NOTABILIA FOR USE OF FILM CAPACITORS

Make sure as follows before use to ensure the safety.

- **Make sure to require our specifications before use and if you have any further questions or concerns, please contact us.**
  Confirm your use condition that is within our specifications and this notabilia in use.
- **Film capacitor will emit smoke and take fire in the worst case because it uses flammable substance.**
- **If our products are used in life-threatening devices or equipment, please contact us without fail.**

Please check Guideline of notabilia for fixed plastic film capacitors for use in electronic equipment form Japan Electronics and Information Technology Industries Association (JEITA).

JEITA RCR-2350C Guideline of notabilia for fixed plastic film capacitors for use in electronic equipment

1. In designing devise circuits

1) Operating and installation environment and performance limits of capacitor
   - Confirm operating and installation environment, and use them within the performance in the catalogue and the specifications.

2) Operating environment
   - Avoid using the environments as follows
     a. It is wetted by the water, the salt water, and oil.
     b. It is filled with poisonous gas (H_2S, H_2SO_3, HNO_2, CL_2, NH_3, etc)
     c. In ozone, and it is shined with radioactive rays or ultraviolet.
     d. In case of over the performance in the catalogue and specifications of vibration and shock.

3) Operating temperature
   - Use the capacitors within the temperature range

   Operating temp. = ambient temp. + own temp. rise + Other temp. rise ≒ surface temp. of the capacitor

4) Confirmation of operating circuit (Across the line)
   - Safety performance classes of capacitors that are used in across the line, depend on standards. Select the suitable capacitor for its applied circuit.
   - Consult us, when the capacitor is applied noise immunity test that may apply high surge current to the capacitor that may cause damage to it.

5) Confirmation of operation circuit (Charge and discharge)
   - The abrupt charge and discharge of exceeding the specifications may cause damage to the characteristic performance of the capacitors or destruction to the capacitors. Consult us, if they will be used in the circuits that will be applied the abrupt charge and discharge frequently.
   - When the capacitors are applied the abrupt charge and discharge frequently at Withstanding voltage and Insulation resistance test, use series resistor (1kΩ or more) to do not over 1A. Do not use the capacitors that were had withstanding voltage test for the products that may be on the market.

6) Confirmation of operating circuit (Applied low voltage)
   - In case of applied voltage to the capacitor is low or the resister connected in series is large, it may not function the self-hearing performance and occasionally short-circuit.

7) Rated voltage
   - Use within the rated voltage specified.
     Do not apply the peak value (DC voltage + AC peak value) of surge and ripple voltage to a capacitor exceeding the rated voltage.
   - This product (DC capacitor) may be used in AC circuits. In that case, apply the voltage as follows (Table- 1).
     Do not use the capacitor in across the line (primary side of power supply).
     Some items can not be used in AC circuit (MDX, MDST3, FPS, FPD5, FPA, FPB(250VDC～630VDC) etc).

Table-1

DC Rated voltage	AC Rated voltage (50/60Hz)*1	
	Metallized polyester film capacitor MDS, MDD Series	Metallized polypropylene film capacitor FPD4 ,FPB(1250V)Series
50VDC	32VAC	-
63VDC	40VAC	-
100VDC	63VAC	63VAC
250VDC	125VAC	125VAC
400, 450VDC	200VAC	200VAC
630VDC	250VAC	250VAC
1250VDC(MDD)	500VAC	-
1250VDC(FPB)	-	125VAC

