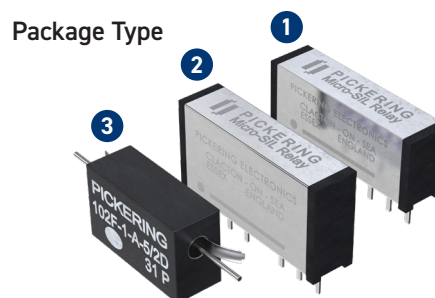


- Up to **20 W** switching capability
- Highest quality instrumentation grade switches
- **1 Form A** or **1 Form B** configurations
- Insulation resistance  $>10^{12} \Omega$
- **3 V, 5 V** or **12 V** coils with optional internal diode
- Suitable for high frequency applications up to **3 GHz** and portable applications.
- **Additional build options are available**
- Many benefits compared to industry standard relays **(see last page)**



The Series 102 is a range of subminiature coaxial reed relays for high frequency applications up to 3 GHz, performance characteristics will be found on reverse of this sheet. Three package types are available, all displaying outstanding RF performance in terms of low insertion loss, good isolation and excellent VSWR characteristics in 50 ohms systems. These relays have good coil drive levels making them ideal for portable applications or where space is at a premium. If an even smaller RF relay is required, look at the Series 109RF or 111 RF.

#### 102M (Mu-metal) Package.

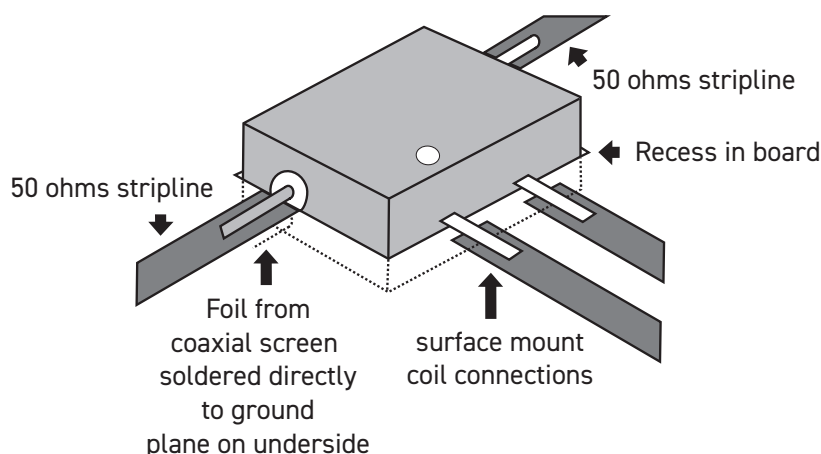
This device, constructed in the popular Single-In-Line format, features a mu-metal case allowing dense packaging without magnetic interaction problems. It has six pins for conventional PCB mounting. With careful printed circuit board layout this configuration will perform well up to 1.5 GHz, it is easy to use and will meet most requirements.

#### 102F (Flatpack) package.

The 102F package dispenses with the leadframe connections to the switch and screen. These terminations are instead brought out axially from the ends of the device where they are soldered directly to the stripline. This technique allows very accurate matching to the 50 ohms line and gives an excellent VSWR right up to 3 GHz.

#### 102F Mounting method:

A small rectangular hole is punched into the printed circuit board or notched into the board edge to accommodate the package. The switch leads are then soldered directly to the 50 ohms stripline, the tin plated copper foil from the screen is soldered directly to the ground plane on the reverse side of the PCB. The coil connections are soldered directly to their tracks in the same way.



Flatpack PCB Connections

#### Also available - Low capacitance reed relays

If your high frequency application does not require coaxial relays, Pickering also manufacture devices featuring very low levels of capacitance between the switch and coil, see our **Series 103**. These are especially useful for such applications as the switching of ranges and attenuators in computer controlled instrumentation. Contact our sales office for further details.

