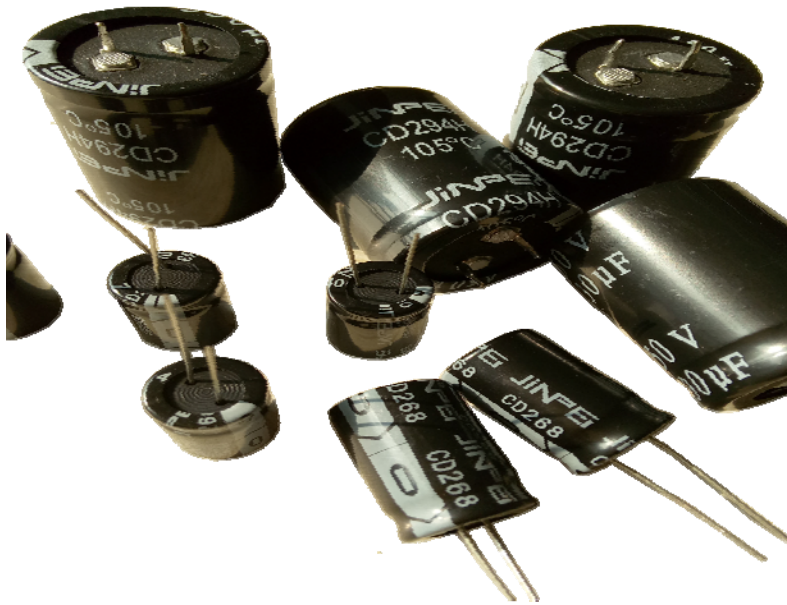


The present situation and the development of electrolytic capacitor

Capacitor is the most widely used, dosage the biggest, and irreplaceable electronic components, its production accounted for about 40% of the electronic components, and electrolytic capacitor of three types of capacitors, electrolytic capacitors, ceramic capacitors, organic film capacitor) production of 36. 8%. Electrolytic capacitor is our country one of the fastest growing components in ten years, at present, the total annual production of domestic electrolytic capacitor close to 25 billion, the average annual growth rate of high of 28%, about a third of the global electrolytic capacitor production. In the process of development, from aluminum electrolytic capacitors and improvement of integrated circuit, the whole circuit under high pressure, high frequency, long life, small capacity other capacitor in the application field, such as multilayer monolithic ceramic capacitors, metallized film capacitor, tantalum electrolytic capacitor, etc.) of the permeable. Electrolytic capacitor is in itself continuously improve, improve and create new. Especially with the improvement of the development of science and technology, social demand, the improvement of the environment, the birth of the new type of machine, high pressure in small type, type and broaden the application field of aluminum electrolytic capacitors have large capacity, demand is growing. Therefore, especially LOW ESR electrolytic capacitors and long life electrolytic capacitor will not shrink, but also has more strong vitality and broad space for development, there will be a faster growth.



The structure and performance characteristics of electrolytic capacitor

Capacitance per unit volume is very large, electrolytic capacitor of capacitance per unit volume capacitor several times to dozens times than others. Nominal capacity is very large, because of using electrolytic capacitor winding structure is easy to enlarge the volume, therefore, can be easily done hundreds of thousands of micro method for ferrari even rated capacity. Have self-healing effect, because there are electrolyte capacitor inside, in the work, the capacitor anode aluminum foil on the dielectric in the event of local failure, the O₂ or OH or acid radical ions in the electrolyte under the action of electric field force, quickly reached the damage position, will damage location obstructed, and will break the oxide film repair, capacitor returned to normal state. Working electric field intensity is high, because the anodic oxide film in the form Cheng per volt grow about 1.4 nm, i.e., anodic oxidation film growth at the time of the electric field intensity is about $7 \times 10^7 \text{v/cm}$, its working state under the electric field intensity is about $5 \times 10^7 \text{v/cm}$, this value is far greater than ceramic capacitors and film capacitor electric field intensity of work. Price advantage, because the main raw material for manufacturing aluminum

electrolytic capacitor use is ordinary industry material, used equipment belong to the general industrial equipment, automation degree is high, so the manufacturing cost is relatively low, particularly the unit capacity of manufacturing cost compared with other types of capacitor have overwhelming advantages.

