When to use electrolytic capacitor

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Some of the most common applications and uses for electrolytic capacitors are:

Capacitors are one of the main components in all electronic devices and are vital to their operation. In modern electronics, you will most commonly find ceramic capacitors decoupling power supplies for almost every integrated circuit (IC) on a circuit board or aluminum electrolytic capacitors as bulk capacitance for a voltage regulator. However, capacitors are used in far more applications than just bypassing noise, and there are many more types of capacitors than only ceramic analog suppliers and aluminum electrolytic.

Different types of capacitors are used for:

In this article, we"re going to look at all the different types of capacitors, where they might be used, and common capacitor voltages. While we might think of capacitors as being a stable technology that hasn"t changed in decades, the reality is that capacitor today is very different from just a decade ago, never mind 20 years in the past. Applications you would never imagine using a certain type of capacitor for in the past are perfectly reasonable today with the advances in capacitor technology. In contrast, while some capacitors today might be thought of as obsolete with no practical applications compared to other capacitor types, they still have their niche applications at which they excel at.

Although all the different types of capacitors provide capacitance - they are not all equal. Capacitance is not the only critical parameter when selecting a capacitor, and each type of capacitor is used in different applications, so sometimes making the right choice is not an easy task. It would be best if you considered capacitance, maximum voltage, equivalent series resistance (ESR), equivalent series inductance (ESL), longevity, size, price, availability, parameters that change with temperature, and so on. For example, when choosing a bypass capacitor, the ESR and ESL parameters are essential. On the other hand, when choosing a capacitor for energy storage or sudden load change, current leakage can be more critical.

Choosing your capacitor primarily depends on your application and budget constraints. The price of capacitors can vary, from less than a cent to more than $100.

Let"s take a look at the capacitor types, where they are used, and when one is more suitable than another.

Ceramic capacitors are one of the most popular and common types of capacitors. In the early days, ceramic capacitors had very low capacitance, but nowadays, this is not the case. Multilayer ceramic capacitors (MLCC) are used extensively in circuits; their capacitance rating can reach hundreds of microfarads (uF). Modern ceramic capacitors can be used in place of other capacitor types for dated hardware/designs, such as electrolytic or tantalum. The difference between an electrolytic capacitor and a ceramic capacitor is the latter offers higher performance at a lower cost.

MLCCs have a ceramic dielectric body, which is a mixture of finely ground granules of para-electric or ferroelectric materials and other components to achieve the desired parameters. They have multiple layers of electrodes which create the capacitance. The ceramic is sintered at high temperatures to form the electrical and mechanical basis of the capacitor.

The ceramic layers are usually very thin; however, this depends on the voltage rating of the component. The higher the voltage, the greater the thickness and size of the capacitor for the same capacitance. The capacitor is usually protected from moisture and other contaminants by a thin coating.

MLCCs are not only popular because they are compact with relatively high capacitance, but also because they are critical for many applications where the electrolytic type would be completely unsuitable. As an often overlooked advantage, ceramic capacitors generally will not burst into flames or explode if you don"t treat them right. They do not have a polarity and can have voltages significantly beyond their ratings applied to them with no damage to the capacitor itself. In contrast, aluminum electrolytic and especially tantalum vs. ceramic capacitor have a tendency to turn into little rocket motors or explode if even a minor reverse voltage is applied to them, or their ratings are even slightly exceeded.

Other advantages of this type of capacitor: