No. 81-11E (5.1)

Operating Instructions

Capacitors for Electrical Apparatus

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⚠ CAUTION about Safety in Use

The film capacitors contain a film based dielectric which may be flammable under certain operating conditions. When in use, they can either emit smoke and/or ignite should the product be defective. It is recommended covering the surrounding resin with flame-resistant materials or case as needed particularly.

Prior to use, please make sure that failure of the film capacitors does not have any negative effects on other surrounding electronic circuit components and devices that would possibly cause damage. Proper safety measures should be taken using fail-safe protective circuit designs to help prevent other devices of becoming unsafe.
Example:

a. False operations
b. Smoke emission/ignitions

The Film Capacitors are designed and manufactured specifically for general electronic devices, including home appliance, etc..
Accordingly, it is strongly recommended that the user contact us in advance it the parts are to be used for the following devices, which require having advanced security measures.
(a) Transport Equipment (motor vehicles, airplanes, trains, ships, traffic signal controllers)
(b) Medical Equipment (life-support equipment, pacemakers for the heart, dialysis controllers)
(c) Aircraft Equipment, Aerospace Equipment (airplanes, artificial satellites, rockets, etc.)
(d) And any similar types of equipment

In use ,please evaluate and confirm the performance by yourself under installing in the apparatus. Especially check the item below and use within specs.
(a) Rated voltage
(b) Temperature on the wall of capacitor case

In the event of troubles of other parts on the circuit such as shortening and opening, provide with proper means for preventing excessive voltage, current or temperature exceeding the rating from being applied to the film capacitor

Please consult us in case that demand the specification of our company without fail and do the confirmation of the use condition and that exceeds the entry value and be indistinct when you use it.

This operating instruction guide is for the all user who are handling the capacitor for electric equipment (the equipment designer, the production worker, user, the person who checks and the equipment abandon etc). It provides important comments for safe handling and usage necessary for the capacitor performance. Please read this before use.

Contents

1. Confirmation of performance rating

Please use the capacitor within the performance rating specified in the products specifications or drawing, when confirming the conditions for operation and the conditions for the installation.
If it is beyond the conditions from specified range, please consult us and indicate the condition clearly.

(1) The surrounding conditions
- a) The range of temperature of the use and the storage
- b) The conditions about harmful gas, salt mist, moisture and oil
- c) The conditions about ozone, ultraviolet rays and radiation
- d) The conditions about the heat influence of other parts

(2) Electric conditions
- a) The maximum permissible voltage and the maximum permissible current
- b) Frequency
- c) The circuit that the rapid charge and discharge is repeated
- d) The waveform of current and voltage

(3) Mechanical conditions
- a) The conditions about vibration
- b) The conditions about shock
- c) The conditions about pull and push

(4) Conditions at the installing
- a) The insertion machines and installing processes
- b) Soldering process
- c) Washing process

2. The confirmation of design conditions

Please confirm the following item when you design the equipment for which the capacitor is used.

2-1. The temperature conditions

The temperature conditions of the capacitor is shown by the maximum permissible temperature. The maximum permissible temperature is temperature of the hottest spot on the capacitor case, when the capacitor and apparatus quipped with the capacitor are in normal operation and temperature is almost stabilized.
It is shown in temperature including a self generation-heat of the capacitor.
Please consider the selection and the installation method of the capacitor in consideration of self generation-heat by actual use.

2-2. The permissible voltage

The maximum use voltage of the capacitor do not exceed 110 % of the rated voltage shown by the highest permissible voltage.
Please increase the rated voltage of the capacitor when the voltage change exceeds 110 %.
Especially, please inquire details us, when it is used in the circuit that a transitional voltage is supplied.

2-3. The permissible current

The maximum permissible current of the capacitor is up to 130% of the ratings current. As for a transitional large current, the resisting current value is different according to the kind of each capacitor.
Especially, the metallized film capacitor uses an evaporation metal as the electrode. The electrode is taken out through the metal sprayed (metal-contact) on the element edge side. Therefore, the contact point between the evaporation metal and the metal-contact sever by fusion when a transitional large current flows. And it becomes a factor to decrease the life of the capacitor by the increase of self-generation heat for the increase of tanδ etc.
Moreover, the capacitor with protective function which processed the fuse on the evaporation metal self, it might happen a decrease of the capacitance due to sever by fusion the fuse for the transitional large current.
Please inquire details us, when it is used in the circuit that a transitional large current is charged.

2-4. The frequency

The capacitor is designed to use by the frequency of 50/60Hz unless there is any designation on the drawing. Especially, it increases generation heat of the capacitor and might influence in the life of the capacitor, when using it by a frequency any more. Please inquire details to us.

2-5. The use in a special waveform

When the capacitor is used by a special waveform except for the sine wave, the effective current value is different from rating and might exceed the permissible current. Please inquire details to us.

2-6. The groan sound

By the A.C. voltage supplied between the terminals, the coulomb's force functions between the different electrodes, and electric vibration might occur to the dielectric film. The groan sound is by the mechanical vibration. It has a trend of increase when the harmonic component element and the distortion of power-supply voltage are included. Please confirm it when using though there is no problem in the electric characteristic of the capacitor.

2-7. The selection of the capacitor suitable for the life of the equipment

Please select the capacitor which was suitable for the life of equipments used when a capacitor is used.

2-8. The use for the circuit of rapid charge and discharge

Please do not use the capacitor for the circuit which is rapid electrical charge and discharge repeatedly. An excessive inrush current might charge to the capacitor at the rapid electrical charge and discharge, and the capacitor might be deteriorated because of the current. Please inquire details to us when the capacitor used with such a circuit.

2-9. The condition for operation of the capacitor

(1) Installation condition

To install the oil-fill type capacitor, please provide enough space which specified the size on the products specification or drawing, because the oil-fill type capacitor changes the shape when the safety device is actuated.

(2) Surrounding condition

With long-term use in high-humidity environment, element absorb moisture through the case over time, it will be the factors that lead to performance degradation due to oxidation of the decline and the electrode of the insulation resistance (metallized film and metal spray part).

Make sure enough in advance to the performance and reliability when used in high humidity environments.

If the appliances will be assumed the external influences, such as a lightning surge, take safety measures such as surge protection device. At that time, set voltage, please check that is less than or equal to the withstand voltage of the capacitor.

Please do not use the capacitor in the following condition.

a) Condiion which water, salt water and oil splashes directly on, or condenses dews on.
b) Condition which harmful gas (hydrogen sulfide, sulfurous acid, nitrous acid, chlorine, and ammonia) is filled.
c) Condition to which ozone, ultraviolet rays, and radiation are irradiated more than usually.
d) Condition that extreme vibration or impact that the installation part of capacitor, connected lead wire and terminal of capacitor are transformed hangs on.

2-10. The condition for operation of the capacitor and operation of the protective function

In the case of the capacitor with protective function, though the operation of the protective function in the range of the condition for operation is secured enough, it does not sometimes operate in the case of exceed the condition for operation (Voltage and temperature, etc.). Please use capacitor within the condition for operation.

Please examine taking a protected means in safety in equipment, when it has the possibility that it exceeds the condition for operation by the fault of other parts.

2-11. The capacitor without the protective function

The protective function (processed the fuse on the metallized layer) is normally fitted in the dry capacitors of our production, however, there are some capacitors without the protective function in case of particular use, compliant specification, customers' designation, therefore, please check with your drawing & specification.

2-12. The series connection of the capacitor

In case of connecting more than one capacitor in series, please consider the balance of the actual capacitance , installation of the resistances which divide the voltage of the each capacitor equally, etc, to be sure that it is NOT over the each capacitor's spec.

3. Confirmation in installation process

3-1. Preliminary knowledge before installation

(1) Please do not use the capacitor which was installed and operated in other equipment again. It is not possible to use again except for the capacitor uninstalled to measure electric performance at the time of the periodic inspection.

(2) The restriking-voltage might be generated in the capacitor. At this time, please discharge electricity through resistance.

3-2. Attention at installation

(1) Please install it after confirming ratings of the capacitor (Rated capacitance and rated voltage).

(2) Please do not drop the capacitor to the floor etc. Do not use the dropped capacitor.

(3) Please fit the pitch of the hole of the printed circuit board to the terminal pitch of the capacitor when it installs on the printed circuit board.

(4) Please install the capacitor in the range for non-damage at the part of the installation in the case of installing the capacitor by the screw.

(5) Please do not transform the capacitor to install.

(6) Please do not load to the terminal and lead wire more than necessity. It causes disconnection or a short circuit.

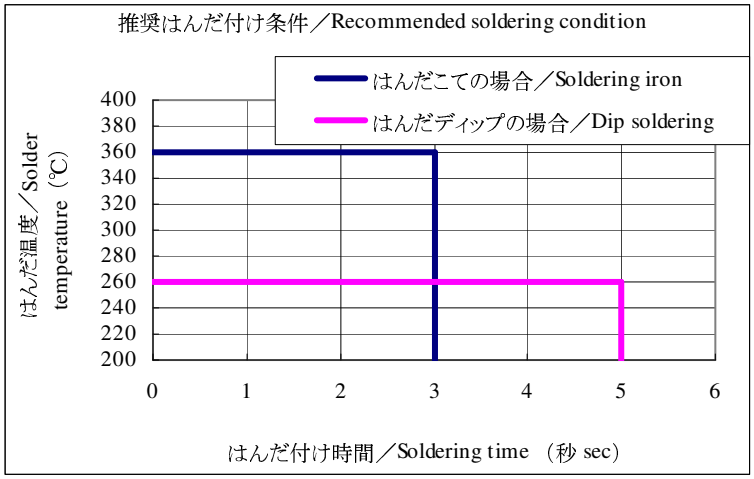
(7) When using resin coating or resin potting components to improve humidity resistance or gas resistance, or to fix parts in place. Please contact with us.

a) The solvent or the constituent in the resin may permeate into the metalized contact or electrode (aluminum foil or evaporated film) to deteriorate characteristics.

b) When hardening the resin, chemical reaction heat (curing heat generation) occurs, which may adversely affect the capacitor.

c) In the case of the lead type capacitors, be sure to test and evaluate enough for the thermal stress to the capacitor.

(8) Film capacitor is thermally sensitive components. When soldering, we recommend the following figure soldering conditions range. When using 2-tank type of soldering equipment, limit time should be the sum of both of tanks. The preheating temperature means the capacitor ambient maximum temperature, including the copper foil portion of the lower surface of the board at the time of preheating.



Example) condition(dipping solder)

Printed Circuit Board (PCB)	Thickness of board T=1.6mm±0.5mm
Pre-heating	Less than 120℃ Less than 1min (at the point of soldering on the PCB)

It should be noted that the allowable soldering conditions range is the range that does not cause deterioration of the characteristics of the capacitor.

Please set up the confirmation of conditions that can be stable soldering. When repairing and dipping twice after soldering, please be performed after the capacitor body was returned to room temperature.

However, do not dip more than three times. In the case of the soldering iron, Do not preheat.

Do not be passed through the adhesive curing oven. After adhesive curing by inserting this capacitor on a printed circuit board, do the soldering. (Damaging to the mounting heat temperature or more heat is added exterior resin, deterioration of the characteristics of the capacitor will occur.)

Do not perform reflow soldering. (Damaging to the mounting heat temperature or more heat is added exterior resin, deterioration of the characteristics of the capacitor will occur.)

3-3. Washing

Please use a solvent of alcohol based when washing.

4. Confirmation in the use

(1) Please do not touch the terminal of the capacitor directly. It will get an electric shock.

(2) Please do not the short-circuited between terminals of the capacitor by the conductor. It causes deterioration of the capacitor.

(3) Please confirm the installation environment of the equipment which installed a capacitor.

5. Confirmation for maintenance check

(1) When the capacitor does the maintenance check, please execute it after turning the switch of equipment off and completely discharging the electrical charge by resistance. It will get an electric shock when the electric charge remains in the capacitor.

(2) Please confirm the capacitance, insulation resistance, dielectric dissipation factor and electric performance specified in the specifications and drawing, etc.

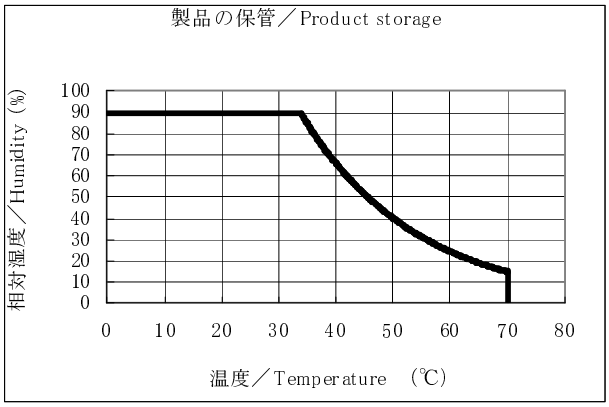
6. Confirmation in the case of emergency

(1) Please turn the power supply of the equipment off, or pull the plug of the power supply code out from the outlet, when the abnormal heat of the capacitor, fire and smoke and a bad smell occurred while using the equipment. After it confirmed that a power source was cut off., extinguish the fire promptly.

7. Confirmation of storage

Please note the following matter when keeping the capacitor.

(1) Keeping period : 1 year (under condition below)
(2) The range of temperature : Refer Graph
(3) Relative humidity : Refer Graph
(4) Keep the capacitor away from the water drops, dust, sunshine.



8. Confirmation of disposal

Please adopt either of the following method when you abandon the capacitor.

(1) Please deliver it to a special industrial waste disposal trader and reclamation, etc., when you do not incinerate the capacitor.
(2) Please incinerate after the capacitor is punctured, when the capacitor which a metal case is used for is incinerated.

9. Others (applicable regulations, laws)

(1) Foreign Exchange and Foreign Trade Control Law

When exporting this product, please export procedures in line with the export-related laws and regulations of the Foreign Exchange and Foreign Trade Law and the like.

(2) Chemical, environmentally hazardous substances

Panasonic Group "Chemical Substances Management Rank Guidelines"
http://panasonic.co.jp/procurement/data/chemical_j.pdf
To comply with the limits and the RoHS Directive banned substances that are described in the most recent edition.