

# Thyristor · Triac

R07ZZ0003EJ0303

Rev.3.03

## Precautions on Handling

June 10, 2024

■ In order to use low and medium power semiconductors safely

Please read and follow these “Precautions on Handling” carefully before using the low and medium power Thyristor and Triac.

 <b>Cautions</b>	
Packing	<ul style="list-style-type: none"> <li>· The packing of our products shall withstand certain environmental conditions. However, depending on the circumstances, the outer carton or the inner packing might be broken, and the product might be exposed. Please do not expose the outer carton to external shocks, rainwater, pollution, and other factors.</li> </ul>
Transportation	<ol style="list-style-type: none"> <li>(1) During transport, keep the packing cartons in the correct orientation. If the carton is upside down or leaning against something and an abnormal force is applied, the devices may be damaged.</li> <li>(2) Do not throw or drop the cartons. The devices may be damaged.</li> <li>(3) If getting wet, the devices may fail during use. When transporting in the rain or snow, make sure to protect the carton from moisture.</li> </ol>
Storage	<ul style="list-style-type: none"> <li>· The products should be stored within the normal temperature and humidity range (i.e., at 15 to 35°C and 45 to 75% R.H.). In an environment far above or below this range, the product performance and reliability may be deteriorated.</li> </ul>
Long-term Storage	<ol style="list-style-type: none"> <li>(1) When storing for one year or longer, provide humidity removing measures. When using products after long-term storage, be sure to check that the exterior is free from flaw, dirt, rust, and so on.</li> <li>(2) If stored in a highly unfavorable environment or over three years under the normal storing conditions (those specified in the previous section), be sure to check that the exterior is free from flaw, dirt, rust, and so on and inspect solderability and electric characteristics.</li> </ol>
Operating Environment	<ul style="list-style-type: none"> <li>· Do not use the products where they may be exposed to water or organic solvents, where corrosive gases are generated, or where explosive gases or dust are present. Because use in such places may cause serious accidents.</li> </ul>
Flammability	<ul style="list-style-type: none"> <li>· The molding resin is a flame retardant material certified or equivalent to UL Standard UL94 V-0, but it is not non-flammable.</li> </ul>
Anti-electrostatic Measure	<ul style="list-style-type: none"> <li>· To prevent destruction and deterioration due to static electricity, be sure to observe the following precautions.               <ol style="list-style-type: none"> <li>(1) Precautions to prevent electrostatic destruction                   <p>If static electricity or excessive voltage charged on the human body or packing material is applied between the terminals, the device may be destroyed or deteriorated. The basis of anti-electrostatic measures is to suppress the generation of static electricity as much as possible and to release the charge as soon as possible.</p> <ol style="list-style-type: none"> <li>(a) For transportation and storage, do not use containers that are easy to accumulate static electricity.</li> <li>(b) Keep the devices in the conductive bag or tube until immediately before use. Never touch the terminals with bare hands.</li> <li>(c) During assembly, ground the equipment and human body. It is recommended to lay conductive rugs over the workbench and the surrounding floor and ground them. The electrostatic level of the work environment should not exceed 100 V.</li> <li>(d) If the terminals of the device mounted on the circuit board are open, the device may be destroyed or degraded by the static electricity on the board.</li> <li>(e) When using a soldering iron, ground the tip.</li> </ol> </li> </ol> </li> </ul>

## Cautions

### Mounting

#### ■ Forming and cutting electrode leads

·To prevent the devices from destruction or deterioration due to the forming and cutting of the electrode leads, observe the following instructions.

- (1) It is desirable to use a dedicated forming machine to avoid stress. Alternatively, prepare two flat nose pliers, fix the base of the lead by one pliers, and bend the lead on the tip side by another pliers.
- (2) When bending the lead, bend it at a point at least 2 mm away from the body.
- (3) When laterally bending, do not exceed 30°. (For longitudinal bending, the angle should be within 90°.)

