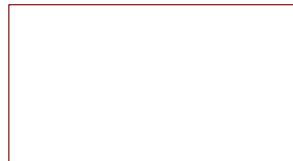


MCU



File: MCU.kicad_sch

Boost converter



File: BoostConverter.kicad_sch

Current Source And Monitoring



File: CurrentSourceAndMonitoring.kicad_sch

LEDS



File: leds.kicad_sch

I2C PROCESS bus addresses allocation

INA219 i2c address 1000000

Boost digipot i2c address 0101111

I2C AUX bus addresses allocation

LED PWM i2c address 1101000

OPT: OLED i2c address 011110X

H2 MountingHole H5 MountingHole

H4 MountingHole H6 MountingHole

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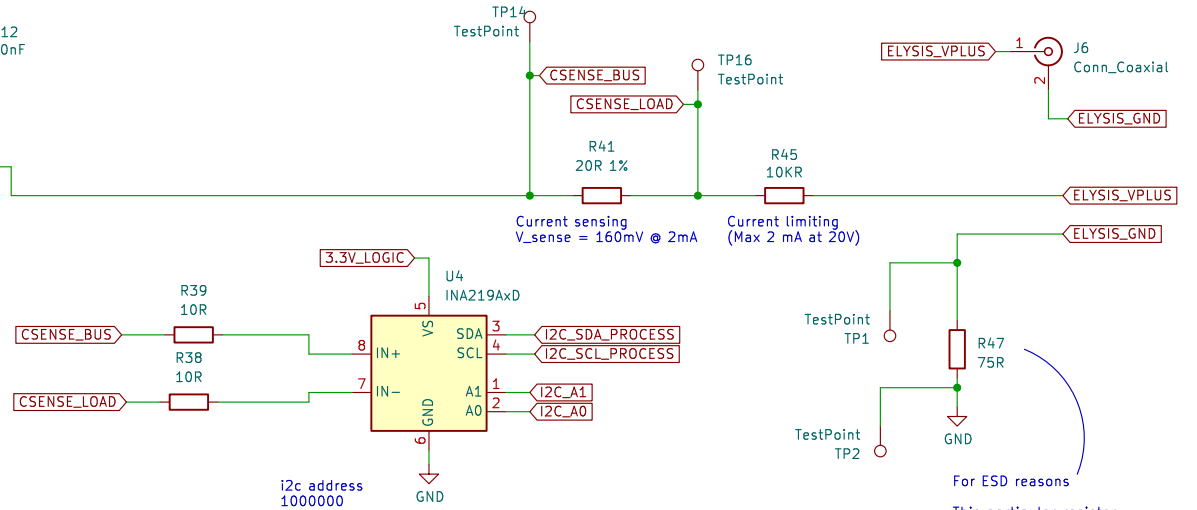
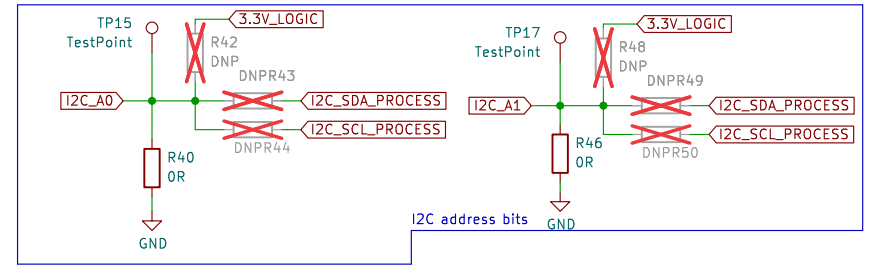
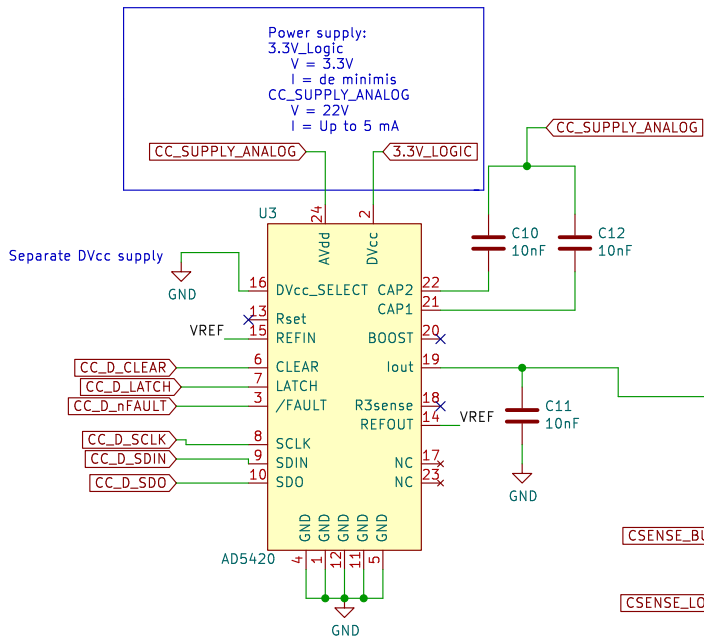
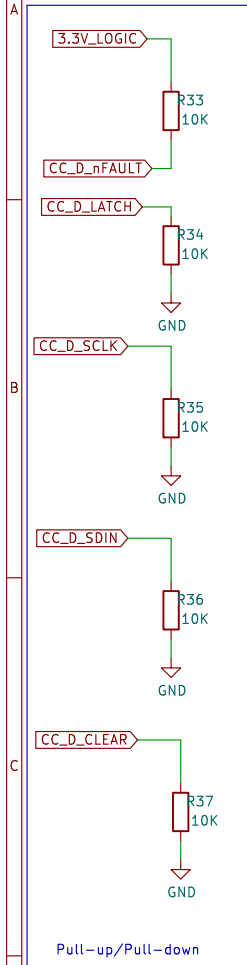
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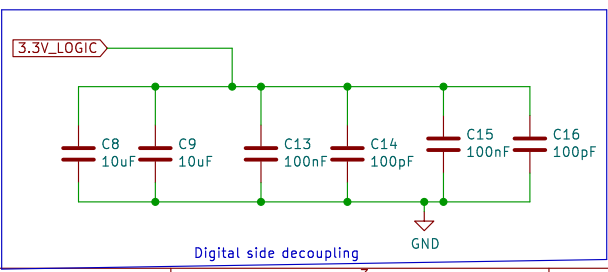
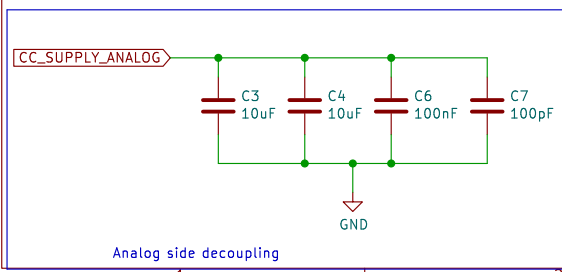
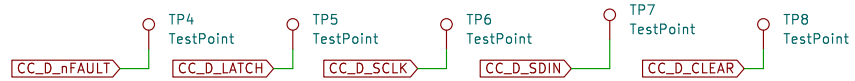
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Current Source and Monitoring

