

# Schematic Revision History

V2.0 July 2022. Contributed by Dennis Yaskevich, Michael Anderson and Jose Yesta Lozano


V2.1 August 2023 Contributed by Dennis Yaskevich and Michael Anderson

## V2.1 Changes

- 1. Replace TXB0106PWR with TXS0102DQMR that supports open drain for i2c usage.  
Mux ABCD lines converted to discrete level translation ala previous version mux enable pin.
- 2. Changed R18 resistor to be between TP14 and junction between pin 8 on AD8137 and R17
- 3. Eliminated PD pin on arduino pin A7 as its not needed. Pin is designed to float on AD8137 in on state (verify float feature)
- 4. Moved d\_pin from aref to A7 on arduino due to issues in using aref as a GPIO pin
- 5. Added 0.1uF bypass capacitors on bilevel translator per data sheet
- 6. Changed L4 inductance from 10uH to 22uH (BOM updated)
- 7. Connected CS from TP5100 to A0 on MCU. Pulled up with 10k to 3V3. (BOM updated)
- 8. Added in MRA4003T3G diode to pwr in for MCU to prevent MCU from powering board when only connected to computer
- 9. Eliminated Standby pin connection to MCU from the TP5100 IC
- 10. Adding in external I2C interfaced DAC IC (MCP4725A0T-E/CH). Tied A0 pin to Vss (GND) pin.
- 11. Added in separate LDO voltage regulator (AP2204K-ADJTRG1) to only pwr negative rail charge pump.
- 12. Added pullup resistor (10k Ohms) to enable pin for charge pump IC (LM27761DSGR).
- 13. Added 220Ohm load to -5 rail line for LM27761DSG IC (charge pump U3)
- 14. Added in 1M Ohm pull down resistors for V1 and V2 inputs for U2 op amp.
- 15. 5V LDO replaced with MIC5209 with enable pin feature
- 16. U30 OpAmp is replaced with an alternative with single circuit. 1.65V rail is not used anymore
- 17. Block diagram updated to reflect architectural changes

## NOTES

All resistors are 1% tolerance unless otherwise noted

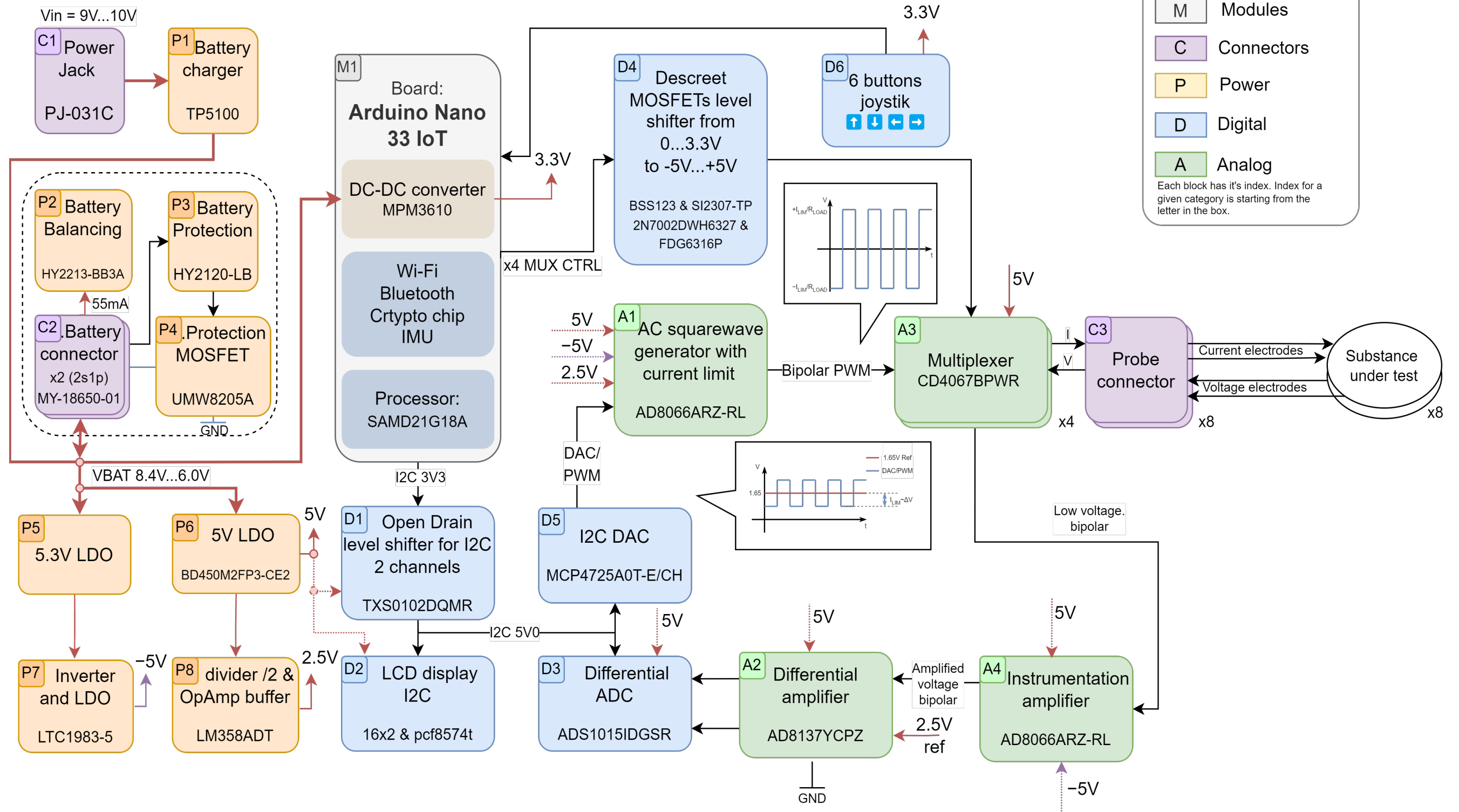
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Date: 2023-08-23 Drawn By: MD Anderson		

