



CircuitPirates

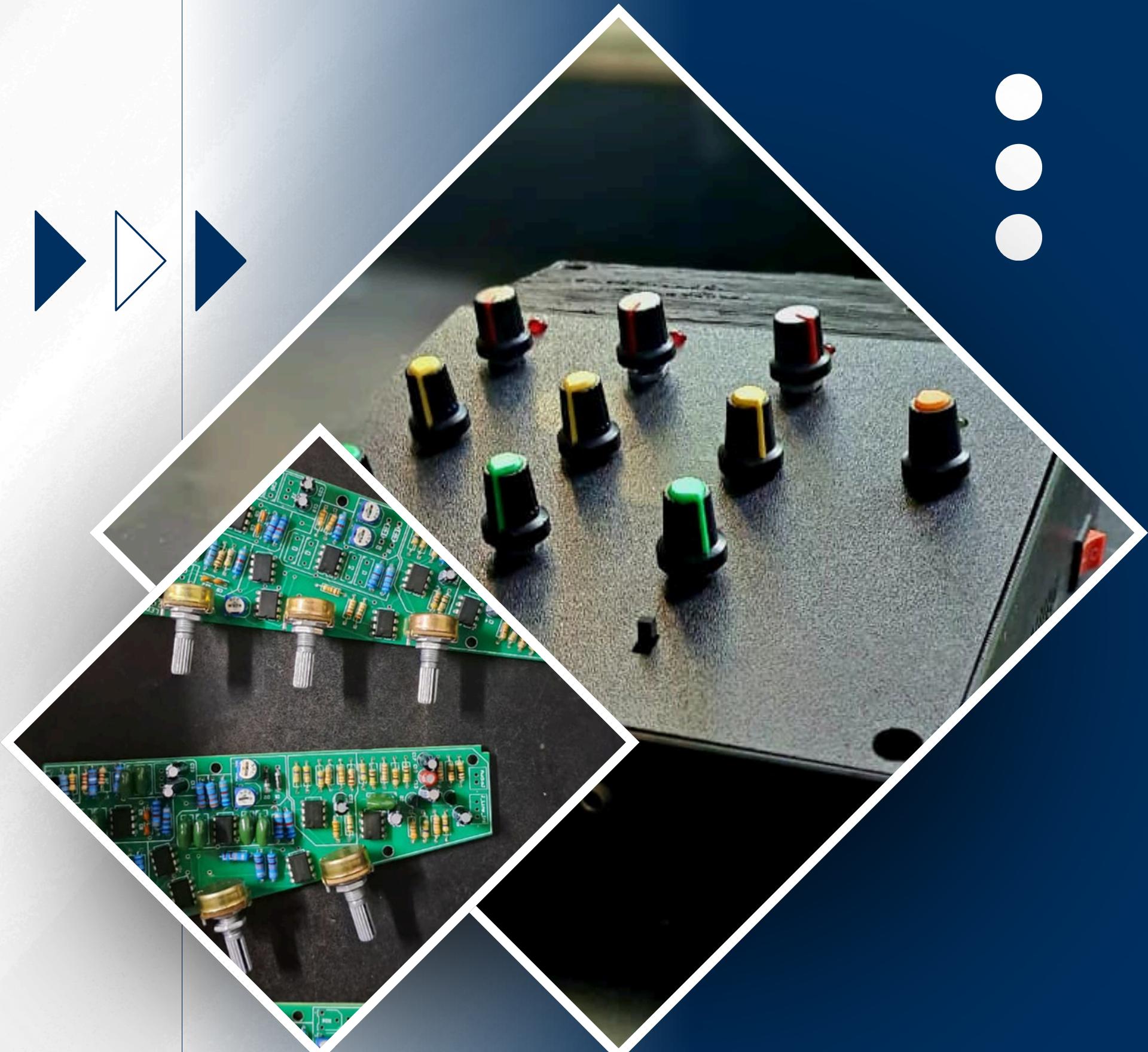
# 3 CHANNEL AUDIO MIXER WITH 3 BAND EQUALIZER

D.M.D.P.Dissanayaka ( 230155J)

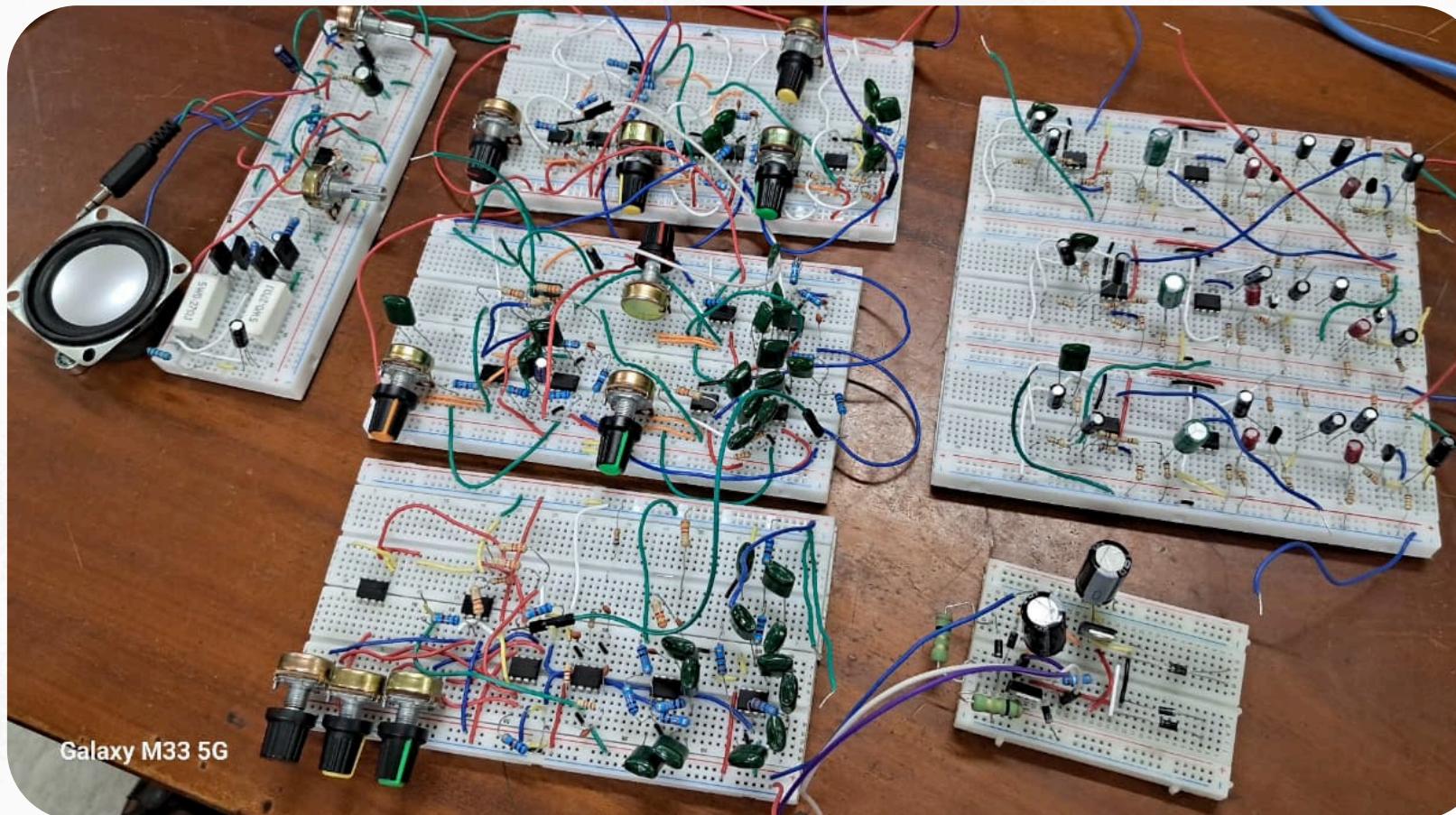
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W.U.Deshan (230130E)