AD5420 Transfer function (0 to 20mA mode) $I_{out} = \left[\frac{20 \text{ mA}}{2^N} \right] \times D$
 Each codepoint is 0.000305 mA = 0.305 uA
 NB: Available in P&P @ JLC



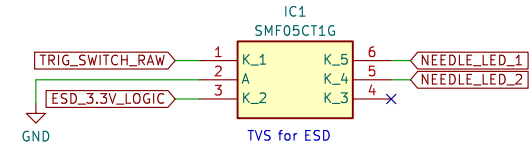
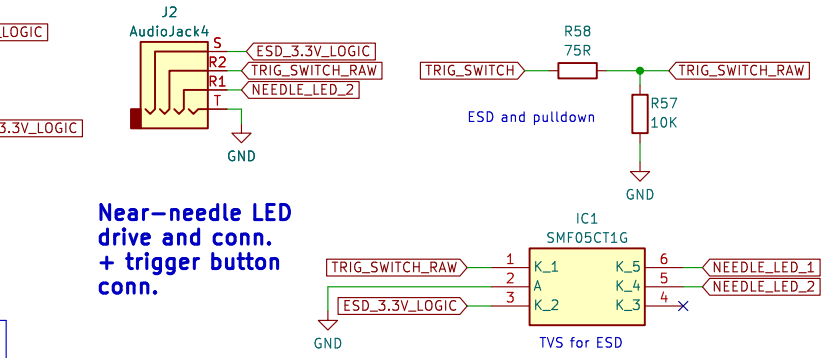
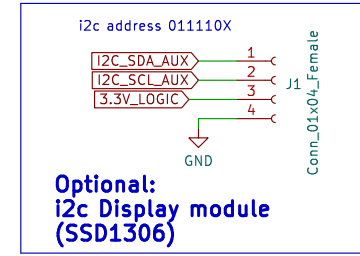
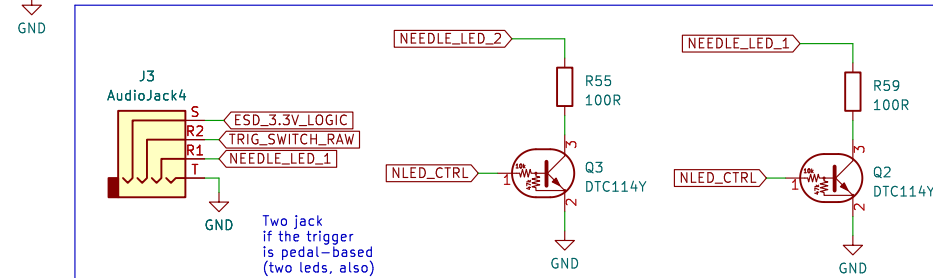
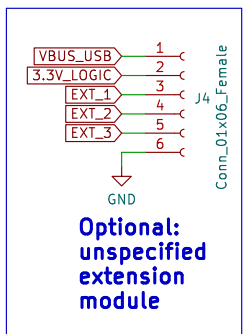
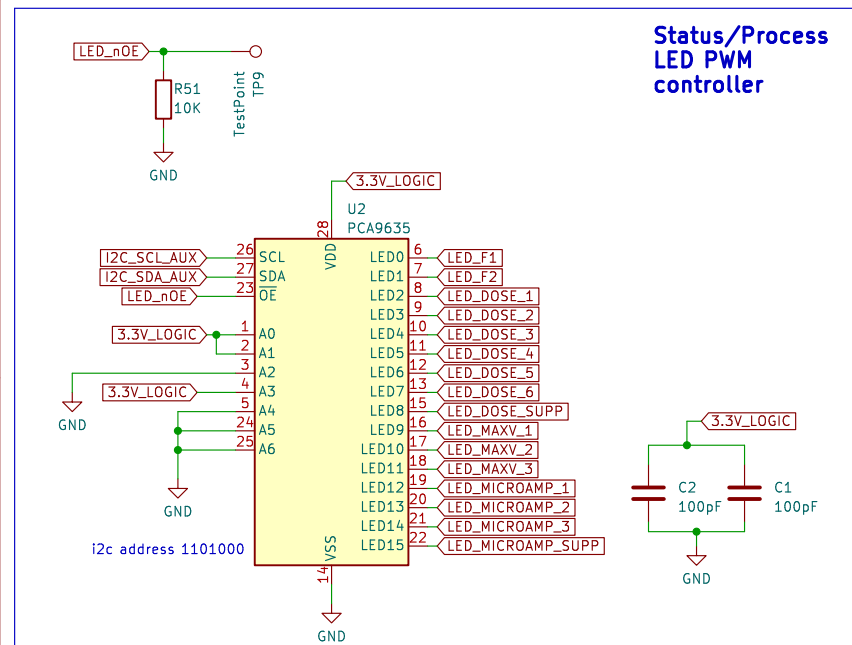
