Pickering Series 109

**Micro-SIL® SIL/SIP Reed Relays**

Including coaxial types

Up to 20 Watts switching - Very high packing density

**Features**

- **SoftCenter®** construction (see adjacent diagram)
- Highest quality instrumentation grade switches
- 1 Form A and 2 Form A (energise to make)
- 1 Form B (energise to break)
- 1 Form C (changeover)
- 1 Form A Coaxial 50 Ohms impedance (energise to make)
- 1 Form A Coaxial 75 Ohms impedance (energise to make)
- Insulation resistance greater than $10^{12} \Omega$
- 3, 5 and 12 Volt coils with or without internal diode

The mu-metal packaged Series 109 and 109RF, and the plastic packaged Series 109P, are magnetically screened single-in-line reed relays that stack on 0.15 inches x 0.6 inches pitch. The adjacent column gives further details of the device types available.

These relays require little more than half the board area of the more usual 0.2 x 0.8 inch devices, this allows around 80 percent more relays onto your board. These are the ideal choice for high density applications such as A.T.E. switching matrices or where very little board area is available.

Mu-metal, due to its high permeability and low magnetic remanence is used to provide magnetic screening. This eliminates problems that would otherwise occur due to magnetic interaction. Interaction is usually measured as a percentage increase in the voltage required to operate a relay when two additional relays, stacked one each side, are themselves operated. An unscreened device mounted on this pitch would have an interaction figure of around 40 percent.

Relays of this size without magnetic screening would therefore be totally unsuitable for applications where dense packing is required. Pickering Series 109 and 109RF have a typical interaction figure of 1 percent. Series 109P and 109PH have a typical figure of 3 percent.

Two types of Form A (energise to make) switches are available, a general purpose switch (switch no.1) and a vacuum sputtered ruthenium switch (switch no.2) which is ideal for low level or “cold” switching applications. 5 volt coils normally have a resistance of 500 ohms and 12 volt coils are 1000 ohms. A sensitive single pole 5 volt device with a 1000 ohms coil is also available. Internal back E.M.F. clamping diodes are an option for all types. The small size of these relays often makes it possible to increase the functionality of existing designs without increasing the size of printed circuit boards.

**Device Types**

**Series 109** 1 Form A, 2 Form A, 1 Form B, 1 Form C

Similar in construction to the Pickering Series 107 and Series 108. These patented devices are encapsulated in mu-metal cans using very high resistivity resins.

**Series 109RF** Coaxial 1 Form A

Coaxial relays in mu-metal cans. They are available with a characteristic impedance of either 50 or 75 ohms. For R.F. up to 2GHz, telecoms, video or high speed digital switching up to 500 Mbits/sec.

**Series 109P** 1 Form A

The electrical specification and dimensions are identical to the 1 Form A Series 109. They are encapsulated using the same resins within a plastic package which features an internal mu-metal magnetic screen.

**Typical Pickering SoftCenter® Construction**

Unique Pickering Construction vs. Industry Standard Construction

- **Internal mu-metal magnetic screen** providing high packing density without magnetic interaction
- **SoftCenter® Soft inner encapsulation material** to protect reed switch
- **Hard outer encapsulation material**
- **Very hard molding material**
- **Coil winding**
- **Self supporting coil to maximize magnetic drive**
- **Diodes**
- **Coil supporting bobbin, reduces space and magnetic drive**

For FREE evaluation samples go to: pickeringrelay.com/samples
Series 109 switch ratings - The contact ratings for each switch type are shown below:

<table>
<thead>
<tr>
<th>Switch No</th>
<th>Switch form</th>
<th>Power rating</th>
<th>Max. switch current</th>
<th>Max. carry current</th>
<th>Max. switching volts</th>
<th>Life expectancy ops typical</th>
<th>Operate time inc bounce</th>
<th>Release time</th>
<th>Special features</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>15 W (2L Version) 20 W (Other)</td>
<td>1.0 A</td>
<td>1.2 A</td>
<td>200</td>
<td>10^10</td>
<td>0.5 ms</td>
<td>0.2 ms</td>
<td>General purpose</td>
</tr>
<tr>
<td>2</td>
<td>A or B</td>
<td>10 W</td>
<td>0.5 A</td>
<td>1.2 A</td>
<td>200</td>
<td>10^10</td>
<td>0.5 ms</td>
<td>0.2 ms</td>
<td>Low level</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>3 W</td>
<td>0.1 A</td>
<td>0.1 A</td>
<td>30</td>
<td>10^10</td>
<td>0.75 ms</td>
<td>0.5 ms</td>
<td>Change over</td>
</tr>
</tbody>
</table>

Switch No 2 A is particularly good for switching low currents and/or voltages. It is the ideal switch for A T.E. systems where cold switching techniques are often used. Where higher power levels are involved, switch No. 1 is more suitable.

