Panasonic

Small Screw Terminal SSR Ideal for DC Control

AQ-A RELAYS (DC only)

FEATURES
1. Compact Size
   W 40 x L 58 x H 25.5 mm
   W 1.575 x L 2.283 x H 1.004 inch
2. With terminal cover for safety (output side only).
3. Mounting pitch 47.5 mm 1.870 inch
4. Internal diode protects element on output side
5. With LED indication for operation status verification

TYPICAL APPLICATIONS
• Photovoltaic power generation system
• Storage battery system
• For control of all types of business equipment and industrial use DC heaters/motors, etc.

ORDERING INFORMATION

Output current
1: 10A
5: 30A

Load voltage, Type
5: 100 V DC, Screw terminal and DC only
7: 600 V DC, Screw terminal and DC only

Input voltage
1: 4 to 32 V DC

Functions
DL: Internal diode and LED indication

TYPES
1. AQ-A Solid State Relays (DC only)

<table>
<thead>
<tr>
<th>Type</th>
<th>Load current</th>
<th>Load voltage</th>
<th>Input voltage</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC only</td>
<td>30A</td>
<td>100V DC</td>
<td>4 to 32V DC</td>
<td>AQAD551DL</td>
</tr>
<tr>
<td></td>
<td>10A</td>
<td>600V DC</td>
<td></td>
<td>AQAD171DL</td>
</tr>
</tbody>
</table>

Standard Packing; carton: 2 pcs., case: 60 pcs.

2. Accessories

<table>
<thead>
<tr>
<th>Type</th>
<th>Part No.</th>
<th>Packaged quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard heat sink (45mm 1.772inch wide)</td>
<td>AQP-HS-J25A</td>
<td>No carton, 5 in a case</td>
</tr>
<tr>
<td>Slim heat sink (Mountable on a DIN rail)</td>
<td>AQP-HS-SJ20A</td>
<td>No carton, 8 in a case</td>
</tr>
<tr>
<td>DIN rail mounting plate</td>
<td>AQP-DPJ</td>
<td>No carton, 50 in a case</td>
</tr>
<tr>
<td>Terminal cover</td>
<td>AQAD801</td>
<td>No carton, 50 in a case</td>
</tr>
<tr>
<td>Mounting rail</td>
<td>AT8-DL1A</td>
<td>1 in a carton, 100 in a case</td>
</tr>
<tr>
<td>Fastening plate</td>
<td>AT4806</td>
<td>1 in a carton, 200 in a case</td>
</tr>
</tbody>
</table>
AQ-A (AQAD)

RATING

1. Ratings (Measurement condition: at 20°C 68°F, Input ripple: 1% or less)

<table>
<thead>
<tr>
<th>Item</th>
<th>ADAQ551DL</th>
<th>ADAQ171DL</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage</td>
<td>AQAD551DL</td>
<td>AQAD171DL</td>
<td></td>
</tr>
<tr>
<td>Input current</td>
<td>4 to 32V DC</td>
<td>Max. 20mA</td>
<td></td>
</tr>
<tr>
<td>Drop-out voltage</td>
<td>Min. 1V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. load current (DC)</td>
<td>30A</td>
<td>10A</td>
<td></td>
</tr>
<tr>
<td>Peak load current (V_in = 60V DC)</td>
<td>90A</td>
<td>20A</td>
<td>100 ns (1 shot)</td>
</tr>
<tr>
<td>Load voltage (DC)</td>
<td>100V</td>
<td>600V</td>
<td>Absolute maximum rating</td>
</tr>
</tbody>
</table>

"OFF-state" leakage current: Max. 100μA, V_in = Max.
"ON" resistance: Max. 20mΩ, Max. 200mΩ at Max. carrying current
Max. power dissipation: 20W

