PCB relays – Pin or SMD – for DC operation, polarised, monostable or bistable

Features

- Universal ultra miniature relay with optimum capabilities
- Directly triggerable with TTL standard modules such as ALS, HCT and ACT
- Especially high sensitivity
- Extremely small size: base area only 0.98 cm² or 1.07 cm², volume only 0.68 cm³ or 0.85 cm³
- Relay system encapsulated in epoxy resin, thus especially immune to environmental influences
- Very high grade of shock resistance

Versions

- Relay types: monostable, 1 winding or bistable, 2 windings or bistable, 1 winding
- With 1 changeover contact
- With bifurcated contacts
- FCC version on request. Testing of open contacts with surge voltage in accordance with FCC 68.302 (1.5 kV, 10/160 µs) passed
- Automatically placeable from bar magazines (e.g. on Siemens HS-180)
- For SMD configuration, strap packaging possible on request
- For printed circuit assembling
- Immersion cleanable

Typical applications

- Storage element for input and output equipment
- Data and communication technology
- Medical equipment
- Measurement and control equipment
- Automobile technology
- Safety engineering
- Toy engineering

Approvals

- CECC Option: with qualification approval in accordance with CECC 16501-002/ VDE 400.74/04.90 for pin version
- CSA File LR 45064-5
- UL File E 48393
Miniature Relay P1

Pin version

Dimension drawing (in mm)

Mounting hole layout

View on the terminals

Orientation mark (imprinted)

Basic grid 2.54 mm according to EN 60097 and DIN 40803

Terminal assignment

View on the terminals

Monostable and bistable, 1 winding

Bistable, 2 windings

The contact position illustrated shows the release condition.

If a positive potential is applied to terminal 3, the relay adopts the operating position.

The contact position illustrated shows the release condition.

If a positive potential is applied to terminal 3 or a negative potential to terminal 6 as against terminal 8, the relay adopts the operating position.
SMD version

Dimension drawing (in mm)

Orientation mark (imprinted)

Solder pad layout
Attention: View onto the component side of the PCB!

Orientation mark

Terminal assignment
View on the terminals
Monostable and bistable,
1 winding

Bistable,
2 windings

The contact position illustrated shows the release condition.
If a positive potential is applied to terminal 3, the relay adopts the operating position.

The contact position illustrated shows the release condition.
If a positive potential is applied to terminal 3 or a negative potential to terminal 8 as against terminal 8, the relay adopts the operating position.
**Contact data**

<table>
<thead>
<tr>
<th>Number of contacts and type</th>
<th>1 changeover contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact assembly</td>
<td>Bifurcated contacts</td>
</tr>
<tr>
<td>Contact material</td>
<td>Pd Ni, Au Rh coated</td>
</tr>
<tr>
<td>Limiting continuous current at max. ambient temperature</td>
<td>1 A</td>
</tr>
<tr>
<td>Maximum switching current</td>
<td>1 A</td>
</tr>
<tr>
<td>Maximum switching voltage</td>
<td>125 V~</td>
</tr>
<tr>
<td></td>
<td>150 V~</td>
</tr>
<tr>
<td>Maximum switching capacity</td>
<td></td>
</tr>
<tr>
<td>DC voltage</td>
<td>30 W, see load limit curve</td>
</tr>
<tr>
<td>AC voltage</td>
<td>60 VA</td>
</tr>
<tr>
<td>Recommended for load voltages greater than</td>
<td>100 µV</td>
</tr>
<tr>
<td>Contact resistance (initial value) / measuring current / driver voltage</td>
<td>≤ 50 mΩ / 10 mA / 20 mV</td>
</tr>
</tbody>
</table>

**Load limit curve**

$I = \text{switching current}$

$U = \text{switching voltage}$

■ = recommended application field

Load limit curve: Safe shutdown, no stationary arc > 10 ms
## Miniature Relay P1

### Coil data

<table>
<thead>
<tr>
<th></th>
<th>From 1.5 V– to 24 V–</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nominal voltages</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Nominal power consumption</strong></td>
<td></td>
</tr>
<tr>
<td>monostable with 1 winding</td>
<td>65 ... 130 mW</td>
</tr>
<tr>
<td>bistable with 2 windings</td>
<td>65 ... 150 mW</td>
</tr>
<tr>
<td>bistable with 1 winding</td>
<td>30 ... 130 mW</td>
</tr>
<tr>
<td><strong>Operative range/pick-up class according to IEC 255-1-00</strong></td>
<td>1/a</td>
</tr>
<tr>
<td>and VDE 0435 Part 201</td>
<td></td>
</tr>
<tr>
<td><strong>Maximum operate voltage</strong></td>
<td>75 % of nominal voltage</td>
</tr>
<tr>
<td><strong>Maximum release voltage (bistable)</strong></td>
<td>75 % of nominal voltage</td>
</tr>
<tr>
<td><strong>Minimum release voltage (monostable)</strong></td>
<td>10 % of nominal voltage</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$U_I$</th>
<th>Minimum voltage at 20 °C after pre-energizing with nominal voltage without contact current</th>
</tr>
</thead>
<tbody>
<tr>
<td>$U_{II}$</td>
<td>Maximum continuous voltage at 20 °C</td>
</tr>
</tbody>
</table>