### Switch Ratings

1 Form A coaxial (energize to make)	1 Form B coaxial (energize to break)
10 W at 200 V 20 W at 200 V	10 W at 200 V 20 W at 200 V

### Series 102 switch ratings - contact ratings for each switch type

Switch No	Switch form	Power rating	Max. switch current	Max. carry current	Max. switching volts	Life expectancy ops typical (see Note <sup>1</sup> )	Operate time inc bounce (max)	Release time	Special features
1	A or B	10 W	0.5 A	1.2 A	200	10 <sup>8</sup>	0.5 ms	0.2 ms	Low Level
2	A or B	20 W	1 A	1.2 A	200	10 <sup>8</sup>	0.5 ms	0.2 ms	General Purpose

#### Note<sup>1</sup>: Life Expectancy

The life of a reed relay depends upon the switch load and the end of life criteria. For example, for an 'end of life' contact resistance specification of 1Ω, switching low loads or when 'cold' switching, typical life is expected to be greater than 1 x 10<sup>9</sup> ops. At higher voltages and the maximum load (resistive), typical life is 1 x 10<sup>7</sup> ops. In the event of abusive conditions, e.g. high currents due to capacitive inrushes, this figure reduces considerably. Pickering will be pleased to perform life testing with any particular load conditions.

### Operating Voltages

Coil voltage - nominal	Must operate voltage - maximum at 25 °C	Must release voltage - minimum at 25 °C
3 V	2.25 V	0.3 V
5 V	3.75 V	0.5 V
12 V	9 V	1.2 V

### Environmental Specification/Mechanical Characteristics

In the table below, the upper temperature limit can be extended to +125 °C if the coil drive voltage is increased to accommodate the resistance/temperature coefficient of the copper coil winding. This is approximately 0.4% per °C. This means that at 125 °C the coil drive voltage will need to be increased by approximately 40 x 0.4 = 16% to maintain the required magnetic drive level. Please contact [sales@pickeringrelay.com](mailto:sales@pickeringrelay.com) for assistance.

Operating Temperature Range	-20 °C to +85 °C
Storage Temperature Range	-35 °C to +100 °C
Shock Resistance	50 g
Vibration Resistance (10 - 2000 Hz)	20 g
Soldering Temperature (max) (10 s max)	270 °C
Washability (Proper drying process is recommended)	Fully Sealed

### Washing Guidelines

Pickering do not make any specific recommendations on washing reed relays, due to the large number of factors in cleaning processes, however we do have suggestions on best practices. Click [here](#) for more information.

**102M (mu-metal) Coil Data and Type Numbers**

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note <sup>4</sup> )		Capacitance (typical) (see Note <sup>2</sup> )	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 Package Type 1	102M-1-A-3/1D	3	250 Ω	0.15 Ω	10 <sup>12</sup> Ω	10 <sup>12</sup> Ω	See Note <sup>3</sup>	0.1 pF
	102M-1-A-5/1D	5	500 Ω					
	102M-1-A-12/1D	12	1000 Ω					
1 Form A, Switch No. 2 Higher Power Dry Reed Package Type 1	102M-1-A-5/2D	5	375 Ω	0.15 Ω	10 <sup>12</sup> Ω	10 <sup>12</sup> Ω	See Note <sup>3</sup>	0.1 pF
	102M-1-A-12/2D	12	1000 Ω					
1 Form B Switch No. 1 Package Type 2	102M-1-B-5/1D	5	1000 Ω	0.15 Ω	10 <sup>12</sup> Ω	10 <sup>12</sup> Ω	See Note <sup>3</sup>	0.1 pF
	102M-1-B-12/1D	12	1500 Ω					
1 Form B, Switch No. 2 Higher Power Dry Reed Package Type 1	102M-1-B-5/2D	5	1000 Ω	0.15 Ω	10 <sup>12</sup> Ω	10 <sup>12</sup> Ω	See Note <sup>3</sup>	0.1 pF
	102M-1-B-12/2D	12	1500 Ω					

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

**102F (flatpack) Coil Data and Type Numbers**

Device Type	Type Number	Coil (V)	Coil resistance	Max. contact resistance (initial)	Insulation resistance (minimum at 25 °C) (see Note <sup>4</sup> )		Capacitance (typical) (see Note <sup>2</sup> )	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A Switch No. 1 Package Type 3	102F-1-A-3/1D	3	250 Ω	0.10 Ω	10 <sup>12</sup> Ω	10 <sup>12</sup> Ω	See Note <sup>3</sup>	0.1 pF
	102F-1-A-5/1D	5	500 Ω					
	102F-1-A-12/1D	12	1000 Ω					
1 Form A, Switch No. 2 Higher Power Dry Reed Package Type 3	102F-1-A-5/2D	5	375 Ω	0.10 Ω	10 <sup>12</sup> Ω	10 <sup>12</sup> Ω	See Note <sup>3</sup>	0.1 pF
	102F-1-A-12/2D	12	1000 Ω					

