SOLID STATE RELAYS
AN OVERVIEW

Compact types from 0.05A to 40A
For more and more applications, modern solid state relays are now a viable alternative to the classic electromechanical relays. Compared to conventional relays, semiconductor-based switching elements offer two essential advantages: superb reliability and a nearly unlimited lifespan. The various solid-state relay types all work according to the same principle: in the input circuit, an LED energizes an optoelectronic device via optical beam (→ insulation method), which in turn activates a power semiconductor on the output. At Panasonic, we differentiate between two solid state relay categories: the PhotoMOS type, with a MOSFET on the output, and the SSR type, with a TRIAC as a power semiconductor.

Panasonic has played an instrumental role in the development of modern relays. Thanks to our research and production centers in Japan and Germany, we now offer a versatile product line that provides solutions for practically any application. As an ISO 9001-certified supplier, we not only deliver the quality you’ve come to expect from Panasonic, we also offer the support that only global players can provide.

For more and more applications, modern solid state relays are now a viable alternative to the classic electromechanical relays. Compared to conventional relays, semiconductor-based switching elements offer two essential advantages: superb reliability and a nearly unlimited lifespan. The various solid-state relay types all work according to the same principle: in the input circuit, an LED energizes an optoelectronic device via optical beam (→ insulation method), which in turn activates a power semiconductor on the output. At Panasonic, we differentiate between two solid state relay categories: the PhotoMOS type, with a MOSFET on the output, and the SSR type, with a TRIAC as a power semiconductor.

Ready to run – it’s up to you to say when!

With most SSRs, you can choose between two types of switching behaviors:

**Zero-cross**

The zero-cross output does not become conductive until the load voltage crosses zero. As a result, the voltage on the component and on the load stays low during the switching cycle. The inrush current – and thus the impact on the component and on the load – as well as the electromagnetic noise are thereby reduced to a minimum.

**Random**

The random output becomes conductive immediately upon application of the LED input current. Thus, in addition to serving as a simple switch, it also lets you drive the load via phase control.

**Fig. 1: Zero-cross switching behavior**

**Fig. 2: Random switching behavior**
APT1- Phototriac coupler

Ideal for TRIAC driver

FEATURES

• Reduced zero-cross voltage (max. 15V)
• Several housing types available (including wide terminal type with 10.16mm pitch between I/O)
• High I/O isolation voltage (between input and output; for SOP type: 3750V; for DIP type: 5000V)
• Handles both 100 and 200V AC loads
• Zero-cross type and random type available

AQ-H

Compact DIP type: 0.3A to 1.2A

FEATURES

• Compact SSR, ideal for AC load control
• Supports 0.3A, 0.6A, 0.9A, and 1.2A RMS on-state current
• Handles both 100 and 200V AC loads
• High I/O isolation voltage: 5000V AC (between input and output)
• Zero-cross type and random type available
• No derating up to +40°C
• No heat sink required

AQ-G / AQ-10

Compact SIL type: 1A to 10A

FEATURES

• Slim vertical types
• 1A to 10A load types available
• High I/O isolation voltage: 3000V AC
• VDE (EN60950-1)-compliant types (with reinforced insulation) available
• Integrated snubber circuit
• Zero-cross type and random type available
**AQ-J**

Compact high-capacity plug-in SSR: 10 A to 25 A

**FEATURES**
- Compact dimensions: W28 x L38 x H30 mm
- Simple installation:
  - Screw mount or DIN rail mount
  - Easy I/O connection with tab terminals
- Built-in varistor
- Integrated snubber circuit
- Heat sink combined type easy to mount on DIN rail
- Output arrangement 1a and 2x 1a available in the heat sink combined type
- Zero-cross type and random type available
- High I/O isolation voltage: 3000 V AC

**AQ-A / AQ-AD**

Compact high-capacity screw terminal type: 15A to 40A

**FEATURES**
- AC or DC switching
- Compact dimensions: W40 x L58 x H25.5 mm
- Terminal cover on output side
- Wide input range (4 to 32 V DC)
- Mounting pitch: 47.5 mm (1.870 in)
- Operation status LED
- Reinforced insulation (breakdown voltage: 4000 V RMS between input and output)
- Built-in varistor (AC), Built-in Diode (DC)
- Integrated snubber circuit (AC)
- Zero-cross type and random type available (AC)
### Solid State Relays: Selected Models