*1 Permit +10% for voltage change

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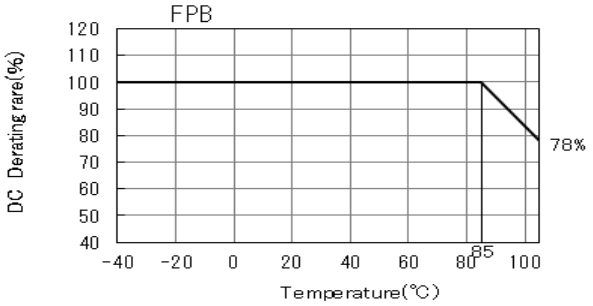
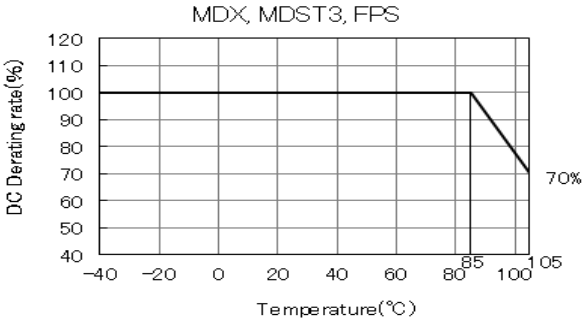
8) The relation between max operating voltage and operating temperature

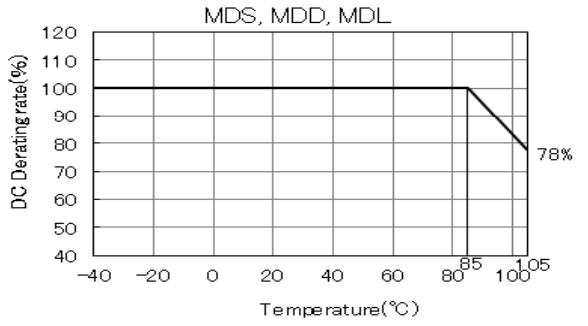
・If it is used at more than max operating temperature, derate the voltage as follows.

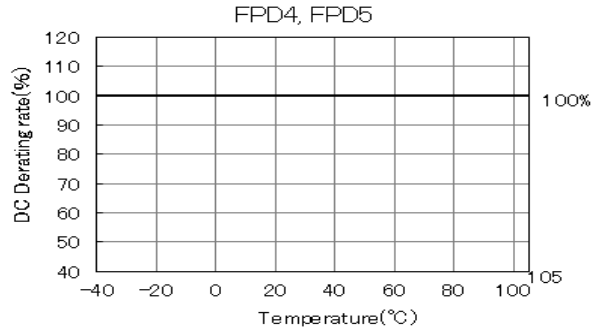
$$\text{Derating rate (\%)} = \frac{\text{Operating voltage}}{\text{Rated voltage}} \times 100$$

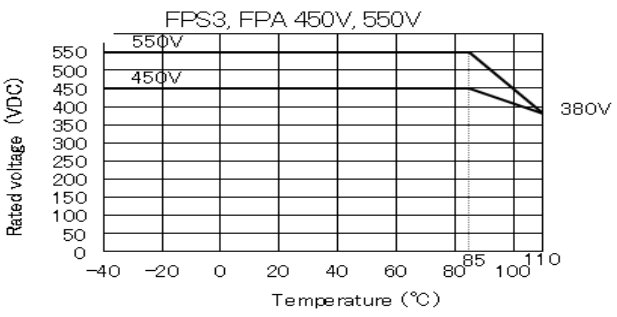
For DC











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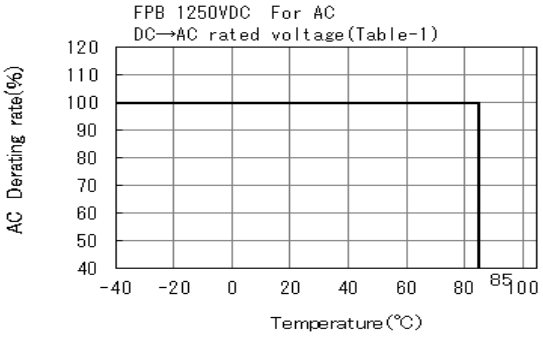

