**FEATURES**

1. **10A high-capacity realized for PC board terminal (with heat sink)**
   SSR for compact PC boards with 10 A capacity that is two times greater than our previous model. It is suitable for long-life, highly frequent control.

2. **VDE (EN60950-1) reinforced insulation compliant**

3. **Superior anti-vibration and anti-shock characteristics**
   The body is molded as a single unit with flame resistant resin which makes it highly resistant against vibration and shock, and gives it superior protection from environment. The body can also be washed.

4. **Vertical types with SIL terminal arrangement and flat types are available.**
   1) The vertical type is available in thicknesses of 10 mm (2 A and 3 A types) and 12 mm (10 A types). Terminal arrangement is SIL in integral multiples of 2.54 mm (0.1 inch).
   2) The height of the flat type is 12 mm. The terminal arrangement is DIL in integral multiples of 2.54 mm.

5. **Reduced noise generation**
   The load will operate at close to zero voltage even when the input signal is applied during a cycle. Also, even if an input signal is cancelled during a cycle, the load is cut off at close to zero current. For this reason, hardly any noise is produced and radio frequency interference (RFI) and electromagnetic interference (EMI) are kept to a minimum.

6. **Built-in Snubber circuit prevents malfunction.**

**TYPICAL APPLICATIONS**

- Printing machines
- Packing machines
- Traffic signal control
- Automatic ticket punchers
- Terminal equipment of data processing
- Computer peripherals
- NC machines

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**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>Load current</th>
<th>AQ</th>
<th>-</th>
<th>-</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 A, 2 A, 3 A, 10 A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Load voltage</th>
<th>D1: 3 to 60 V DC</th>
<th>D2: 10 to 200 V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>2: 75 to 250 V AC</td>
<td>3/28 V DC: 3 to 28 V DC</td>
<td>4/32 V DC: 4 to 32 V DC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shape</th>
<th>Nil: Vertical type</th>
<th>J: Flat type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil: DC output</td>
<td>ZT: Zero-cross AC output (Phototriac coupler)</td>
<td></td>
</tr>
</tbody>
</table>

* Random types are available upon request.
1. AQ1 Solid State Relays

<table>
<thead>
<tr>
<th>Load</th>
<th>Isolation</th>
<th>Zero-cross function</th>
<th>Zero-cross 3 A (Vertical)</th>
<th>4 to 32 V DC</th>
<th>3 A, 75 to 250 V AC</th>
<th>AQ3A2-ZT4/32VDC 10 A</th>
<th>4 to 32 V DC</th>
<th>10 A, 75 to 250 V AC</th>
<th>AQ10A2-ZT4/32VDC DC Optically coupled isolation</th>
<th>1 A</th>
<th>3 to 28 V DC</th>
<th>1 A, 10 to 200 V DC</th>
<th>AQ1AD2-3/28VDC 2 A</th>
<th>3 to 28 V DC</th>
<th>2 A, 3 to 60 V DC</th>
<th>AQ2AD1-3/28VDC</th>
</tr>
</thead>
</table>

Standard packing: Carton 20 pcs., Case 200 pcs.

Note: *1 Non zero-cross type also available. Please inquire.

2. Heat sink for AQ1 solid state relay

<table>
<thead>
<tr>
<th>Product name</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat sink for AQ10A2-ZT4/32VDC</td>
<td>AQ-HS-5A</td>
</tr>
</tbody>
</table>

Standard packing: Carton 20 pcs., Case 200 pcs.

