

Caution/Notice

Caution

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Notice

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⚠ Caution

■ Storage and Operation Conditions

The insulating coating of capacitors does not form a perfect seal; therefore, do not use or store capacitors in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. And avoid exposure to moisture.

Before cleaning, bonding, or molding this product, verify that these processes do not affect product quality by testing the performance of a cleaned, bonded or molded product in the intended equipment.

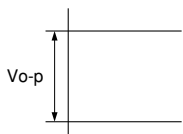
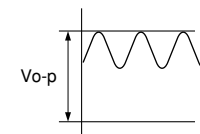
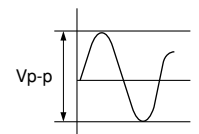
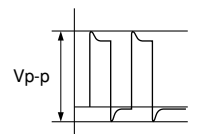
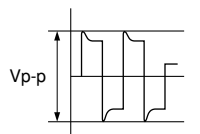
Store the capacitors where the temperature and relative humidity do not exceed -10 to 40 degrees centigrade and 15 to 85%. Use capacitors within 6 months after delivered.

■ Rating

1. Operating Voltage

When DC-rated capacitors are to be used in AC or ripple current circuits, be sure to maintain the V_{p-p} value of the applied voltage or the V_{o-p} which contains DC bias within the rated voltage range. When the voltage is applied to

the circuit, starting or stopping may generate irregular voltage for a transit period because of resonance or switching. Be sure to use a capacitor with a rated voltage range that includes these irregular voltages.

| Voltage | DC Voltage | DC+AC Voltage | AC Voltage | Pulse Voltage (1) | Pulse Voltage (2) |
|------------------------|--|--|--|--|--|
| Positional Measurement |  |  |  |  |  |

2. Operating Temperature and Self-generated Heat

Keep the surface temperature of a capacitor below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself.

When the capacitor is used in a high-frequency current, pulse current or similar current, it may self-generate heat due to dielectric loss. The applied voltage load should be such that the capacitor's self-generated heat is within 10°C at an atmosphere temperature of 25°C.

When measuring, use a thermocouple of small thermal capacity-K of $\varnothing 0.1\text{mm}$ in conditions where the capacitor is not affected by radiant heat from other components or surrounding ambient fluctuations.

Excessive heat may lead to deterioration of the capacitor's characteristics and reliability. (Never attempt to perform measurement with the cooling fan running. Otherwise, accurate measurement cannot be ensured.)

■ Soldering and Mounting

1. Vibration and Impact

Do not expose a capacitor to excessive shock or vibration during use.

2. Installation

Installation torque should not exceed the torque strength values in "Specifications and Test Methods".

Do not use a screw with a thread depth greater than specified.

Avoid installation in which any bending torque is applied to the capacitor terminal.

Do not rework or resolder the terminal.

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.

■ Rating

1. Capacitance Change of Capacitor

(1) Class 1 Capacitors

Capacitance might change a little depending on the surrounding temperature or an applied voltage.

Please contact us if you intend to use this product in a strict time constant circuit.

(2) Class 2 and 3 Capacitors

Class 2 and 3 capacitors with temperature characteristics B, E and F have an aging characteristic, whereby the capacitor continually decreases its capacitance slightly if the capacitor is left on for a long time. Moreover, capacitance might change greatly depending on the surrounding temperature or an applied voltage.

So, it is not likely to be suitable for use in a time constant circuit. Please contact us if you need detailed information.

| No. | Item | | Specifications | Test Method | | | | | | | | | | | | |
|-----------------|-------------------------------|--------------------|--|--|---------------|--------------|-----------------|-----|---|---|------------|------|-------|------|------|------|
| 1 | Operating Temperature Range | | -20 to +85°C | — | | | | | | | | | | | | |
| 2 | Capacitance | | Within the specified tolerance | The capacitance should be measured at 25°C with 1±0.1kHz and AC1 to 5V(r.m.s.). | | | | | | | | | | | | |
| 3 | Temperature Characteristics | | Capacitance change Within +22/-82% (Temp. range: +10 to +85°C) | The capacitance measurement should be made at each step specified in table. Capacitance change from the value of step 3 should not exceed the limit specified. <table border="1"> <thead> <tr> <th>Step</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>Temp. (°C)</td> <td>25±2</td> <td>-20±3</td> <td>25±2</td> <td>85±2</td> <td>25±2</td> </tr> </tbody> </table> | Step | 1 | 2 | 3 | 4 | 5 | Temp. (°C) | 25±2 | -20±3 | 25±2 | 85±2 | 25±2 |
| Step | 1 | 2 | 3 | 4 | 5 | | | | | | | | | | | |
| Temp. (°C) | 25±2 | -20±3 | 25±2 | 85±2 | 25±2 | | | | | | | | | | | |
| 4 | Dissipation Factor (D.F.) | | 1.5% max. | The dissipation factor should be measured at 25°C with 1±0.1kHz and AC1 to 5V(r.m.s.). | | | | | | | | | | | | |
| 5 | Dielectric Strength | Between Terminals | No failure | The capacitor should not be damaged when DC voltage of 150% of the rated voltage is applied between the terminals for 60±5 sec. in insulating liquid or gas. (Charge/Discharge current ≤ 50mA) | | | | | | | | | | | | |
| 6 | Insulation Resistance (I.R.) | | 10000MΩ min. | The insulation resistance should be measured with DC1000V within 60±5 sec. of charging. | | | | | | | | | | | | |
| 7 | Strength of Terminal | Torque Strength | Capacitor should not be broken. | When mounting the capacitor on equipment, be sure to mount them within the torque strength values shown in the table below. <table border="1"> <thead> <tr> <th>Terminal Type</th> <th>Torque (N·m)</th> </tr> </thead> <tbody> <tr> <td>ISO M4, No.8-32</td> <td>1.5</td> </tr> </tbody> </table> | Terminal Type | Torque (N·m) | ISO M4, No.8-32 | 1.5 | | | | | | | | |
| Terminal Type | Torque (N·m) | | | | | | | | | | | | | | | |
| ISO M4, No.8-32 | 1.5 | | | | | | | | | | | | | | | |
| 8 | Life | Appearance | No marked defect | Apply a DC voltage of 125% of the rated voltage for 100+24/-0 hrs. in silicon oil at 85±2°C. Post-treatment: Capacitor should be stored for 24 hrs. at room condition*. (Charge/Discharge current ≤ 50mA) | | | | | | | | | | | | |
| | | Capacitance Change | Within ±20% | | | | | | | | | | | | | |
| | | D.F. | 5.0% max. | | | | | | | | | | | | | |
| | | I.R. | 1000MΩ min. | | | | | | | | | | | | | |
| 9 | Humidity (Under Steady State) | Appearance | No marked defect | Set the capacitor for 100+24/-0 hrs. at 40±2°C in 90 to 95% relative humidity. Post-treatment: Capacitor should be stored for 24 hrs. at room condition*. | | | | | | | | | | | | |
| | | Capacitance Change | Within ±20% | | | | | | | | | | | | | |
| | | D.F. | 5.0% max. | | | | | | | | | | | | | |
| | | I.R. | 1000MΩ min. | | | | | | | | | | | | | |

* "room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa