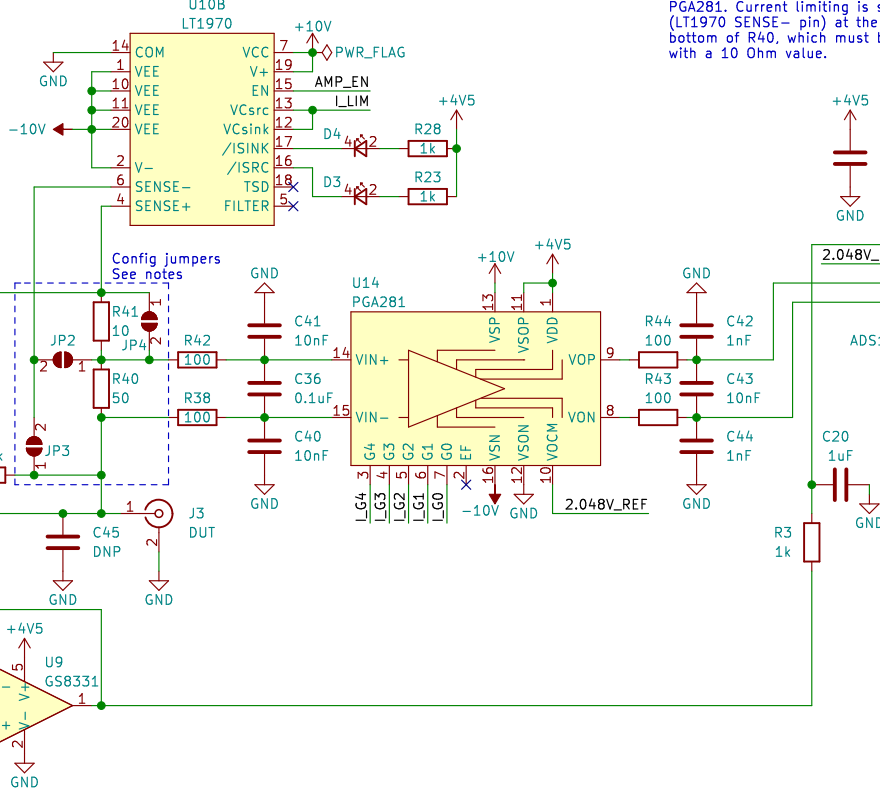
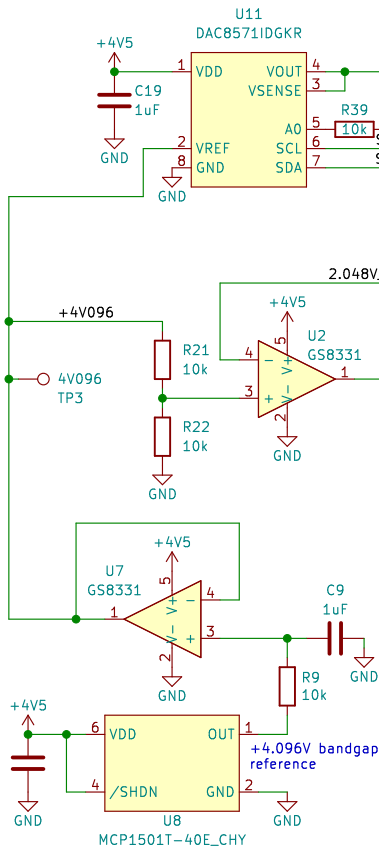


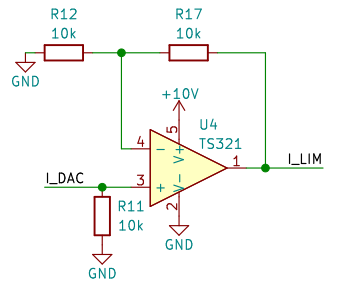
Unipolar DAC output is fed to a power op-amp & shifted to bipolar to drive DUT. Voltage drop through a shunt resistor is measured with a chopper-stabilised instrumentation amplifier to sense current.