3. SPECIFICATIONS

1. Rating (Ambient temperature: 20°C 68°F, Ripple factor: less than 1%)

<table>
<thead>
<tr>
<th>Item</th>
<th>Type</th>
<th>AC output type</th>
<th>DC output type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Zero-cross 3 A type</td>
<td>10 A type</td>
</tr>
<tr>
<td>Input side</td>
<td>Input voltage</td>
<td>4 to 32 V DC</td>
<td>3 to 28 V DC</td>
</tr>
<tr>
<td>Input impedance</td>
<td>—</td>
<td>—</td>
<td>Approx. 1.6 kΩ</td>
</tr>
<tr>
<td>Input current, max.</td>
<td>20 mA</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Drop-out voltage, min.</td>
<td>1.0 V</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Load side</td>
<td>Max. load current</td>
<td>3 A</td>
<td>10 A&lt;sup&gt;11&lt;/sup&gt;</td>
</tr>
<tr>
<td>Load voltage</td>
<td>75 to 250 V AC</td>
<td>10 to 200 V DC</td>
<td>3 to 60 V DC</td>
</tr>
<tr>
<td>Non-repetitive surge current</td>
<td>100 A</td>
<td>5 A</td>
<td>AC: In one cycle at 60 Hz, DC: 1s</td>
</tr>
<tr>
<td>Max. &quot;OFF-state&quot; leakage current</td>
<td>5 mA</td>
<td>1 mA</td>
<td>AC: at 200 V, 60Hz DC: When maximum load voltage is applied</td>
</tr>
<tr>
<td>Max. &quot;ON-state&quot; voltage drop</td>
<td>1.6 V</td>
<td>1.6 V</td>
<td>2.3 V</td>
</tr>
<tr>
<td>Min. load current</td>
<td>50 mA</td>
<td>5 mA</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
*1 Refer to REFERENCE DATA 3. Input current vs. input voltage characteristics<sup>1</sup>.
*2 Refer to REFERENCE DATA 1. Load current vs. ambient temperature<sup>1</sup>.
*3 Refer to REFERENCE DATA 2. Non-repetitive surge current vs. carrying time<sup>1</sup>.
*4 When load current is below the rating, refer to ‘Cautions for Use’ on page 341.
*5 When heat sink (AQ-HS-5A) is installed. The max. load current is 5 A when heat sink is not installed.

2. Characteristics (at 20°C 68°F, Ripple factor: less than 1%)

<table>
<thead>
<tr>
<th>Item</th>
<th>Type</th>
<th>AC output type</th>
<th>DC output type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Zero-cross 3 A type</td>
<td>10 A type</td>
</tr>
<tr>
<td>Operate time, Max.</td>
<td>(1/2 cycle of voltage sine wave)</td>
<td>+ 1 ms</td>
<td>0.5 ms</td>
</tr>
<tr>
<td>Release time, Max.</td>
<td>(1/2 cycle of voltage sine wave)</td>
<td>+ 1 ms</td>
<td>2 ms</td>
</tr>
<tr>
<td>Insulation resistance, Min.</td>
<td>100 M Ω</td>
<td>for input, output and case</td>
<td>100 M Ω</td>
</tr>
<tr>
<td>Breakdown voltage</td>
<td>4,000 Vrms between input and output</td>
<td>3,000 Vrms between input-output</td>
<td>For 1 minute</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>Destructive</td>
<td>117.6 m/s&lt;sup&gt;2&lt;/sup&gt; (12G), 10 to 55 Hz at double amplitude of 2 mm</td>
<td>117.6 m/s&lt;sup&gt;2&lt;/sup&gt; (12G), 10 to 55 Hz at double amplitude of 2 mm</td>
</tr>
<tr>
<td></td>
<td>Functional</td>
<td>117.6 m/s&lt;sup&gt;2&lt;/sup&gt; (12G), 10 to 55 Hz at double amplitude of 2 mm</td>
<td>117.6 m/s&lt;sup&gt;2&lt;/sup&gt; (12G), 10 to 55 Hz at double amplitude of 2 mm</td>
</tr>
<tr>
<td>Shock resistance</td>
<td>Destructive</td>
<td>Min. 980 m/s&lt;sup&gt;2&lt;/sup&gt; (100 G)</td>
<td>Min. 980 m/s&lt;sup&gt;2&lt;/sup&gt; (100 G)</td>
</tr>
<tr>
<td></td>
<td>Functional</td>
<td>Min. 980 m/s&lt;sup&gt;2&lt;/sup&gt; (100 G)</td>
<td>Min. 980 m/s&lt;sup&gt;2&lt;/sup&gt; (100 G)</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>–30°C to +80°C</td>
<td>–22°F to +176°F</td>
<td></td>
</tr>
<tr>
<td>Storage temperature</td>
<td>–30°C to +100°C</td>
<td>–22°F to +212°F</td>
<td></td>
</tr>
<tr>
<td>Operational method</td>
<td>Zero-cross (Turn-ON and Turn-OFF)</td>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>
REFERENCE DATA

