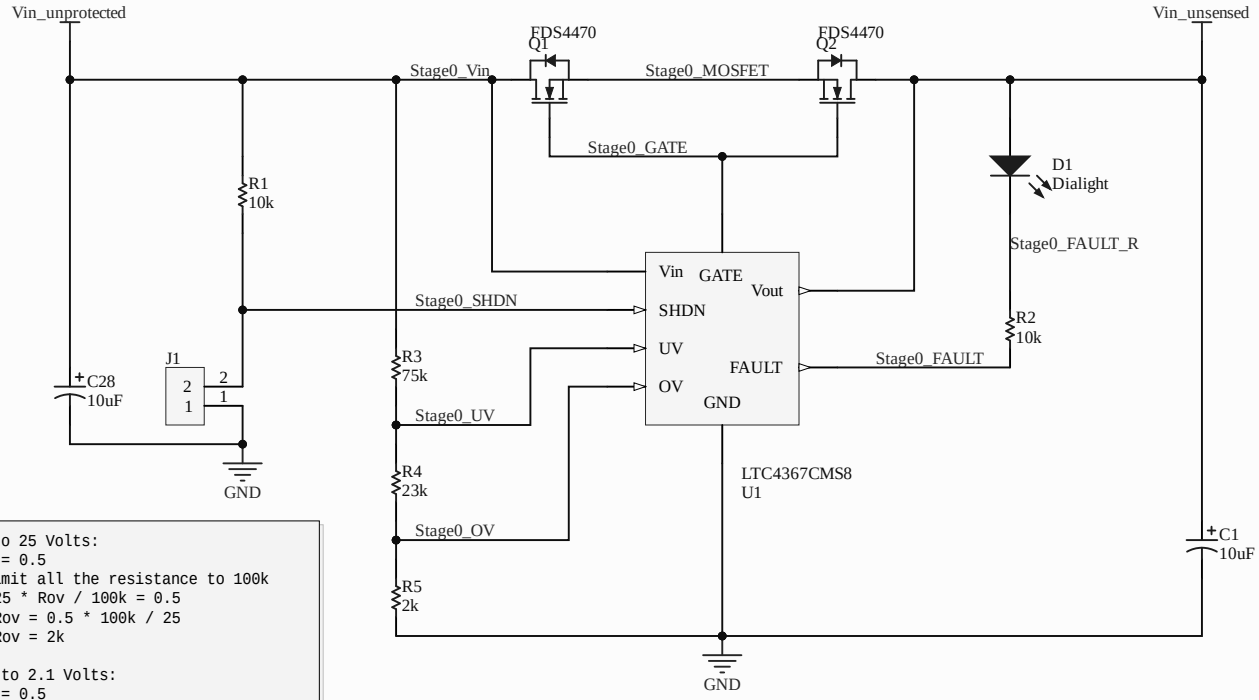
Stage0A_input_protection




```
Overvoltage set to 25 Volts:
        Vtrigger = 0.5
        So, if limit all the resistance to 100k
                25 * Rov / 100k = 0.5
                Rov = 0.5 * 100k / 25
                Rov = 2k

Undervoltage set to 2.1 Volts:
        Vtrigger = 0.5
        So,
                2.1 * (Rov + Ruv) / 100k = 0.5
                2.1 * (2k + Ruv) / 100k = 0.5
                (2k + Ruv) = 0.5 * 100k / 2.1
                2k + Ruv = 23.81k
                Ruv = 21.81k  22k
```

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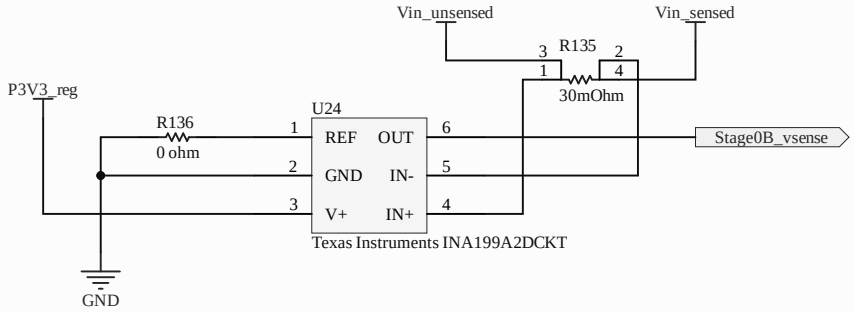
Stage0B_current_sense



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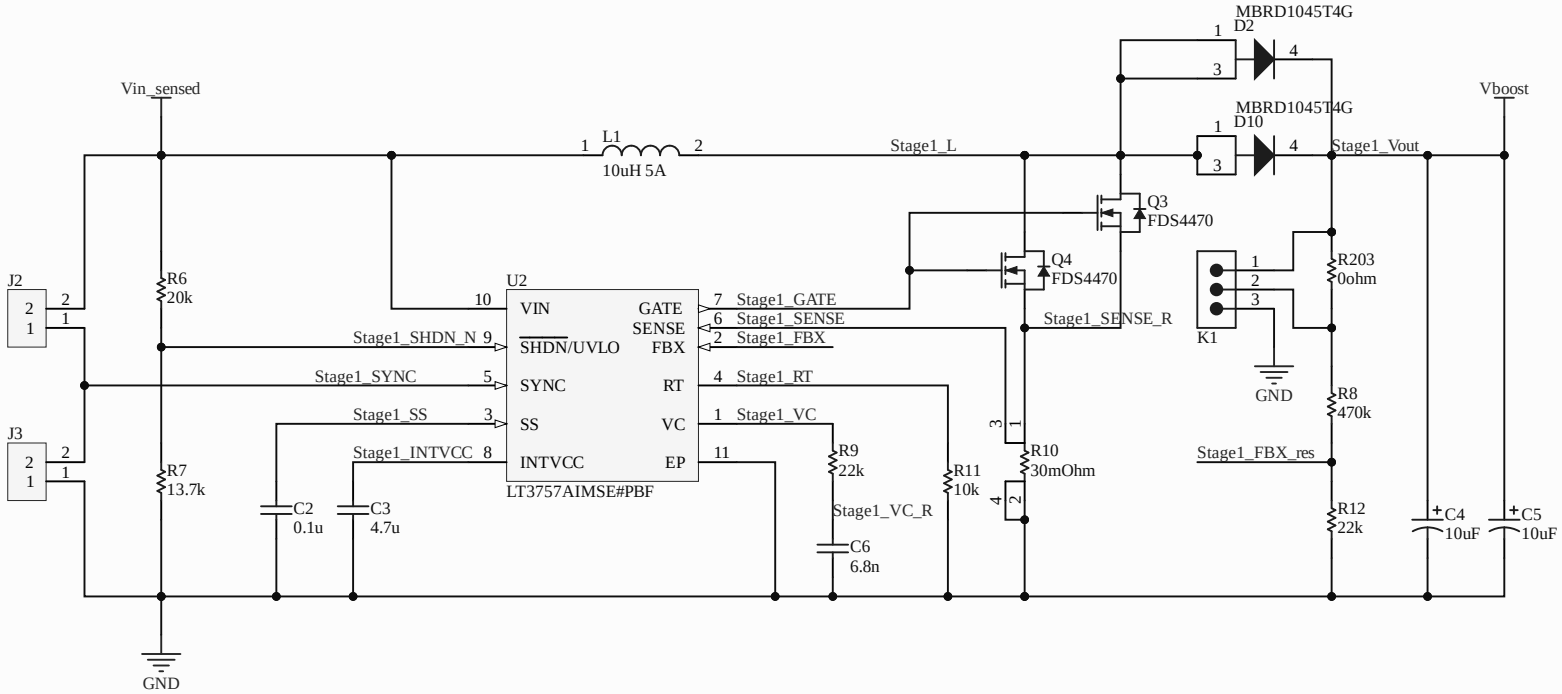
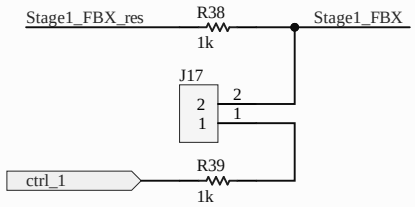
Stage1A_Boost_controller




```
FB voltage set to 38 volts:
        Vfb = 1.7
        So,
                38 * Rbot / (Rtop + Rbot) = 1.7
                Rtop = 470k
                Rbot = 22k
But to control the voltage the Vfb comes
from an average between FB resistors and
PWM from arduino.
        Note that if FB is held above 1.7
        Vout will drop down to Vin  [NOT 0!]
```



