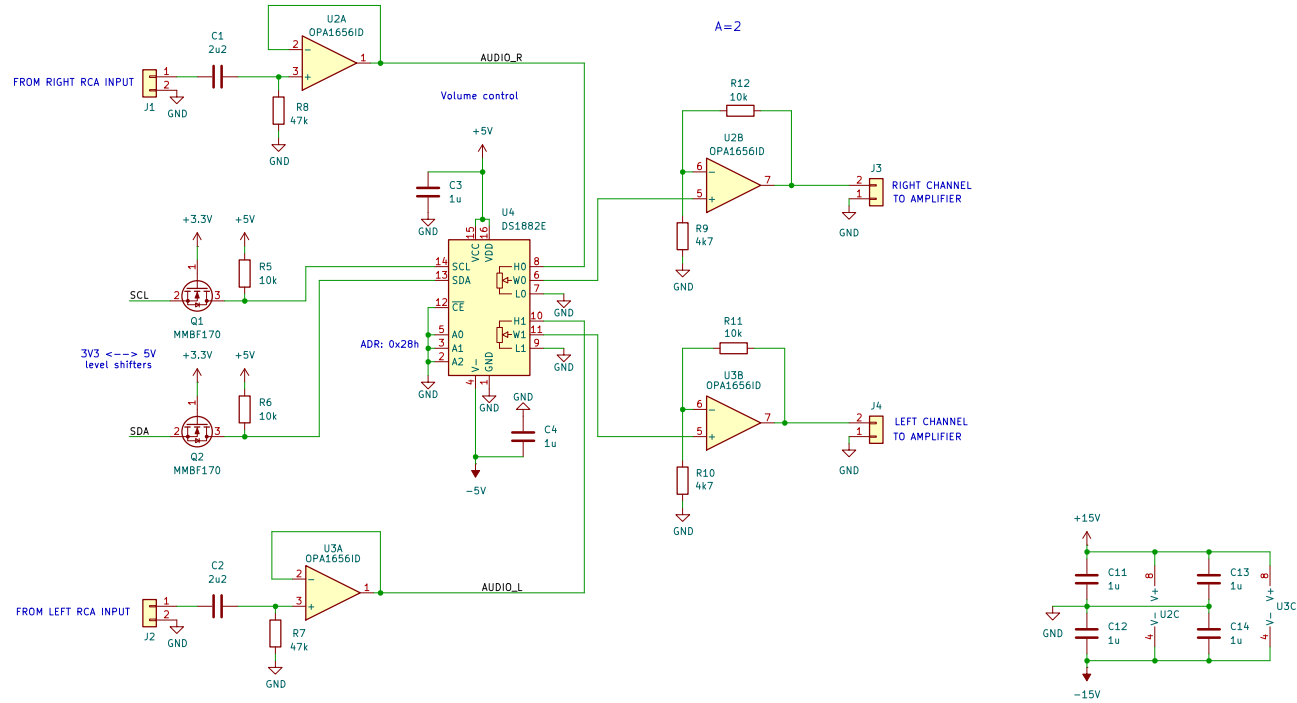
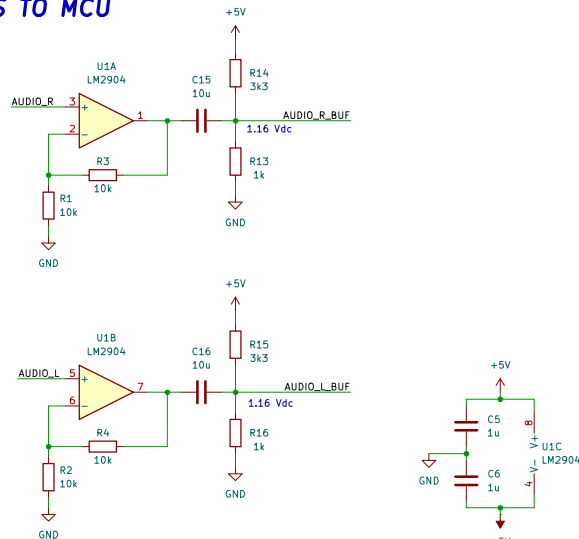