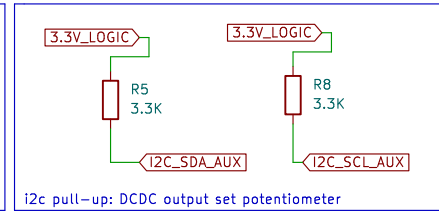
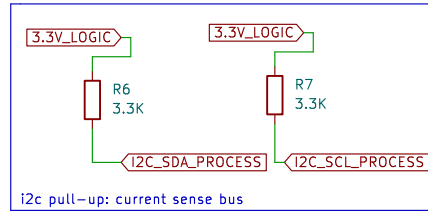
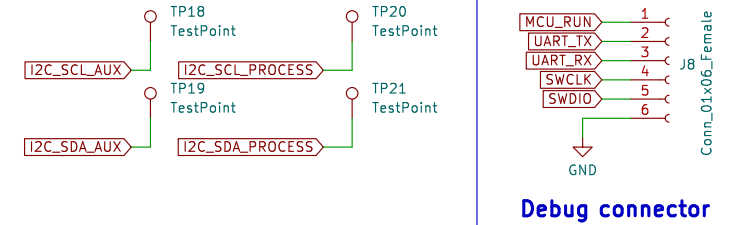
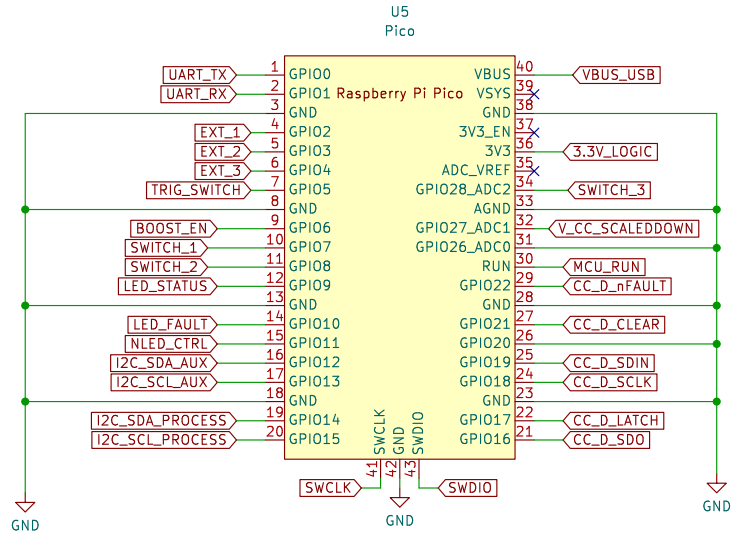
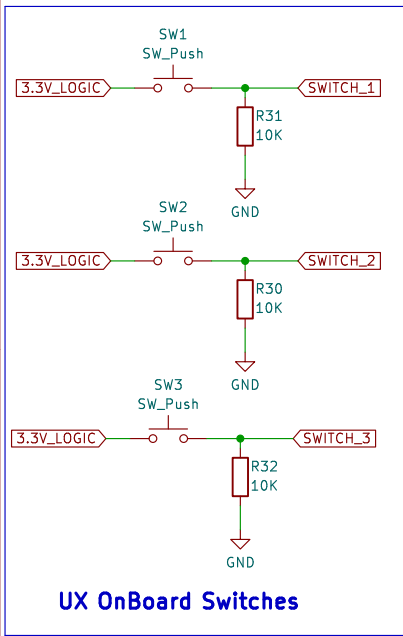
For ESD reasons
 This particular resistor:
 not sure if okay or bad idea
 AD5420: good intrinsic ESD prot
 Cant really use TVS,
 too much leakage?
 and also high breakdown needed?