W.A.S.Nuwanaka (230449N)



# CONTENT



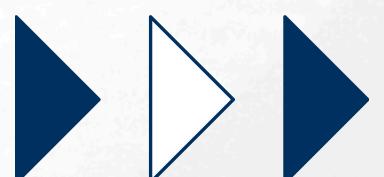
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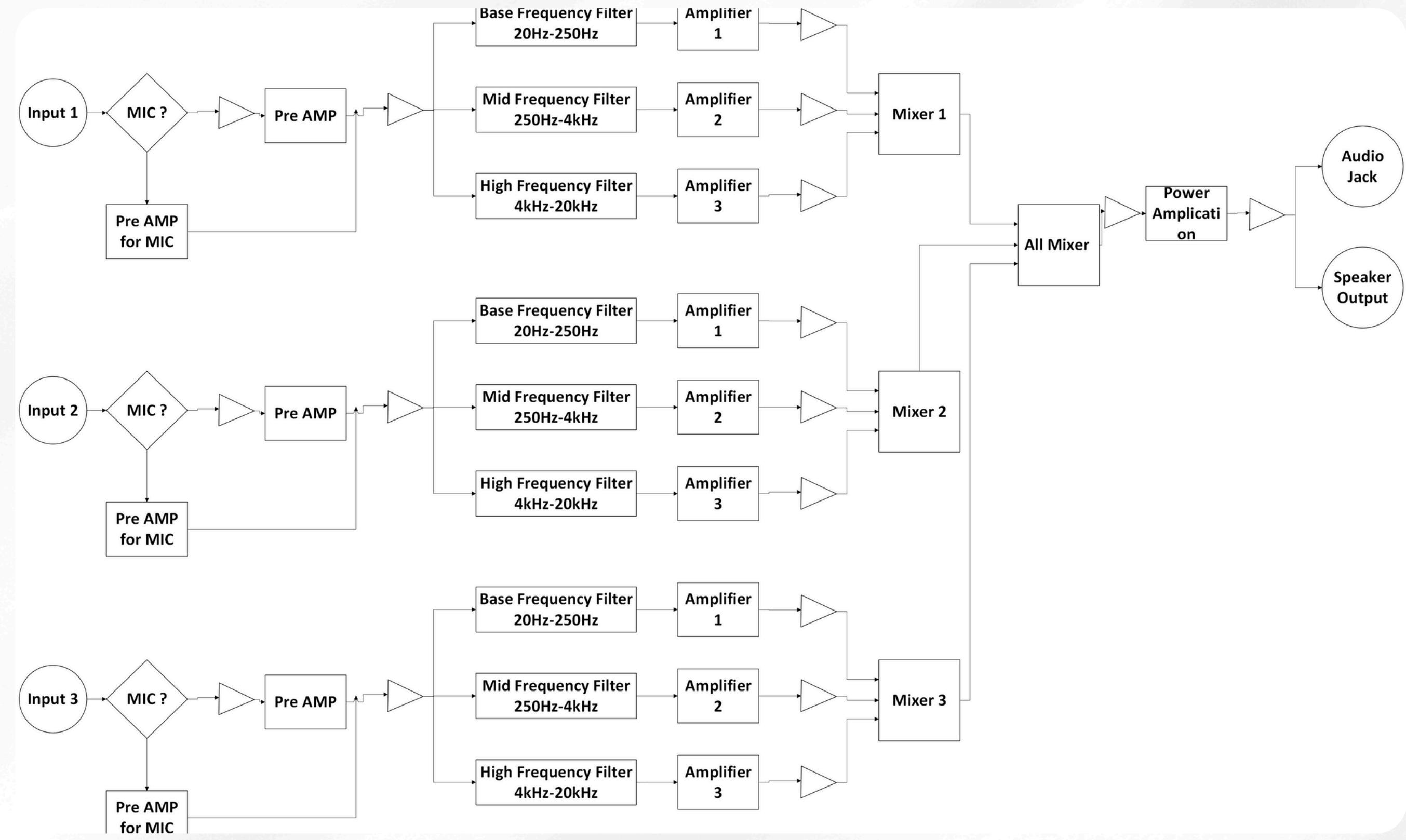
# INTRODUCTION

- 3 channel equalizer with 3 frequency band control system.
- Control bass, mid and trebble seperately for each channel.
- Input to the circuit through an instrument or a mic.(As preffered by user)
- Giving output to speaker or sound device.

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# SYSTEM ARCHITECTURE



# COMPONENT SELECTION

- Low noise, reduce hiss and hum in low-level audio signals.
- High current gain ( $hFE$ ), providing good for weak mic inputs.
- It has low input leakage current
- Operates well at low currents and voltages, making it ideal for small-signal audio stages.

MIC Pre amp



## Opamps selection

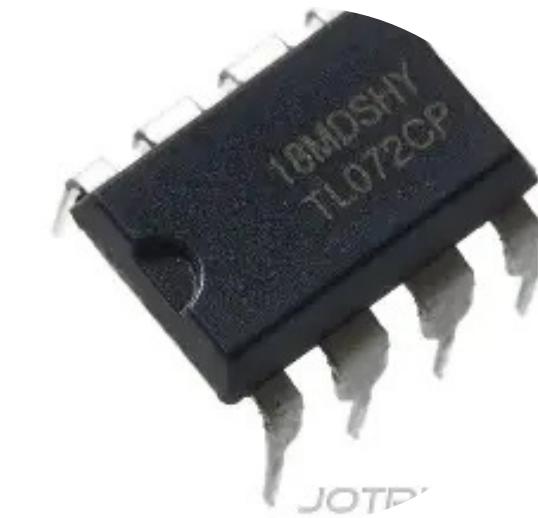


- The NE5532 is highly suitable for audio applications because it offers very low noise ( $\approx 5 \text{ nV}/\sqrt{\text{Hz}}$ )
- High slew rate (9 V/ $\mu\text{s}$ )
- Low distortion (THD  $< 0.002\%$ )
- High output drive capability.

