

FEW TRANSISTOR AMPLIFIER CIRCUITS

This article is a list of various types of amplifier circuits built using Transistors alone. This includes a Class AB amplifier using 4 transistors, then we have a headphone amplifier circuit and finally a low power amplifier using transistor. This article is solely dedicated to publish more transistor amplifier circuits. So you may keep visiting this post in future for more updates.

List of Transistor Amplifiers

1. [Class AB 4 Transistor Amplifier](#)
2. [Headphone Amplifier using Transistors](#)
3. [A Low cost amplifier circuit using Transistor](#)

These are circuits that can be used in a lot of low scale applications. The main feature of these circuits is that they all are just basic designs and the components used can be easily obtained from your junk box. More over the value of the components are not very critical and slight variations in it will not affect the performance.

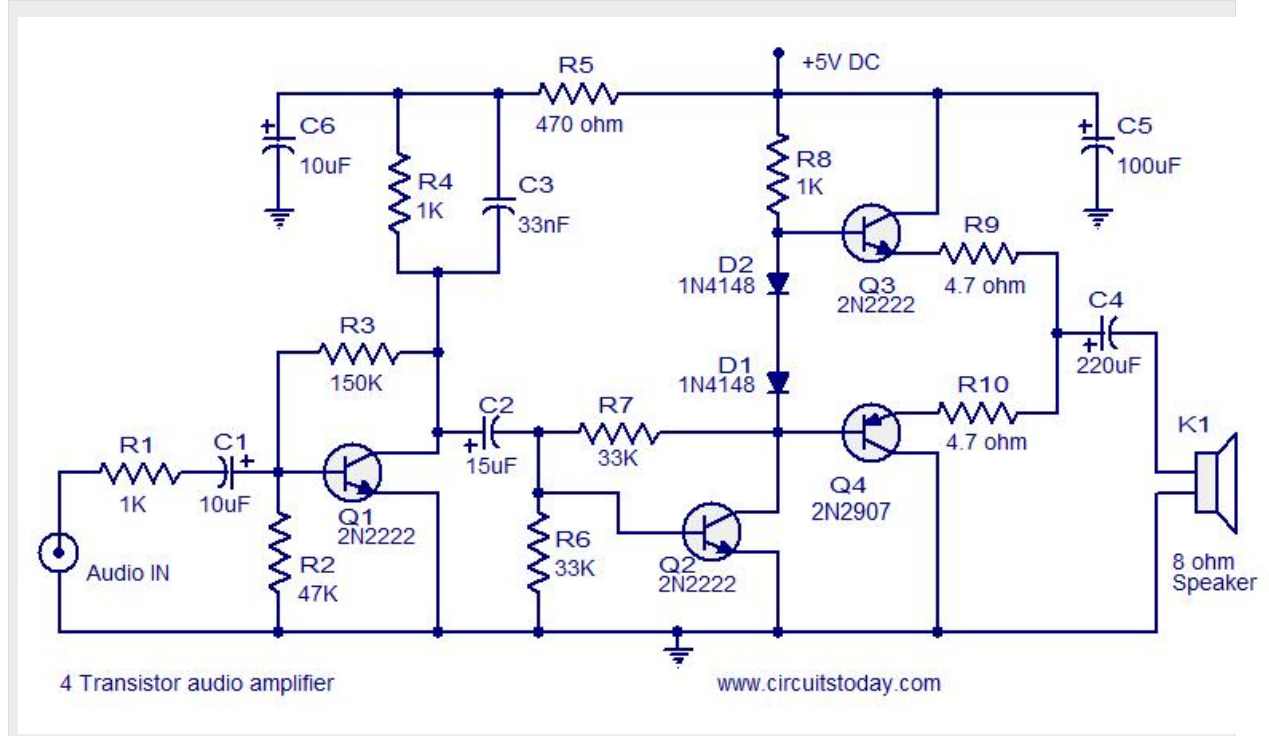
1. 4 Transistor Class AB amplifier.

Description.

A very simple and easy to build class AB audio amplifier using four transistors is shown here. In class AB operation each output device conducts more than half of the input signal cycle. Up to 78% efficiency is possible with class AB designs and cross over distortion is reduced. The circuit shown here is suitable for small radio receivers, audio players, intercom, telephone etc.