However, it is highly advisable to use the Renesas standard formed products whenever possible.

#### ■ Attaching to the heatsink

- (1) To maximize the heat dissipation effect, the contact area should be as large as possible to minimize the contact thermal resistance. The mounting surface of the heatsink should have a surface finish 6 S or smoother, and a warp of  $\pm 100 \mu\text{m}$  or less. The holes on the heatsink for mounting should not exceed the screw diameter + 0.5 mm, and chamfers on the hole should be less than 1% of the diameter.
- (2) For tightening, use a torque wrench etc. and tighten to the specified torque (Table 1 below). Excessive tightening torque may cause package damage and destruction or deterioration of the device.
- (3) The grease should be applied thinly and uniformly over the entire contact area of the device. The thickness of the grease should be 100 to 200  $\mu\text{m}$  in consideration of the accuracy of the surface roughness of the device and heatsink. Applying grease to contact surface of the heatsink helps to prevent corrosion of the contact area. However, use grease that does not deteriorate within the operating temperature range and does not age.

Table 1 Tightening Torque

Package	Renesas Package Code	Screw Diameter	Tightening Torque Recommendation	
			N • m	(kgf • cm)
			TO-220ABA	PRSS0004AT-A
TO-220FPA	PRSS0003AP-A	M3	0.49	(5)
TO-3P	PRSS0004ZE-A	M3	0.59	(6)

#### ■ Polarity

·To prevent destruction or deterioration of the device due to wrong insertion, make sure that the leads are inserted into the circuit board according to the pin arrangement described in the outline drawing.

## Cautions

Mounting (cont'd)	<p>■ Soldering</p> <ul style="list-style-type: none"> <li>· To prevent the devices from destruction, deterioration and impaired reliability due to the mechanical and/or thermal stress, observe the following instructions.</li> <li>(1) Solder only after attaching the device to the heatsink.</li> <li>(2) Resistance to soldering heat             <ul style="list-style-type: none"> <li>① Manual soldering 350°C max., 3 s max.</li> <li>② Flow soldering (Wave soldering) for through-hole type devices 260°C max., 10 s max.</li> <li>③ Reflow soldering for surface mount type devices The recommended soldering method for surface mount devices is reflow soldering. The recommended temperature profile depends on the product. Please contact us.</li> </ul> </li> </ul> <p>■ Cleaning the circuit board</p> <ul style="list-style-type: none"> <li>· When cleaning the circuit board after soldering, observe the following instructions to prevent the devices from destruction, deterioration and impaired reliability due to the mechanical stress.</li> <li>(1) When using an ultrasonic cleaner, make sure that the ratings are as follows.             <ul style="list-style-type: none"> <li>Frequency: 28 kHz max</li> <li>Ultrasonic output: 20 W/l max</li> <li>Cleaning time: 30 s max</li> </ul>             The ultrasonic vibrator should not be in contact with the circuit board and devices. Do not allow the devices to be resonant at the vibrating frequency.           </li> </ul>
Maximum Rating	<ul style="list-style-type: none"> <li>· To prevent devices from destruction, deterioration and impaired reliability, use devices always within the maximum ratings.</li> <li>· The maximum ratings indicate the absolute maximums of temperature, current, voltage, power dissipation, and so on, which must not be surpassed even for an instant.</li> </ul>
Dielectric strength	<p>■ Guarantees of isolation for insulated package products</p> <ul style="list-style-type: none"> <li>· As for insulated package products, the isolation voltage is specified as absolute maximum rating. This value must not be exceeded during operation even for a moment.</li> <li>· Please note that this rated value is the condition at the time of shipping inspection. The dielectric strength of devices might decrease due to stress in handling and mounting processes. Therefore, the finished products should be judged before shipping whether they meet requirements of safe isolation for electrical equipment.</li> <li>· For safety, it's advisable that a heatsink should be electrically floating.</li> </ul>

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