The operating voltage limits $U_I$ and $U_{II}$ are dependent on the temperature according to the formulae:

\[
U_{I\text{tamb}} = k_I \cdot U_{I \text{20 °C}}
\]
\[
U_{II\text{tamb}} = k_{II} \cdot U_{II \text{20 °C}}
\]

- $t_{\text{amb}}$: Ambient temperature
- $U_{I\text{tamb}}$: Minimum voltage at ambient temperature $t_{\text{amb}}$
- $U_{II\text{tamb}}$: Maximum voltage at ambient temperature $t_{\text{amb}}$
- $k_I$ a. $k_{II}$: Factors (dependent on temperature), see diagram
Miniature Relay P1

## Coils versions

<table>
<thead>
<tr>
<th>Nominal voltage $U_{\text{nom}}$ V</th>
<th>Operating voltage range at 20 °C</th>
<th>Resistance at 20 °C Ω</th>
<th>Coil number</th>
<th>Ordering code block 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum voltage, $U_\text{I}$ V</td>
<td>Maximum voltage, $U_\text{II}$ V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2.25</td>
<td>8.8</td>
<td>137 ± 14</td>
<td>006</td>
</tr>
<tr>
<td>5</td>
<td>3.75</td>
<td>14.5</td>
<td>370 ± 37</td>
<td>001</td>
</tr>
<tr>
<td>12</td>
<td>9</td>
<td>35</td>
<td>2250 ± 225</td>
<td>002</td>
</tr>
<tr>
<td>24</td>
<td>18</td>
<td>50</td>
<td>4500 ± 450</td>
<td>004</td>
</tr>
</tbody>
</table>

### Pin version

<table>
<thead>
<tr>
<th>Pin version</th>
<th>monostable, 1 winding</th>
<th>bistable, 2 windings (windings I and II identical)</th>
<th>bistable, 1 winding</th>
<th>bistable, 1 winding</th>
<th>bistable, 1 winding</th>
<th>bistable, 1 winding</th>
<th>bistable, 1 winding</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-A1****</td>
<td>-B1****</td>
<td>-C1****</td>
<td>-D1****</td>
<td>-E1****</td>
<td>-F1****</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2.25</td>
<td>8.55</td>
<td>130 ± 13</td>
<td>130 ± 13</td>
<td>130 ± 13</td>
<td>130 ± 13</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>3.75</td>
<td>14.75</td>
<td>390 ± 39</td>
<td>390 ± 39</td>
<td>390 ± 39</td>
<td>390 ± 39</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>9</td>
<td>29</td>
<td>1500 ± 150</td>
<td>1500 ± 150</td>
<td>1500 ± 150</td>
<td>1500 ± 150</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>18</td>
<td>50</td>
<td>4500 ± 450</td>
<td>4500 ± 450</td>
<td>4500 ± 450</td>
<td>4500 ± 450</td>
<td></td>
</tr>
</tbody>
</table>

### SMD version

<table>
<thead>
<tr>
<th>SMD version</th>
<th>monostable, 1 winding</th>
<th>bistable, 2 windings (windings I and II identical)</th>
<th>bistable, 1 winding</th>
<th>bistable, 1 winding</th>
<th>bistable, 1 winding</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-D1****</td>
<td>-E1****</td>
<td>-F1****</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2.25</td>
<td>8.55</td>
<td>130 ± 13</td>
<td>130 ± 13</td>
<td>130 ± 13</td>
</tr>
<tr>
<td>5</td>
<td>3.75</td>
<td>14.75</td>
<td>390 ± 39</td>
<td>390 ± 39</td>
<td>390 ± 39</td>
</tr>
<tr>
<td>12</td>
<td>9</td>
<td>29</td>
<td>1500 ± 150</td>
<td>1500 ± 150</td>
<td>1500 ± 150</td>
</tr>
<tr>
<td>24</td>
<td>18</td>
<td>50</td>
<td>4500 ± 450</td>
<td>4500 ± 450</td>
<td>4500 ± 450</td>
</tr>
</tbody>
</table>

1) At 24 V operation of the 12 V winding with a series resistor of 4500 Ω results in reduced power consumption.