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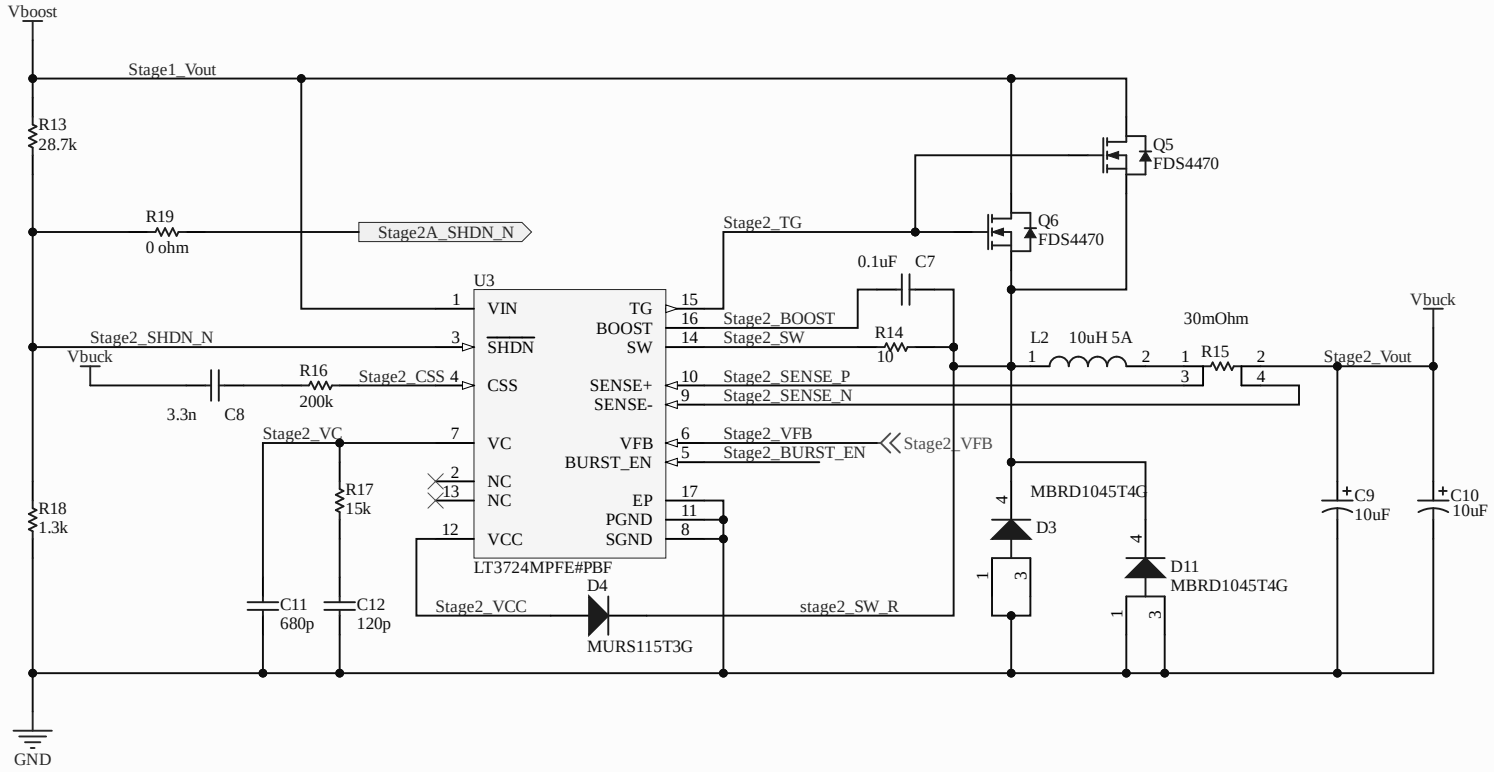
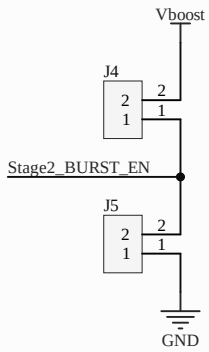
Stage2A_Buck_controller





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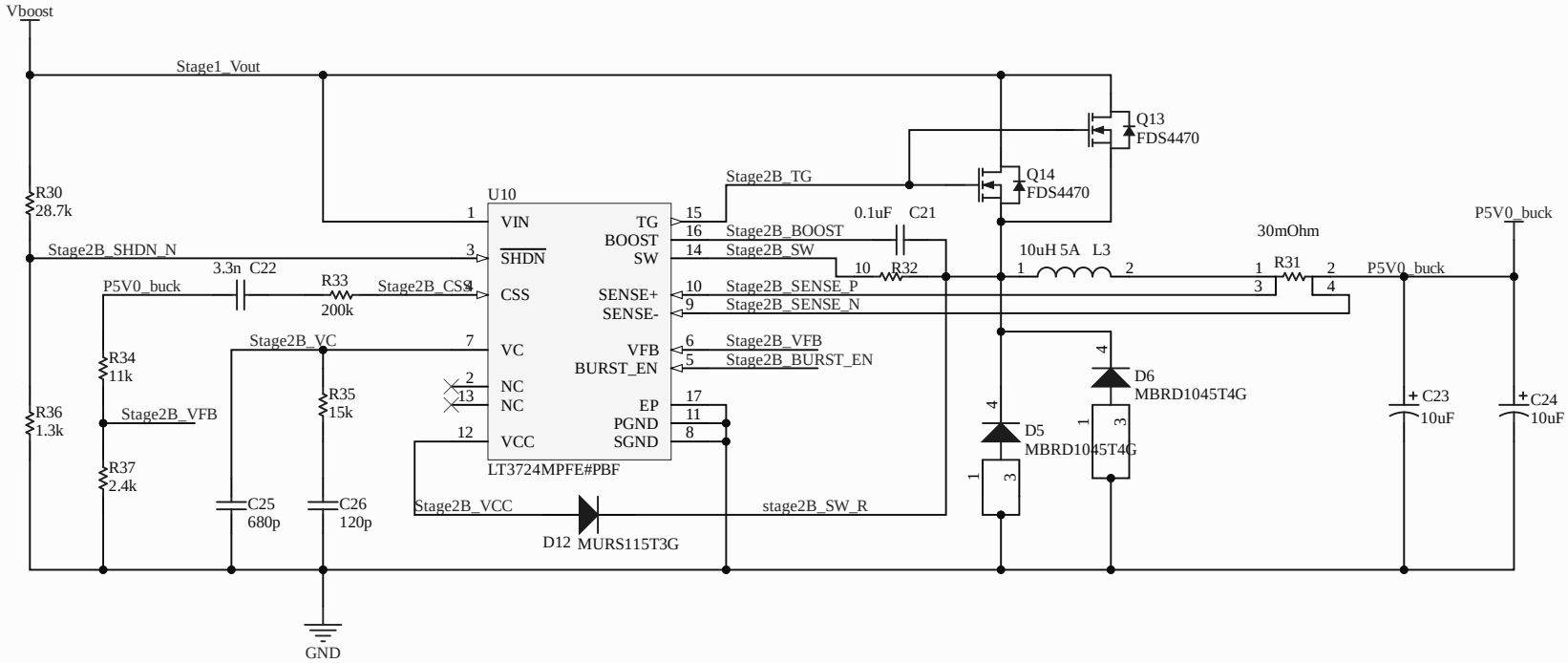
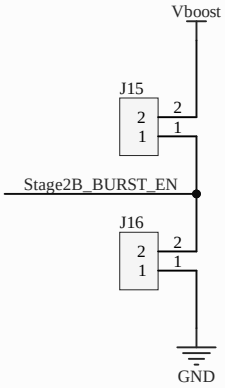
Stage2B_5Volt_buck




```
Vbuck = 5 Volts
        So,
                5 * Rbot / (Rtop + Rbot) = 1.185
                Rtop = 18k
                Rbot = 5.6k
```



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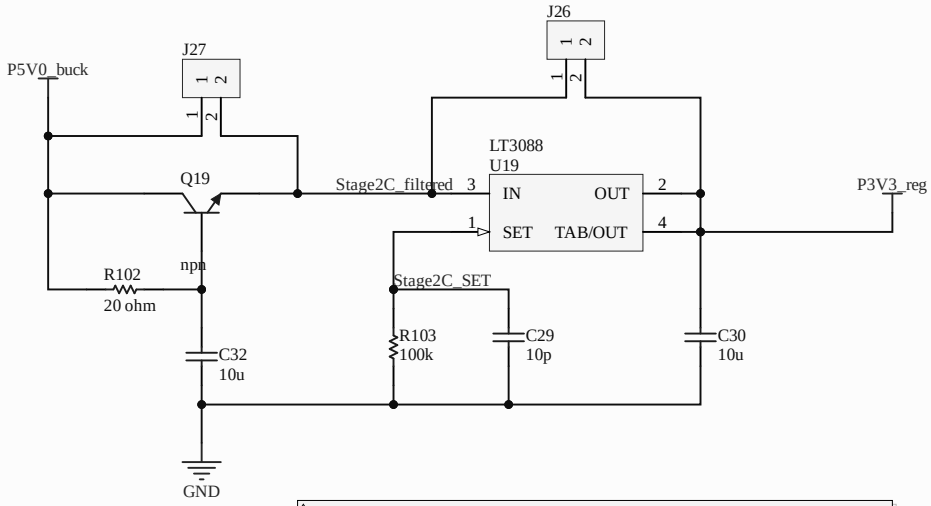
Stage2C_3V3_reg