Transistor Q1 with its associated components is wired as a pre amplifier stage. The audio input is coupled to the base of Q1 through resistor R1 and capacitor C1. Resistor R3 provides collector to base bias for Q1 and C3 is an AC by pass capacitor for the collector resistor R4. Collector to base biasing is a good method of biasing for circuits like this as it provides enough negative feedback, prevents thermal runaway and stabilizes the operating point. The second stage is the driver stage for the push pull pair. Q2 with its associated components perform this job. This stage is also collector to base biased and its input is coupled to the output of the preamplifier stage using capacitor C2. Resistor R8 limits the collector current of Q2. The third stage is the class AB push pull section comprising of transistors Q3 and Q4. Diodes D1 and D2 provides the bias voltage for the push pull stage. The output of the amplifier is coupled to the loud speaker through the capacitor C4. C5 and C6 are power supply filter capacitors.

Circuit diagram of 4 transistor amplifier.



4 Transistor Class AB amplifier

Notes.

- ❑ The circuit can be assembled on a vero board.
- ❑ K1 can be an 8 ohm/5W speaker.
- ❑ C6 must be grounded near to the Q1 and C5 must be grounded near to the loud speaker ground. This reduces noise.
- ❑ Use 5V DC for powering the circuit.

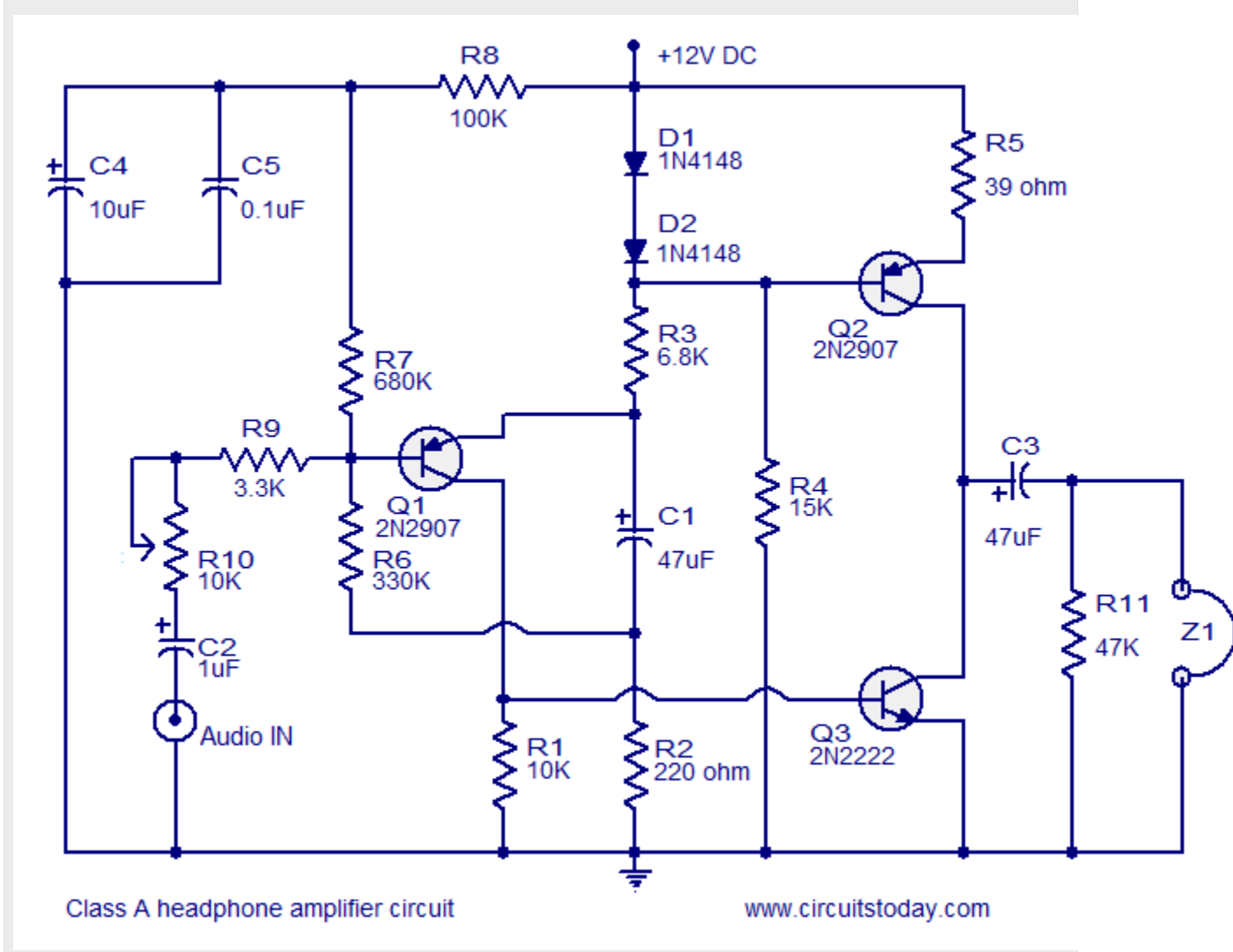
2. Class A Headphone amplifier.