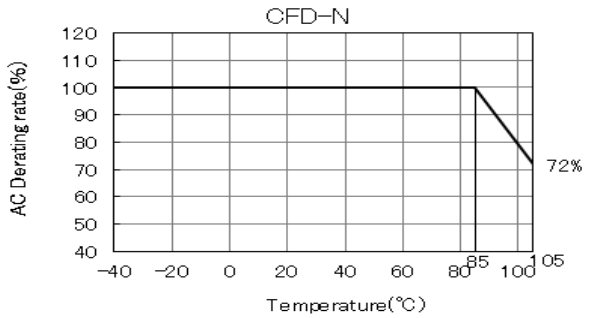

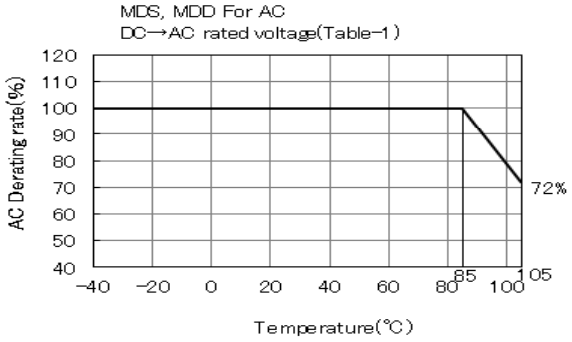

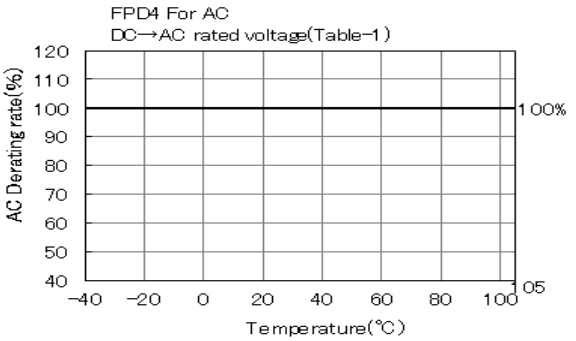

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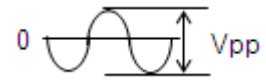
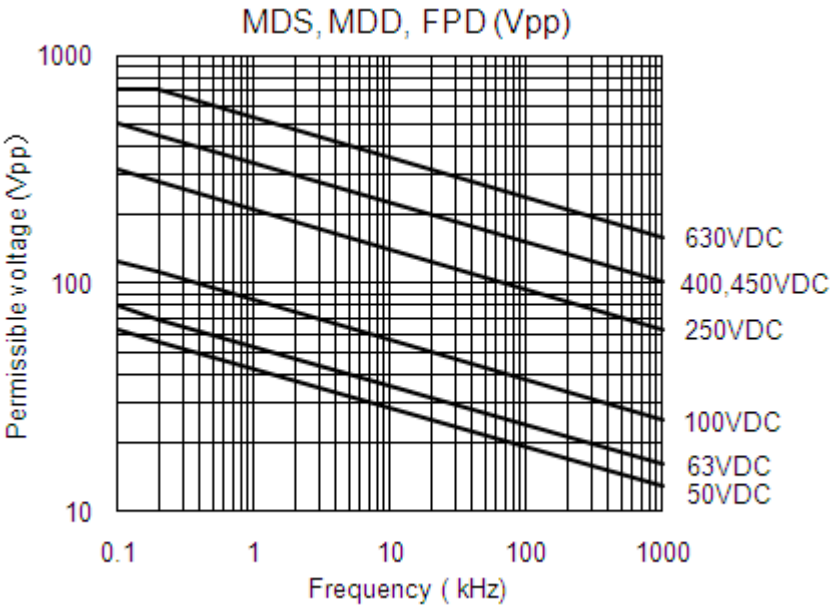
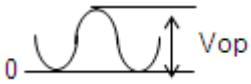
9) Using High frequency