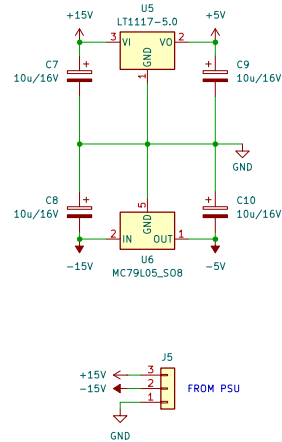
VOLUME CONTROL / INPUT BUFFER



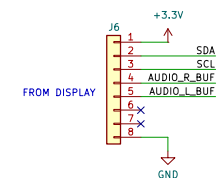
AUDIO BUFFERS TO MCU



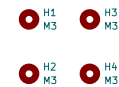
VOLTAGE REGULATORS



CONNECTOR TO MCU

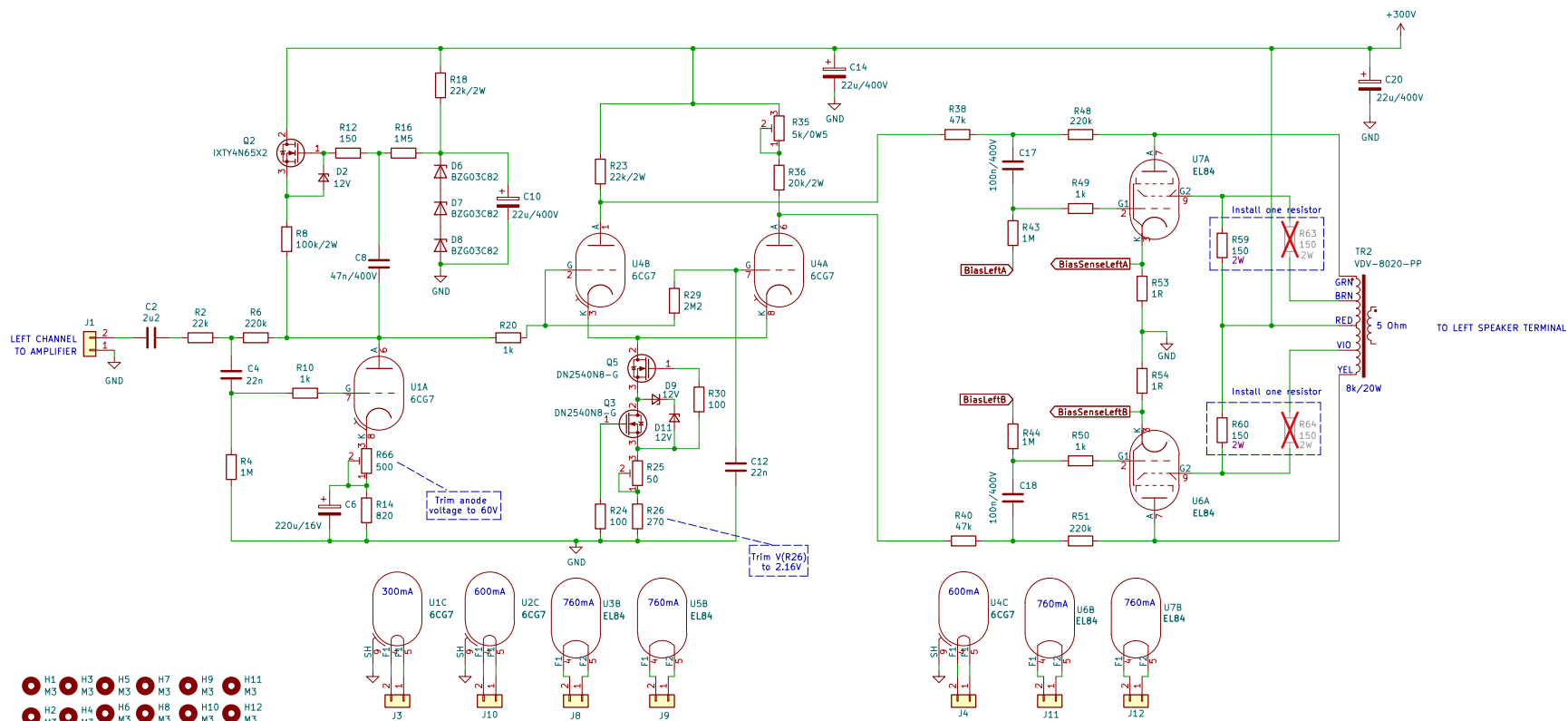
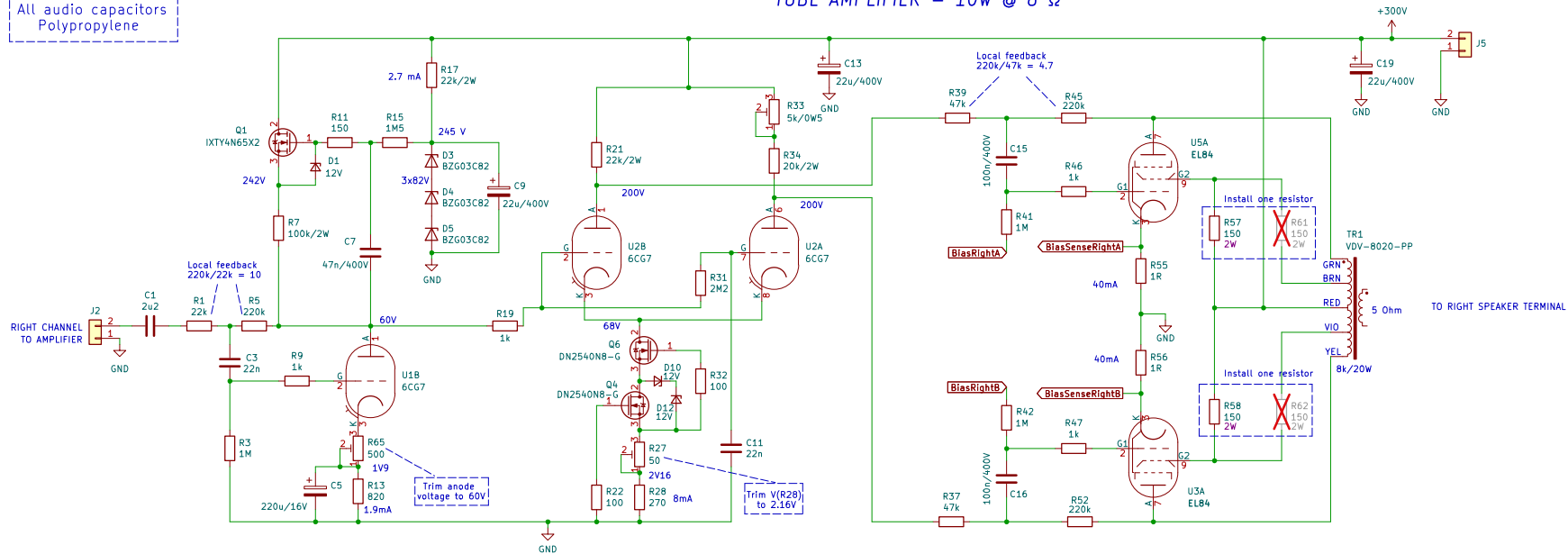