2. Characteristics (Measurement condition: at 20°C 68°F, Input ripple: 1% or less)

<table>
<thead>
<tr>
<th>Item</th>
<th>ADAQ551DL</th>
<th>ADAQ171DL</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operate time</td>
<td>Max. 10ms</td>
<td>Max. 5ms</td>
<td>V_in = 4 V, I_L = 1 A, V_L = 10 V Resistance load</td>
</tr>
<tr>
<td>Release time</td>
<td>Max. 3ms</td>
<td>Max. 1ms</td>
<td>V_in = 4 V, I_L = 1 A, V_L = 10 V Resistance load</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>100MΩ between input and output</td>
<td>at 500V DC</td>
<td></td>
</tr>
<tr>
<td>Breakdown voltage</td>
<td>4,000 Vrms between input and output</td>
<td>for 1min.</td>
<td></td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>10 to 55Hz double amplitude of 1.5mm (0.059inch)</td>
<td>X, Y, Z axes</td>
<td></td>
</tr>
<tr>
<td>Shock resistance</td>
<td>Min. 980 m/s²</td>
<td>X, Y, Z axes</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>–20°C to +80°C –4°F to +176°F</td>
<td>Non-condensing at low temperatures</td>
<td></td>
</tr>
<tr>
<td>Storage temperature</td>
<td>–20°C to +85°C –4°F to +185°F</td>
<td>Non-condensing at low temperatures</td>
<td></td>
</tr>
<tr>
<td>Max. switching frequency</td>
<td>0.5 times/s</td>
<td>V_in = 4 V, duty = 50%, I_L = Max., V_L = Max.</td>
<td></td>
</tr>
</tbody>
</table>

Note: V_in is input voltage, I_L is load current, and V_L is load voltage.

REFERENCE DATA

1. Load current vs. ambient temperature characteristics
   Use load current within range specified in the figure below.

   Tested condition
   **With external heat sink**
   When using standard heat sink (AQPHS-J25A) or slim heat sink (AQPHS-SJ20A)
   1) If attached to a heat sink, use a heat conductive compound (Ex. Momentive Performance Materials Inc. YG6111 or TSK5303) of similar coating to improve cooling.
   **Without external heat sink**
   If the mounting surface is not metallic and a heat sink is not used, expose the bottom surface and plate surface to improve heat dissipation.

   **(1) 30A type (AQAD551DL)**
   **(2) 10A type (AQAD171DL)**

2. Max. switching frequency vs. load voltage × load current characteristics
   **(1) 30A type (AQAD551DL)**
   **Ambient temperature: 20°C 68°F**

   **(2) 10A type (AQAD171DL)**
   **Ambient temperature: 20°C 68°F**

3. Input current vs. input voltage characteristics
**DIMENSIONS (mm inch)**

External dimensions

![Image of external dimensions]

- 2-M4: 1.575
- 2-M3: 0.413
- 4.3 dia.: 1.69
- 47.5: 1.870
- 10.5: 0.413
- 15.5: 0.610
- 1.870
- 4.3
- 40
- 58
- 2.283

**Schematic**

- Load power source
- Input power source
- Load

**Mounting dimensions**

- 2-4.3 dia. or M4
- 2-4.6 dia. or M4
- 4-M4
- Lot No.
- 1.870
- 47.5

**GENERAL TOLERANCE:** ±1.0 ±0.039

**ACCESSORIES (mm inch)**

AQP-HS-SJ20A Slim Heat Sink

![Image of AQP-HS-SJ20A Slim Heat Sink]

**External dimensions**

- 7-M4: 1.874
- 4.6 dia.: 1.81
- 1.81
- 0.236
- 1.181
- 1.181
- 3.236
- 3.071
- 0.63
- 0.30
- 0.30