# Flexi-TEER block diagramm Rev.0.6

## Legend

- M Modules
- C Connectors
- P Power
- D Digital
- A Analog

Each block has its index. Index for a given category is starting from the letter in the box.



**FLexi TEER**

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Block Diagram

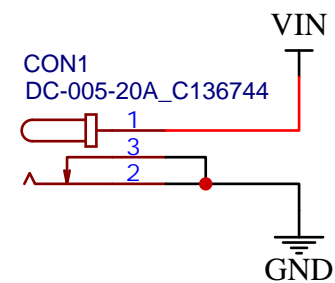
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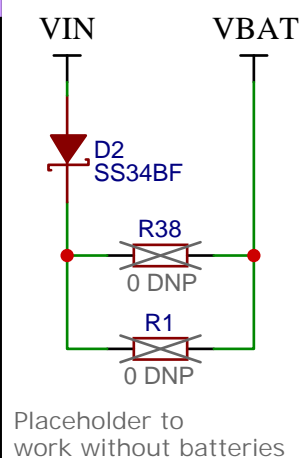
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# Power jack

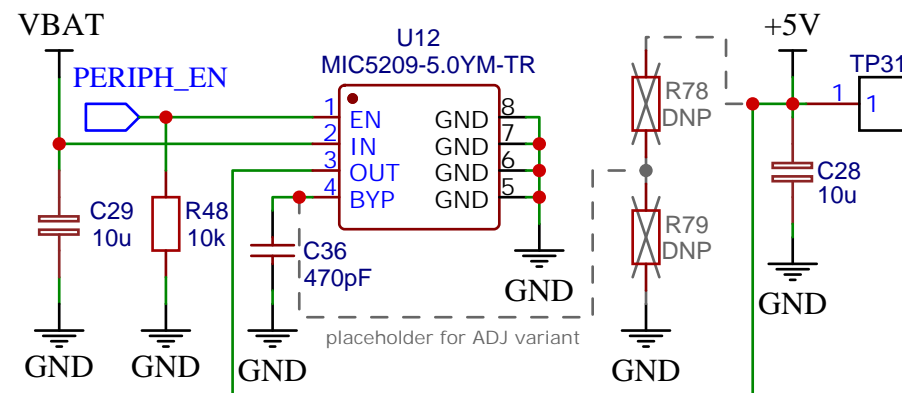


5.5x2.1mm Jack  
Input Voltage 9V...12V  
9V >10W PSU is recommended

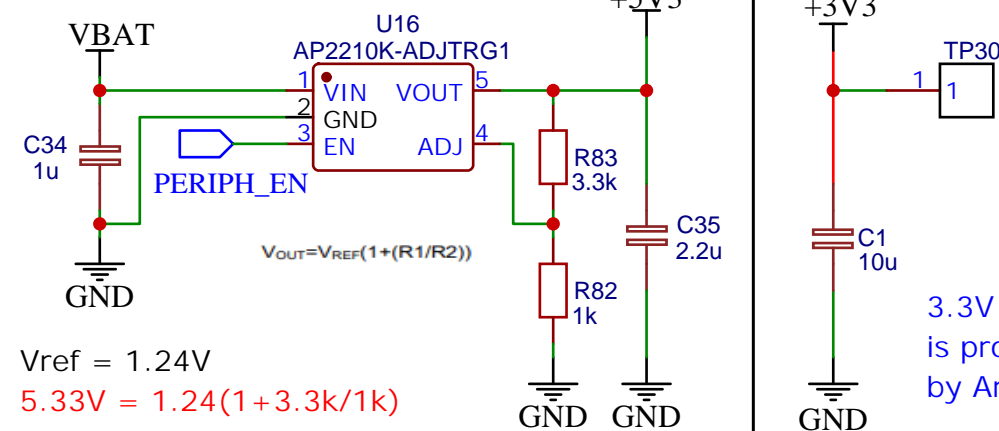


