

Derating of rate voltage(U_R)

The U_R has to be derated, for operation at higher temperature and a capacitor of DC rating is used in an AC circuit.

(1) where operating temperature is high

① With all film capacitors, the voltage strength diminishes when the operating temperature is increased, due to tiny weak points in the film which under increased temperature, are subject to greater stress and can then break down.

Thus, if capacitors are used in temperature exceeds the T_R specified in each series, but without exceeding the T_{max} . specified in each series, the U_R has to be derated according to the graph in each series.

② When using at high frequency, however, since the capacitor itself has ΔT , this derating ratio cannot be applied.

(2) When a DC rated capacitor is used in an AC circuit.

The U_R of the capacitor for electronic appliance is usually indicated in the DC voltage except for special purposes.

In the case of U_R , DC voltage specifications are distinguished from AC voltage data.

Thus, if a capacitor of DC rating is used in an AC circuit, the operating AC voltage value should be derated due to heat generation or corona discharge that could take place inside the capacitor.

① at commercial frequency(50/60Hz)

The capacitors must be used within the U_{RAC} specified in each series.

② at high frequency(>60Hz)

(i) At high frequency, the allowed AC voltage drops off, because capacitors generate more heat due to higher dissipation factor with increasing frequency.

Therefore, for operation at high frequency, the U_{RAC} has to be derated.

Especially, polyester capacitors are relatively high in dissipation factor, and when use at high frequency, the ΔT increases. Use within the $\Delta T \leq 10^\circ\text{C}$ and $T_h \leq T_R$.

(ii) The derating AC voltage (permissible sinusoidal AC voltage that can be applied to capacitors) can be determined from the graphs of "Max. permissible AC rms

voltage(Urms)-frequency"specified in each series.

- (iii) Heat convection coefficient, $\tan\delta$ vary considerably depending upon material, technology, construction, geometry of each capacitor, frequency and temperature.

This complicates the calculation of Max. permissible AC rms voltage(Urms) or ΔT , under practical operating condition.

The graphs have consequently been obtained empirically, based on natural convection at $T_h = \text{max.} +85^\circ\text{C}$ and $\Delta T = 10^\circ\text{C}$.

- (iv) Operating within the AC ratings insures that;

- 1) the dielectric is not overstressed
- 2) there is no corona discharge
- 3) $\Delta T \leq 10^\circ\text{C}$

(v) Special cooling techniques or operation below $+85^\circ\text{C}$ may allow higher AC voltage operation at high frequencies.

③ The AC voltages described refer to clean sine wave form without transient.

Though AC load capability of a capacitor covers AC mains voltage range, therefore, standard electronics film capacitors are basically not suitable for operation directly connected to AC mains (e.g. across the line).

For these AC mains applications, the **MPX** series- "Noise suppression capacitors on AC mains"-which are especially designed X- capacitors, are recommended.

 If you need a further information , please contact to technical division.

工作电压降额使用

当电容工作在高于额定温度和直流电压电容工作在交流电压回路时，电容应降额使用。

(1) 工作在高温场合

①所有的薄膜电容器的耐压强度会随着温度升高而变小，由于薄膜上的微小瑕疵点在温度升高时会承受更大的电场强度而出现击穿。因此，如果电容器使用在超过每种系列型号规定的额定温度，且未超过规定的最大允许工作温度时，电容额定电压应依据每种电容系列的电压衰减系数曲线降额使用。

② 但当电容使用在高频场合时，由于电容自身的温升，上述衰减系数是不适用的。

(2) 直流电容器使用在交流回路时

除了特殊用途，使用在电子电器的电容器常常用DC电压标示额定电压。

在规定额定电压情况下，直流电压是有别于交流电压的数据。因此，如果一个直流电容器应用在交流回路，电容工作的交流电压应该降额使用，这是由于电容内部会出现发热或电晕放电现象。

① 工作在工频 (50/60Hz)

电容的交流工作电压必须在规格书范围内。

② 工作在高频 (>60Hz)

(i) 当工作在高频时，由于电容DF值会随频率增加而变大，电容产生更多的热量，因此允许交流电压会降低。所以当工作在高频时，交流额定电压需降额使用。

特殊是聚酯类薄膜电容，他们的DF值相对较高，工作在高频时温升更高。使用条件为温 $\Delta T \leq 10^\circ\text{C}$ ，且电容表面实际温度 $T_h \leq$ 电容规定额定温度 T_R 。

(ii) 允许的施加的降额交流电压决定于每款电容系列规定的“最大允许交流电压-工作频率”特性曲线。

(iii) 散热系数，损耗角正切值 ($\tan\delta$) 的变化主要取决于与电容的材料，工艺，结构，形状，和工作的频率及温度。这使最大允许交流电压或温升 ΔT 的计算变得复杂，在实际应用条件下，曲线的取得常常是在自然对流情况下，电容本体最高温度和温升 $\Delta T = 10^\circ\text{C}$ 的条件下实验而来。

(iv) 工作在交流电压下应确保：

- 1) 介质无承受过大电场强度。
- 2) 无电晕放电现象
- 3) 电容温升 $\Delta T \leq 10^\circ\text{C}$

(v) 如果使用有特别冷却方式或工作在+85℃温度以下时，允许工作在高频的交流电压下。

③ 上述的交流电压指无暂态突波电压的纯正弦波形。

尽管电容的交流负载能力覆盖了AC电源电压范围，然而，标准的电子类薄膜电容器基本不适合直接连接在交流电源电压适用（如跨接电源）。

这种交流电源电压的应用，我们推荐使用专用于抑制交流电源干扰的MPX系列X级电容。

 If you need a further information , please contact to technical division.