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 Vin = 5V then Vout 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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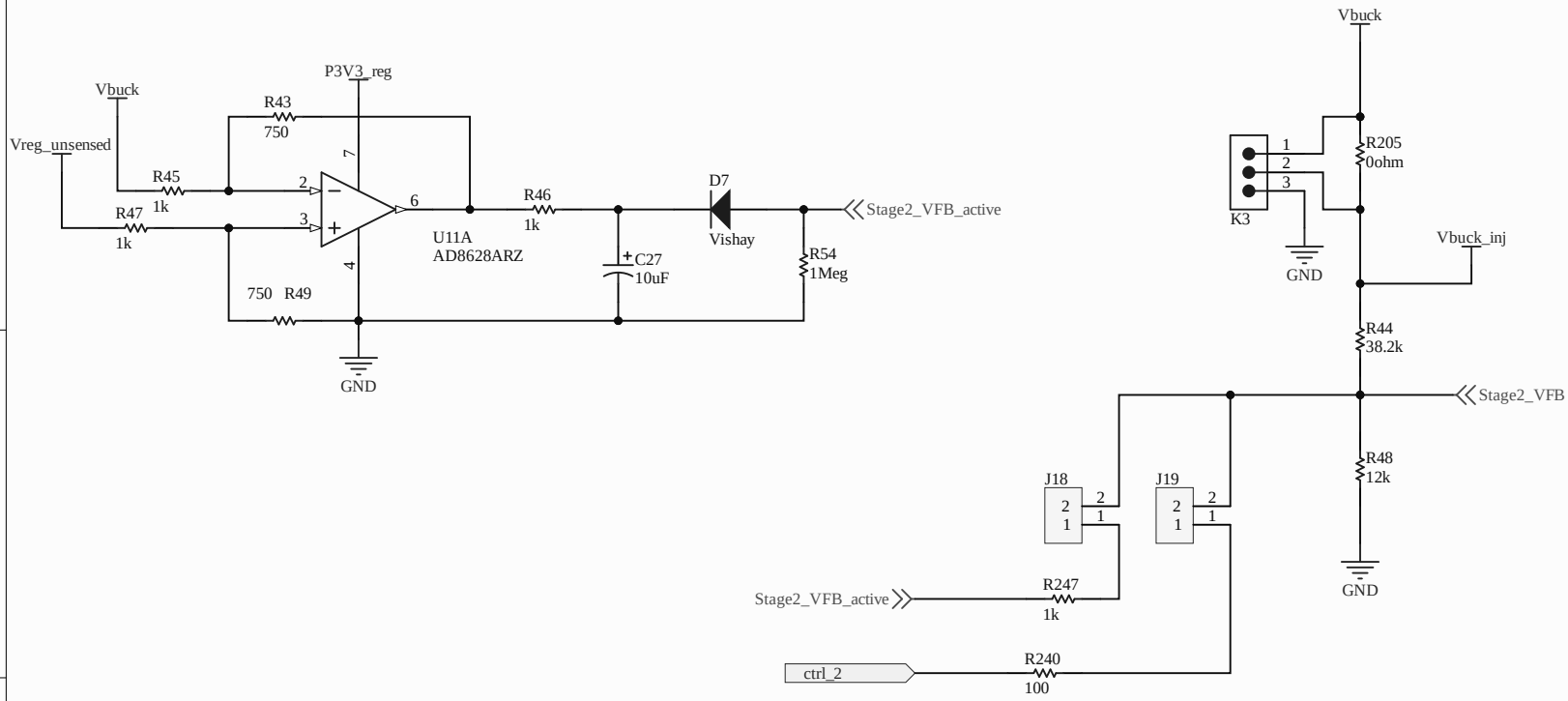
Stage2D_active_feedback



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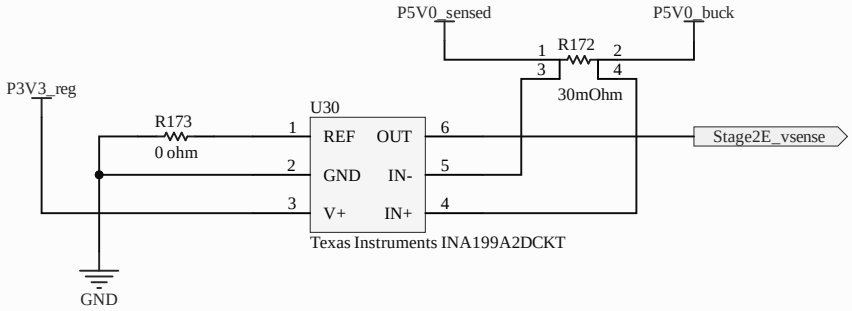
Stage2E_current_sense



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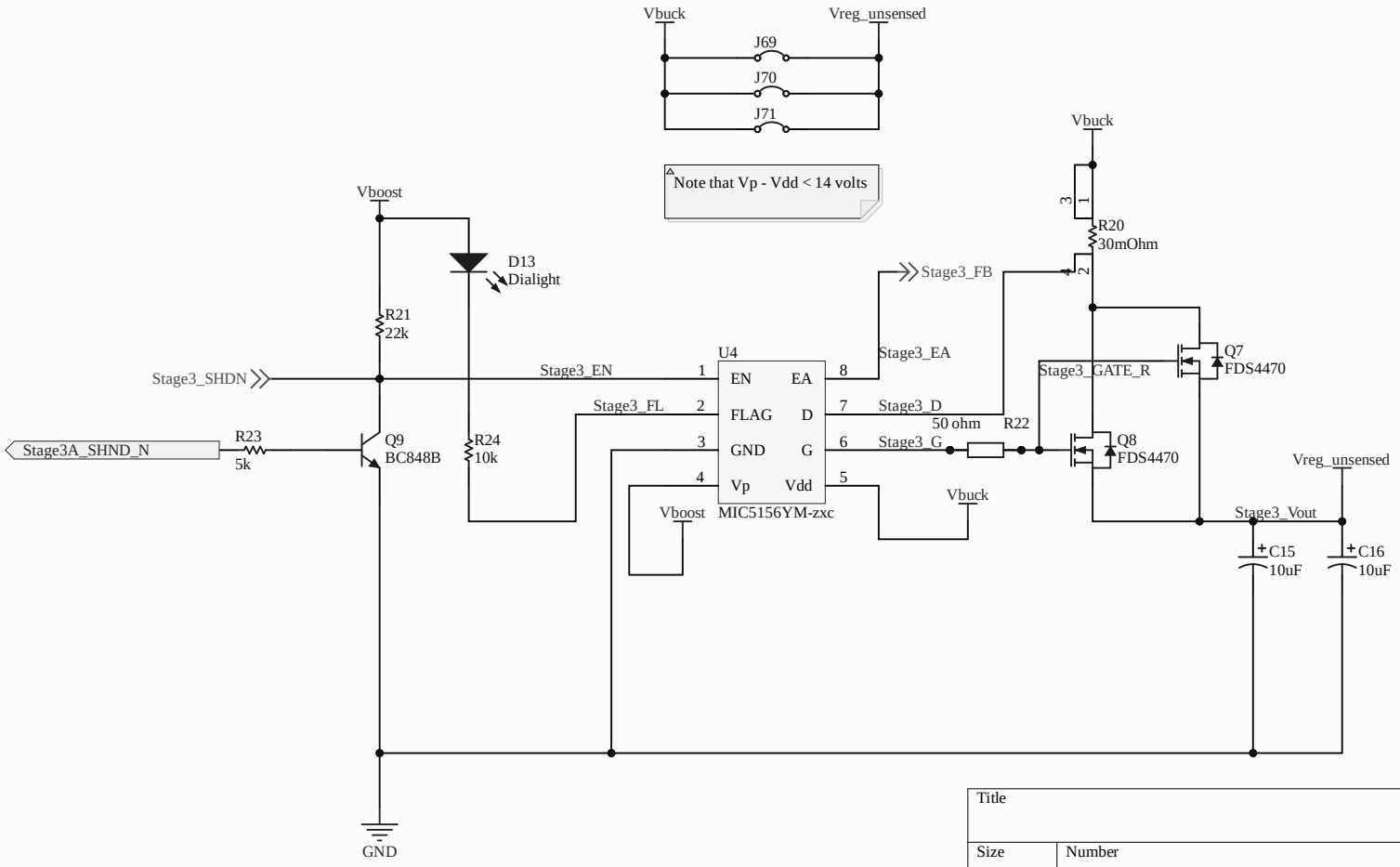
Stage3A_Reg_controller



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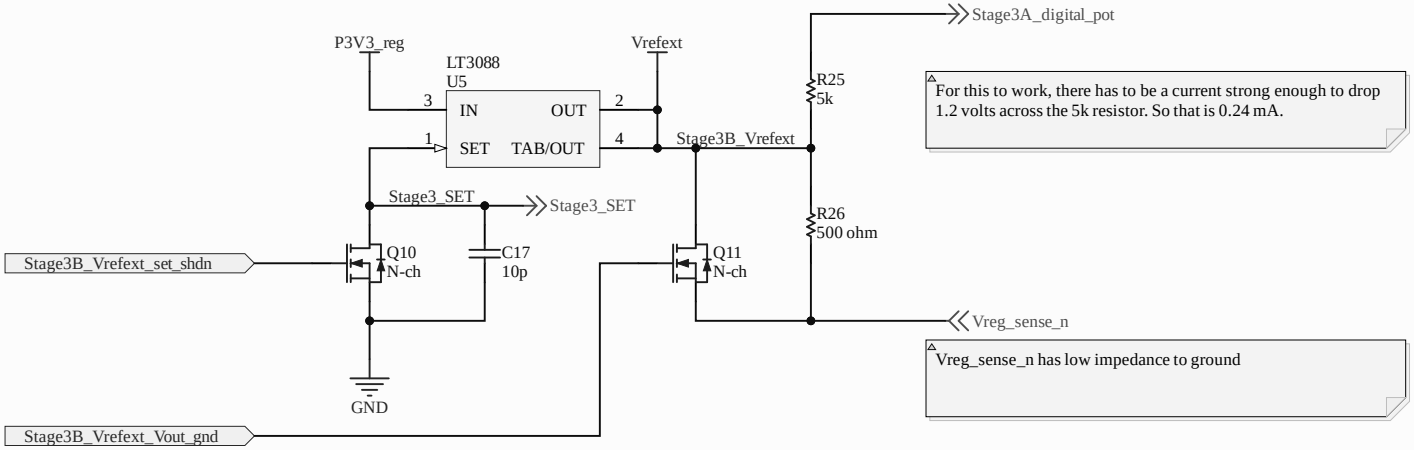
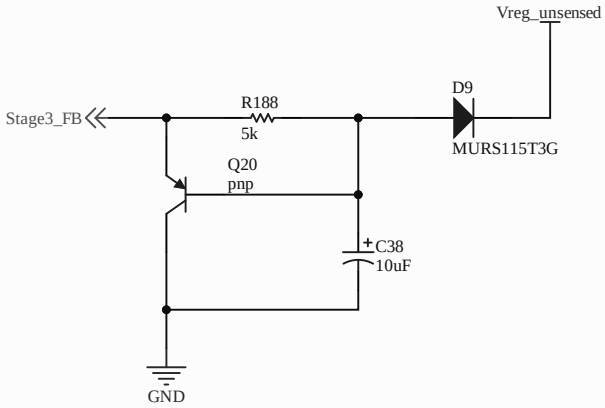
Stage3B_ref_voltage