Description.

This is the circuit diagram of a Headphone amplifier operating in the class A push pull mode. In class A mode the output device (transistors) conduct over the entire input signal cycle. The maximum possible efficiency for Class A operation is 50% and it further reduces when capacitive coupling is used. But the advantages of Class AB amplifier are no cross over distortion, high fidelity and low harmonic distortion. These amplifiers are most suitable for low power applications.

In the circuit transistor Q1 works as the preamplifier. Resistors R6 and R7 provides potential divider biasing for Q1. Audio input is coupled to the base of Q1 through capacitor C2, resistor R9 and POT R10. Emitter of Q1 is coupled to the base of Q2 through resistor R3. Diodes D1 and D2 provides bias voltage for Q2. Base of Q3 is directly coupled to the collector of Q1. Resistor R5 limits the collector current of Q2 and Q3. C4 and C5 are power supply filter capacitors. Output of the amplifier is coupled to the head phone using the capacitor C3.

Circuit diagram of head phone amplifier.



Head phone amplifier Class A

Notes.

- ☐ The circuit can be assembled on a vero/perf board.
- ☐ Power supply can be anything between 6 to 24V DC.
- ☐ I used 12V DC for powering the circuit.
- ☐ Z1 can be a 100 ohms or higher head phone.
- ☐ Electrolytic capacitors voltage rating must be according to the supply voltage you use.

3.Low power transistor amplifier circuit

Description.