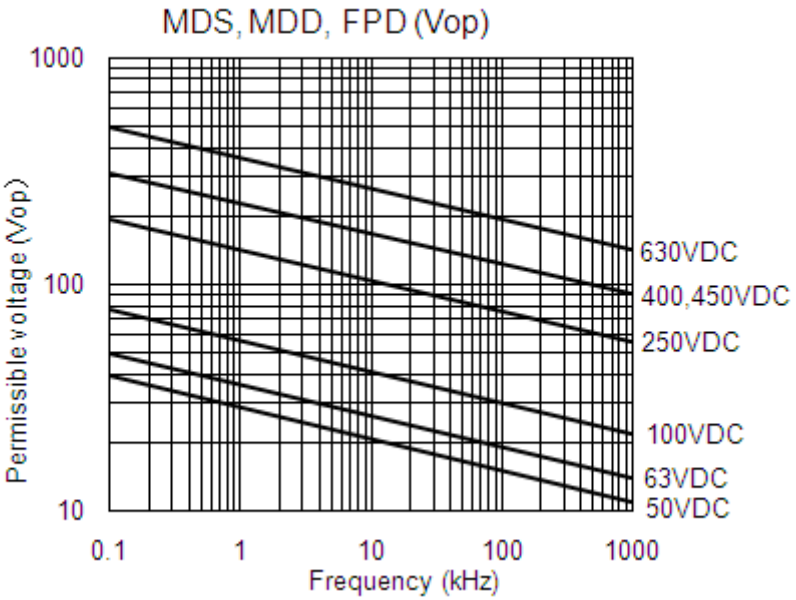
・When the voltage change of the high frequency is large, corona occurs and may lead to dielectric deterioration. In case of using high frequency, use capacitors within the limits of permissible voltage, permissible current, operating temperature and temperature rise as follows. Consult us, if they are close to or over the limits.

1. Permissible voltage









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2. Operating temp. and temp. rise

・In case of using high frequency, use capacitors within the limits of operating temperature and temperature rise as follows because capacitors generate heat.

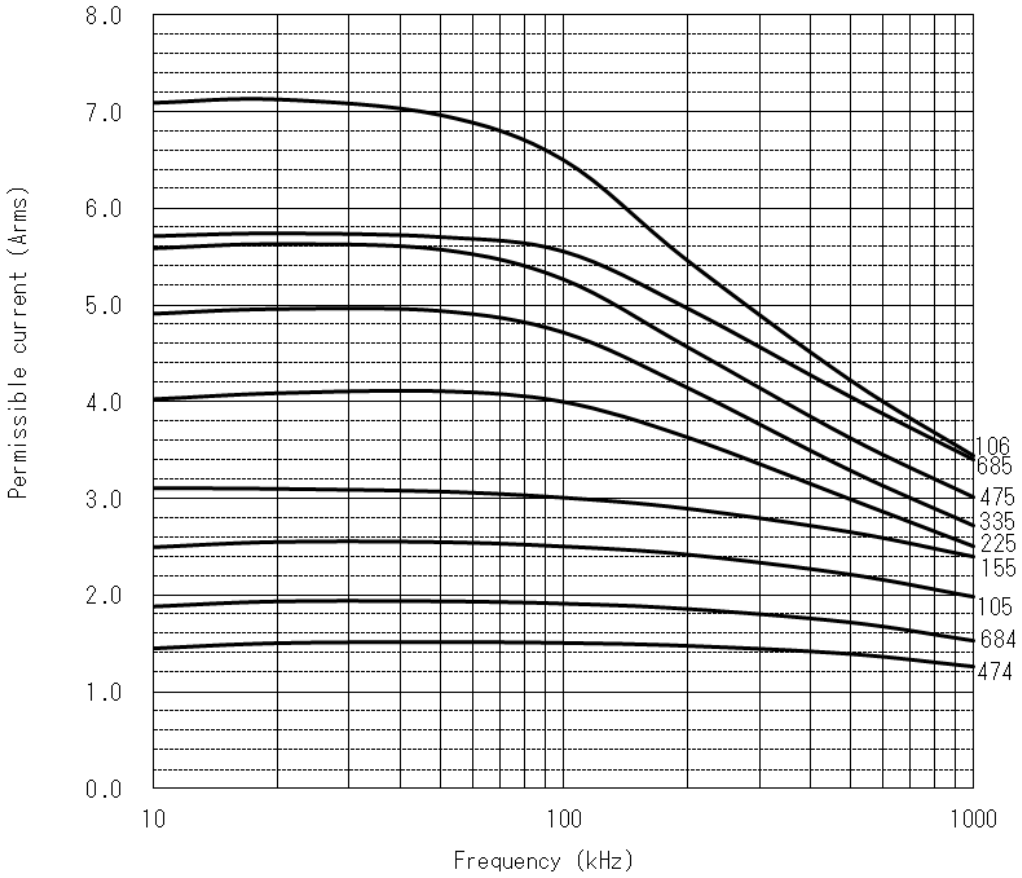
Item	Operating temp. (Surface temp.)	Temperature rise
MDS, MDD, MDX, FPS, FPB	105℃MAX	10℃MAX
FPH, FPG	85℃MAX	10℃MAX
FPD4, FPD5	105℃MAX	10℃MAX
FPA,FPS3	110℃MAX	10℃MAX