Placeholder to work without batteries

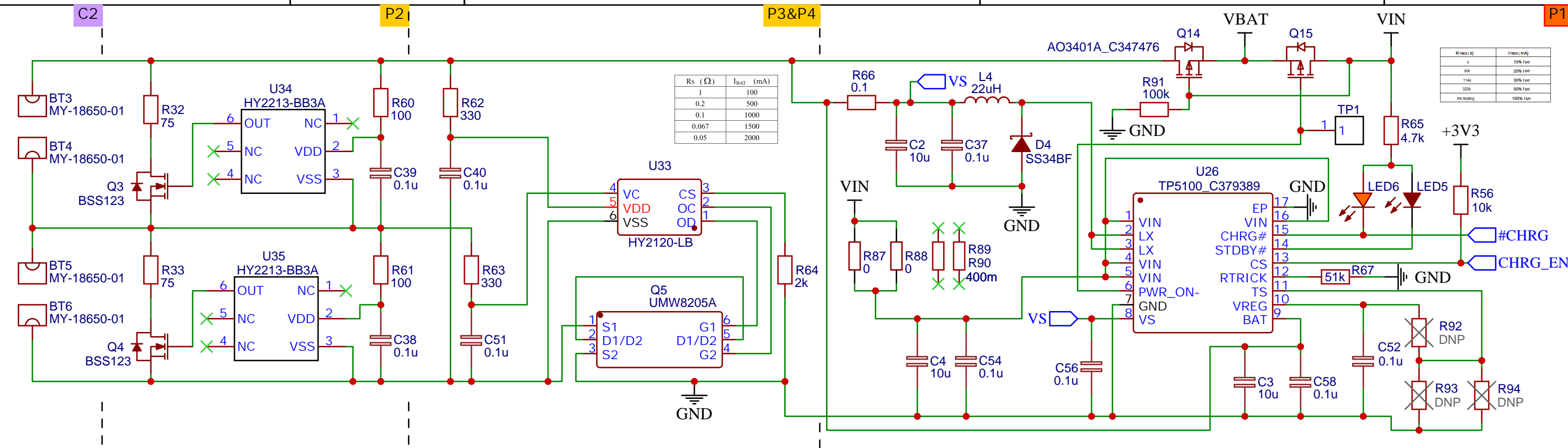
# 5V0 LDO



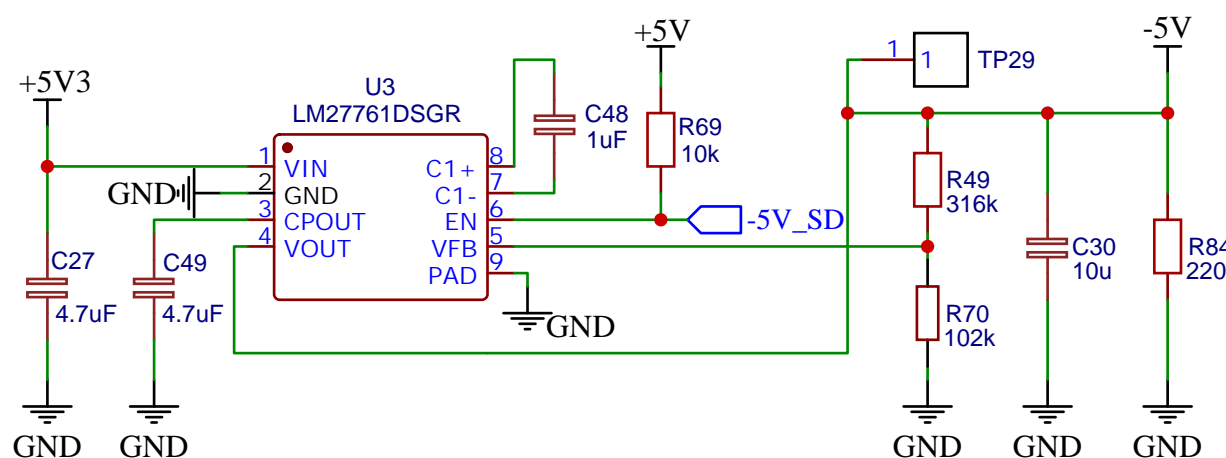
# 5V3 LDO



3.3V power is provided by Arduino

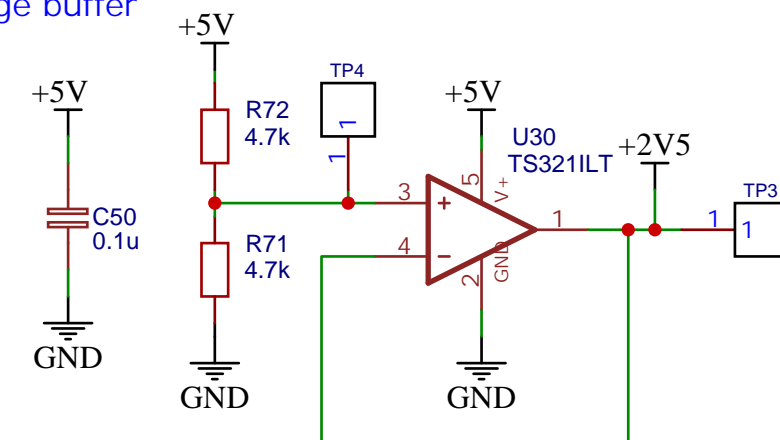


# Negative -5V generator. Inverter + LDO



$$V_{out} = -1.22V \cdot (R1 + R2) / R2, R2 > 50k$$

# 2.5V ref. voltage buffer



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Power

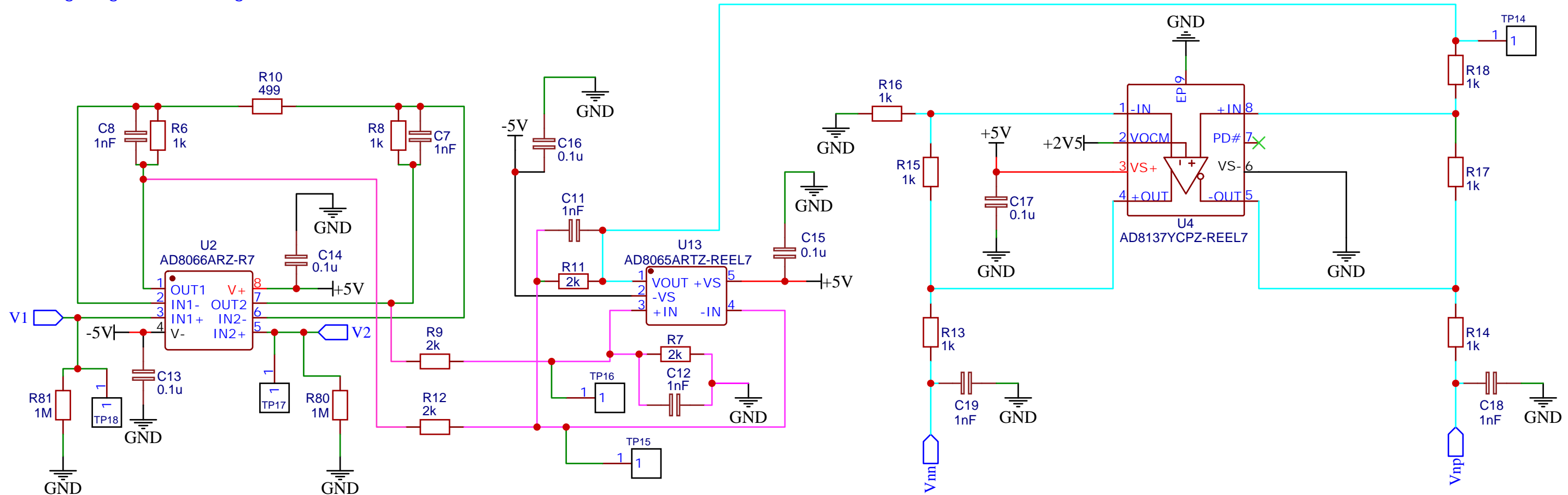
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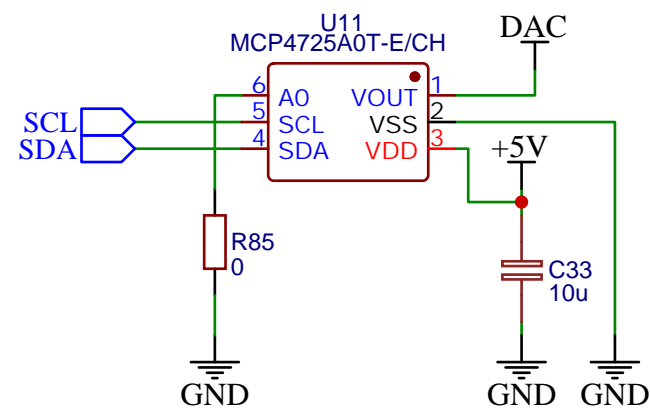
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## Voltage Signal Processing