Config A:  
R41 is shorted out. Current is only measured through R40 by the PGA281. Current limiting is sensed (LT1970 SENSE- pin) at the top and bottom of R40, which must be replaced with a 10 Ohm value.

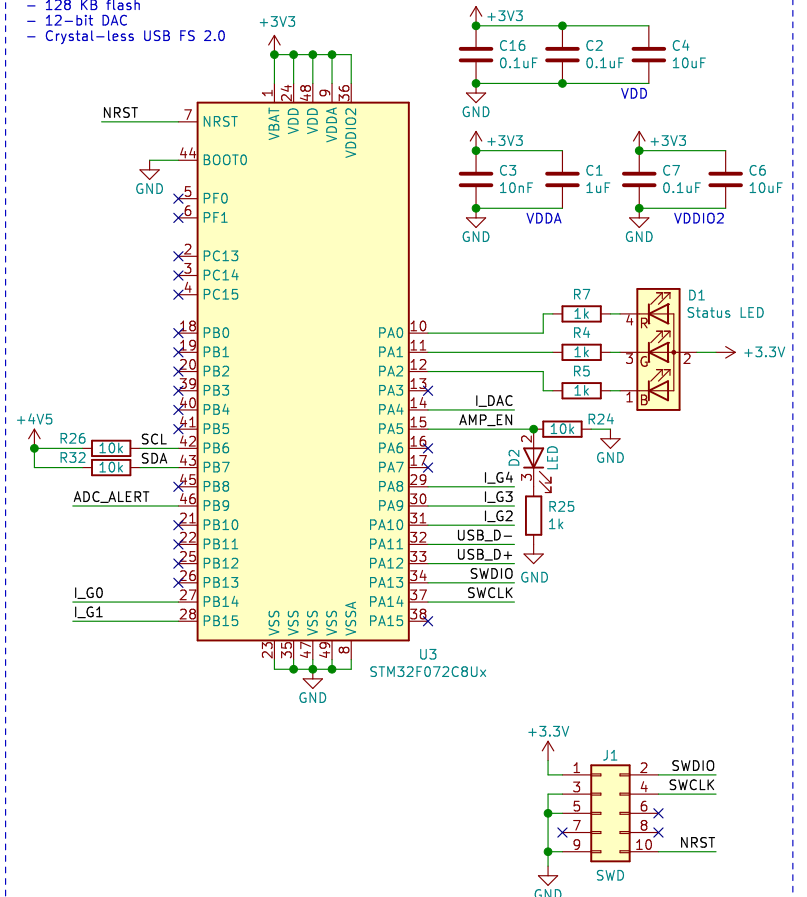
**Config B:**  
Current limiting is sensed over the 10 Ohm R41 shunt whilst the PGA281 senses over the 50 Ohm R40. This allows a 40mA current limit with a 5x increase in current resolution compared to config A. The disadvantage is that the power amplifier must supply higher voltages to overcome the drop across the higher value R40 resistor

	Configuration	
	A	B
JP1	Short	Open
JP2	Open	Short
JP3	Short	Open
R41	Removed	10 Ohm
R40	10 Ohm	50 Ohm



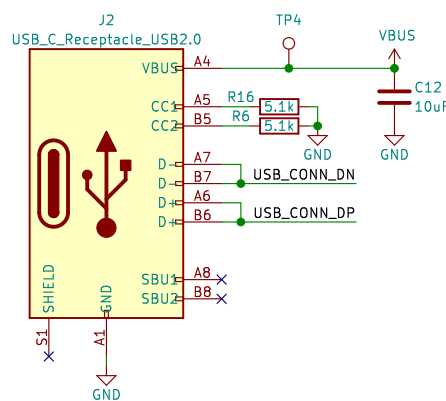
STM32F072CBU6

- 48 MHz Cortex M0 core
- 16 KB SRAM
- 128 KB flash
- 12-bit DAC
- Crystal-less USB FS 2.0