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

**Note<sup>2</sup>: Capacitance across open switch**

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

**Note<sup>3</sup>: Capacitance values**

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

**Note<sup>4</sup>: Insulation resistance**

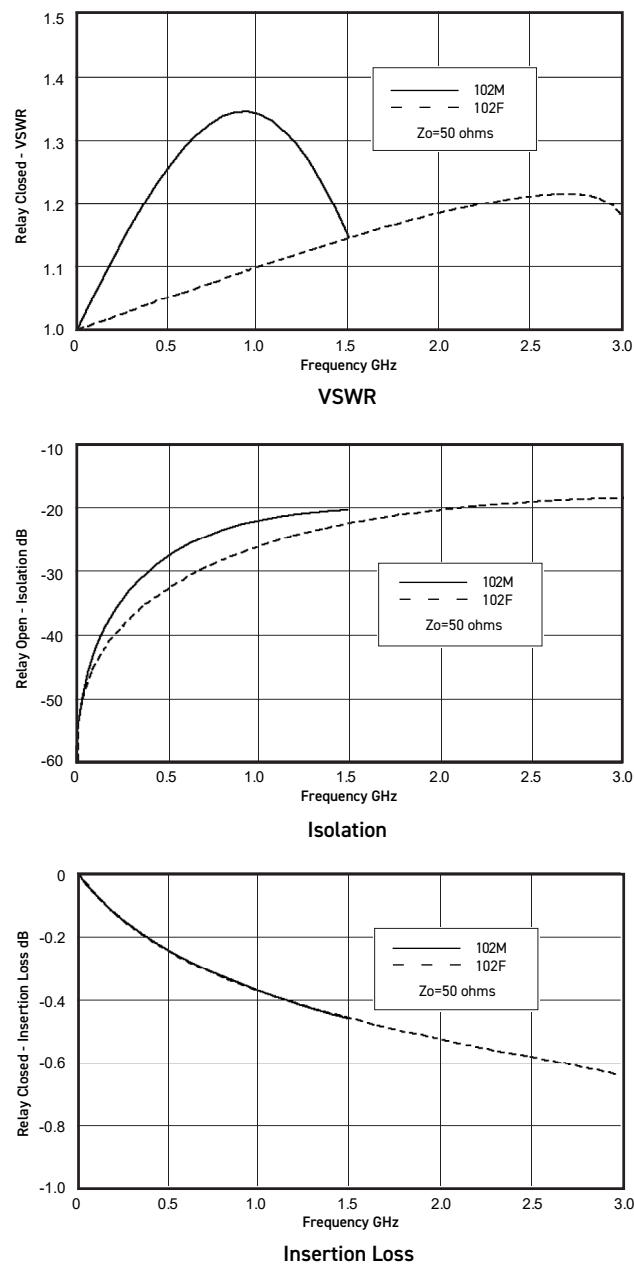
Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

The technical information shown in this data sheet could contain inaccuracies or typographical errors. This information may be periodically changed or updated and these changes will be included in future versions of this data sheet.

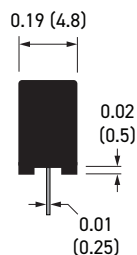
For different values, latest specifications and product details, please contact your local Pickering sales office.

For **FREE** evaluation samples go to: [pickeringrelay.com/samples](https://www.pickeringrelay.com/samples)

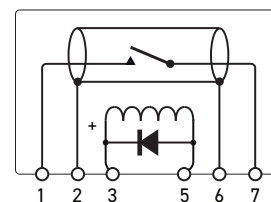
Typical Performance Characteristics



### Package Type **1**



# 1 Form A Coaxial



## Package Type 2

**19g**

0.75 (19.1)

0.40 (10.2)

0.125 (3.2)

Pin 1

0.1 (2.54)

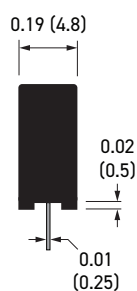
0.1 (2.54)

0.2 (5.1)

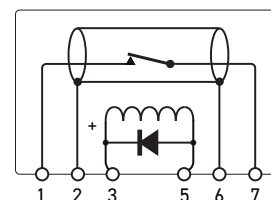
0.1 (2.54)

0.1 (2.54)

0.02 (0.5)



## 1 Form B Coaxial



### Package Type **3**

0.53 Max (13.5)

0.5 (12.7)

0.19 (4.8)

Copper Foil Screen Connection

0.2 (5.06) dia Switch Connection

0.2 (5.1)

0.15 (3.8)

Pin 1

0.2 (5.1)