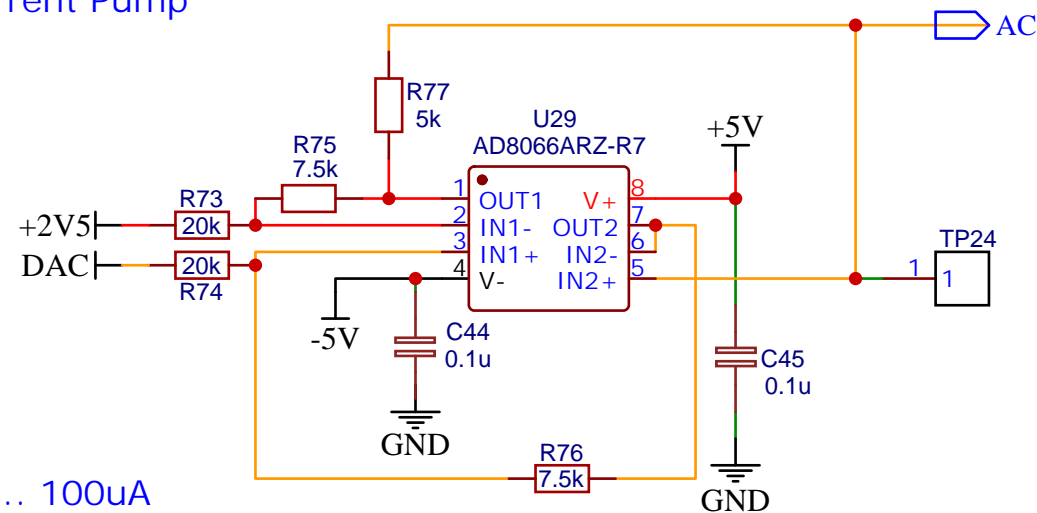


## DAC



I2C address = 0110 000 (0x60) (A0 state)

## The Howland Current Pump



I range = 10uA ... 100uA  
Rload range = 100 Ohm ... 100 kOhm

## ADC

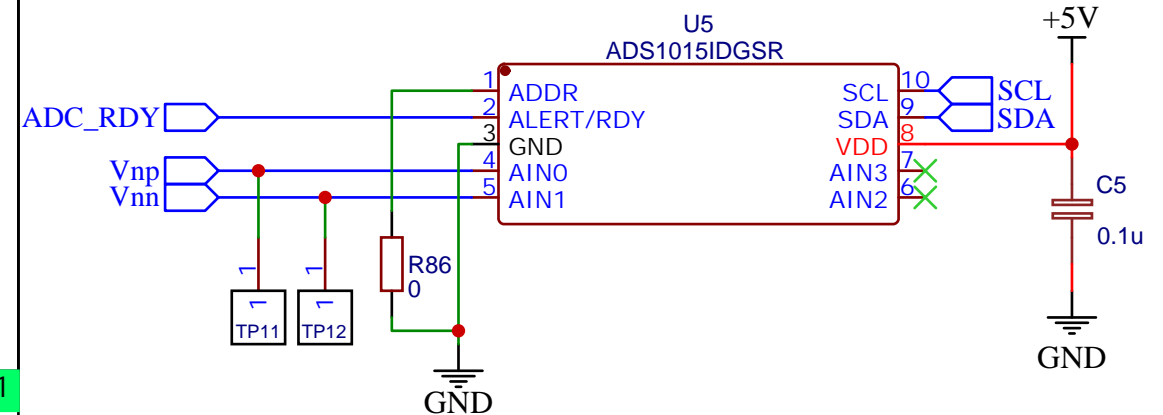


Table 2. ADDR Pin Connection and Corresponding Slave Address

ADDR PIN CONNECTION	SLAVE ADDRESS
GND	1001000
VDD	1001001
SDA	1001010
SCL	1001011

I2C address = 0100 1000 (0x48)