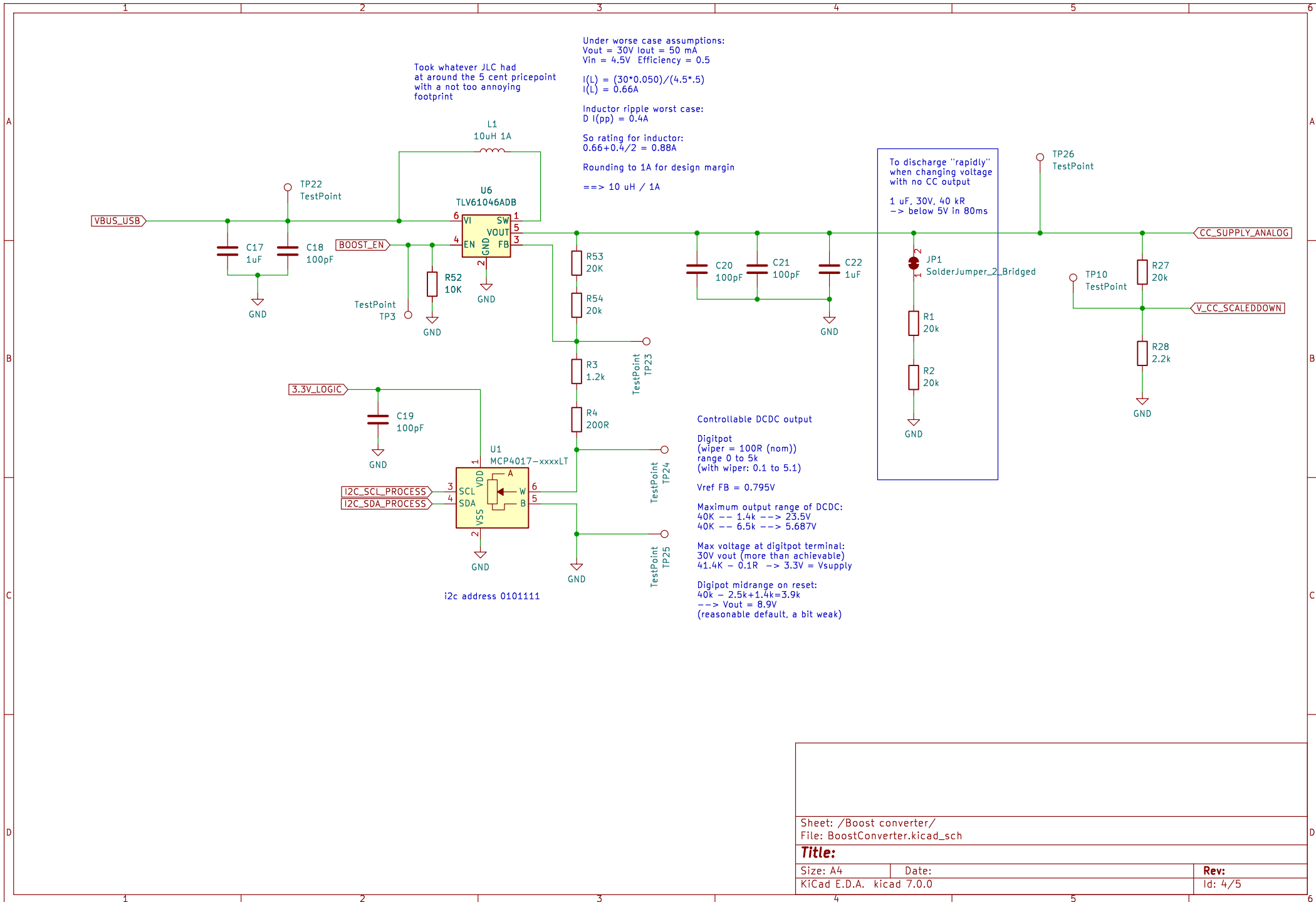
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Sheet: /MCU/		Date:	
File: MCU.kicad_sch		Rev:	
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Took whatever JLC had at around the 5 cent pricepoint with a not too annoying footprint