3. Permissible current

・Specified permissible current are Peak current and Effective current. Do not use capacitors under the condition of over the specified both current.
The peak current is mentioned in the ratings & dimensions table and the effective current is mentioned in the graph of permissible current depends on frequency. (In the high frequency use, permissible current is depends on the frequency. The example of Permissible current depends on frequency is shown below.)
Please contact us about details of each item and rating.

【 Example of Permissible current depends on frequency 】

Item : Resin coating metallized film capacitor (FPB series)
Rated voltage : 250V_{DC}



10) The hum of capacitors
・When the circuit is applied the voltage change abruptly, it may make hum.
Although hum does not spoil the characteristics of capacitors, consult us when the hum makes the problem.

11) Others
・When the board is designed, the hole spacing on the board adjust to the terminal spacing of a capacitor.
・The lead wire is also available the forming lead type.
・Avoid putting the heating parts around the capacitor and reverse side of the board (under the capacitor).
・Design after due consideration, the characteristics is change by the temperature and the frequency change.

2. Mounting instruction

1) Attachment

・Check the ratings (rated voltage and capacitance) before attachment.
・Do not transform the capacitor at the time of attaching.
・Check the pitch of capacitor and the hole pitch of the board.
・The strength of the clinching the lead wire of capacitor should not be too strong at the time of insert machine.
・Be careful of the shock of attaching, checking and centering by the insert machine.

2) Soldering

・Check the followings, when it is soldered by soldering iron.

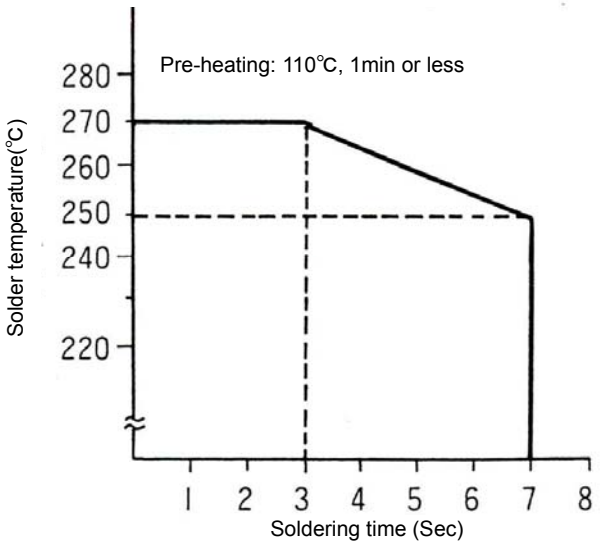
a. The conditions of soldering (temperature, time) should be within the following.
Temperature of soldering iron : 350 ℃
Time of soldering: 3 sec or less for one lead
b. In case of lead forming before soldering because lead pitch is not same as the hole pitch, the body of capacitor should not be under the stress of processing.
c. If re-working or putting out is necessary, it should be done after the capacitor has returned to the normal temperature (30 ℃ or less).
Re-working is 1 time or less
d. The soldering iron should not touch the capacitor directly.