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Signal Processing

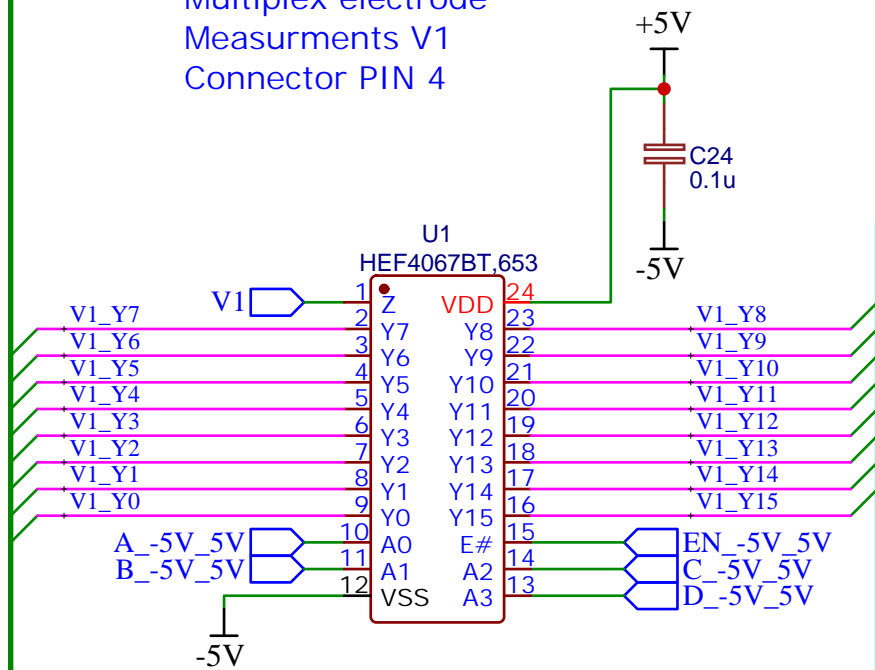
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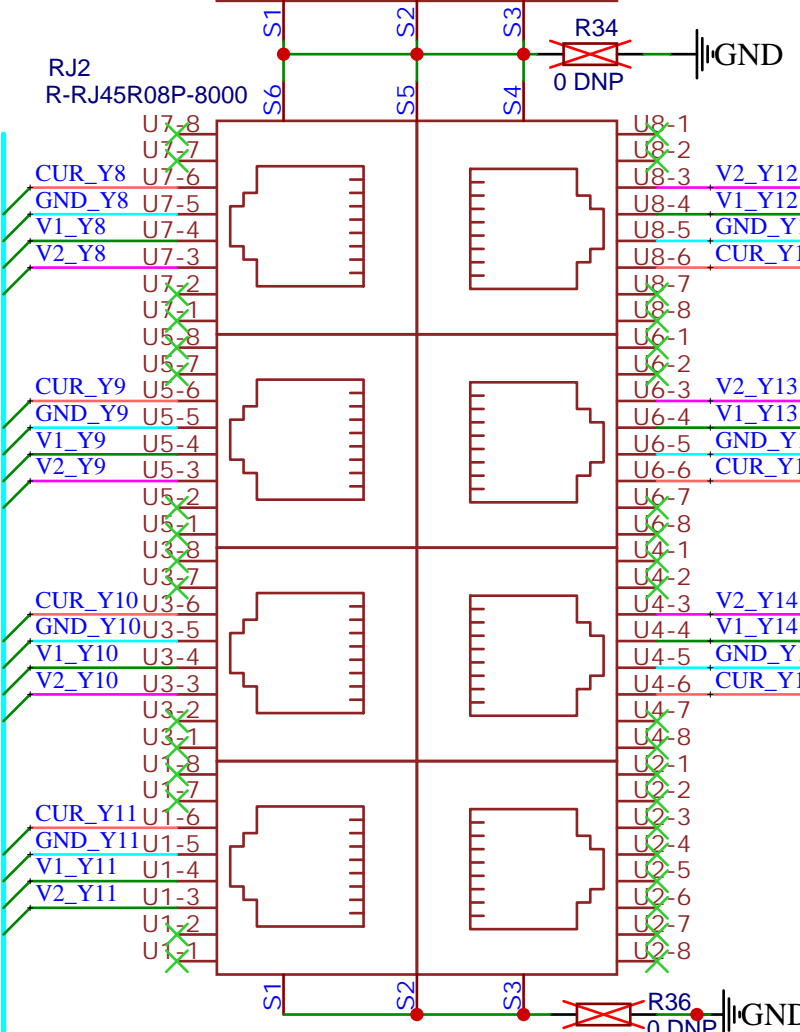
