Effects of ambient temperature to life (for reference)

Because an aluminum electrolytic capacitor is essentially an electrochemical component, increase temperatures accelerate the chemical reaction producing gas within the capacitor, diffuse the gas to outside through the end seal, and consequently accelerate a gradual decrease in capacitance and a guradual increase in tenδ and ESR, the following equation has been experimentally found to express the relationship between the temperature acceleration factor and the deterioration of the capacitor.

Where：

$Lx = Lo.Ktemp = Lo.B^{(To-Tx)/10}$

Ktemp = B(To-Tx)/10

Lx = Life time (hour) of capacitor to be estimated

Lo = Base life time (hour) of capacitor

To = Maximum rated operating temperature (℃) of capacitor shown in catalog

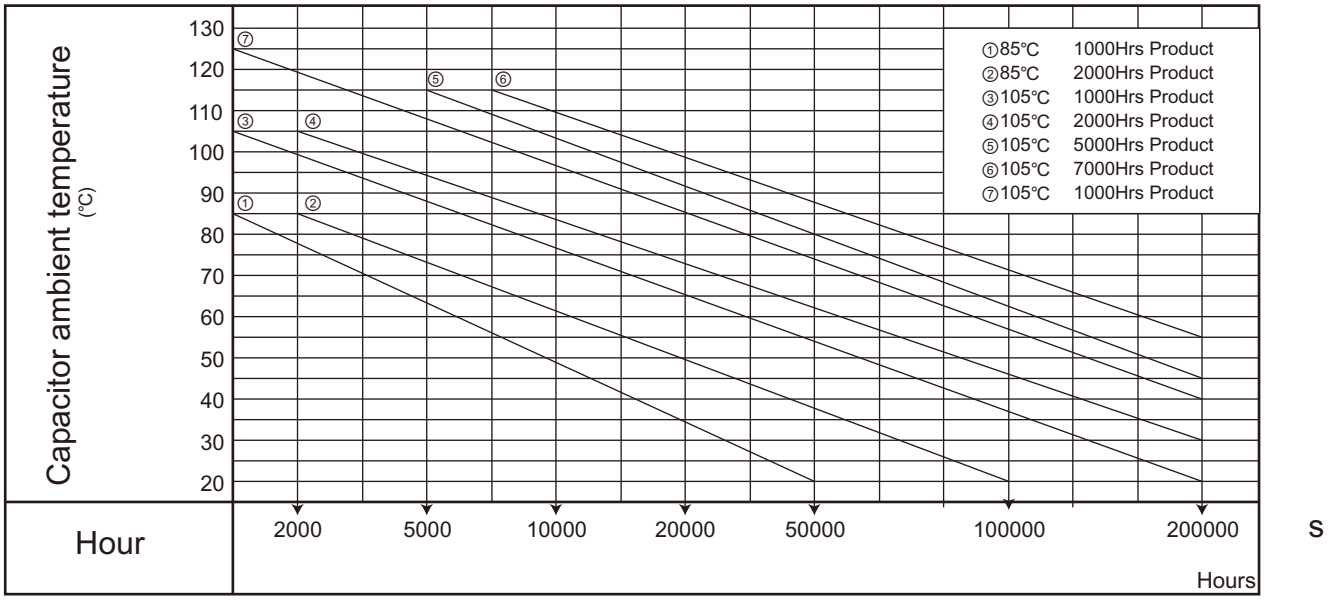
Tx = Actual ambient temperature (℃) of capacitor

B = Temperature acceleration factor (=2)

This equations is similar to Arrehenius equation that express a relationship between chemical reaction rates and temperature and called Arrehenius rule of aluminum electrolytic capacitors.

The temperature acceleration factor (B) is approximately 2 over an ambient temperature range (Tx) from 40 ℃ to the maximum rated operating temperature of the capacitor, and it means that the lifetime is approximately halved with every 10℃ rise in ambient temperature and can be extended by using the capacitors at low temperatures.

For an ambient temperature range (Tx) of 20℃ to 40℃, the factor B will be close to 2, and the lifetime will be actually extended. However, the environment where the devices are placed and their operating conditions influence ambient temperature, and in particular the ambient temperature in this range will be very inconstant. Therefore, a minimum lifetime should be estimated form the above formula by using the 40℃ as Tx.



※ 1. A guide limit of the calculated like Aimo is 15 years max

2. Tx ≧40℃