TO MCU GND



All audio capacitors
Polypropylene

TUBE AMPLIFIER – 10W @ 8 Ω



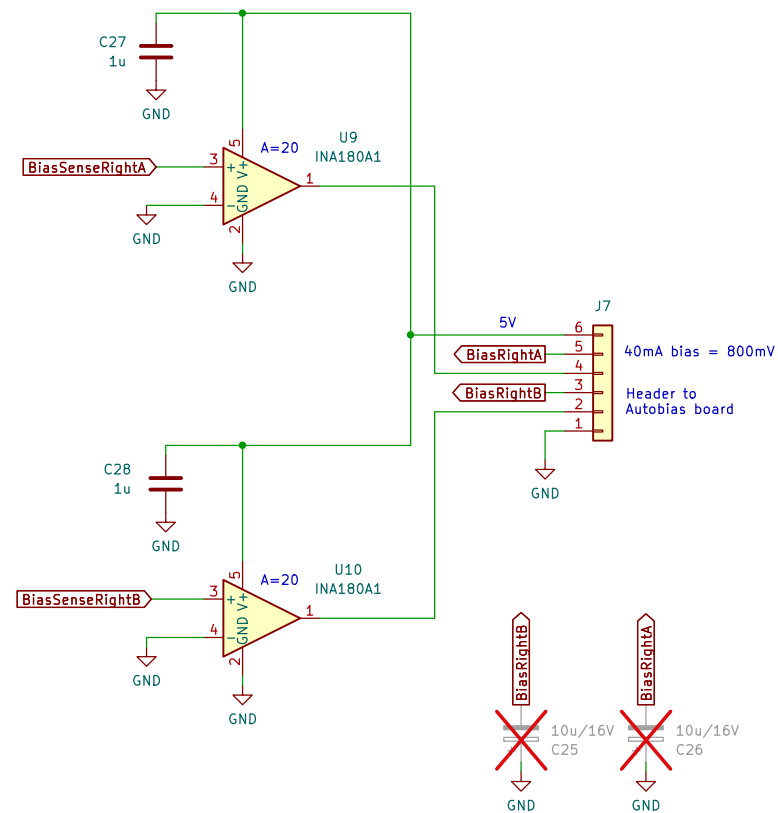
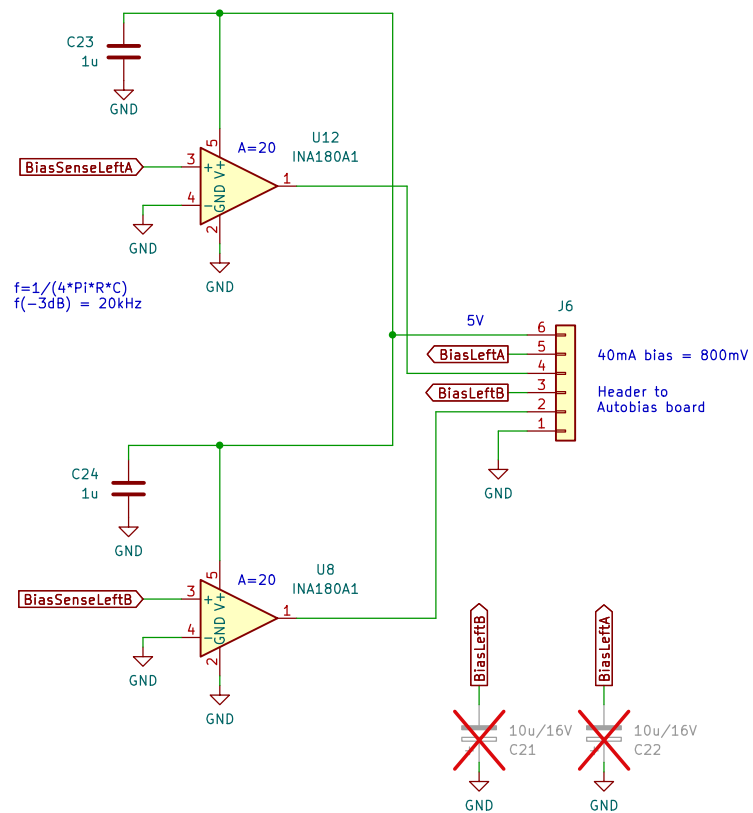
Current Sensing

CATHODE CURRENT SENSING

Bestand: CurrentSensing.kicad_sch

Connector: 538-43645-0508
Header: 538-43650-0516
Contact: 538-43030-0001-CT

CATHODE CURRENT SENSING AMPLIFIERS



BIAS VOLTAGE MEASUREMENT

BIAS VOLTAGE MEASUREMENT

The diagram illustrates the connection of an MCP3562R ADC for bias voltage measurement. The ADC is powered by a +3V3 supply through AVDD and DVDD pins, each with a 1uF capacitor. The REF+ pin is connected to a 10uF/16V capacitor, which is connected to BiasSenseLeftA. The REF- pin is connected to GND. The CH0 pin is connected to BiasSenseLeftB, CH1 to BiasSenseRightA, CH2 to BiasSenseRightB, and CH3 to GND. The MCLK pin is connected to an external clock source (marked with an 'X'). The IRQ/DAT pin is connected to the ADC_IRQ pin. The SDO pin is connected to the ADC_MISO pin, SDI to the ADC_MOSI pin, SCK to the ADC_SCK pin, and CS to the ADC_CS pin. The AGND and DGND pins are connected to GND.