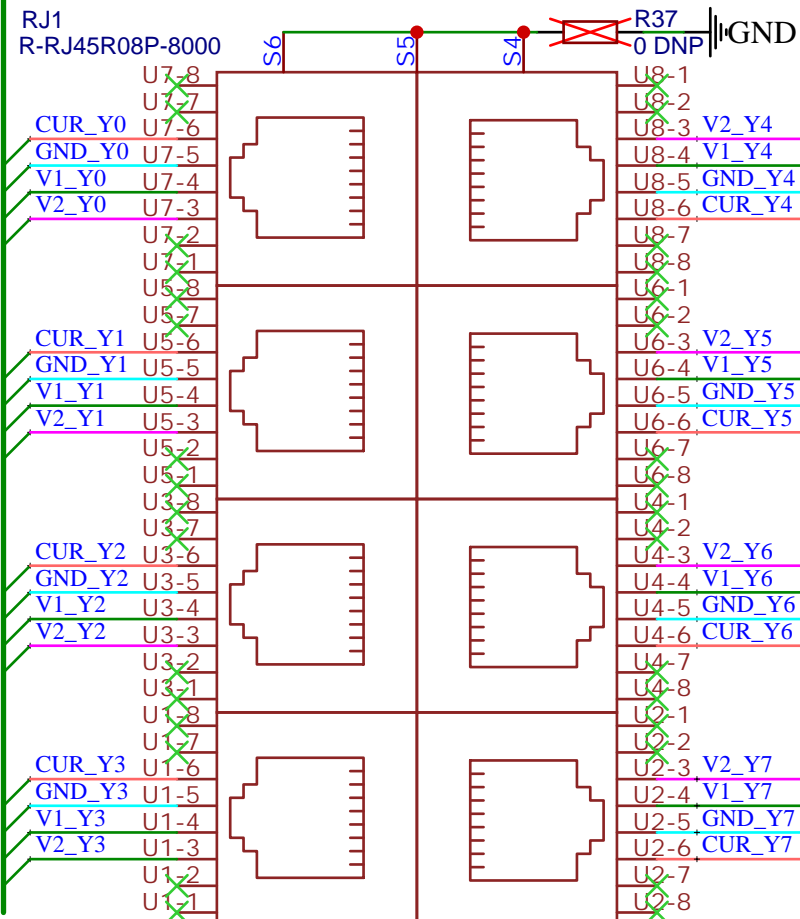
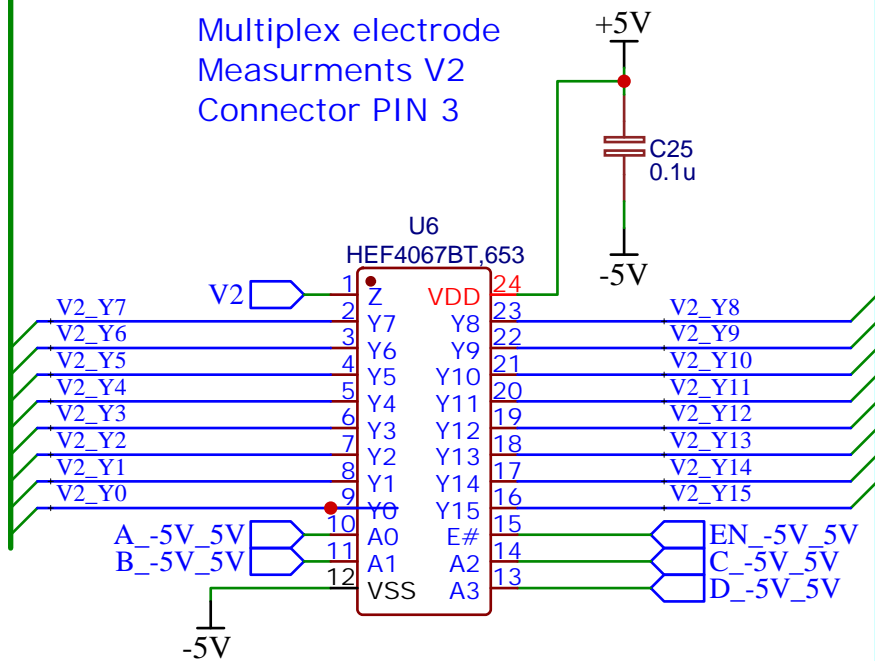
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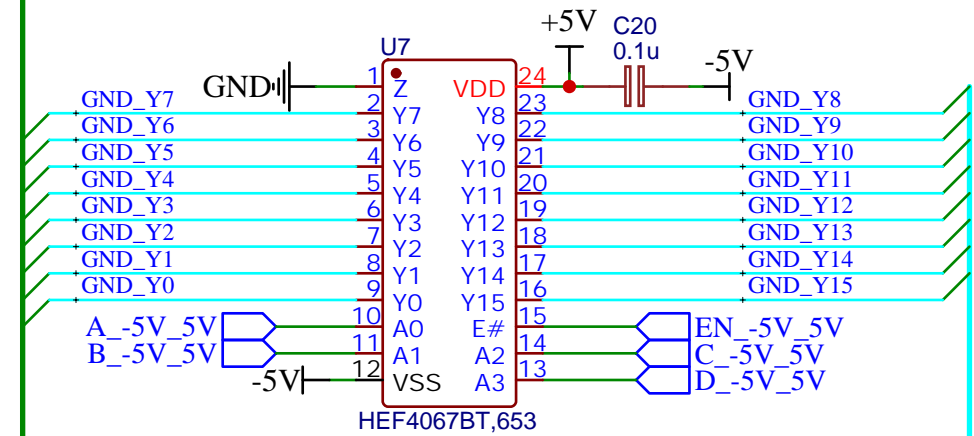
Multiplex electrode  
Measurments V1  
Connector PIN 4