0.2 (5.1)

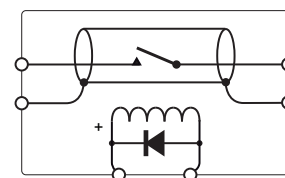
0.30 (7.6)

0.03 (0.8)

0.125 (3.2)

Suggested PCB Cut-out 0.55 (14.0) x 0.35 (8.9)

## 102F Package






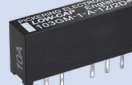
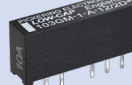


**pickering**

### Similar Relays Comparison

If the Series 102 is unsuitable for your application, Pickering also manufactures three other reed relay types with similar characteristics, but in different package sizes.

If your high frequency application does not require coaxial relays, Pickering also manufacture devices featuring very low levels of capacitance between the switch and coil, see our Series 103. These are especially useful for such applications as the switching of ranges and attenuators in computer controlled instrumentation. Contact our sales office for further details.

Series Name		111RF-1-A	109RF50-1-A		109RF75-1-A		102M-1-A		102M-1-B		102F-1-A		103GM-1-A	
Physical Outline														
Depth	mm (inches)	3.7 (0.145)	3.7 (0.145)				4.8 (0.19)		4.8 (0.19)		7.6 (0.30)		4.8 (0.19)	
Width		10.0 (0.39)	15.1 (0.595)				19.1 (0.75)		19.1 (0.75)		12.7 (0.5)		19.1 (0.75)	
Height		6.6 (0.26)	6.6 (0.26)				7.6 (0.3)		10.2 (0.4)		4.8 (0.19)		8.1 (0.32)	
Package Volume (mm³)		245	369				① 697		② 936		③ 464		743	
Typical Weights (g)		0.56	0.88		0.87		1.43		2.19		0.8		1.28	
Contact Configuration		1-A (SPST)	1-A (SPST)		1-A (SPST)		1-A (SPST)		1-B (SPNC)		1-A (SPST)		1-A (SPST)	
Reed Switch Type		Dry	Dry	Dry	Dry	Dry	Dry		Dry		Dry		Dry	
Stand-off Voltage (V)		-	-	-	-	-	-	-	-	-	-	-	-	-
Switching Voltage (V)		170	200	200	200	200	200	200	200	200	200	200	200	200
Switching Current (A)		0.5	1.0	0.5	1.0	0.5	0.5	1	0.5	1	0.5	1	1	0.5
Carry Current (A)		0.5	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Switch Power (W)		10	15/20	10	15/20	10	10	20	10	20	10	20	20	10

### Reed Relay Selection Tool

Because Pickering offer the largest range of high-quality reed relays, sometimes it can be difficult to find the right reed relay you require. That is why we created the Reed Relay Selector, this tool will help you narrow down our offering to get you the correct reed relay for your application. To try the tool today go to: [pickeringrelay.com/reed-relay-selector-tool](https://pickeringrelay.com/reed-relay-selector-tool)

### Standard Build Options

The Series 102 Reed Relays are available with a number of standard build options to tailor them to your specific application. These options are detailed in the table below. If you decide to go ahead and specify one, or more, of these options you will be allocated a unique part number suffix.

Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
Custom packaging possibility	Pulse capability
Equivalents to competitors discontinued parts	Enhanced specifications
	Equivalents to competitors discontinued parts
	Non-standard coil voltages and resistance figures
	Special Life testing under customer's specific load conditions
	Specific environmental requirements
	Controlled thermal EMF possibility

### Customization

If your specific requirements are not met by standard relay, or any of the standard build options, please speak to us to discuss producing a customized reed relay to service your specific application: [pickeringrelay.com/contact](http://pickeringrelay.com/contact)

### 3D Models

Interactive 3D models of the complete range of Pickering relay products in STEP, IGS and SLDPRP formats can be downloaded from the website: [pickeringrelay.com/3d-models](http://pickeringrelay.com/3d-models)

**Part Number Description:** 102M - 1 - A - 5 / 2 D - xxx

Series \_\_\_\_\_  
 Number of reeds \_\_\_\_\_  
 Switch form \_\_\_\_\_  
 Coil voltage \_\_\_\_\_  
 Switch number (see tables on pages 2) \_\_\_\_\_  
 Diode if fitted (omit if not required) \_\_\_\_\_  
 Unique suffix (if standard build option selected) \_\_\_\_\_

### Help

If you need any technical advice or other help, 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](mailto:techsales@pickeringrelay.com)