3) Flow soldering

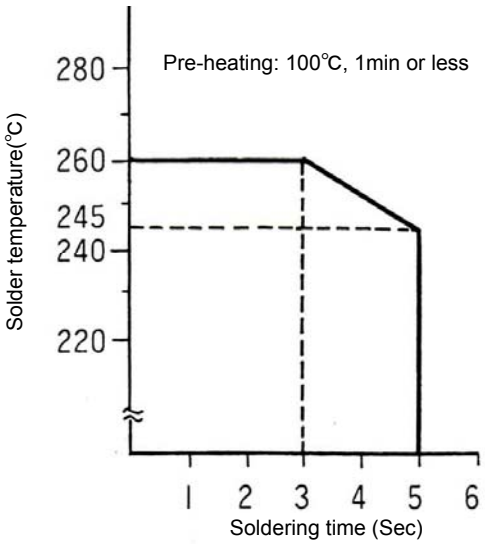
・Check the following at the time of flow soldering

a. The capacitor should not be into solder, only the reverse side of the board (under the capacitor) shall be dipped into the solder.
b. The flux should not attach except the lead.
c. Other parts should not be attached to the capacitor at the soldering.
d. The conditions of soldering (pre-heating, solder temperature, immersion time) should be within the followings.
e. If re-working is necessary, it should be done after the capacitor has returned to the normal temperature (30 ℃ or less).
Re-working is 2 times or less

Metallized polyester film capacitor



Metallized polypropylene film capacitor



4) Resistance to soldering heat (Metallized polypropylene film capacitor)

・We recommend using formed type for small volume PP products (confirm ratings & dimensions table) because Heat resistance of Polypropylene is lower than Polyester.

5) After soldering

・After the soldering, the capacitor should not be under the stress as follows.

a. Avoid inclining, pulling down and twisting the capacitors.
b. Avoid moving a board to hold the capacitor.
c. Avoid hitting the capacitor. In case of putting the board on another board, avoid hitting the capacitor by other part and the board.

6) Washing

・Consult us, when the capacitor is will be washed by the solvent of acidity and alkalinity.

・We recommend as follows.

Coating	Solvent	Conditions of washing
Resin coating type: MDS, MDD, FPD, MDX FPS, FPA, FPB etc	Alcoholic solvent	Dip or dip with ultrasonic in normal temperature solvent : Within 5min. or less

・After the cleaning, the capacitor should not keep in atmosphere of the solvent and closed container.

・Dry the capacitor and the board by hot air (maximum temperature or less) immediately after the cleaning.

7) In using adhesive or coating agent

・In using adhesive agent or coating agent, check the following.

a. The flux and stain should not be left between the capacitor and the board.

b. Before using adhesive agent or coating agent, dry the solvent enough.

c. The conditions of the adhesive agent and coating agent gluing should be within 150℃ and 2min. or less.

3. During operation

1) Precautions for during operation of equipment.

・Avoid touch to the capacitor directly.

・Avoid short circuit by the conductive substance between the leads.

・Avoid putting the conductive substance (solution of acidity and alkalinity) on the capacitor.

・Confirm installation environment.

Avoid the environments as follows

a. It is wetted by the water、the salt water, and oil.

b. It is exposed to direct rays of the sun.

c. In ozone, and it is shined with radioactive rays or ultraviolet.

d. It is filled with poisonous gas (H_2S, H_2SO_3, HNO_2, HCL, NH_3 etc)

e. In case of over specification of vibration and shock

4. In case of emergency

1) In case of emergency

・Turn off or plug off the equipment, when the equipment s should discharge smoke, fire or smell.

5. Storage and handling

1) The condition of storage

・Avoid keeping the capacitor in high temperature and humidity.
Keep in the temperature (5～35℃), humidity (75%RH or less)

・Avoid the condition of wetted by the water, oil, and the salt water.

・Avoid keeping the capacitor in poisonous gas (H_2S, H_2SO_3, HNO_2, CL_2, NH_3 etc)

・Avoid keeping the capacitor in ozone, and avoid the condition be exposed to radioactive rays or ultraviolet.

2) Handling

・Do not apply excessive stress to the capacitors such as vibration, shock (like dropping) or other mechanical stress.

・Do not apply excessive mechanical stress to lead wire of the capacitors such as bending or tensile.

6. In case of rejection

1) In case of rejection

・In case of rejection, ask a specialist for the disposal of industrial wastes.

7. Others

1) The standpoint of a catalogue sheet

・Products specifications, materials and other points mentioned in the catalogue may be changed without notification.