**Mounting dimensions**

- 2-4.3 dia. or M4
- 2-4.6 dia. or M4

**GENERAL TOLERANCE:** ±1.0 ±0.039

**Note:** When using on a DIN rail, please install so that the “A” part is on top.
AQ-A (AQAD)

AQP-HS-J25A Standard Heat Sink

CAD Data

External dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>4.724</td>
</tr>
<tr>
<td>100</td>
<td>3.937</td>
</tr>
<tr>
<td>82</td>
<td>3.228</td>
</tr>
<tr>
<td>64</td>
<td>2.520</td>
</tr>
<tr>
<td>46</td>
<td>1.811</td>
</tr>
<tr>
<td>30</td>
<td>1.181</td>
</tr>
<tr>
<td>20</td>
<td>0.790</td>
</tr>
<tr>
<td>142</td>
<td>5.591</td>
</tr>
</tbody>
</table>

Mounting dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-M4.5 or 5 dia.</td>
<td>±0.1</td>
</tr>
<tr>
<td>3-M4</td>
<td>±0.004</td>
</tr>
</tbody>
</table>

General tolerance: ±1.0 ±0.039

AQP-DPJ DIN Rail Mounting Plate

CAD Data

External dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.6x5.6 elliptical hole</td>
<td>1.670</td>
</tr>
<tr>
<td>3-M4</td>
<td>1.181</td>
</tr>
</tbody>
</table>

ATA4806 Fastening plate

CAD Data

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>M4</td>
<td>0.790</td>
</tr>
<tr>
<td>10</td>
<td>0.394</td>
</tr>
</tbody>
</table>
CAUTIONS FOR USE

1. Derating design
Derating is essential in any reliable design and is a significant factor for product life. Even if the conditions of use (temperature, current, voltage, etc.) of the product fall within the absolute maximum ratings, reliability can be reduced remarkably when continually used under high load (high temperature, high humidity, high current, high voltage, etc.). Therefore, please derate sufficiently below the absolute maximum rating and verify operation of the actual design before use.

2. Noise and surge protection at the input side
A high noise surge voltage applied to the SSR input circuit can cause malfunction or permanent damage to the device. If such a high surge is anticipated, use C or R noise absorber in the input circuit.

3. If the polarity of the input voltage of input side is reversed
Reversing the polarity may cause permanent damage to the device. Take special care to avoid polarity reversal.

4. In the case of input voltage containing ripple
If the input voltage contains ripple, the peak of the ripple should not exceed the maximum rated control voltage (32V), and the bottom of the ripple should exceed the minimum rated control voltage (4V).

5. If the polarity of the load voltage of output side is reversed
Although the built-in diode for protection against reverse connection will prevent damage from occurring if the output terminals are connected with reverse polarity, please be aware that the circuit will short.

6. Spike voltage
If an inductive load generates spike voltages which exceed the absolute maximum rating, the spike voltage must be limited. Typical circuits are shown below.

Even if spike voltages generated at the load are limited with a clamp diode or varistor if the circuit wires are long, spike voltages will occur by inductance. Keep wires as short as possible to minimize inductance.

7. Others
1) If an SSR is used in close proximity to another SSR or heat-generating device, its ambient temperature may exceed the allowable level. Carefully plan SSR layout and ventilation.
2) Terminal connections should be made by referring to the associated wiring diagram.
3) When mounting a heat sink, coat it with a heat conducting compound or similar in order to improve the heat dissipation effect.
4) The product is hot during and immediately after operation. Use caution.
5) When mounting a slim heat sink (AQP-HS-SJ20A) on a DIN rail, mount it as per the instructions in Note of the dimensional drawing. Mounting in the opposite direction may cause disengagement due to vibration or impact.
6) For higher reliability, check device quality under actual operating conditions.
7) As a guide, the tightening torque for the screw terminals should be approximately 1.0 N·m on the output side and approximately 0.5 N·m on the input side.

8. Transportation and storage
1) Extreme vibration during transport will warp the terminal or damage the relay. Handle the carton and case with care.
2) Storage under extreme conditions will cause external appearance defects, and deterioration of the characteristics. The following storage conditions are recommended:
   - Temperature: 0 to 45°C
   - Humidity: Less than 70% R.H.
   - Atmosphere: No harmful gasses such as sulfurous acid gas, minimal dust.