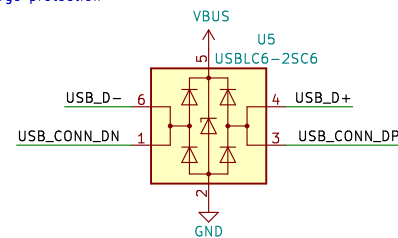
USB-C connector configured  
as a USB 2.0 device

USB-C connector configured  
as a USB 2.0 device



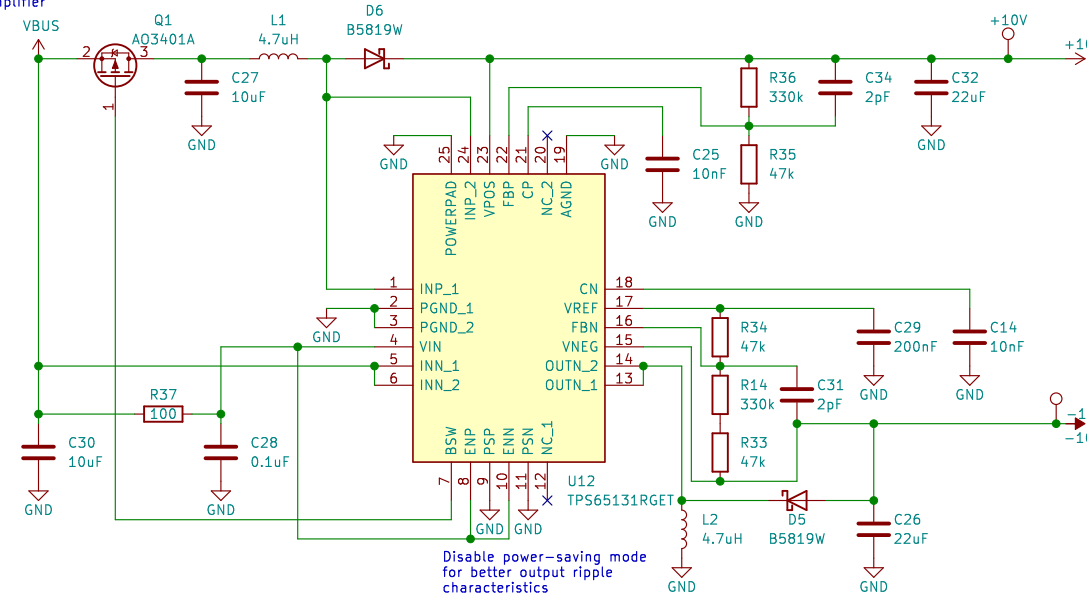
Electrostatic discharge protection  
for USB data lines

Electrostatic discharge protection  
for USB data lines



Take a USB input voltage and split it to +9.7 V and -9.7 V for the output amplifier

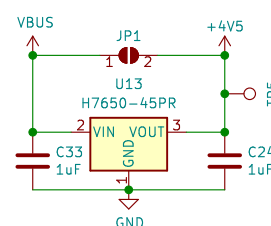
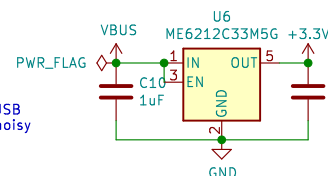
Take a USB input voltage and split it to +9.7 V and -9.7 V for the output amplifier



+3.3V for microcontroller

+3.3V for microcontroller

+4.5V for ADC & DAC.  
Can be bypassed to run  
converters directly from USB  
5V, but may suffer from noisy  
power supplies



MountingHole H4  
MountingHole H3  
MountingHole H2  
MountingHole H1  
GND

**Joel Troughton**

Sheet: /  
File: uSMU\_10.kicad\_sch

Title: uSMU v1.0

Size: A3	Date: 2021-05-22
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Sheet No	Date: 2021
KiCad E.D.A.	eeschema (6.0.0)

Rev: 1/1