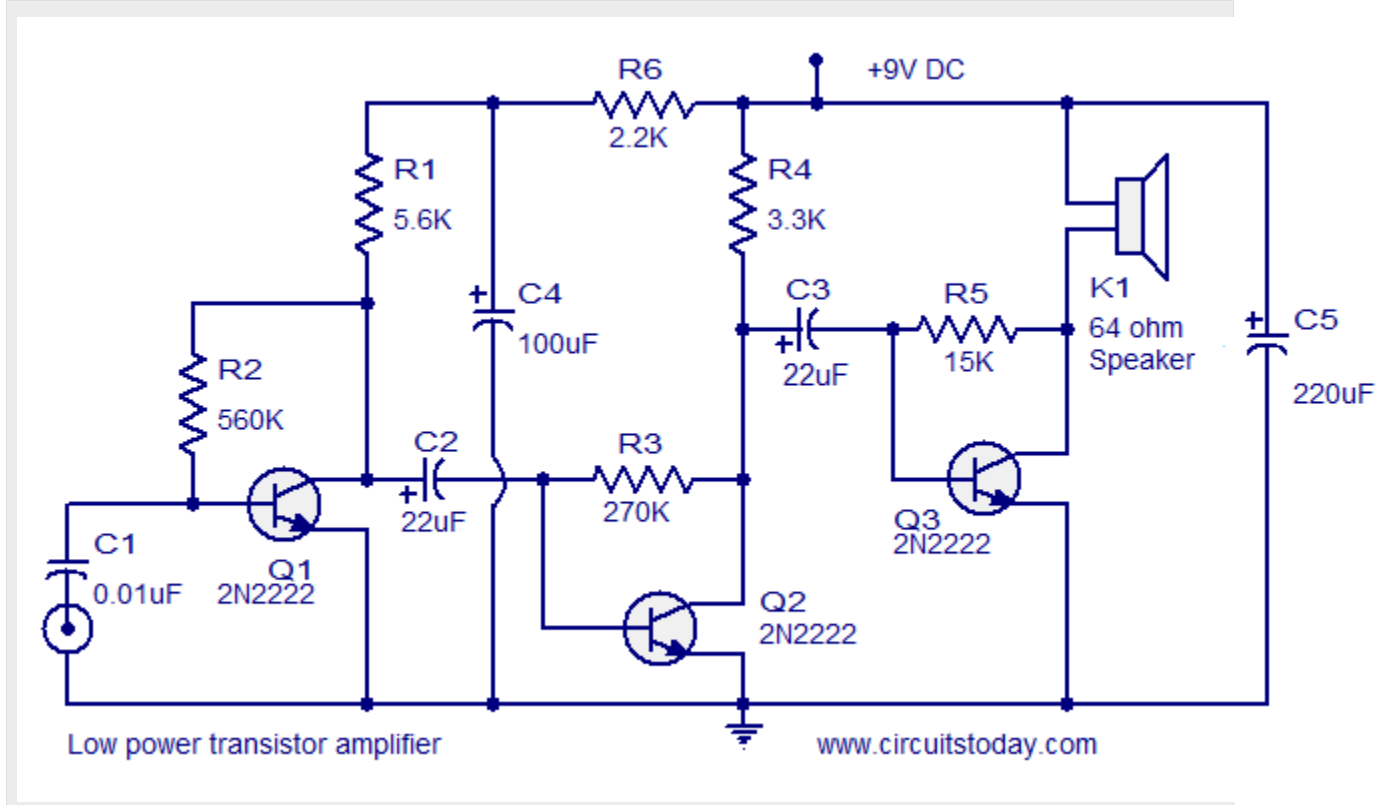
A very simple low power three stage transistor amplifier circuit is shown below. First and second stages are pre amplifiers and third is the output stage. Collector to base biasing is employed for each stages and it is enough for circuits like this.

Collector to base biasing: Consider the first stage. $R1$ is the collector resistor and $R2$ is the base resistor. This type of biasing provides some negative feedback, avoids thermal runaway and stabilizes the operating point. When the temperature increases the collector current also increases. This increases the voltage drop across the collector resistance $R1$ and this decreases the voltage drop across base resistor $R2$. As a result, base current drops which in turn drops the collector current and thermal runaway is avoided. Stabilization of operating point is achieved by the prevention of variation in collector current with temperature.

When a transistor amplifier is operating, the collector voltage will be phase opposite to the input signal. Since base resistor $R2$ is connected between collector and base, some fraction of the phase opposite collector voltage is fed back to the input (base) through the base resistor $R2$ and thus negative feedback is achieved. Negative feed back reduces the voltage gain of the amplifier but it improves the stability.

In the circuit collector of $Q1$ is coupled to the base of $Q2$ using the capacitor $C2$. $R3$ is the biasing resistor for $Q2$ and $R4$ is its collector resistor. Collector of $Q2$ is coupled to the base of $Q3$ using the capacitor $C3$. $R5$ is the biasing resistor for $Q3$ and speaker is connected as the collector load. Capacitors $C4$ and $C5$ are filters. $C1$ is the input DC decoupling capacitor.

Circuit diagram of low power transistor amplifier.



Low power transistor amplifier

Notes.

- ❑ The circuit can be assembled on vero or perf board.
- ❑ Use 9V DC for powering the circuit. A 9V PP3 battery is fine.
- ❑ All electrolytic capacitors must be rated 10 or 15V.
- ❑ An optional protection diode can be added in series to the positive supply line. This protects the circuit from accidental polarity reversals.
- ❑ Type number of the transistors are not very critical. Replacement will not affect the performance to a great extent.
- ❑ Powering the circuit using a mains adapter will induce some noise.
- ❑ Speaker impedance can be 64 ohms or more.

Source :<http://www.circuitstoday.com/few-transistor-amplifier-circuits>