

Useful life and failure rate of HITACHI's electrolytic capacitors

The criteria for the useful life occur with Hitachi electrolytic capacitors according to very strict rules.

The useful life is reached if one of 3 following criteria is reached:

1. The capacitance amounts only to 80% of the beginning value.
2. The dissipation factor reaches 200% of the specified value.
3. The leakage current reaches the specified value.

However, this means that after the achievement of the useful life the capacitor is long functioning furthermore still.

This causes the high quality of these capacitors.

The high reliability of the Hitachi electrolytic capacitors is reflected equally in the extremely low failure rate.

The failure rate is given with

$$\lambda_{HITACHI} = 0.5 \text{ FIT (Failure In Time)} \equiv 0.5 \times 10^{-9} \text{ failures/hour !}$$

Are n the number of the tested capacitors, t the application time and m the number of the defective capacitors within the application time (t and m must be chosen of course accordingly largely to receive statistically evaluateable statements), then 2 possibilities follow in general for the information of the failure rate λ

$$\lambda = \frac{m}{n} \frac{t_0}{t} \text{ FIT} \quad \text{or} \quad \lambda = \left(\frac{m \cdot t_0}{n \cdot t} 10^{-4} \right) \% / 1000h .$$

with $t_0 = 10^9 \text{ h}.$

This means

$$1 \text{ FIT} \equiv 10^{-4} \% / 1000h$$

How evidently, the failure rate λ can be given in FIT or in % failures ever 1000h.

With the concrete value $\lambda = 0.5 \text{ FIT}$ for Hitachi electrolytic capacitors follows with it

$$\lambda_{HITACHI} = 5 \cdot 10^{-5} \% / 1000h$$

With it follows the following important appraisal:

The failures of the Hitachi electrolytic capacitors are in the concrete application during the whole useful life generally less than 0.1%!!