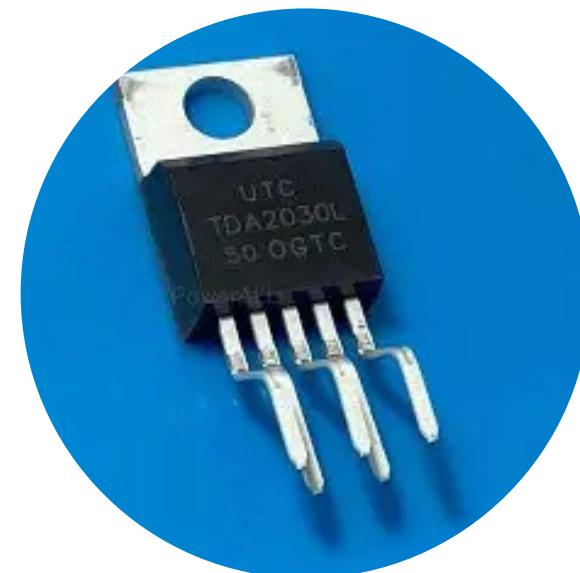
# COMPONENT SELECTION

- TL072 uses JFET inputs, giving it very high input impedance.
- Lower input bias current
- Good for high-impedance sources (like guitar pickups or sensors).

Opamps selection



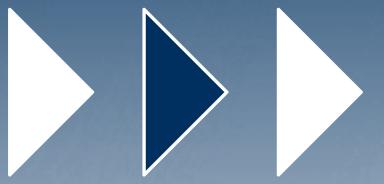
Power amp IC



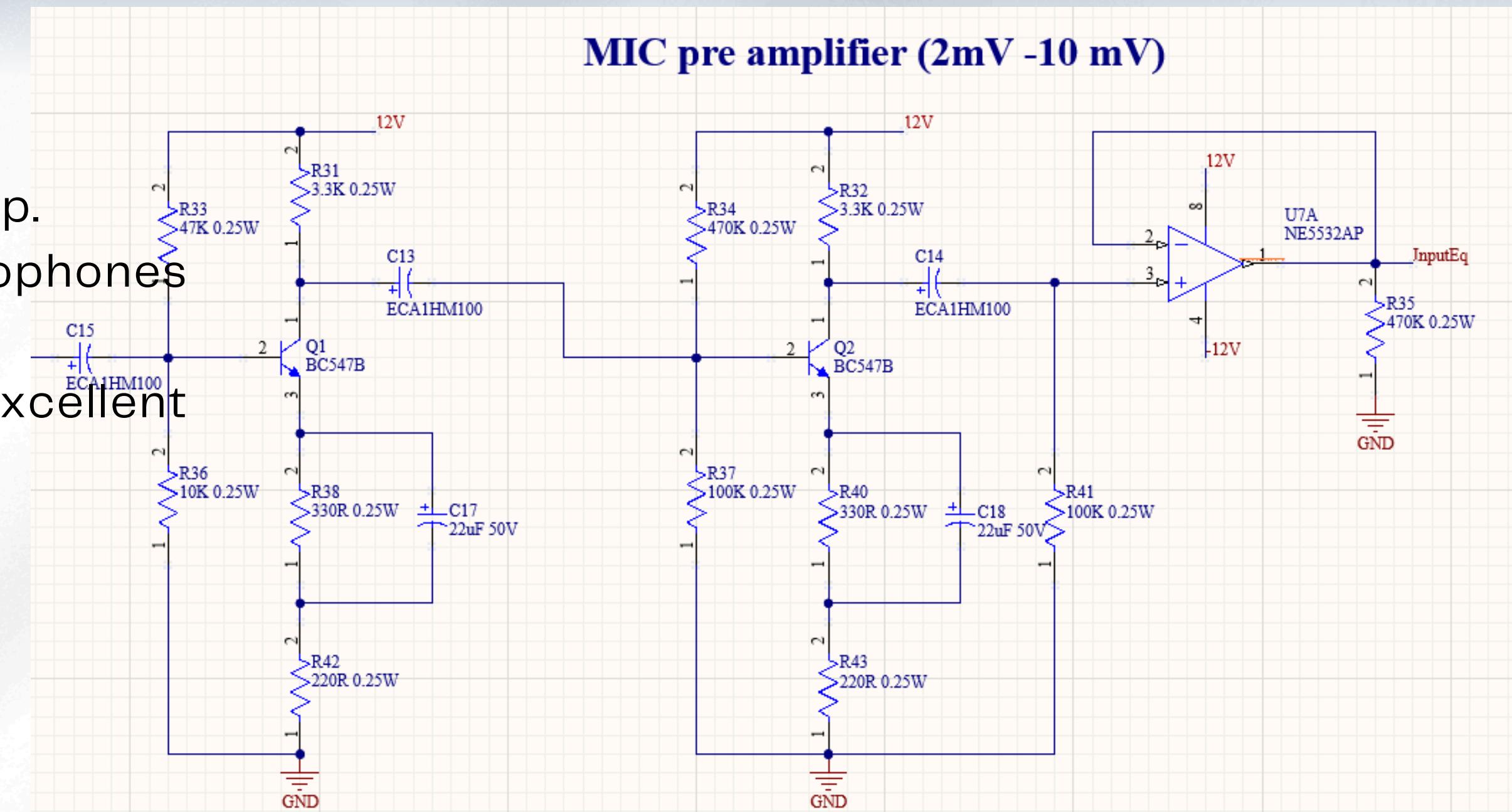
- Class AB power amplifier IC.
- For low-frequency audio applications.
- Can deliver about 12–18 W of output power with very low distortion (typically <0.1% THD)
- Wide frequency response, ensuring clear and natural sound reproduction.

# MIC PREAMPLIFIER

(2mV-10mV  
Peak input voltage)



- Amplify the input to drive OpAmp.
- Low input impedance.
- High output impedance.
- Gain ~160
- Output is line voltage with 1.72Vpp.
- Input impedance matches microphones well
- Voltage-divider bias gives excellent thermal stability.