### Contact Us

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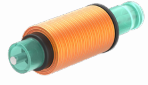
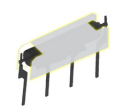
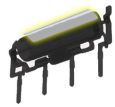


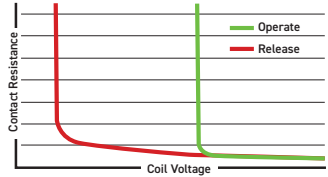

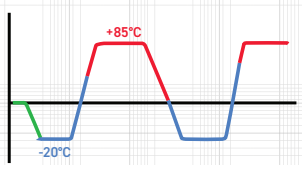

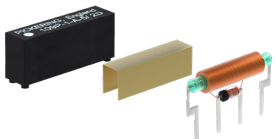

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For a full list of agents, distributors and representatives visit: [pickeringrelay.com/agents](http://pickeringrelay.com/agents)



# 10 Key Benefits of Pickering Reed Relays

Key Benefit	Pickering Reed Relays	Typical Industry Reed Relays	
<b>1</b> Instrumentation Grade Reed Switches	Instrumentation Grade Reed Switches with vacuum sputtered Ruthenium plating to ensure stable, long life up to 5x10E9 operations.	Often low grade Reed Switches with electroplated Rhodium plating resulting in higher, less stable contact resistance.	
<b>2</b> Formerless Coil Construction	Formerless coil construction increases the coil winding volume, maximizing magnetic efficiency, allowing the use of less sensitive reed switches resulting in optimal switching action and extended lifetime at operational extremes.	Use of bobbins decreases the coil winding volume, resulting in having less magnetic drive and a need to use more sensitive reed switches which are inherently less stable with greatly reduced restoring forces.	  Pickering former-less coil      Typical industry coil wound on bobbin
<b>3</b> Magnetic Screening	Mu-metal magnetic screening (either external or internal), enables ultra-high PCB side-by-side packing densities with minimal magnetic interaction, saving significant cost and space. <b>Pickering Mu-Metal magnetic screen - interaction approx. 5%</b>	Lower cost reed relays have minimal or no magnetic screening, resulting in magnetic interaction issues causing changes in operating and release voltages, timing and contact resistance, causing switches to not operate at their nominal voltages. <b>Typical industry screen - interaction approx. 30%</b>	  X-Ray of Pickering mu-metal magnetic screen      X-Ray of typical industry mu-metal magnetic screen
<b>4</b> <b>SoftCenter™</b> Technology	<b>SoftCenter™</b> technology, provides maximum cushioned protection of the reed switch, minimising internal lifetime stresses and extending the working life and contact stability.	Transfer moulded reed relays (produced using high temperature/pressure), result in significant stresses to the glass reed switch which can cause the switch blades to deflect or misalign leading to changes in the operating characteristics, contact resistance stability and operating lifetime.	  Pickering soft center protection of the reed switch      Typical industry thermo-setting hard moulded protection of the reed switch
<b>5</b> 100% Dynamic Testing	100% testing for all operating parameters including dynamic contact wave-shape analysis with full data scrutiny to maintain consistency.	Simple dc testing or just batch testing which may result in non-operational devices being supplied.	<b>Dynamic Contact Resistance Test</b> 
<b>6</b> 100% Inspection at Every Stage of Manufacturing	Inspection at every stage of manufacturing maintaining high levels of quality.	Often limited batch inspection.	
<b>7</b> 100% Thermal Cycling	Stress testing of the manufacturing processes, from -20 °C to +85 °C to -20 °C, repeated 3 times.	Rarely included resulting in field failures.	
<b>8</b> Flexible Manufacturing Process	Flexible manufacturing processes allow quick-turn manufacturing of small batches.	Mass production: Usually large batch sizes and with no quick-turn manufacturing.	
<b>9</b> Custom Reed Relays	Our reed relays can be customized easily, e.g. special pin configurations, enhanced specifications, non-standard coil or resistance figures, special life testing, low capacitance, and more.	Limited ability to customize.	
<b>10</b> Product Longevity	Pickering are committed to product longevity; our reed relays are manufactured and supported for more than 25 years from introduction, typically much longer.	Most other manufacturers discontinue parts when they reach a low sales threshold; costing purchasing and R&D a great deal of unnecessary time and money to redesign and maintain supply.	

For more information go to: [pickeringrelay.com/10-key-benefits](https://pickeringrelay.com/10-key-benefits)