Components and Connections:

- ADC:** MCP3562R (U2)
- Power:** +3V3 supply connected to AVDD and DVDD (1uF capacitors).
- Reference:** REF+ connected to 10uF/16V capacitor (C1) and BiasSenseLeftA; REF- connected to GND.
- Inputs:** CH0 (BiasSenseLeftB), CH1 (BiasSenseRightA), CH2 (BiasSenseRightB), CH3 (GND).
- Outputs:** MCLK (external clock), IRQ/DAT (ADC_IRQ), SDO (ADC_MISO), SDI (ADC_MOSI), SCK (ADC_SCK), CS (ADC_CS).
- Grounds:** AGND and DGND connected to GND.

From current sense amps

MCU ESP32-S3 super mini

CONNECTORS

J1: SERCOM WITH DISPLAY

- 1: BIAS_RXD
- 2: BIAS_TXD
- 3: GND

J2: FROM PSU

- 4: +5V
- 3: +15V
- 2: -15V
- 1: GND

J3: Header to Amplifier pcb (Left channel)

- 6: +3V3
- 5: BiasLeftA
- 4: BiasSenseLeftA
- 3: BiasLeftB
- 2: BiasSenseLeftB
- 1: GND

J4: Header to Amplifier pcb (Right channel)

- 6: +3V3
- 5: BiasRightA
- 4: BiasSenseRightA
- 3: BiasRightB
- 2: BiasSenseRightB
- 1: GND

BIAS VOLTAGE GENERATOR

Summing amplifiers:
 i.e. $V_{ref} = 8V$
 then
 $8V + -(10k/10k) = -8V$
 $2V8 + -(10k/10k) = -2V8$

ADC@2V $\rightarrow -(8V + 2V8) = -10V8$
 ADC@5V $\rightarrow -(8V + 0V) = -8V$

-8V to -10V8 $\Rightarrow$ 40mA to 10mA in 4095 steps
 $\rightarrow$ 7.3 uA/step

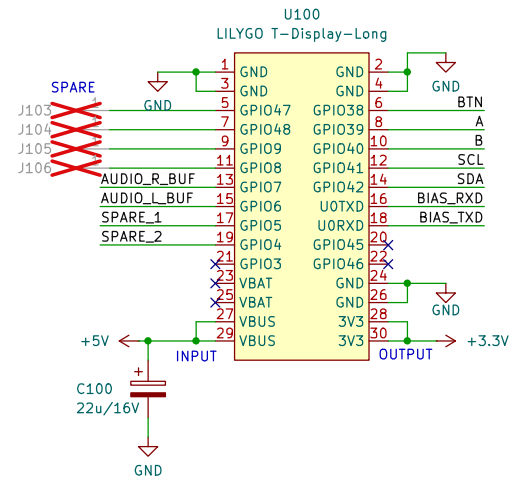
Use jumpers for auto/manual bias
 $15k / 10u \rightarrow f(-3dB) = 1Hz$

Address selection default: 0x60

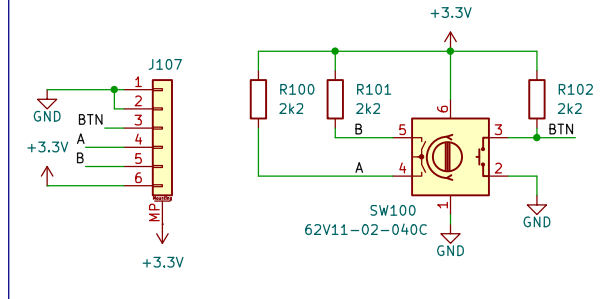
Trim RV5 to set maximum bias voltage.
 i.e. if set to 8V then the bias voltage can be between -8V and -10V since the dac range is 2V and the summing amplifier inverts.
 Range: 7.5V - 12.8V



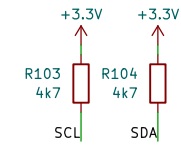
MICROCONTROLLER + DISPLAY



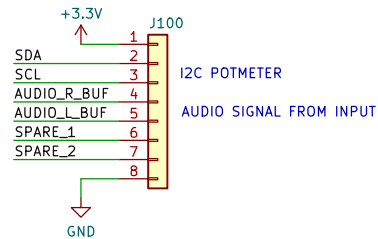
ENCODER + BUTTON



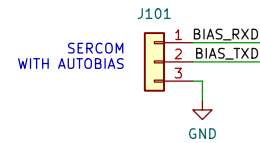
I2C pull-up



CONNECTOR TO AUDIO INPUT



CONNECTOR TO AUTOBIAS



CONNECTOR TO PSU

