

Projecte Bàsic d'Enginyeria: Puzzle 1

Main classes of audio amplifiers

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1 Introduction

The job of amplifiers is to amplify the waveform introducing as little as possible distortion. They are built mainly by transistors or vacuum valves.

Typically denoted by a letter or two, the most common audio amplifier classes are A, B, A/B, C and D.

2 Classes of Audio Amplifiers

2.1 Class A

Class A consumes high continuous currents from its power supply, which implies heat that has to be dissipated. That signifies low performance since a lot of energy is lost, instead, they provide a lot of quality.

That class is used in audio circuits and high-end appliances.

Its efficiency is between 20 % and 30 %.

2.2 Class B

Class B, also called "Push-Pull", is characterized by having almost zero intensity through its transistors when there is no signal at the circuit input. The consumption is lower than in class A although the quality also decreases.

Despite its obvious strength, the odds of seeing an amplifier of this class are low. The reason for this is known as "cross distortion". This is a delay in the handoff between the devices controlling the positive and negative parts of the waveform.

That class is used in telephone systems and portable security transmitters.

Its efficiency is between 75 % and 85 %.

2.3 Class A/B

Class A/B combines the best of Classes A and B to create an amplifier without the drawbacks of either (with large signals they behave like a class B, but with small signals, they do not present the zero-crossing distortion of class B).

This class is the most common in audio because of having high quality and performance. Its efficiency is between 50 % and 70 %.

2.4 Class C

Class C is very similar to B. It differs in that its state of rest is located in the saturation zone with high current. The class C amplifier is exclusive for RF signals. The main feature of this amplifier is that the active element conducts less than 180°, from a sinusoidal signal applied to its input. That is, it amplifies only a portion of the signal.

Its efficiency is between 75 % and 85 %.

2.5 Class D

Class D amplifiers have high energy performance, in some cases higher than 90 percent, which reduces the necessary surface area of heat sinks, and therefore the overall size and weight of the circuit.

The problem they have is that they generate electromagnetic radiation, they are full of coils and they need a thorough design since it can interfere virtually with everything nearby.

Its efficiency is over 90 %.

2.6 Other Common Amplifier Classes

There are other types of amplifiers that are not used as often. They have been created to improve efficiency in some specific cases. Some examples are those of class G, class H, class T, ...

The problem they have is their cost. They are more expensive than the others.

3 Summary

Although we can use most amplifier classes in our project without problems, we must look at them to find the most appropriate. As we have seen, the main differences between the various types are the cost, the efficiency of the amplifier and, although less important, the weight.

4 Bibliography

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