



V-CHIP ALUMINUM ELECTROLYTIC CAPACITORS

LIFE OF ALUMINUM ELECTROLYTIC CAPACITORS

The life of aluminum electrolytic capacitors is mainly dependent on environmental conditions (e.g. ambient temperature, humidity etc.) and electrical factors (e.g. operating temperature, ripple current etc.). Generally, the wear-out mechanism of aluminum electrolytic capacitors is based on evaporation of electrolyte through the rubber seal. Consequently, the factor of temperature (ambient temperature and internal heating due to ripple current) is the most critical to electrolytic capacitors life. The effect of voltage on capacitor life is negligible, especially for low voltage electrolytic capacitors. The lifetime of aluminum electrolytic capacitors can be expressed as following equations.

Le=Lo • Kt • Kr

Where:

- Le=Expected life at operating temperature Te(h)
- Lo=Specified life at maximum operating temperature To(h)
- Kt=Ambient temperature acceleration term
- Kr=Ripple current acceleration term

Kt=Lo • A^(To-Te)/10

Where: 其中:

- To=Maximum rated operating temperature(°C)
- Te=Actual ambient temperature(°C)
- A=Acceleration coefficient (for the range from 35°C to the maximum operating temperature, A≈2)

Kr=2^(-ΔT/5) Where:

ΔT=An increase in core temperature by internal heating due to ripple current

(ΔT=core temperature—ambient temperature)

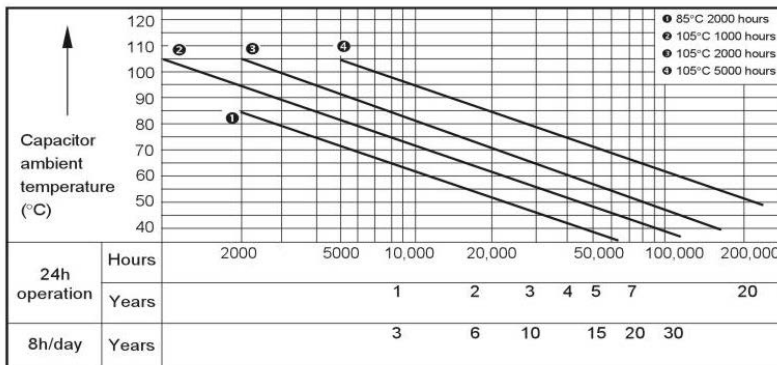
ΔT can be estimated as follows:

ΔT=(I² • R)/(β • S)

Where: 其中:

- I=Ripple current of the capacitor (A rms)
- R=Equivalent series resistance of the capacitor (Ω)
- β= Heat radiation coefficient of the aluminum can (W/°C • cm²)
- S=Surface area of the capacitor (cm²)

Quick Reference Guide of the Expected Life



NOTE: All designs and specifications are for reference only and are subject to change without prior notice. If any doubt about safety for your application, please contact us immediately for technical assistance before purchase.