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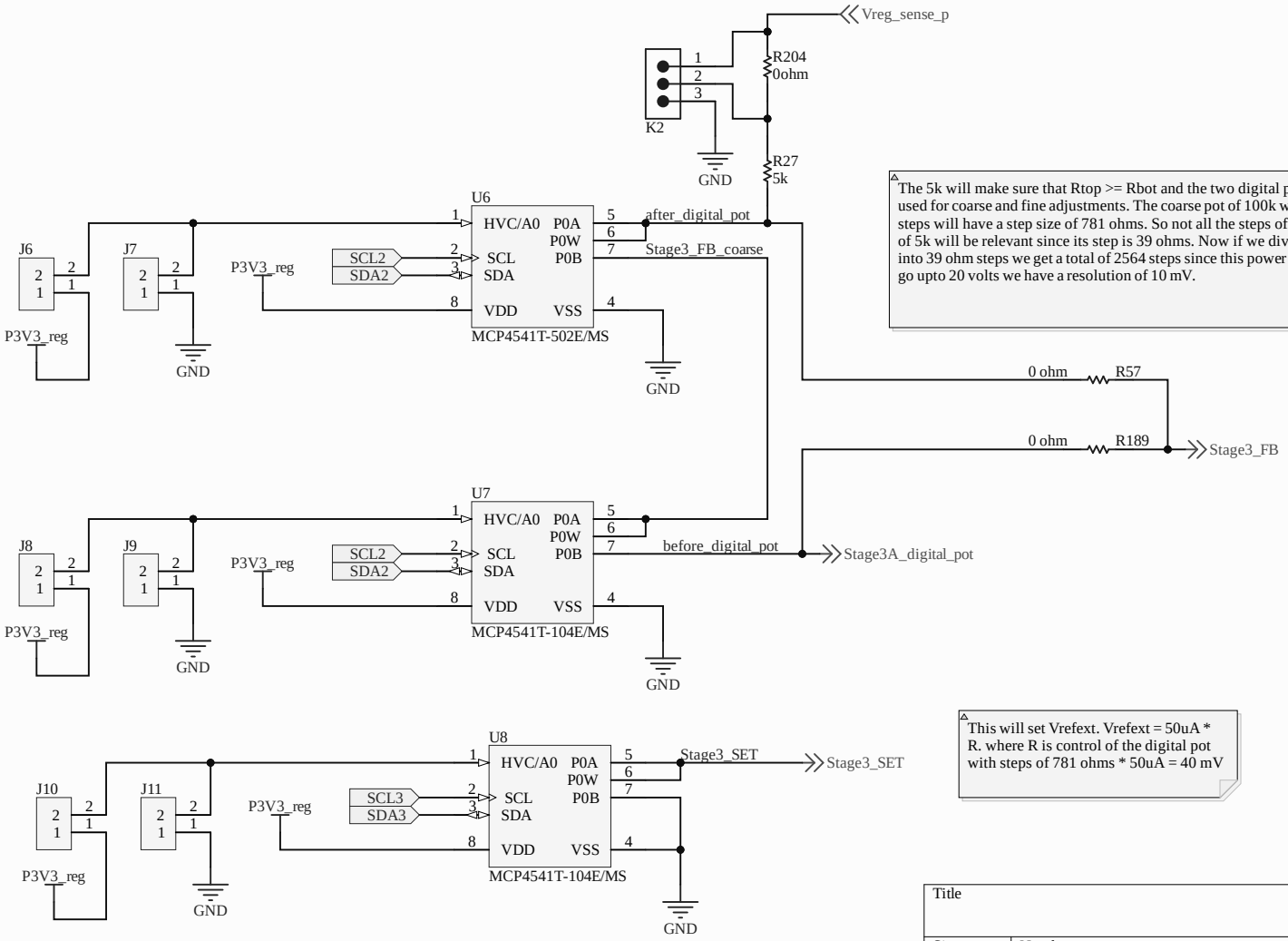
Stage3C_dig_pot



The 5k will make sure that Rtop >= Rbot 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. Vrefext = 50uA * R. where R is control of the digital pot with steps of 781 ohms * 50uA = 40 mV

Title		
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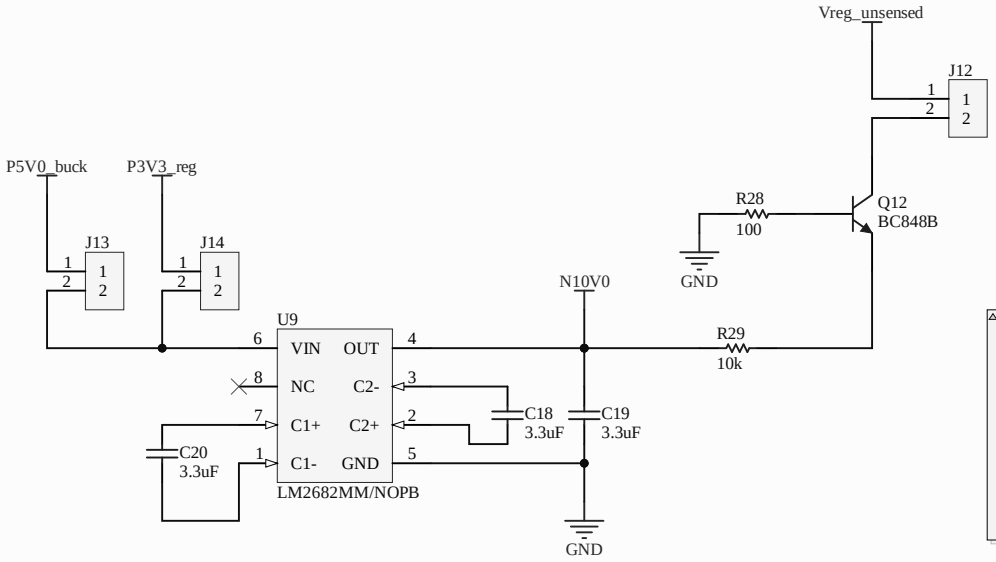
Stage3D_neg_voltage



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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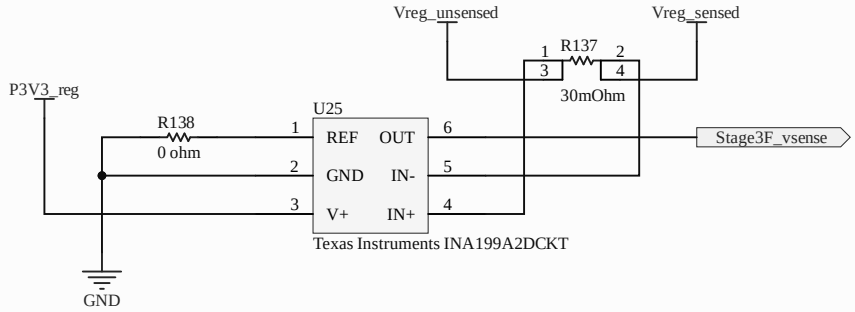
Stage3E_current_sense



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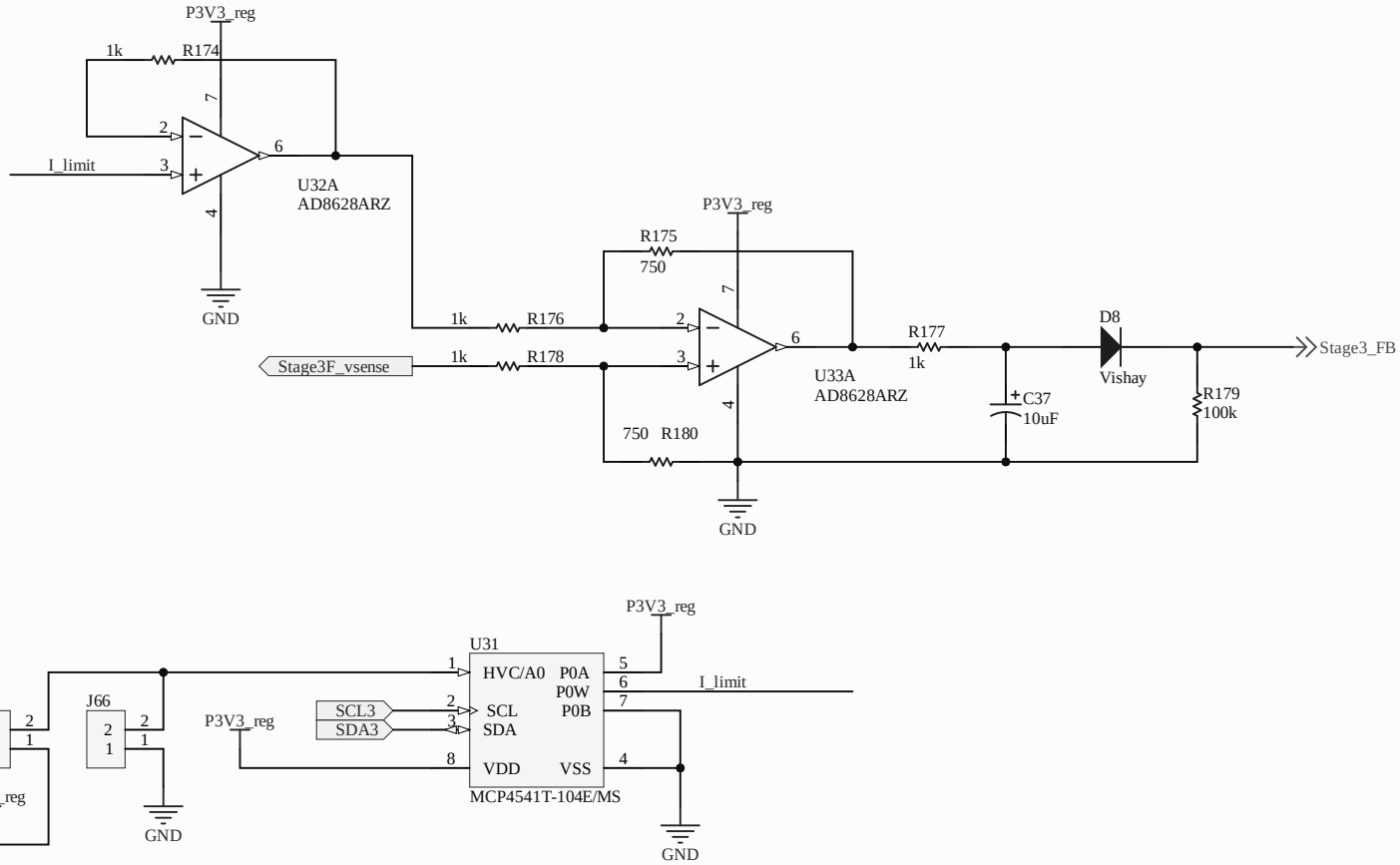
Stage3F_current_limit



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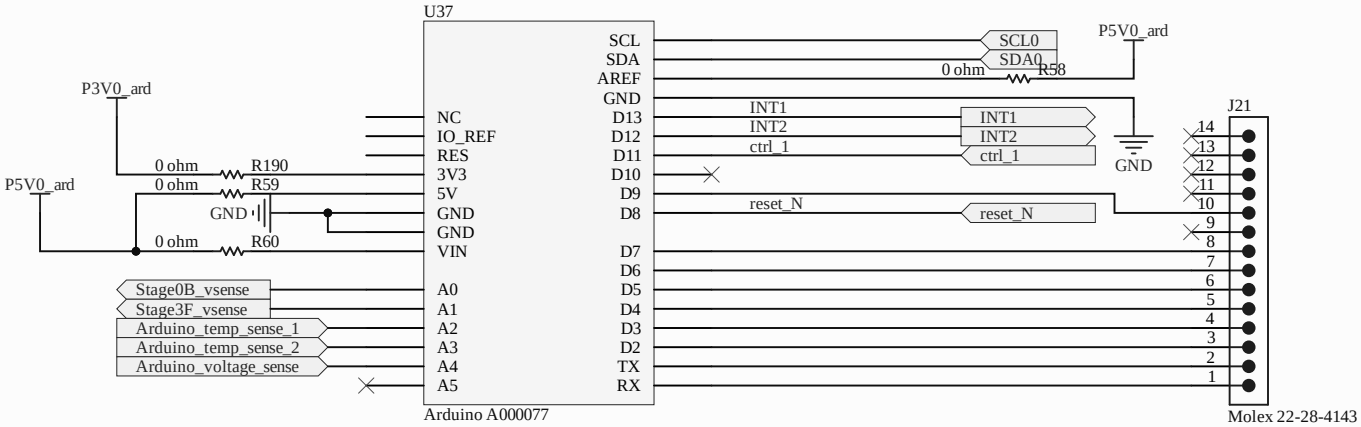
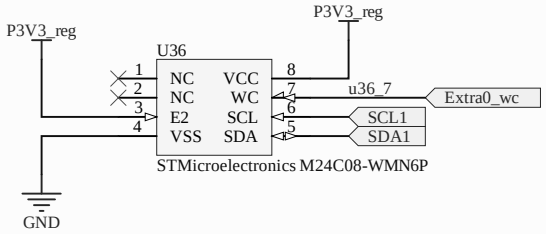
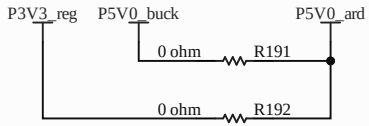
Extra0_arduino







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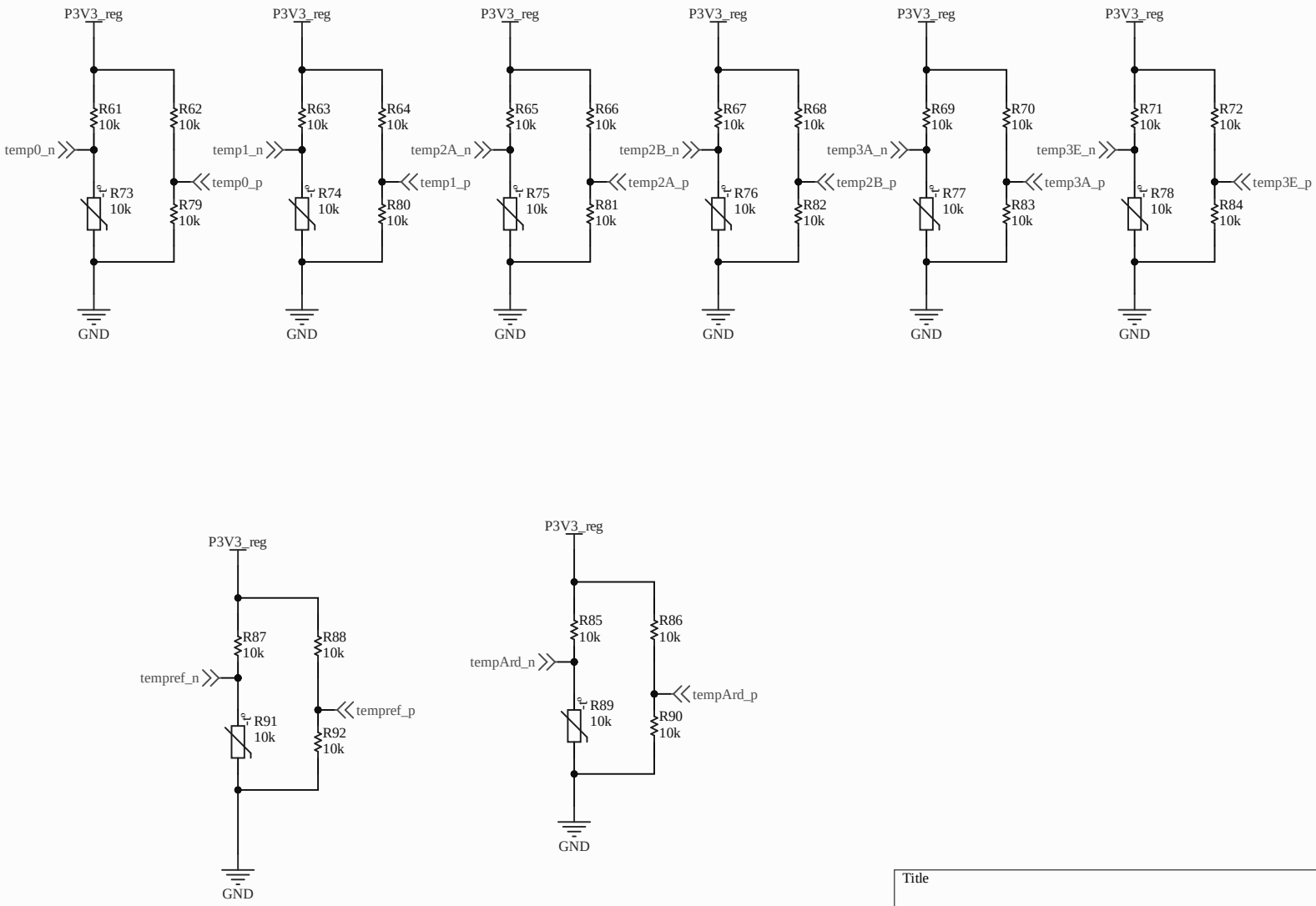
Extra1_temp_sensor