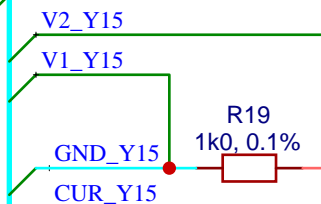
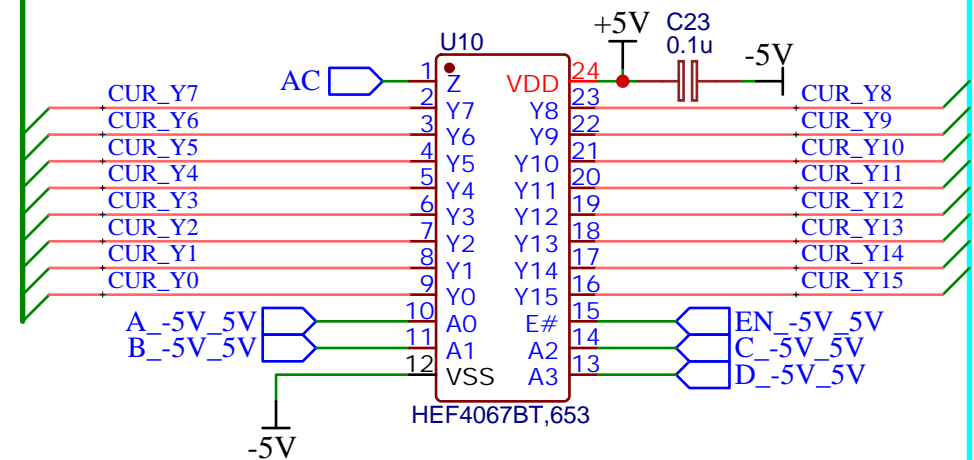
Multiplex electrode  
Measurments V2  
Connector PIN 3



Multiplex I\_1 electrode  
Connector PIN 6



Multiplex I\_2 electrode  
Connector PIN 5



Directly convertible from RJ45 to RJ11  
for use on EVOM Meter and vise-versa

Channel 16 (pins 121-128) is reserved for internal calibration of currents via an onboard 1k ohm resistor



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Electrodes

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