1.-(1) Load current vs. ambient temperature
(AC output, 3 A type) Part No.: AQ3A2-ZT4/32VDC and AQ3A2-J-ZT4/32VDC
Allowable ambient temperature: –30°C to +80°C –22°F to +176°F

1.-(2) Load current vs. ambient temperature
(AC output, 10 A type) Part No.: AQ10A2-ZT4/32VDC
(A) When not using a heat sink
(B) When using a standard heat sink AQ-HS-5A
(When attached to a heat sink, use a heat conductive compound (Ex. Toshiba silicone YG6111 or TSK5303) of similar coating to improve cooling.)

1.-(3) Load current vs. ambient temperature
(DC output, 1 A and 2 A types) Part No.: AQ1AD2-3/28VDC and AQ2AD1-3/28VDC
Allowable ambient temperature: –30°C to +80°C –22°F to +176°F

2.-(1) Non-repetitive surge current vs. carrying time
(AC output, 3 A and 10 A types) Part No.: AQ3A2-ZT4/32VDC, AQ3A2-J-ZT4/32VDC and AQ10A2-ZT4/32VDC

2.-(2) Non-repetitive surge current vs. carrying time
(DC output) Part No.: AQ1AD2-3/28VDC and AQ2AD1-3/28VDC

3.-(1) Input current vs. input voltage characteristics
(AC output, 3 A and 10 A types) Part No.: AQ3A2-ZT4/32VDC, AQ3A2-J-ZT4/32VDC and AQ10A2-ZT4/32VDC

3.-(2) Input current vs. input voltage characteristics
(DC output) Part No.: AQ1AD2-3/28VDC and AQ2AD1-3/28VDC

4.-(1) Load current vs. ambient temperature characteristics for adjacent mounting
(AC output, 3 A vertical type) Part No.: AQ3A2-ZT4/32VDC

4.-(2) Load current vs. ambient temperature characteristics for adjacent mounting
(AC output, 10 A type) Part No.: AQ10A2-ZT4/32VDC (without heat sink)
AQ1

DIMENSIONS (mm inch)

1. AC output, 3A types (Vertical)

CAD Data

Mounting hole location (Copper-side view)

General tolerance: ±0.5 ±0.020

Tolerance: ±0.1 ±0.004

2. AC output, 3A types (Flat)

CAD Data

Mounting hole location (Copper-side view)

General tolerance: ±0.5 ±0.020

Tolerance: ±0.1 ±0.004

3. AC output, 10A types

CAD Data

Mounting hole location (Copper-side view)

* There 2 holes are not necessary when not using heat sink (AQ-HS-5A)

General tolerance: ±0.5 ±0.020

Tolerance: ±0.1 ±0.004

Download CAD Data from our Web site.
4. Heat sink (for AQ10A2-ZT4/32VDC)

CAD Data

Note: When using heat sink, please refer to “Thermal Design”

5. DC output, 1A and 2A types

Cad Data

Note: When using heat sink, please refer to “Thermal Design”

CAUTIONS FOR USE

1. When using bent output terminals
   To avoid applying mechanical stress on the main unit and molded section of the solid state relay, radio pliers should be used to grasp the terminals between the point of bending and the molded case when making the bends.

   Terminal bend section
   Printed circuit board
   Solid state relay
   Solder

2. When a heat sink is mounted on the 10 A type
   The heat sink (AQ-HS-5A) or a radiator which can make good contact should be used.
   If a heat sink is used in which the contact condition is bad, a heat conducting compound should be used to improve the heat radiation. (Ex. Silicon compound Toshiba silicon YG6111 or TSK5303) The compound should be applied between the heat sink and the AQ1.

   Approx. 0.6N·m of torque should be used for tightening the M3 screws.