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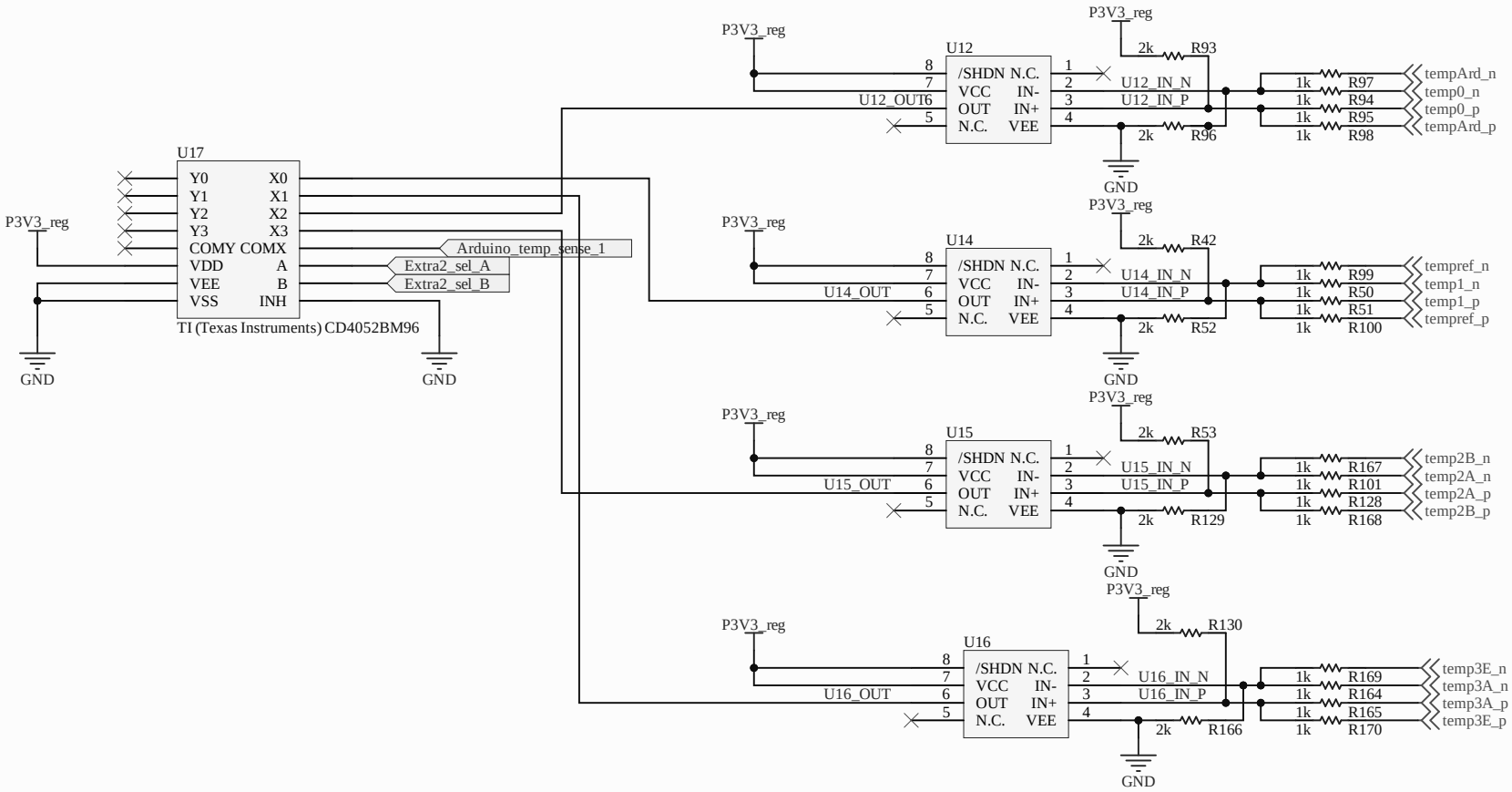
Extra2_temp_amp



One should select just one differential pair going to the op-amp.

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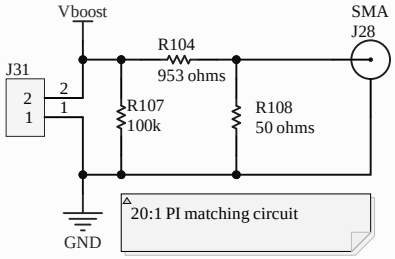
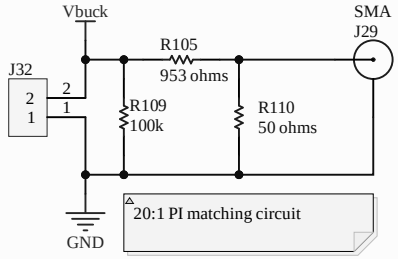
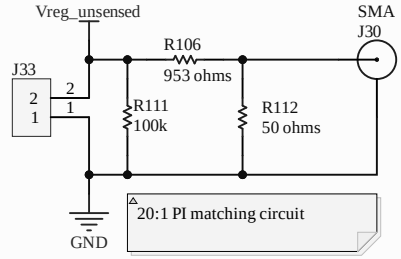
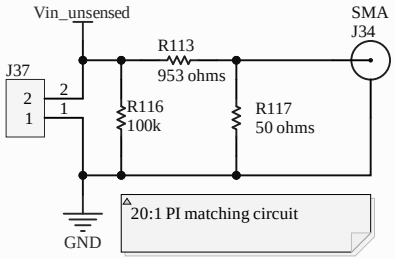
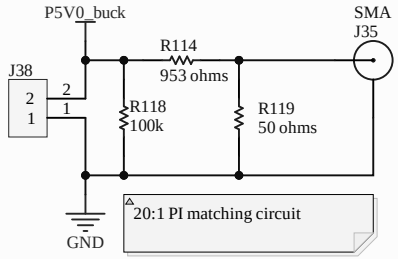
Extra3_test_points

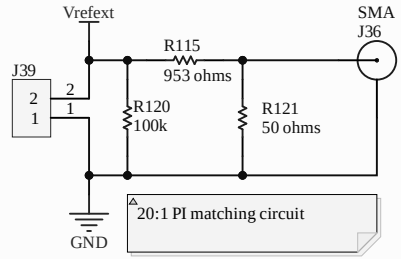


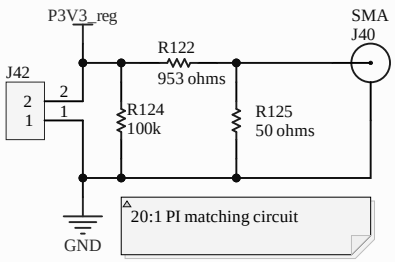


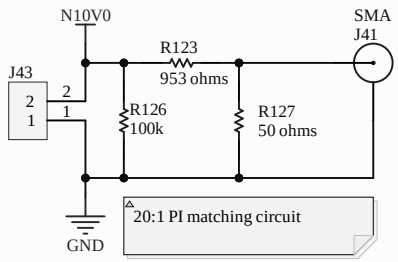












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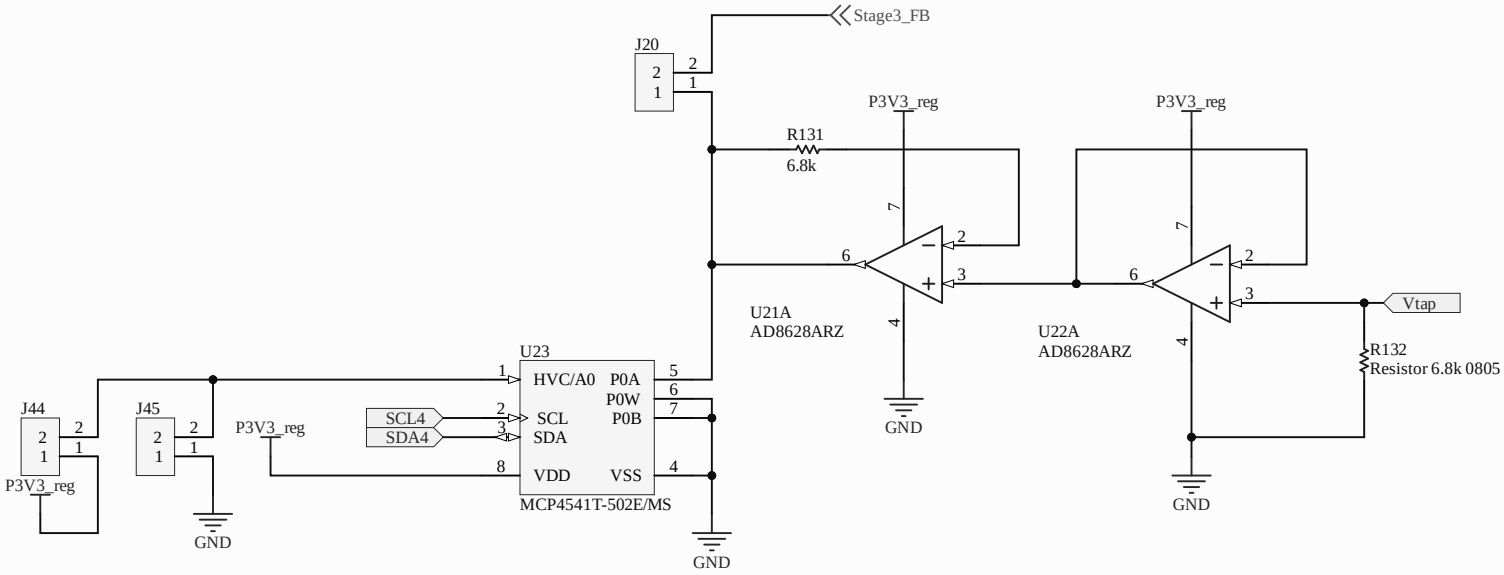
Extra4_trigger



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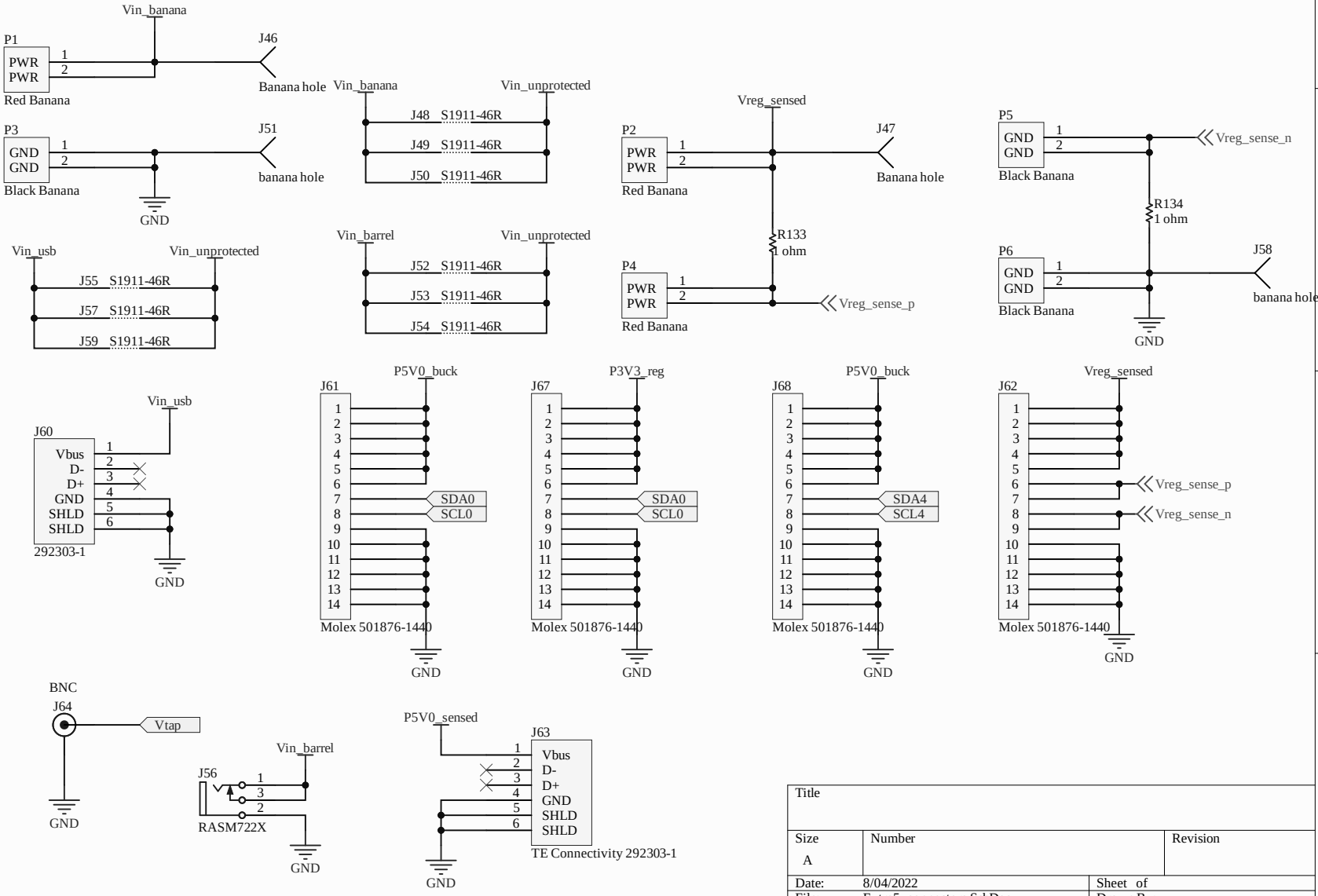
Extra5_connectors



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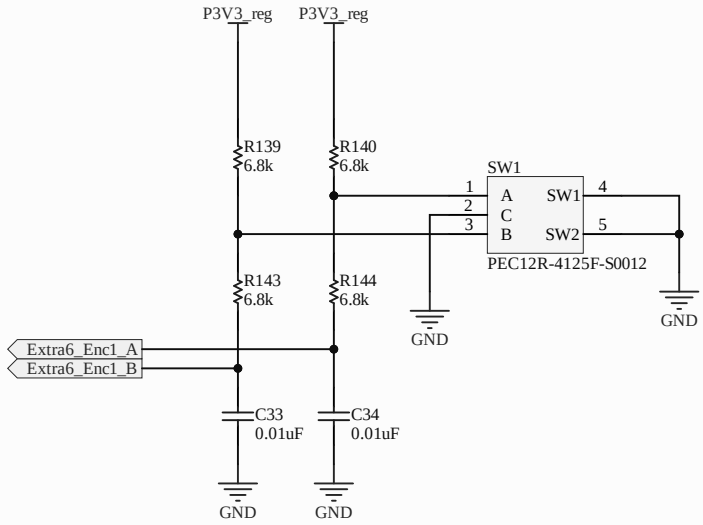
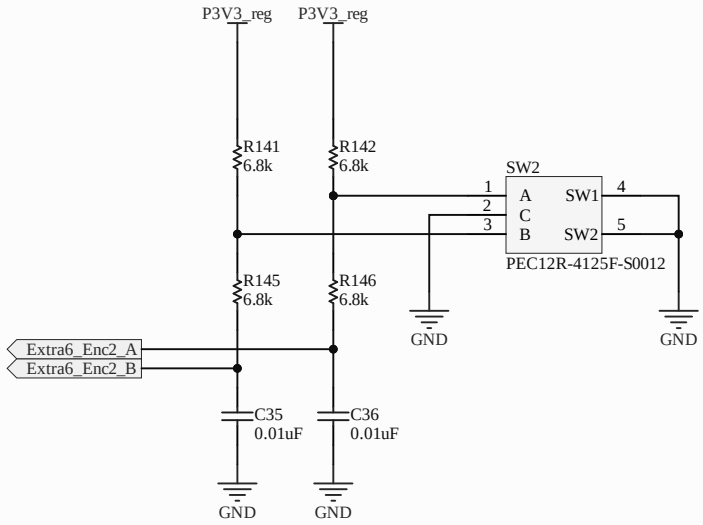
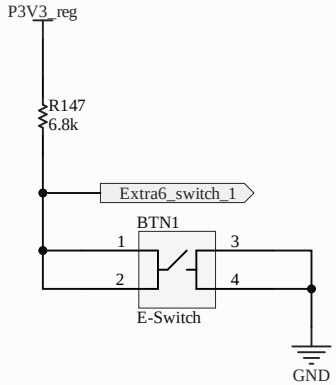
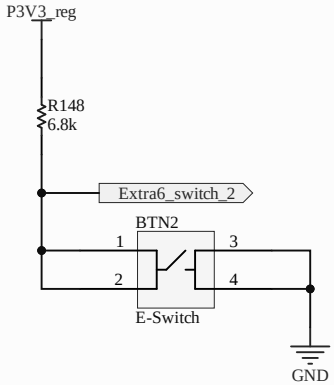
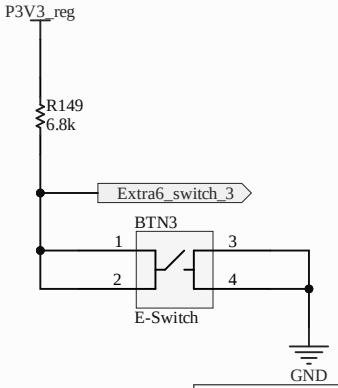
Extra6_UI

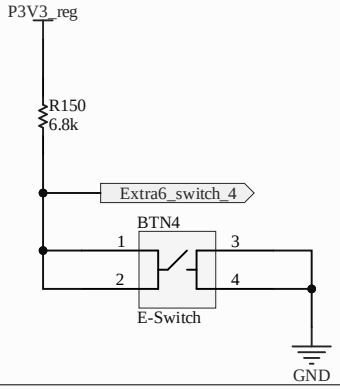












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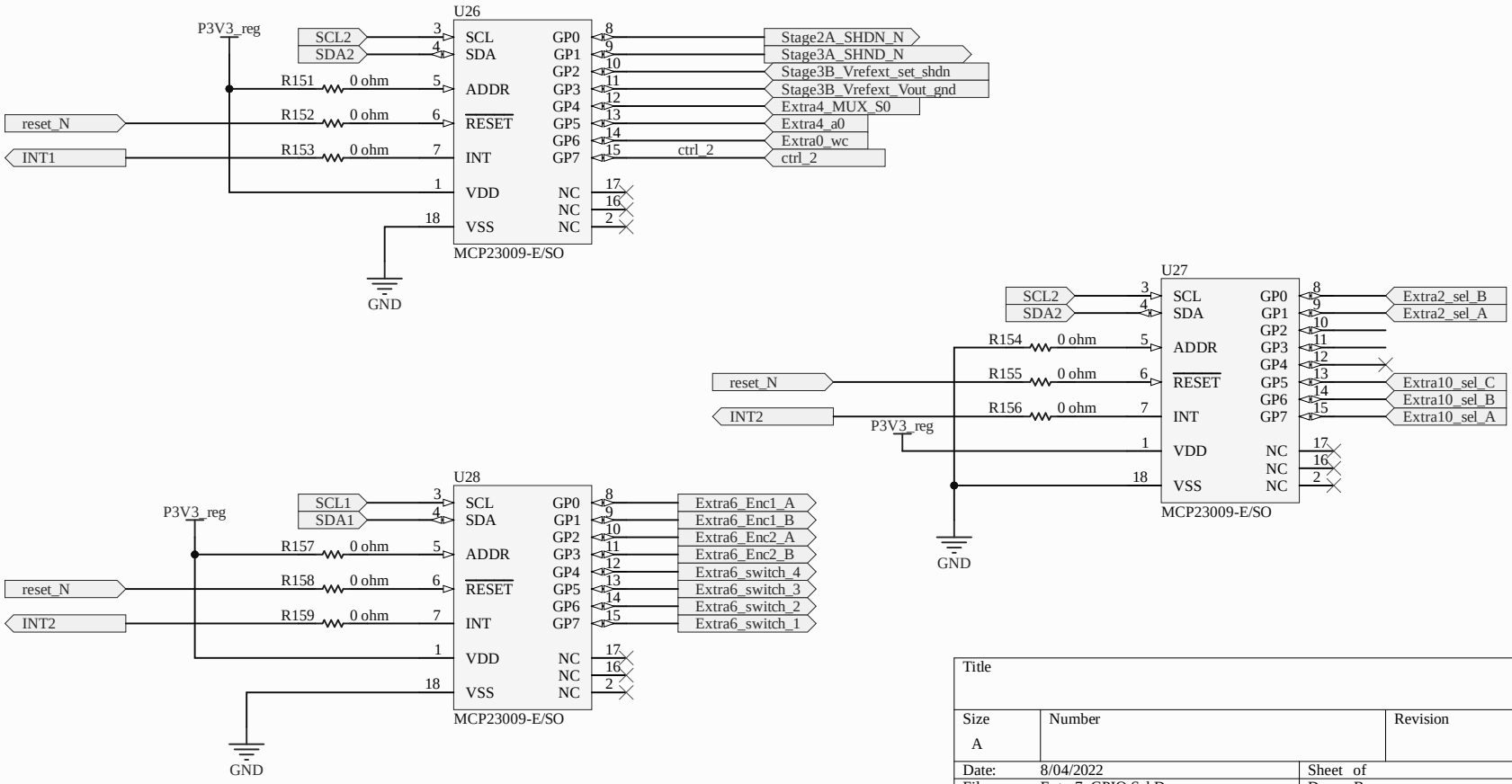
Extra7_GPIO



