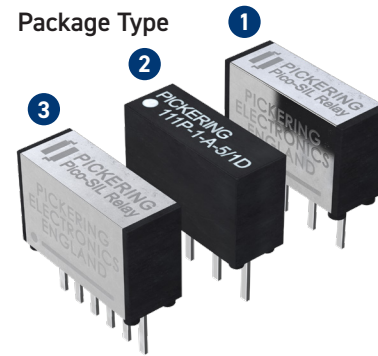


- Stacks on **0.15 x 0.40 inches** pitch
- Highest quality instrumentation grade switches
- Mu-metal magnetic screening
- Two package styles - mu-metal package or plastic package with internal mu-metal magnetic screen
- They take up the minimum of board area, conserving board space
- Includes **111RF**, a **50 Ω** coaxial device suitable for use up to **2.5 GHz**
- Insulation resistance **>10¹² Ω**
- **3 or 5 V** coils with or without internal diode
- **Additional build options are available**
- Many benefits compared to industry standard relays **(see last page)**



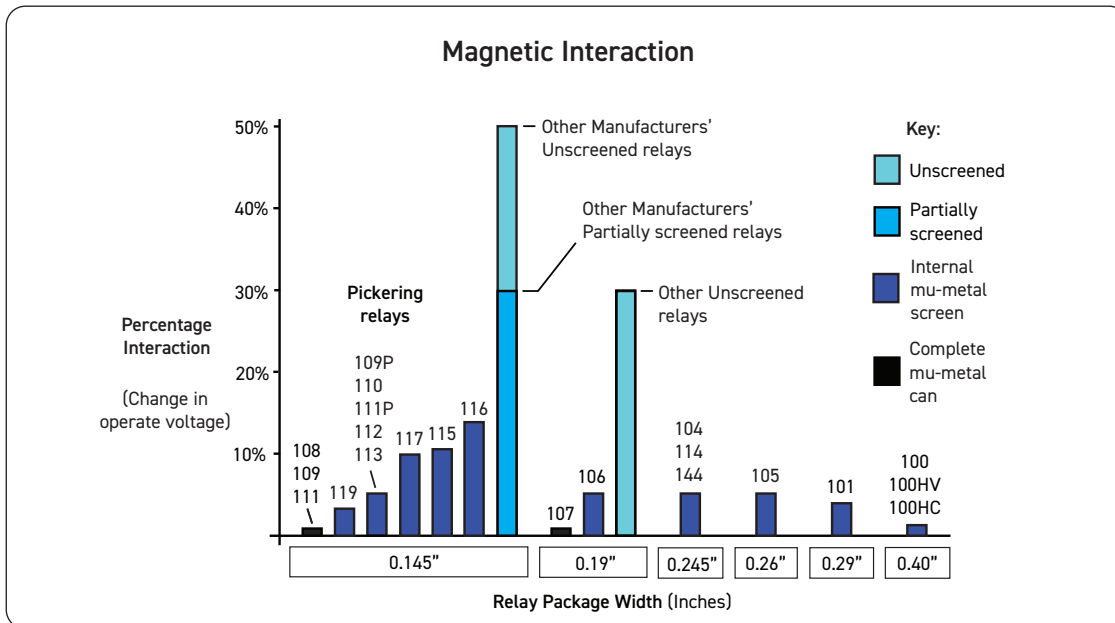
Requiring around one third the board area of the more usual 0.2 x 0.8 inch devices these relays are ideal for high density applications.

Two package styles are available:

The type 111 is encapsulated in a mu-metal can. The coaxial version, type 111RF, is also available in this package style.

The type 111P is encapsulated in a plastic package and features an internal mu-metal screen. An internal diode is an option in both types.

Magnetic screening is essential to avoid magnetic interaction problems. 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%. Relays of this size would therefore be totally unsuitable for applications where dense packing is required. Pickering Series 111 have an interaction figure of around 1%.



For more information on magnetic interaction please visit: pickeringrelay.com/magnetic-interaction

Switch Ratings - Dry Switches

1 Form A (energize to make)
10 W at 170 V

Series 111 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 ¹)	Operate time inc bounce (max)	Release time	Special features
1	A	10 W	0.5A	0.5A	170	10 ⁸	0.5ms	0.2ms	General purpose

Note¹: 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 1Ω, switching low loads (10 V at 10 mA resistive) or when 'cold' switching, typical life is approx 2.5 x 10⁸ ops. At the maximum load (resistive), typical life is 1 x 10⁶ 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 condition.

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

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 for assistance.

Operating Temperature Range	-20°C to +85°C
Storage Temperature Range	-35°C to +100°C
Shock Resistance	50g
Vibration Resistance (10 - 2000Hz)	20g
Soldering Temperature (max) (10s 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.

