



**CAPACITOR
COMPETENCE**
since 1958

FILM CAPACITORS
HANDLING PRECAUTIONS



ENGINEERED SOLUTIONS

JIANGHAI EUROPE
Electronic Components GmbH

Warranty:

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Rated Voltage U_R :

Rated Voltage is the maximum operating peak voltage of either polarity but of a non-reversing type waveform, for which the capacitor has been designed, for continuous operation. The Rated Voltage is marked on the capacitor and defined in the datasheets as U_R .

Operating voltage:

The plastic film capacitor varies in the maximum applicable voltage depending on the applied voltage waveform, current waveform, frequency, ambient temperature (capacitor surface temperature), capacitance value, etc. Be sure to use capacitors within the specified values by checking the voltage waveform, current waveform, and frequency applied to them (In the application of high frequency, the permissible voltage varies with the type of the capacitor. Refer to the specification for details.).

Non-recurrent surge voltage U_S :

Peak voltage induced by a switching or any other disturbance of the system which is allowed for a limited number of times and for durations shorter than the basic period.

- Maximum duration: 50 ms / pulse

- Maximum number of occurrences: 1000 (during load)

Maximum rate of voltage rise dV/dt :

Maximum permissible repetitive rate of voltage rise of the operational voltage.

Charging and discharging:

Because the charging and discharging current of capacitor is obtained by the product of voltage rise rate (dV/dt) and capacitance, low voltage charging and discharging may also cause deterioration of capacitor such as shorting and open due to sudden charging and discharging current. When charging and discharging, pass through a resistance of $20\Omega/V$ to $1000\Omega/V$ or more to limit the current.

When connecting multiple film capacitors in parallel in withstand voltage test or life test, connect a resistance of $20\Omega/V$ to $1000\Omega/V$ or more in series to each capacitor (For detail see the specification). In addition, capacitors must be discharged via a resistor before handling. Because the capacitors do not have any discharge resistors built-in, there is a risk of residual voltages and electric energy contents that maybe dangerous.

Operating Current:

The pulse (or AC) current flowing through the capacitor is expressed as: $I = C \times dV/dt$. Due to the fact that the dissipation factor of the capacitor is greater than zero, heat will be generated in any application where alternating currents or pulses occur. The resulting internal temperature rise may cause a severe deterioration of the capacitor's withstand voltage, or may lead to a breakdown (even smoke or fire may result). Therefore, the safe use of capacitor must be within the rated voltage (or category voltage) and the permissible current ranges. The rated current must be considered by dividing into pulse current (peak current) and continuous current (rms current) depending on the break down mode, and when using, should make sure the both currents are within the permissible range.

Temperature range:

Use film capacitors only within the specified operating temperature range.

Expected lifetime:

The expected lifetime of the capacitor depends on the applied voltage and the hot spot temperature during operation. For capacitors applied in different situations, the obtainable average service lives are different. The capacitors used in DC-Link circuits will have an expected lifetime of approximately 100000 hours at rated voltage and 70°C hot spot temperature.

Insulation voltage U_i :

rms value of AC voltage designed for the insulation between terminals of the capacitor to case or earth. The insulation voltage is equal to the rated voltage of the capacitor, divided by $\sqrt{2}$, unless otherwise specified.

Voltage between terminals U_{IT} :

Voltage between terminals (at 20°C, 10s): $1.5 \times U_{RDC}$

Voltage between terminals and case U_{IC} :

Voltage between terminals and case (at 20°C, 10s): $2 \times U_i + 1000$ or $3000 (V_{AC})$, whichever value is larger.

Buzzing noise:

Any buzzing noise produced by a capacitor is caused by the vibration of the film due to the Coulomb force that is generated between the electrodes with opposite poles. If the wave-form with a high distortion rate or frequency is applied across the capacitor, the buzzing noise will become louder. But the buzzing noise is of no harm to the capacitor.

Surface over temperature $\Delta\theta_{case}$:

When current continuously flow through the capacitor, the temperature inside the capacitor will rise induced by dissipated heat. If the temperature exceeds the maximum allowed hot-spot temperature, it might cause a short circuit or fire. The limits described in the catalogue must not be exceeded and it's necessary to check the temperature on the capacitor's surface in operation.

Flame retardation:

Although flame retarding PU resin or plastic case material is used in the coating or encapsulation of plastic film capacitors, continuous exposure to high temperature ambient or fire will break the coating layer or plastic case of the capacitor, and may lead to melting and ignition of the capacitor element.

Humid ambient:

If used for a long time in a humid ambient, the capacitor might absorb humidity and oxidize the electrodes causing damage to the capacitor. In case of AC application, high humidity would increase the corona effect. This phenomenon causes a drop in capacitance and an increase of capacitor losses.

Storage conditions:

1) Capacitors must not be stored in corrosive atmospheres, particularly not when chlorides, sulfides, acids, lye, salts, organic solvents or similar substances are present.

2) It must not be stored in high temperature and/or high humidity environments. The following storage conditions must be kept (applicable only for storage in the original package):

Temperature: $\leq 35^\circ\text{C}$

Humidity: $\leq 80\% \text{ RH}$, no dew allowed on the capacitor.

Storage time: ≤ 24 months (from the date marked on the capacitor's body or on the label sticking to the package)

Mounting:

Other devices, which are mounted near the capacitor, should not touch the capacitor. Additional heat coming from other components near the capacitor may reduce the lifetime of the capacitor. Do never attempt to bend or twist the capacitor after mounting and avoid any mechanical stress on the terminals. Never exceed the max. permissible torques when tightening the terminal screws or the mounting bolt's cap nuts.

Caution during use of Capacitors:

Do not touch the terminals of capacitors. Keep the capacitor free from conductive solution, such as acids, alkali and so on. Ensure that the operating environment of the equipment into which the capacitor has been built is within the specified conditions mentioned in the catalogue or specification sheets.

Definition of electrical parameters:

Separate documents as application notes, equivalent circuit diagrams and so on are available on request.

Packaging:

Please refer to the data book for details. Further information is available on request.

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