7 Types of Capacitors and Their Uses

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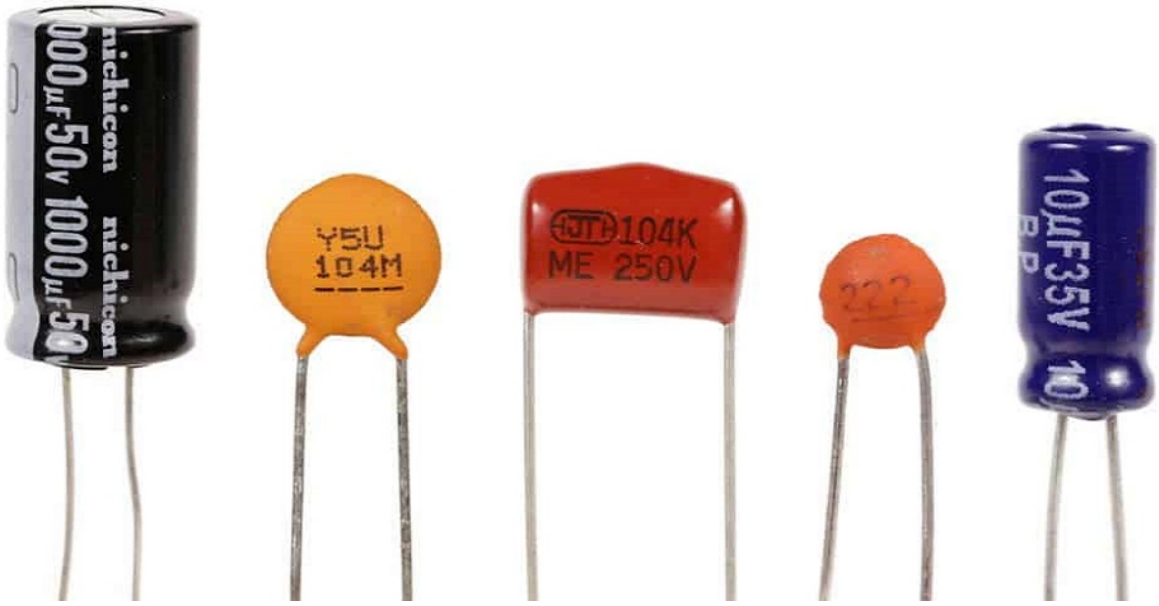

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You may already know a bit about capacitors and probably want to know more about different types of capacitors to expand your knowledge. In this article from Linquip, we will explain the most popular capacitor types and enable you to understand each and every one of them in detail. Keep on reading.

Different Types of Capacitors

There are two major types of capacitors: Fixed Capacitors and Variable Capacitors. These two contain different types of capacitors including non-polarized and polarized for the fixed group and tuning and trimming for the variable group. But how do they work?

First, let’s take one step back: The structure of a simple capacitor! These systems usually contain two conducting plates. These plates are normally separated with the help of an insulating layer. Due to different needs in different applications, multiple types of capacitors have been designed, each suitable for specific purposes.

For example, small value capacitors are the components of electric filters and tuned circuits in electronic circuits. They can also help with power supply systems for smoothing rectified current. These small value capacitors can also work when there’s a need to couple signals between different stages of amplifiers. Larger value capacitors are also useful in electrical circuits to work as energy storage or for power factor correction.

1. **Fixed Capacitors**

   Fixed capacitors are among the major types of capacitors. These ones have fixed capacitance values.

2. **Variable Capacitors**

   These ones, on the contrary, have adjustable capacitance values (these values are tunable.)

Although some people believe that fixed capacitors are more important, the variable ones come in handy in many situations as well.

Fixed capacitors contain different types such as:

1. Ceramic capacitors
2. Electrolytic capacitors
3. Film and paper capacitors
4. Super capacitors

5. Glass, air-gap, vacuum, silicon, silver mica capacitors

Some capacitors are also named based on their application such as a motor capacitor, suppression capacitor, power capacitor, DC-link capacitor, audio crossover capacitor, snubber capacitor, lighting ballast capacitor, coupling, bypassing, or decoupling capacitor.

These types can be further categorized into two major groups: Polarized and Non-Polarized. For example, film capacitors and ceramic capacitors are among non-polarized ones; while super capacitors are electrolytic capacitors are in the polarized group.

Ceramic capacitor

Among popular types of capacitors, you can easily spot the name of ceramic capacitors. This capacitor type can help out in many different applications such as audio and RF due to their economical prices as well as their reliability. Ceramic capacitor values start from a few pico-farads up to 0.1 micro-farads. Their loss factor depends on the dielectric in the system, but all in all, the number is still considered to be particularly low.

Electrolytic capacitor

This polarized capacitor type is great for low-frequency applications such as audio coupling and power supplies applications. They can provide high capacitance values that are usually somewhere above 1μF.

Film and paper capacitors

Different film capacitors such as polystyrene film capacitors and metalized polyester film capacitors have been designed to suit specific needs. The polystyrene film capacitors are among economical types of capacitors that contain limited frequency response up to a few hundred kHz. They also provide a close tolerance capacitor for necessary applications. The polyester film capacitor provides a tolerance of 5% or 10% which is considered to be low but the good news is they are also cheap. The metalized polyester film capacitor is made from a polyester film capacitor that is metalized. They are considerably smaller than regular polyester film capacitors since their electrodes are thin and hence, the ability to fit into a relatively smaller package.

Super capacitors

The super capacitor also goes by the name “supercap” or “ultra-capacitor”. This capacitor is also among popular types of capacitors and provides very large values of capacitance considered to be up to several thousand Farads. They are popular in automotive applications as well as within systems that require a memory hold-up supply.

Silver Mica capacitor

This capacitor type provides a relatively higher level of stability. They also offer very high accuracy as well as low loss. Silver mica capacitors are normally used for RF applications providing maximum values of 1000 pF. Although useful, they are not as popular as the rest of the capacitors mentioned in this article.

Glass capacitor

This capacitor uses glass as the dielectric and hence the name. They have high levels of performance due to their low loss. Glass capacitors have high RF current capability as well. Because of their structure and their use, glass capacitors are considered to be among the expensive capacitors on the market.

Tantalum capacitor

This capacitor type is considered to be a polarized one and provides a very high capacitance level. Although they are great when it comes to high capacitance level, high ripple currents or voltages above their working voltage is not suitable for them.

Polycarbonate capacitor

These capacitors have a very high tolerance and are suitable for systems that need very high reliability as well as great performance. Polycarbonate capacitors have been designed in a way to hold their capacitance value over time. They can also remain stable in a temperature ranging from -55°C to +125°C which is considered to be a very wide range. Just like silver mica capacitors, polycarbonate capacitors are also low in popularity.