

## Reliability Issues of Electrolytic Capacitors

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### Abstract

*There are few electronic components which – carrying out the same function – can differ so much from the constitutive materials point of view as the capacitor. However, there are some families that are representative for this electronic component. In the following, the reliability of two families of electrolytic capacitors (aluminum and tantalum capacitors, respectively) is analyzed. First, for each family of electrolytic capacitors, after a short description of the design and characteristics, the main applications are described. Then, the typical failure mechanisms are detailed, the main factors that influence the reliability are identified, and some methods for diminishing their action are proposed.*

**Keywords:** Reliability, Electronic components, Electrolytic capacitors, Failure mechanisms.

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<sup>1</sup> The primary function of the dielectric is to maintain a fixed distance between the anode and the cathode to create a capacitance between them. It also acts as an insulator that blocks the flow of DC current between the electrodes. This dielectric is often fragile and uneven, requiring the cathode to be a soft material or a liquid. The liquid electrolyte also helps to reform the dielectric, meaning the electrolyte promotes the re-growth of the dielectric at a local hot spot when the capacitor has a DC bias applied across it.

<sup>2</sup> Achieving a high capacitance (on the order of  $\mu\text{F}$ ) is easy using electrolytic capacitors, but achieving a low value of inductance ( $\approx \text{pH}$ ) is difficult when using surface mount capacitors.