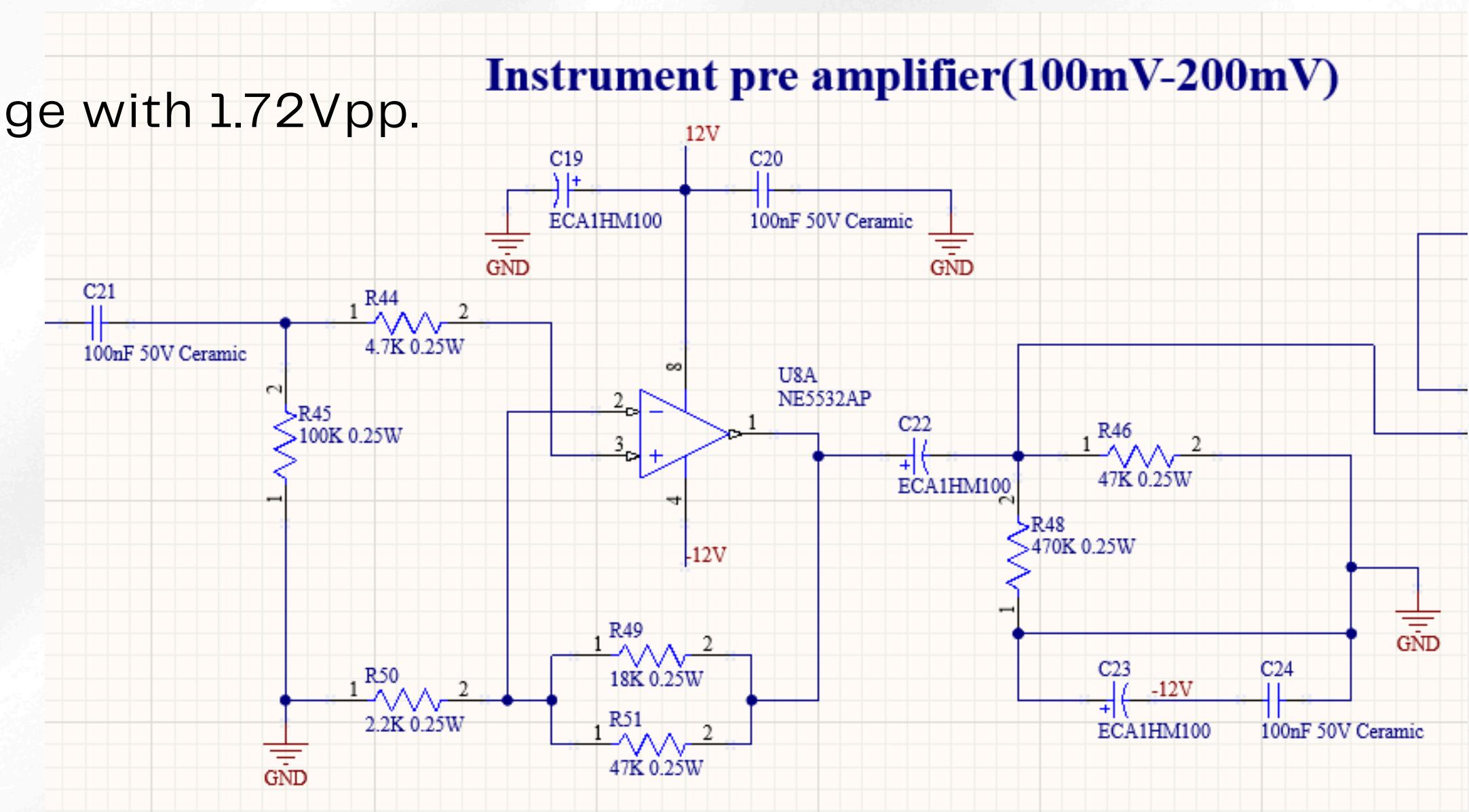


# INSTRUMENTAL PREAMPLIFIER

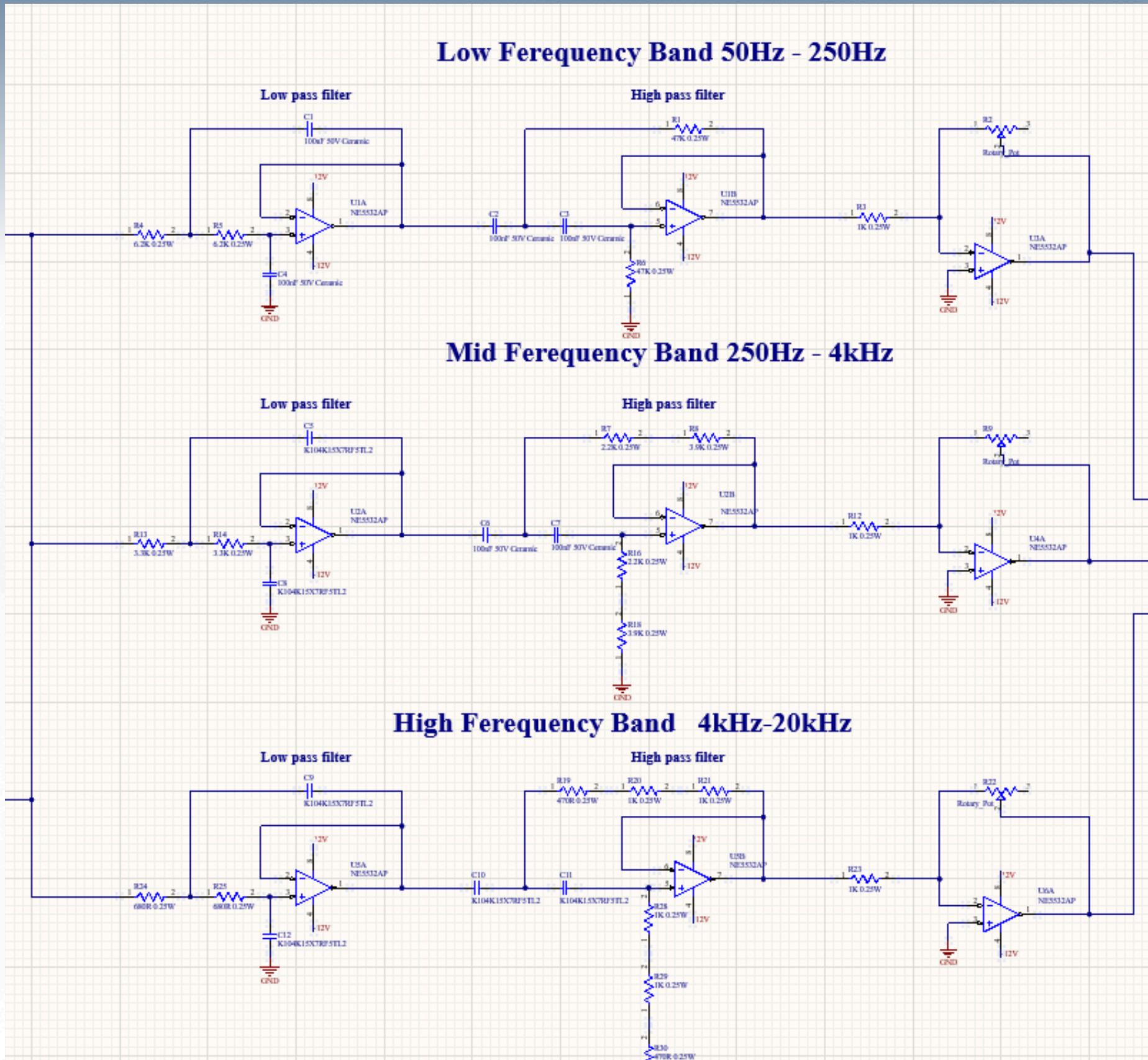
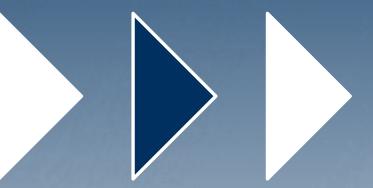
(100mV-200mV)  
Peak input voltage



- Amplify the instrument input to drive OpAmp.
- High input impedance.
- High output impedance.
- Gain ~7.5.
- Peak Output is set to line voltage with 1.72Vpp.



