

# High Frequency Amplifier

## Description

An amplifier is an electronic device that can increase the power of a signal (a time varying voltage or current). Depending on its frequency of operation we have several types of amplifiers. As name suggests high frequency amplifiers are designed to operate at high frequencies. These have a vast variety of applications like telecommunication, high-speed electronic measurements, laser research and photonic research.

When designing a high frequency amplifier, factors like bandwidth, low noise, high gain and noise immunity are extremely important.

Your project is to build a high frequency amplifier using transistors which can drive a head-phone.

## Outcomes

1. Design a high frequency amplifier which can drive a load impedance of  $8\Omega$  (head-phone).
2. The design must be compatible with working 12V.
3. The design must be able to amplify a sine wave of 0.1V (peak-peak voltage).
4. The design must be work in the frequency range of 20 kHz – 100kHz (Bandwidth requirement)
5. The design must consist of minimum 3 numbers of transistors (usage of op-amps are prohibited).
6. Apart from the demonstration, a datasheet must be provided for the design.

## Additional Information

- Any change of project specifications is negotiable only before the mid review.
- You should be able to justify the component selection in your design.
- All the circuits **must** be simulated using software (**Ex- LT Spice, Multisim, PLECS** etc.) before the implementation.
- All the circuits **must** be designed using professional software used in electronic product design and manufacturing. (**Ex – Orcad, Altium Designer**)
- Complete set of design and manufacturing documents such as **Schematics, Layout, 3D Model, Gerber files, Assembly files, Bill of Materials (BOM)** etc. **must** be generated and properly documented.
- It is **encouraged** to procure materials/components from a reputable electronic component distributor such as **Mouser, Digi-Key, Arrow Electronics, LCSC** etc. (Latter two suppliers offer affordable shipping options.)

- It is **encouraged** to outsource PCB manufacturing to external suppliers (**Ex- PCBWay, JLCPCB** etc.), and **discouraged** from making PCBs inhouse.
- **Main functionality** of the project **must** be achieved with basic electronics components such as **Resistors, Capacitors, Inductors, Diodes, Transistors and other analog Integrated Circuits**. Using any other pre-built **programmable** ICs are **prohibited**.
- Microcontrollers can be **only** used for User Interface operation.
- Enclosure design must be done using a professional software. (**Ex-SOLIDWORKS** etc.)
- Enclosure and 3D Model of the circuit **must** be **assembled** and **inspected** before manufacturing.
- 3D printing, Laser Cutting and Sheet Metal bending can be used to manufacture the enclosure.

## Supervisors

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