<table>
<thead>
<tr>
<th>Model 1)</th>
<th>Housing</th>
<th>Load voltage (AC) 2)</th>
<th>Continuous load current</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>APT1211S</td>
<td>SOP4</td>
<td>250V</td>
<td>0.05A</td>
<td>Zero-cross</td>
</tr>
<tr>
<td>APT1221S</td>
<td>SOP4</td>
<td>250V</td>
<td>0.05A</td>
<td>Random</td>
</tr>
<tr>
<td>APT1211(A)</td>
<td>DIP4</td>
<td>250V</td>
<td>0.1A</td>
<td>Zero-cross</td>
</tr>
<tr>
<td>APT1221(A)</td>
<td>DIP4</td>
<td>250V</td>
<td>0.1A</td>
<td>Random</td>
</tr>
<tr>
<td>APT1212(A)</td>
<td>DIP6</td>
<td>250V</td>
<td>0.1A</td>
<td>Zero-cross</td>
</tr>
<tr>
<td>APT1222(A)</td>
<td>DIP6</td>
<td>250V</td>
<td>0.1A</td>
<td>Random</td>
</tr>
<tr>
<td>AQH0213(A)</td>
<td>DIP8</td>
<td>250V</td>
<td>0.3A</td>
<td>Zero-cross</td>
</tr>
<tr>
<td>AQH0223(A)</td>
<td>DIP8</td>
<td>250V</td>
<td>0.3A</td>
<td>Random</td>
</tr>
<tr>
<td>AQH3213(A)</td>
<td>DIP8</td>
<td>250V</td>
<td>1.2A</td>
<td>Zero-cross</td>
</tr>
<tr>
<td>AQH3223(A)</td>
<td>DIP8</td>
<td>250V</td>
<td>1.2A</td>
<td>Random</td>
</tr>
<tr>
<td>AQG12112</td>
<td>SIL4</td>
<td>250V</td>
<td>1A</td>
<td>Zero-cross</td>
</tr>
<tr>
<td>AQG22112</td>
<td>SIL4</td>
<td>250V</td>
<td>2A</td>
<td>Zero-cross</td>
</tr>
<tr>
<td>AQG12212</td>
<td>SIL4</td>
<td>250V</td>
<td>1A</td>
<td>Random</td>
</tr>
<tr>
<td>AQG22212</td>
<td>SIL4</td>
<td>250V</td>
<td>2A</td>
<td>Zero-cross</td>
</tr>
<tr>
<td>AQ3A2ZT432</td>
<td>SIL4</td>
<td>250V</td>
<td>3A</td>
<td>Zero-cross</td>
</tr>
<tr>
<td>AQ10A2ZT432</td>
<td>SIL4</td>
<td>250V</td>
<td>10A*</td>
<td>–</td>
</tr>
<tr>
<td>AQJ416V</td>
<td>Hockey Puck</td>
<td>250V</td>
<td>25A*</td>
<td>Zero-cross</td>
</tr>
<tr>
<td>AQJ116V</td>
<td>Hockey Puck</td>
<td>250V</td>
<td>15A*</td>
<td>Zero-cross</td>
</tr>
<tr>
<td>AQA211VL</td>
<td>Hockey Puck</td>
<td>250V</td>
<td>15A*</td>
<td>Zero-cross</td>
</tr>
<tr>
<td>AQA411V</td>
<td>Hockey Puck</td>
<td>250V</td>
<td>25A*</td>
<td>Zero-cross</td>
</tr>
<tr>
<td>AQA611V</td>
<td>Hockey Puck</td>
<td>250V</td>
<td>40A*</td>
<td>Zero-cross</td>
</tr>
<tr>
<td>AQAD551DL</td>
<td>Hockey Puck</td>
<td>100VDC</td>
<td>30A*</td>
<td>–</td>
</tr>
<tr>
<td>AQAD171DL</td>
<td>Hockey Puck</td>
<td>600VDC</td>
<td>10A*</td>
<td>–</td>
</tr>
</tbody>
</table>

1) A = SMD model
2) Effective value
* with heat sink fins

### Applications

- **Temperature Control System Configuration**
  - Injection molding machine
  - Temperature controlled bath
  - Printing machine
  - Sensor
  - Controller
  - LCD curing oven
  - Kitchen appliance

- **<Temperature Control System Configuration>**
Global Network

Panasonic Electric Works

Please contact our Global Sales Companies in:

Europe

- **Headquarters** Panasonic Electric Works Europe AG
- **Austria** Panasonic Electric Works Austria GmbH
- **Benelux** Panasonic Electric Works Sales Western Europe B.V.
- **Czech Republic** Panasonic Electric Works Europe AG
- **France** Panasonic Electric Works Sales Western Europe B.V.
- **Germany** Panasonic Electric Works Europe AG
- **Hungary** Panasonic Electric Works Europe AG
- **Ireland** Panasonic Electric Works UK Ltd.
- **Italy** Panasonic Electric Works Italia srl
- **Nordic Countries** Panasonic Electric Works Europe AG
- **Poland** Panasonic Electric Works Polska sp. z o.o.
- **Spain** Panasonic Electric Works España S.A.
- **Switzerland** Panasonic Electric Works Schweiz AG
- **United Kingdom** Panasonic Electric Works UK Ltd.

North & South America

- **USA** Panasonic Industrial Devices Sales Company of America

Asia Pacific / China / Japan

- **China** Panasonic Electric Works Sales (China) Co. Ltd.
- **Hong Kong** Panasonic Industrial Devices Automation Controls Sales (Hong Kong) Co., Ltd.
- **Japan** Panasonic Corporation
- **Singapore** Panasonic Industrial Devices Automation Controls Sales Asia Pacific

**Copyright © 2014 • Printed in Germany**