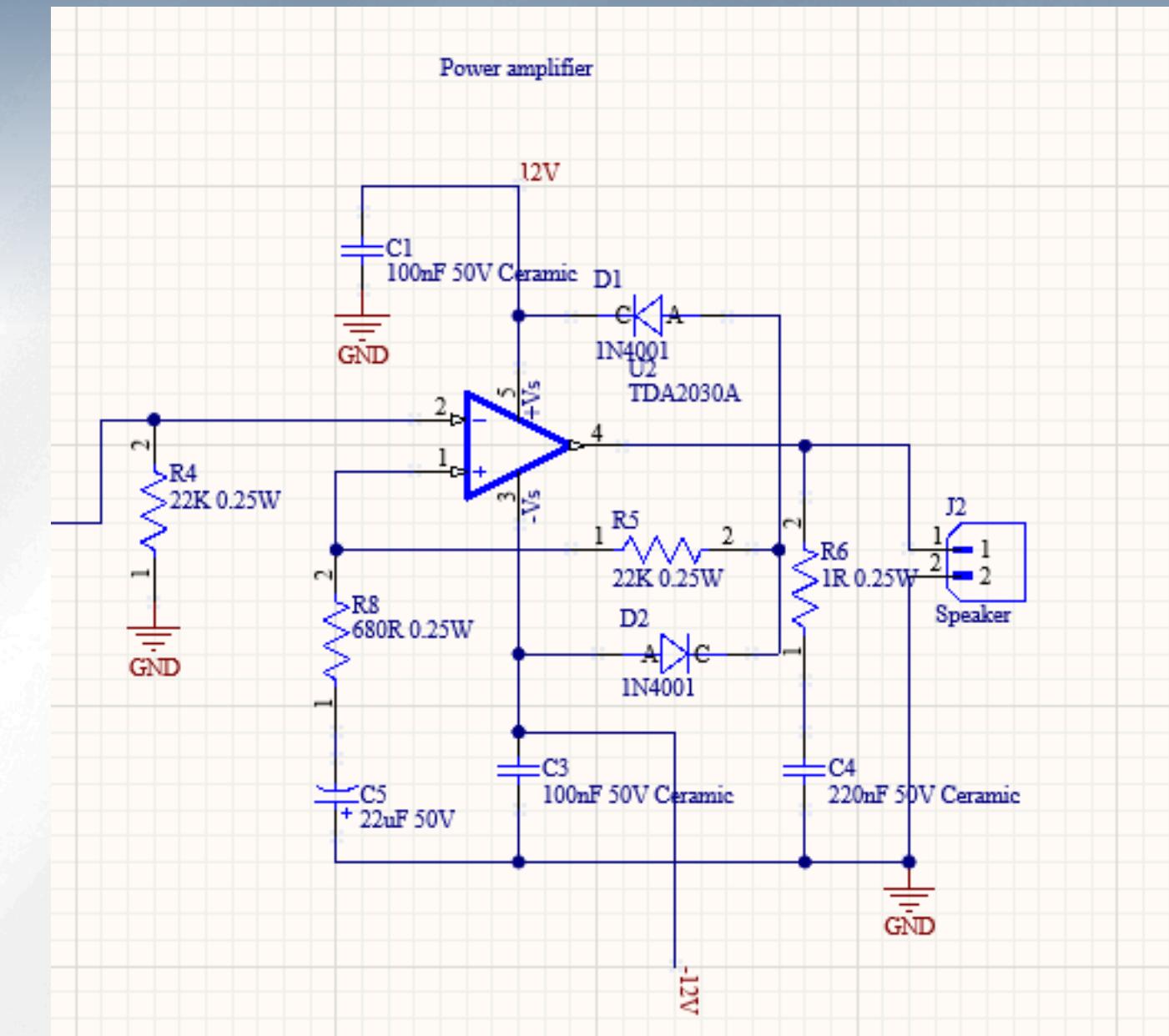
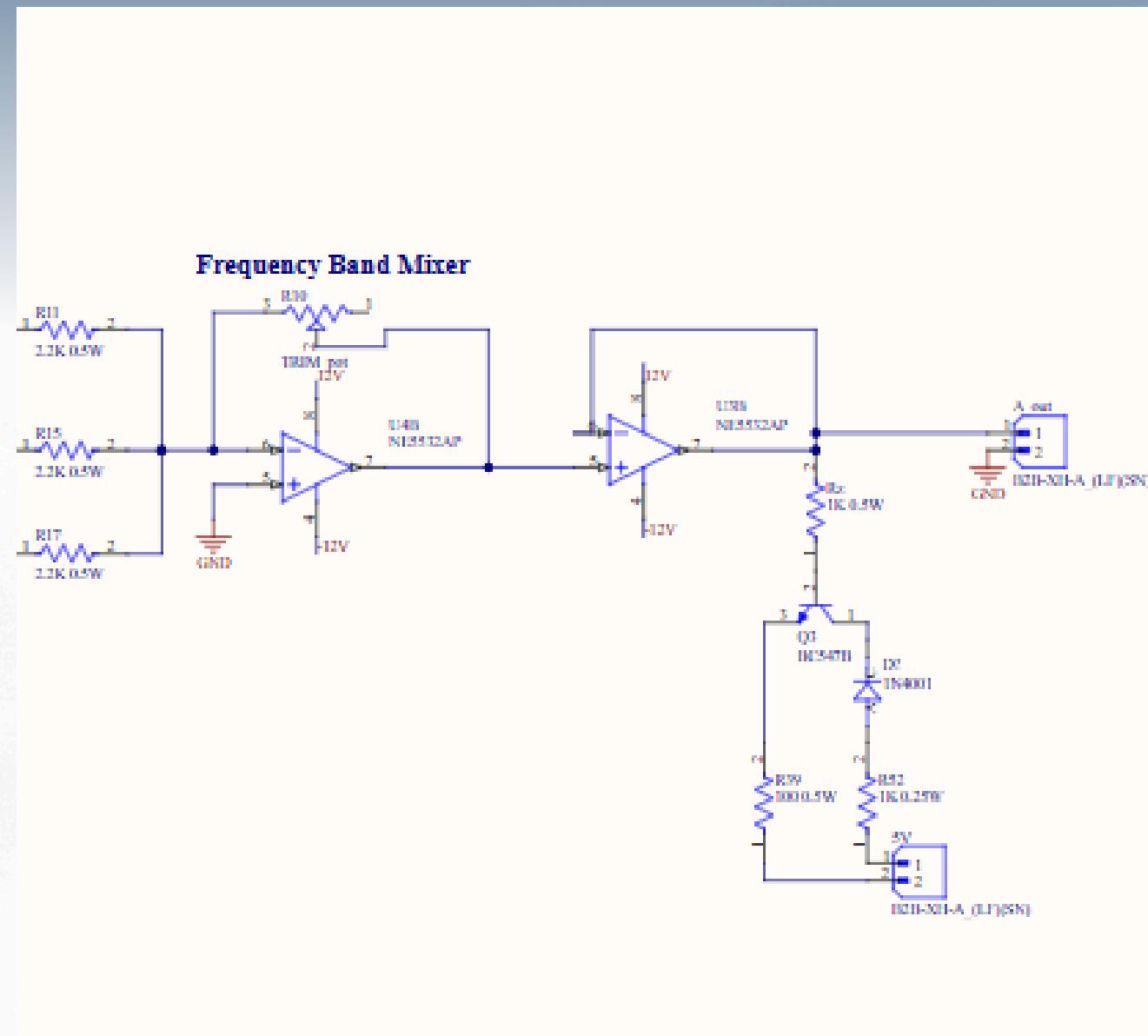
# FREQUENCY BAND EQUALIZER



Cascaded second order Sallen-Key high pass and low pass filters form the band pass filter

$$\omega_0 = 2\pi f_0 = \frac{1}{\sqrt{R_1 R_2 C_1 C_2}}$$

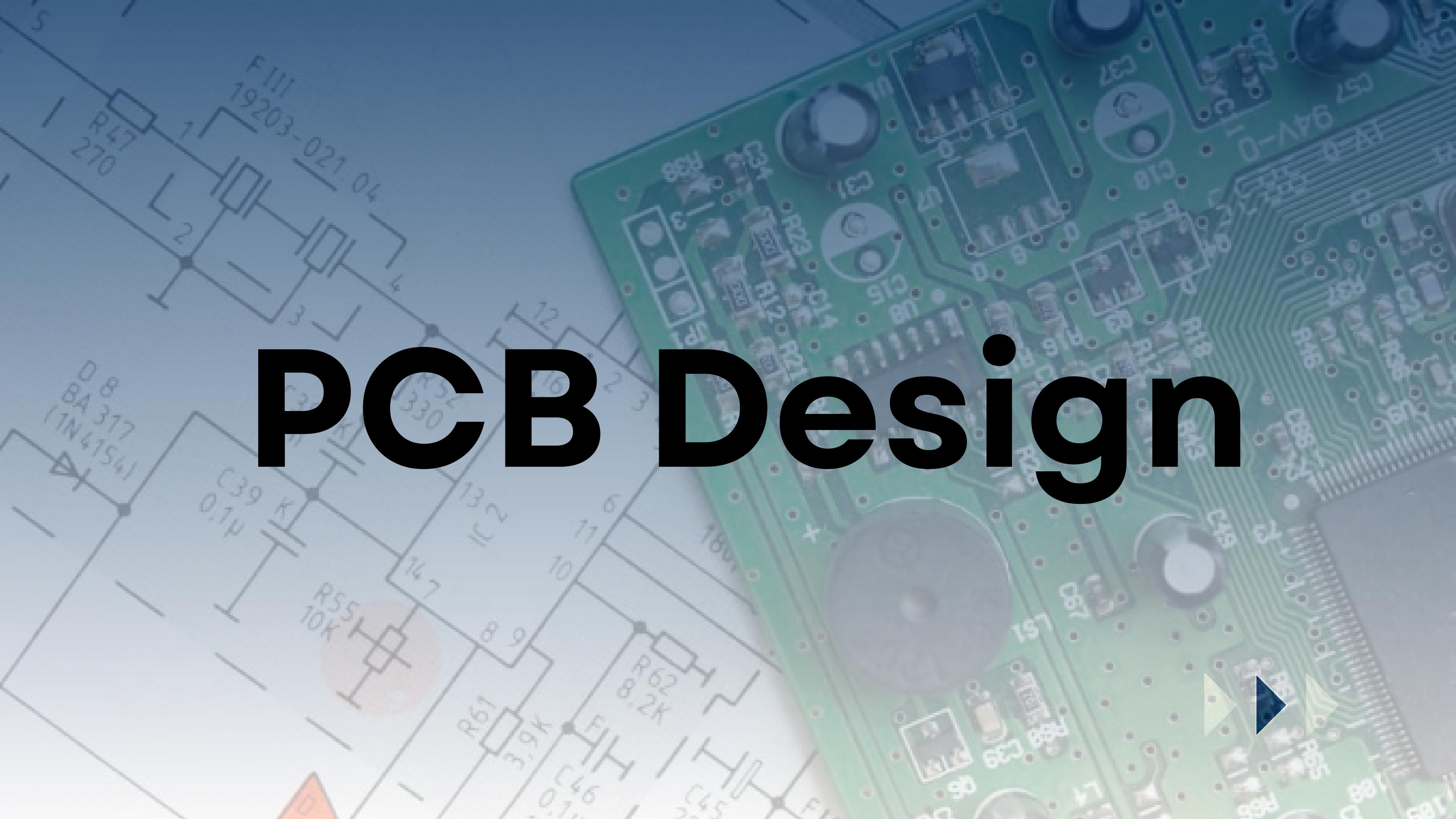
# MIXER AND POWER AMPLIFIER



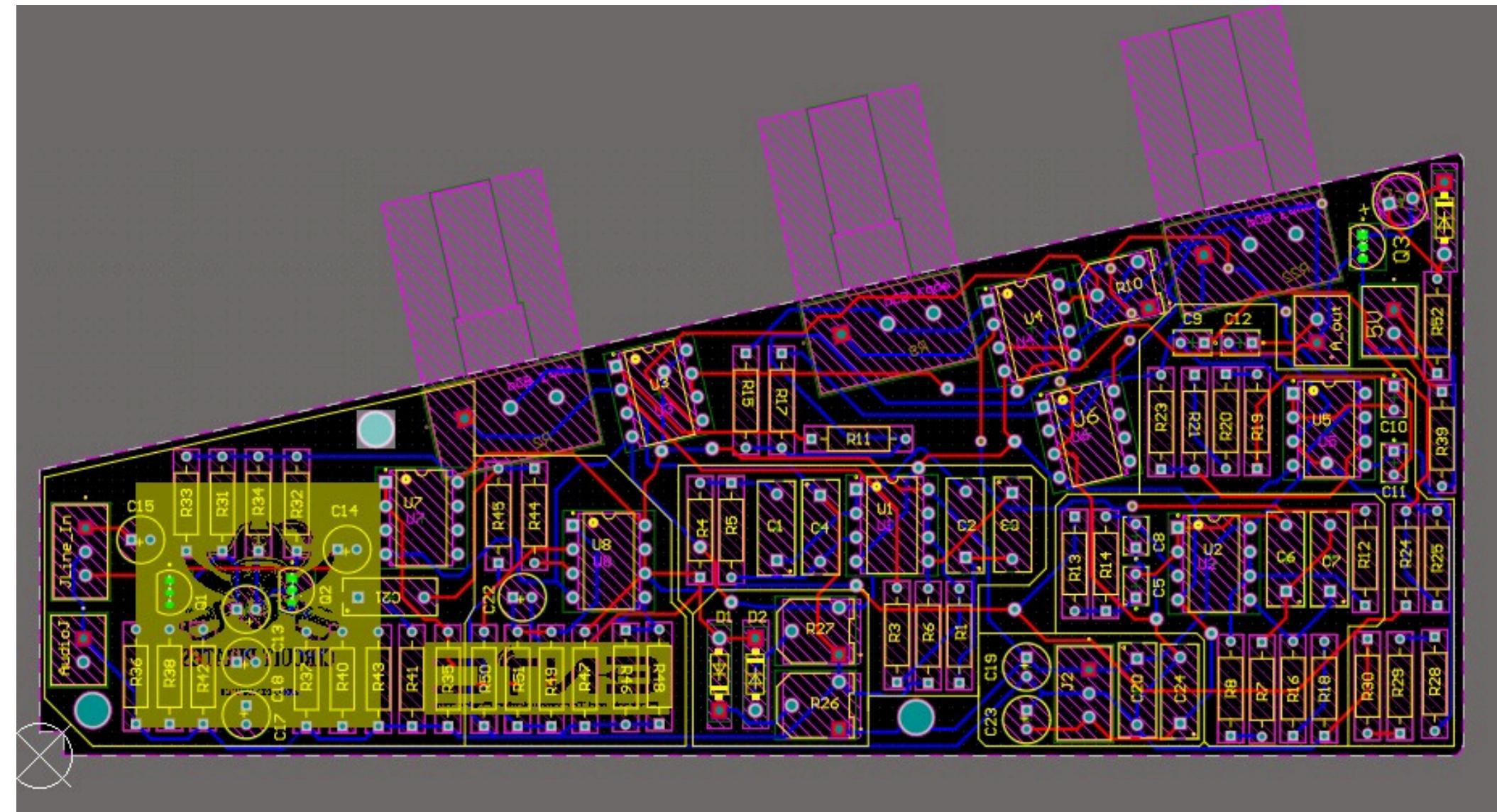
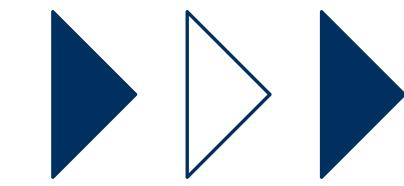
- Combine the three channels.
- Saturation control.
- Operates at line voltage with 1.72Vpp.