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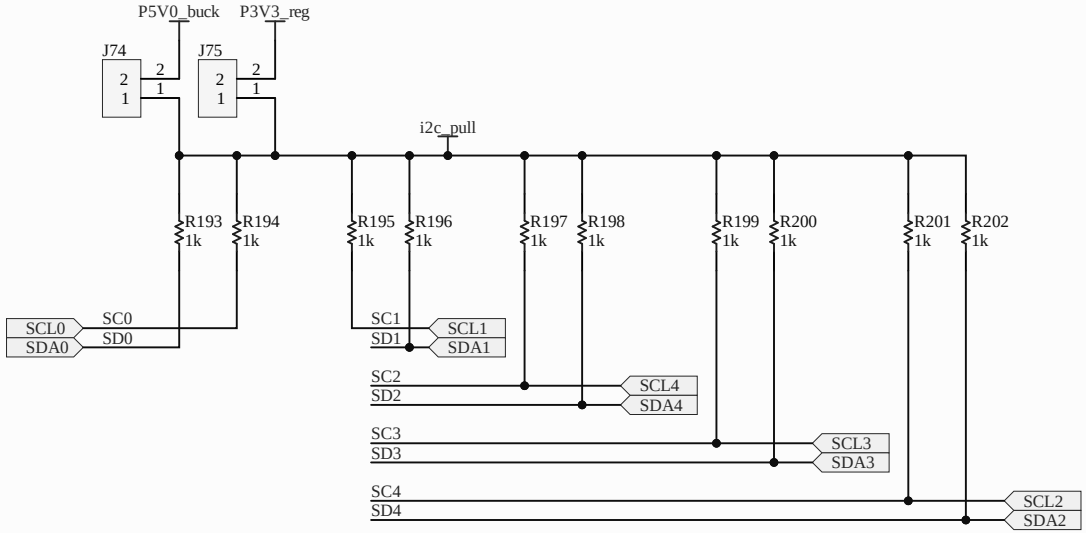
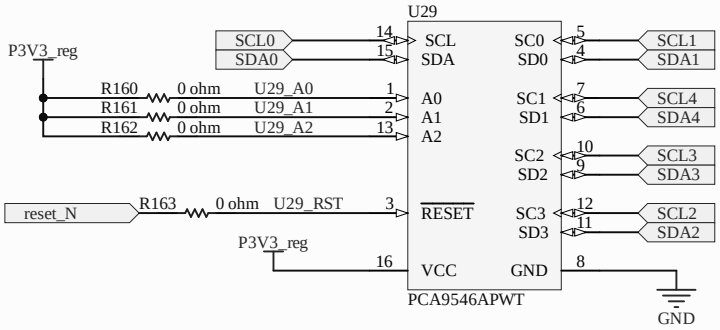
Extra8_i2c





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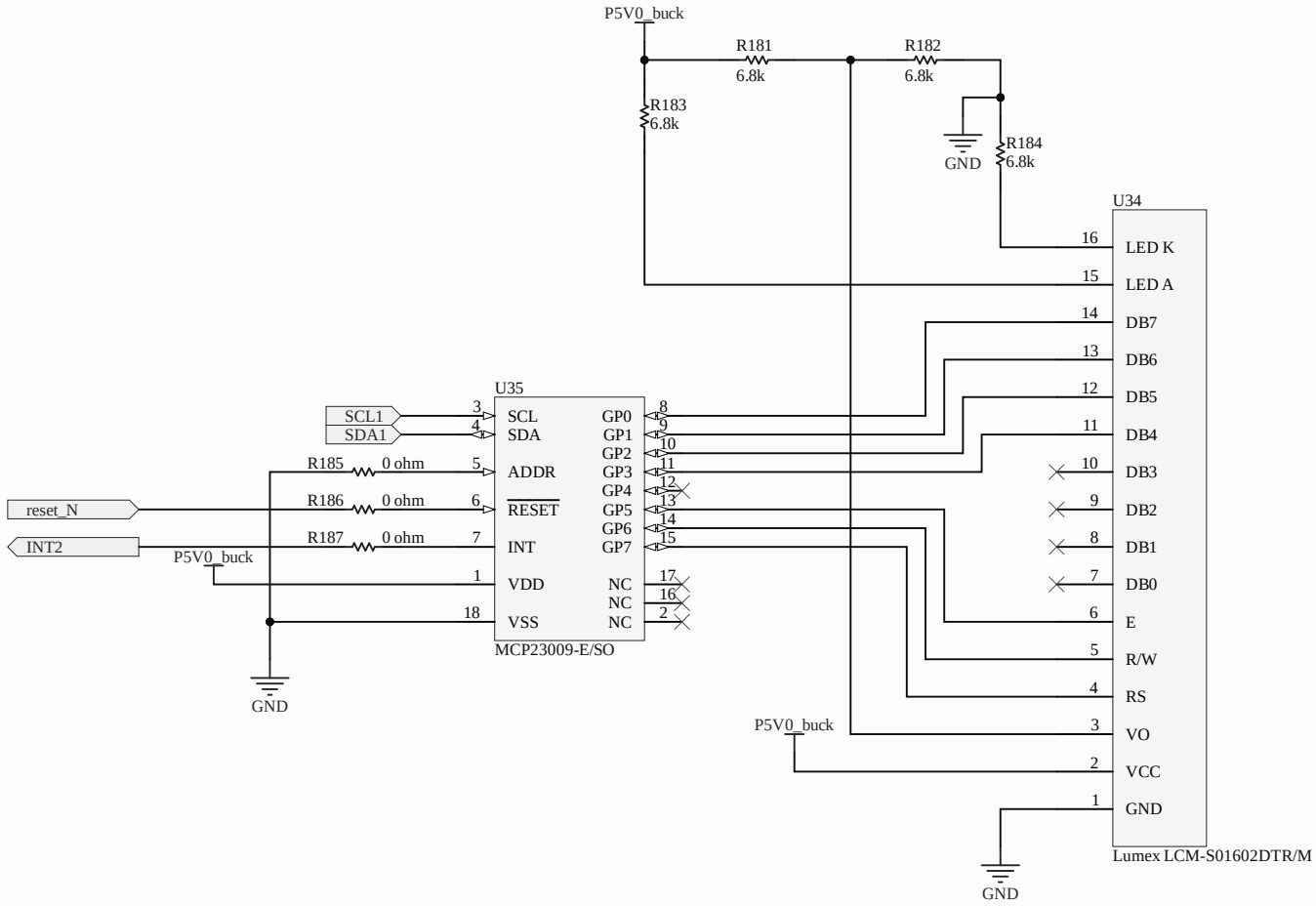
Extra9_LCD



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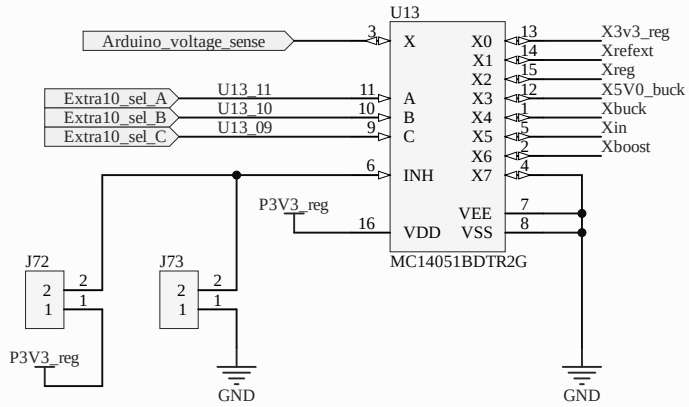
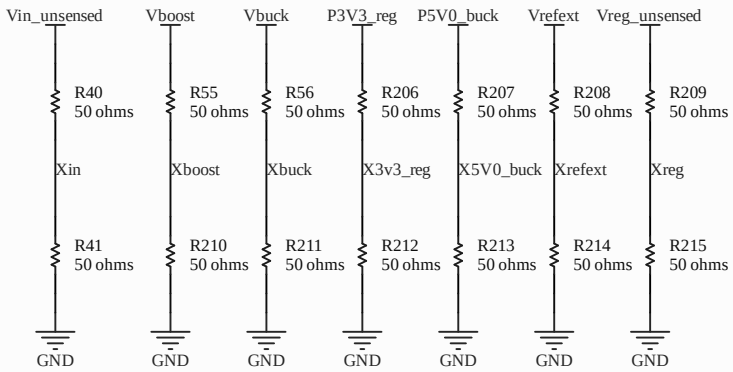
Extra10_voltage_monitor





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