Further coil versions e.g. 1.5 V, 9 V or 15 V are available on request.
### General data

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operate time at $U_{\text{nom}}$ and at 20 °C, typ.</td>
<td>1 ms</td>
</tr>
<tr>
<td>Release time at $U_{\text{nom}}$ and at 20 °C (bistable), typ.</td>
<td>1 ms</td>
</tr>
<tr>
<td>Release time without/with diode in parallel (monostable), typ.</td>
<td>0.4 ms/1.2 ms</td>
</tr>
<tr>
<td>Maximum switching rate without load</td>
<td>200 operations/s</td>
</tr>
<tr>
<td>Ambient temperature according to IEC 255-1-00 / VDE 0435 Part 201</td>
<td>-40 °C ... +70 °C</td>
</tr>
<tr>
<td></td>
<td>(... +85 °C on request)</td>
</tr>
<tr>
<td>Thermal resistance</td>
<td>130 K/W</td>
</tr>
<tr>
<td>Maximum permissible coil temperature</td>
<td>85 °C</td>
</tr>
<tr>
<td>Vibration resistance (function), frequency range according to IEC 68-2-6</td>
<td>20 g, 200 - 2000 Hz</td>
</tr>
<tr>
<td></td>
<td>40 g, 10 - 200 Hz</td>
</tr>
<tr>
<td>Shock resistance (function), half sinus, 11 ms according to IEC 68-2-27</td>
<td>50 g</td>
</tr>
<tr>
<td>Degree of protection according to IEC 529 / VDE 0470 Part 1</td>
<td>immersion cleanable, IP 67</td>
</tr>
<tr>
<td></td>
<td>sealing corresponds to IEC 68-2-17, method Qc 2</td>
</tr>
<tr>
<td>Electrical endurance for resistive load:</td>
<td></td>
</tr>
<tr>
<td>6 V−, 100 mA</td>
<td>approx. 5 x 10⁷ operations</td>
</tr>
<tr>
<td>24 V−, 1 A</td>
<td>approx. 3 x 10⁶ operations</td>
</tr>
<tr>
<td>Mechanical endurance</td>
<td>approx. 1 x 10⁹ operations</td>
</tr>
<tr>
<td>Flammability</td>
<td>flame resistance according to IEC 695-2-2</td>
</tr>
<tr>
<td>Mounting position</td>
<td>any</td>
</tr>
<tr>
<td>Processing information</td>
<td>ultrasonic cleanable</td>
</tr>
<tr>
<td>Weight (mass)</td>
<td>approx. 1.8 g</td>
</tr>
</tbody>
</table>

### Insulation

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulation resistance at 500 V</td>
<td>$\geq 10^9$ Ω</td>
</tr>
<tr>
<td>Dielectric test voltage contact / winding (1 min)</td>
<td>1500 V−rms</td>
</tr>
<tr>
<td></td>
<td>(2000 V−rms on request)</td>
</tr>
<tr>
<td>Dielectric test voltage at open contact (1 min)</td>
<td>500 V−rms</td>
</tr>
<tr>
<td>Clearances/creepage distances coil/contact</td>
<td>0.75 mm / 0.75 mm</td>
</tr>
</tbody>
</table>

Note: Relays with surge voltage resistance of 2.5 kV, 2/10 μs on request
## Ordering code

<table>
<thead>
<tr>
<th>Data position</th>
<th>Block 1</th>
<th>Block 2</th>
<th>Block 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V 2 3 0 2 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B 2 0 1</td>
</tr>
</tbody>
</table>

### Identification of the Miniature Relay P1

**Relay type**
- Pin version: A1 = monostable, 1 winding
- B1 = bistable, 2 windings
- C1 = bistable, 1 winding

**SMD version:**
- D1 = monostable, 1 winding
- E1 = bistable, 2 windings
- F1 = bistable, 1 winding

### Coil number

**Pin version:**
- monostable, 1 winding
  - 006 = 3 V nominal voltage
  - 001 = 5 V
  - 002 = 12 V
  - 004 = 24 V

**SMD version:**
- monostable, 1 winding
  - 026 = 3 V nominal voltage
  - 021 = 5 V
  - 022 = 12 V
  - 024 = 24 V

**Pin- and SMD version:**
- bistable, 2 windings
  - 106 = 3 V nominal voltage
  - 101 = 5 V
  - 102 = 12 V
  - 105 = 24 V

- bistable, 1 winding
  - 056 = 3 V nominal voltage
  - 051 = 5 V
  - 052 = 12 V
  - 054 = 24 V

### Contact arrangement / material
- B201 = 1 changeover contact; palladium nickel, gold-plated, rhodium-coated

**Ordering example:** V23026-B1102-B201
- Miniature relay P1, Pin version, bistable, coil with 2 windings, 12 V nominal voltage

### Note:
The ordering scheme enables a multitude of variations. However, not all variations are defined as construction specifications (ordering code) and thus in the current delivery program.
Special designs can be carried out to customer specifications. Please contact your local representative. The addresses are given on the back page.
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