The disadvantages of electrolytic capacitor

Polarity and the possibility of leakage, because there are a polarity, electrolytic capacitor when use must pay attention to the correct connection is negative, otherwise not only play a role of the capacitor, and the leakage current is very big, inside short time capacitor fever, destroy the oxide film, and damage. Aluminum electrolytic capacitor with aluminum shell and the rubber plug seal, when working electrolyte by thermal gasification, easily from the root of the lead. Capacitor after work for a long time, cause the electrolyte dried up, the capacitor loss effect, this is one of the main failure modes of electrolytic capacitor. Loss tangent value is bigger, temperature and frequency characteristics are relatively poor, working electrolyte in the aluminum electrolytic capacitor cathode role, because the working electrolyte is ionic conductors, and the rate of movement of the ion movement speed is much slower than electronic, causes the working electrolyte conductivity is lower than electronic conductor of electric conductivity. To dip the conductivity after electrolytic paper fall further, therefore, working electrolyte caused by equivalent series resistance than that of the other capacitor equivalent series resistance caused by metal electrodes, which result in the loss tangent of electrolytic capacitor value is bigger, and frequency characteristics are relatively poor. In addition, due to the conductivity of liquid materials is affected by temperature is relatively large, so the temperature characteristic of electrolytic capacitor is relatively poor; Aging, although working electrolyte USES weak acid/its salt as electrolyte, water and organic solvent as solvent, but still has certain corrosion resistance, the capacitor anodic oxide film and rubber plug has certain erosion. In addition, with the passage of time between electrolyte salts and the solvent Can also occur certain chemical reactions. These phenomena will lead to performance degradation of capacitor.

In conclusion, although aluminum electrolytic capacitor has certain drawbacks, limits its application in some occasions, but because of its high capacity and price advantage and other significant advantages, make it with ceramic capacitors, film capacitors, tantalum capacitors of competition firmly occupy more than 30% of the share. As automotive electronics, frequency conversion technology, etc. The development of power electronic technology, the proportion will have rise significantly.

The vitality of electrolytic capacitor

With the development of science and technology, especially the integrated circuit (IC), and the development of very large scale integrated circuit (VLSI), the capacitor industry sustainable development, and even no living space has been doubted, however, since 1987, the global production of capacitor is growing at more than 20% a year, suspicion will not attack since the break. Practice has proved particularly LOW ESR electrolytic capacitors and long life electrolytic capacitor with strong vitality.

IC can not replace the development of aluminum electrolytic capacitor

On the one hand, due to the presence of IC part of small capacity of the capacitor was integrated into the internal circuit; IC, on the other hand, the development of the working frequency of the circuit system increases greatly, lead to aluminum electrolytic capacitor in part by other capacitor in the circuit

To be replaced. However, IC circuit of power supply is always inseparable from the electrolytic capacitor. In addition, the improvement of the performance of the electrolytic capacitor itself also expand to the other capacitor applications. Machine circuit changes only changed the electrolytic capacitor, switch power supply volume shrinking, the energy conversion efficiency increases unceasingly, makes the work frequency of the switch power supply continuously increases (20 ~ 500 KHZ, or even more than 1 MHZ), lead to increase the output part of the high frequency noise, in order to effectively filter, you must use the ultra high frequency impedance and low equivalent series resistance (ESR) capacitor.

Other complementary capacitors and electrolytic capacitors

Multilayer monolithic ceramic capacitor used medium ceramic unceasing development, increasing dielectric constant, coupled with its high frequency performance is good and favorable conditions such as chip in the low pressure applications of small capacity has a certain advantage.

Metallized film preparation technology constantly improve, make the film pressure resistance is greatly increased, in addition, the film capacitor has advantages of high reliability, low ESR, high pressure in the film capacitor in small capacity in the use of special skill.

Tantalum capacitors, not only has excellent temperature and frequency characteristic, and has the advantages of chip in low pressure application field of medium and small capacity has a certain growth.

Electric double layer capacitor materials and preparation technology progress, greatly reduce the ESR, make its application field of large amount of capacity at low pressure is competitive.

Thus, in the high pressure large capacity are not under the impact of the other capacitor, electrolytic capacitor has its unique advantages. In addition, the low pressure little capacity, although there is competition, the way out is to speed up research and development of technology, to strengthen and continue to expand the existing advantages, electrolytic capacitor to overcome its own shortcomings. In recent years, JINPEI electrolytic capacitor manufacturers of LOW ESR electrolytic capacitors and long life electrolytic capacitor has made great breakthrough in many ways, and to achieve a qualitative leap. Not only its share of the market not narrowed, on the contrary, constantly expanding its application field, present a high-speed growth, ushered in the many unprecedented opportunities for development.