Operating voltages:

- **Coin voltage - nominal**
  - 3 V: 2.25 V
  - 5 V: 3.75 V
  - 12 V: 9 V

- **Must operate voltage - maximum at 25°C**
  - 3 V: 2.3 V
  - 5 V: 3.8 V
  - 12 V: 9 V

- **Must release voltage - minimum at 25°C**
  - 3 V: 0.3 V
  - 5 V: 0.5 V
  - 12 V: 1.2 V

Coil data and type numbers:

<table>
<thead>
<tr>
<th>Device type</th>
<th>Package Style</th>
<th>Type Number</th>
<th>Coil (V)</th>
<th>Coil resistance</th>
<th>Max. contact resistance (initial)</th>
<th>Insulation resistance (minimum)</th>
<th>Capacitance (typical)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Form A</td>
<td>General Purpose Switch No. 1</td>
<td>1</td>
<td>109-1-A-5/1D</td>
<td>5</td>
<td>500 D</td>
<td>0.15 D</td>
<td>10^10 D</td>
</tr>
<tr>
<td>1 Form A</td>
<td>Low Level Switch No. 2</td>
<td>1</td>
<td>109-1-A-2/2D</td>
<td>3</td>
<td>330 D</td>
<td>0.12 D</td>
<td>10^10 D</td>
</tr>
<tr>
<td>1 Form B</td>
<td>Low Level Switch No. 2</td>
<td>1</td>
<td>109-1-B-2/2D</td>
<td>5</td>
<td>500 D</td>
<td>0.12 D</td>
<td>10^10 D</td>
</tr>
<tr>
<td>1 Form C</td>
<td>(change-over) Switch No. 3</td>
<td>5</td>
<td>109-1-C-3/3D</td>
<td>5</td>
<td>150 D</td>
<td>0.25 D</td>
<td>10^10 D</td>
</tr>
<tr>
<td>2 Form A</td>
<td>Switch No. 2</td>
<td>3</td>
<td>109-2-A-3/3D</td>
<td>3</td>
<td>200 D</td>
<td>0.14 D</td>
<td>10^10 D</td>
</tr>
<tr>
<td>50 D Coaxial</td>
<td>Switch No. 1</td>
<td>4</td>
<td>109RF01-1-A-5/10D</td>
<td>5</td>
<td>600 D</td>
<td>0.15 D</td>
<td>10^10 D</td>
</tr>
<tr>
<td>50 D Coaxial</td>
<td>Switch No. 2</td>
<td>4</td>
<td>109RF01-1-A-5/5D</td>
<td>5</td>
<td>600 D</td>
<td>0.12 D</td>
<td>10^10 D</td>
</tr>
<tr>
<td>75 D Coaxial</td>
<td>Switch No. 1</td>
<td>4</td>
<td>109RF75-1-A-12/2D</td>
<td>5</td>
<td>600 D</td>
<td>0.15 D</td>
<td>10^10 D</td>
</tr>
<tr>
<td>75 D Coaxial</td>
<td>Switch No. 2</td>
<td>4</td>
<td>109RF75-1-A-12/2D</td>
<td>5</td>
<td>600 D</td>
<td>0.12 D</td>
<td>10^10 D</td>
</tr>
<tr>
<td>1 Form A</td>
<td>Switch No. 1</td>
<td>6</td>
<td>109-1-A-5/1D</td>
<td>5</td>
<td>500 D</td>
<td>0.15 D</td>
<td>10^10 D</td>
</tr>
<tr>
<td>1 Form A</td>
<td>Switch No. 2</td>
<td>6</td>
<td>109-1-A-3/3D</td>
<td>3</td>
<td>250 D</td>
<td>0.12 D</td>
<td>10^10 D</td>
</tr>
</tbody>
</table>

When an internal diode is required, the suffix D is added to the part number as shown in the table.

Environmental specification:

**Standard operating temperature range:** -20 to +85°C

**Note 1:** Life expectancy

The life of a reed relay depends upon the switch load and end of life criteria. For example, for an ‘end of life’ contact resistance specification of 1 Ω, switching low loads (10 V at 10 mA resistive) or when ‘cold’ switching, typical life is approx 1 x 10^6 ops. At the maximum load (resistive), typical life is 1 x 10^5 ops. In the event of abusive conditions, e.g. high currents due to capacitive transients, this figure reduces considerably. Pickering will be pleased to perform life testing with any particular load condition.

**Note 2:** Capacitance across open switch

The capacitance across the open switch was measured with other connections guarded.

**Note 3:** Capacitance values

The value will depend upon the mode of connection/guarding of unused terminals. Please contact technical sales for details.

Help

If you need any technical advice or other help, for example, any special tests that you would like carried out, please do not hesitate to contact our Technical Sales Department. We will always be pleased to discuss Pickering relays with you. email: techsales@pickeringrelay.com

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