Under worse case assumptions:
 $V_{out} = 30V$ $I_{out} = 50\text{ mA}$
 $V_{in} = 4.5V$ Efficiency = 0,5

$$I(L) = (30 \cdot 0.050) / (4.5 \cdot 5)$$

$$I(L) = 0.66A$$

Inductor ripple worst case:
 $\Delta I(pp) = 0,4A$

So rating for inductor:
 $0.66 + 0.4 / 2 = 0.88A$

Rounding to 1A for design margin
 $\Rightarrow 10\text{ uH} / 1A$

To discharge "rapidly" when changing voltage with no CC output
 $1\text{ uF}, 30V, 40\text{ kR}$
 \rightarrow below 5V in 80ms

Controllable DCDC output

Digitpot (wiper = 100R (nom))
 range 0 to 5k (with wiper: 0.1 to 5.1)

$V_{ref\ FB} = 0.795V$

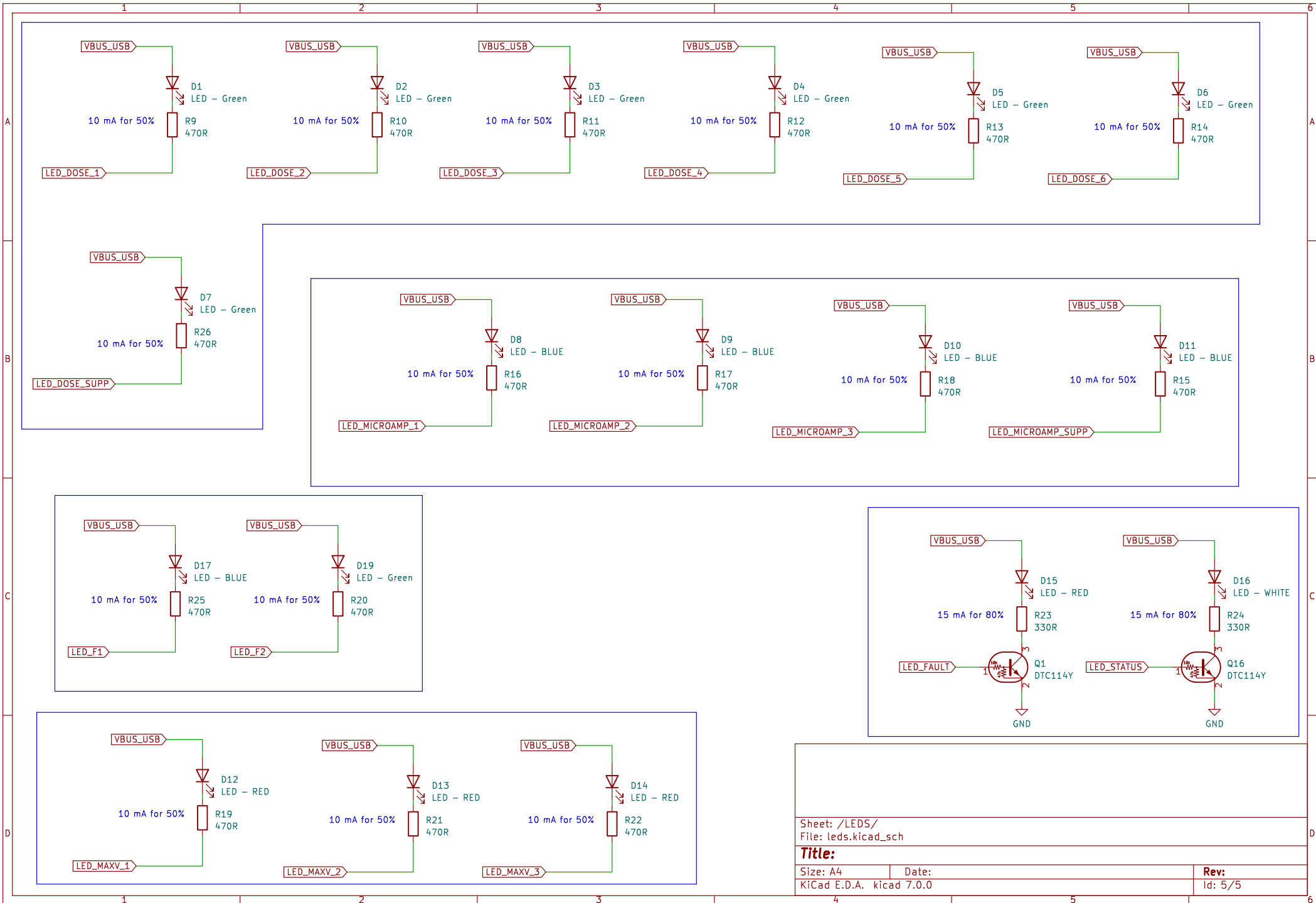
Maximum output range of DCDC:
 $40k \rightarrow 1.4k \rightarrow 23.5V$
 $40k \rightarrow 6.5k \rightarrow 5.687V$

Max voltage at digitpot terminal:
 $30V\ v_{out}$ (more than achievable)
 $41.4k - 0.1R \rightarrow 3.3V = V_{supply}$

Digitpot midrange on reset:
 $40k - 2.5k + 1.4k = 3.9k$
 $\rightarrow V_{out} = 8.9V$
 (reasonable default, a bit weak)

i2c address 0101111

Sheet: /Boost converter/ File: BoostConverter.kicad_sch		
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KiCad E.D.A. kicad 7.0.0		Id: 4/5



Sheet: /LEDS/
File: leds.kicad_sch

Title:

Size: A4	Date:
KiCad E.D.A. kicad 7.0.0	Rev: Id: 5/5