- Amplify line level voltage to drive Speaker.
- High power gain.
- Volume control.

# PCB Design

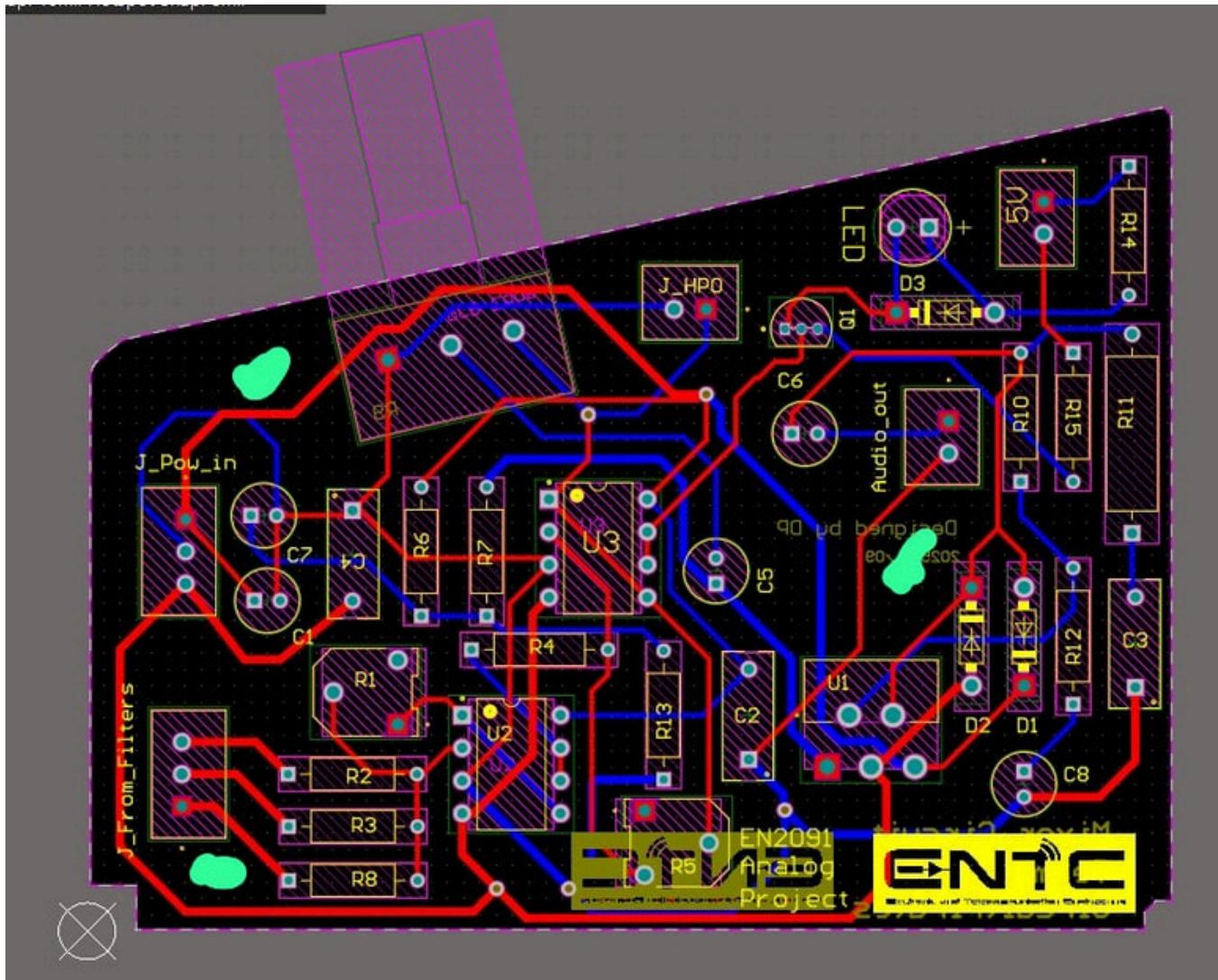
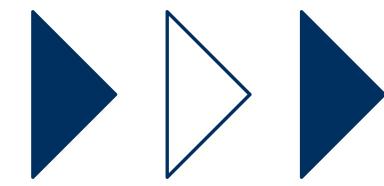


# PCB 2D Pathways

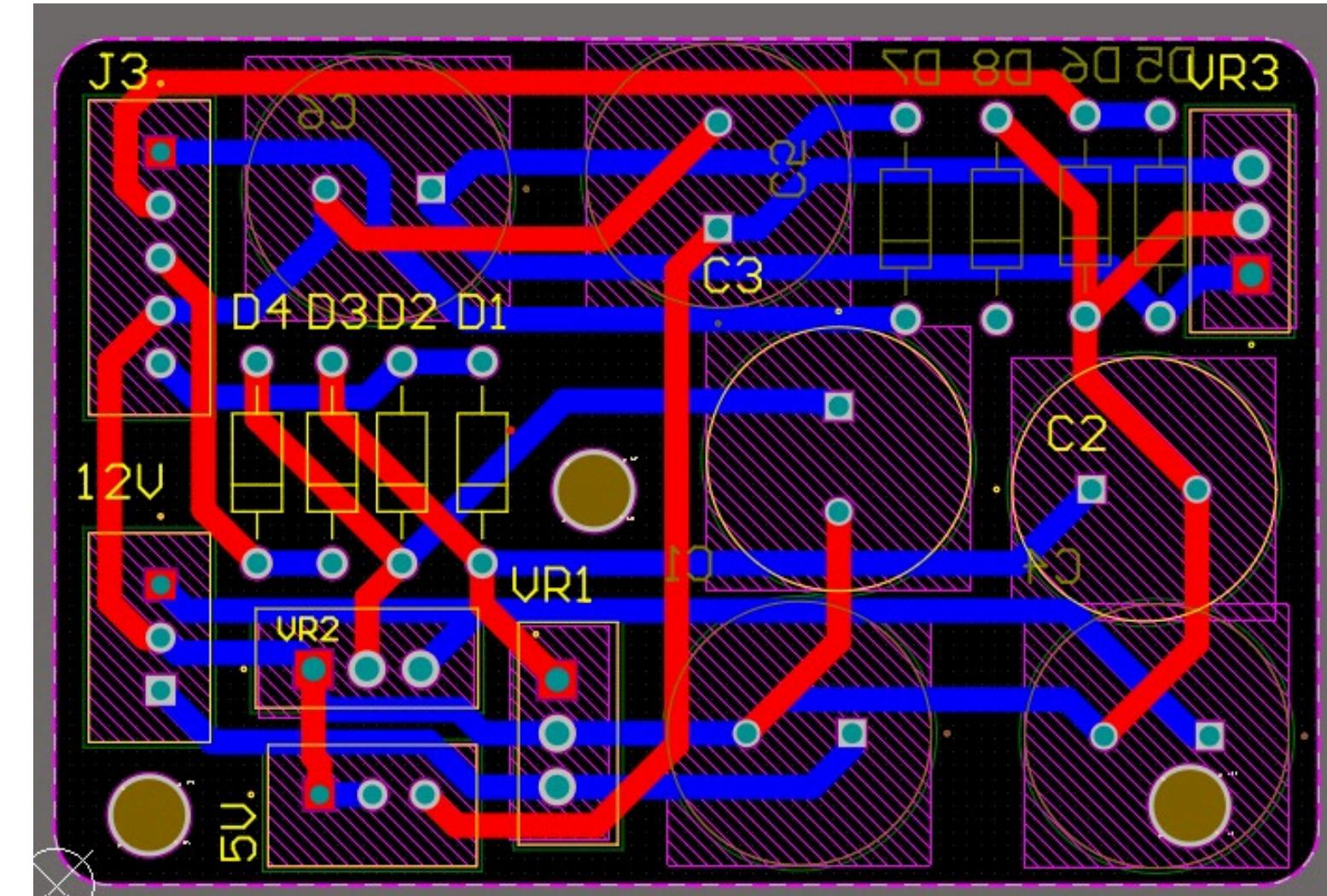


# Pre-Amplifier and Filters Circuit

# PCB 2D Pathways



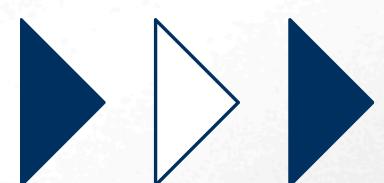
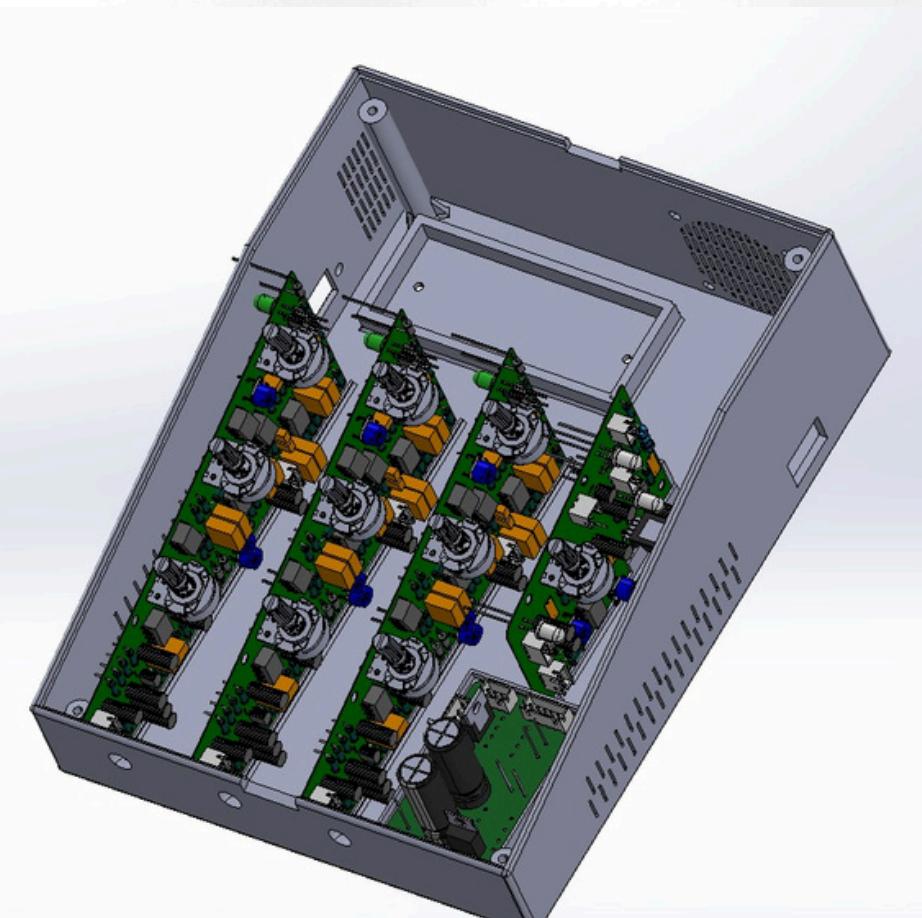
Mixer and Power Amplifier



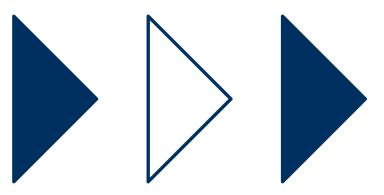
Power supply

# Enclosure Design

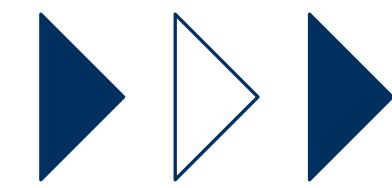




# Final Product

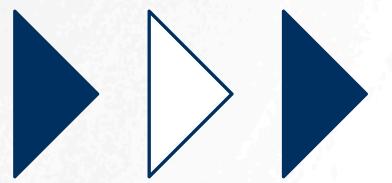


# Power Budget Calculation



- Mixer and equalizers  $\approx 4.6\text{W}$
- Power amplifier:  $\approx 5\text{W}$
- Overall power consumption:  $\approx 15 \text{ W}$
- Power waste:  $15\text{W}-9.6\text{W}\approx 5.4\text{W}$

# Contribution of Group Members



| Student's Name (Index No.)            | Contribution   |
|---------------------------------------|--|
| <b>D.M.D.P.Dissanayaka ( 230155J)</b> | PCB design, Testing & debugging, Circuit design, Breadboard implementation |
| <b>K.G.T.N.Dhananjaya (230138K)</b>   | Circuit design, Circuit simulation, Enclosure design, Filter calculations, |
| <b>W.U.Deshan (230130E)</b>           | Breadboard implementation, Circuit design, Testing, Soldering, Assembling, |
| <b>W.A.S.Nuwanaka (230449N)</b>       | Breadboard implementation, Testing, Soldering, Assembling,                 |

# THANK YOU