Dry Relay: Series 111 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 ³)		Capacitance (typical) (see Note ²)	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A, Switch No. 1 Package Type 1 (mu-metal)	111-1-A-3/1D	3	200 Ω	0.15 Ω	10 ¹² Ω	10 ¹² Ω	1.5 pF	0.15 pF
	111-1-A-5/1D	5	500 Ω					
1 Form A, Switch No. 1 Package Type 2 (plastic)	111P-1-A-3/1D	3	200 Ω	0.15 Ω	10 ¹² Ω	10 ¹² Ω	1.5 pF	0.15 pF
	111P-1-A-5/1D	5	400 Ω					
1 Form A Coaxial Switch No. 1 Package Type 3 (mu-metal)	111RF-1-A-5/1D	5	180 Ω	0.15 Ω	10 ¹² Ω	10 ¹² Ω	1.5 pF	0.15 pF

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

Note²: Capacitance across open switch

This is measured with all other component leads connected to the guard terminal of the measuring bridge.

Note³: Insulation resistance

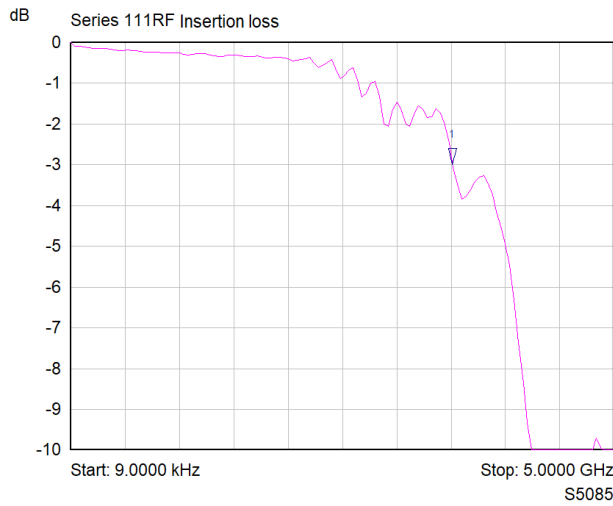
Insulation resistance will reduce at higher temperatures. For more information on temperature effects [click here](#), or [contact Pickering](#) for more in depth guidance.

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.

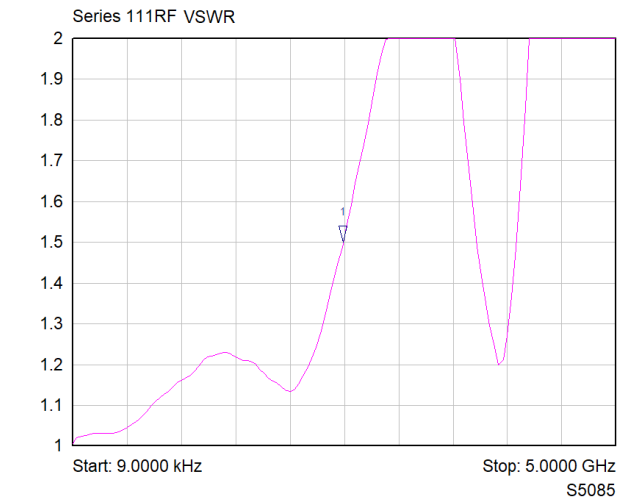
For **FREE** evaluation samples go to: pickeringrelay.com/samples

RF Plots for the 111RF Reed Relay



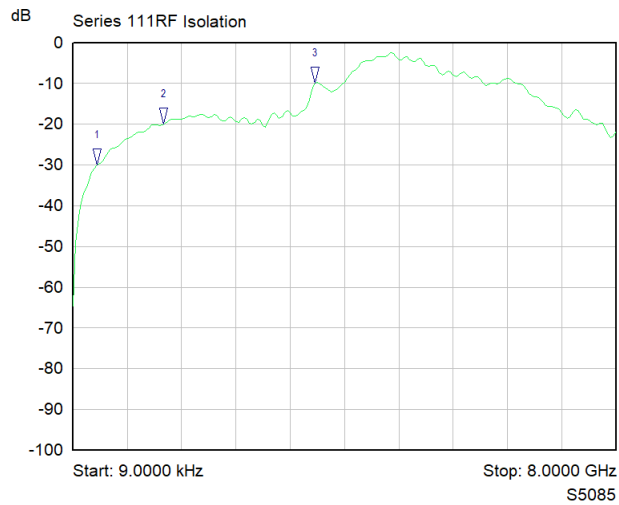
Mkr	Trace	X-Axis	Value
1 ▾	Series 111RF	3.5153 GHz	-3.00 dB

111RF Typical Insertion Loss Plot



Mkr	Trace	X-Axis	Value
1 ▾	Series 111RF	2.4895 GHz	1.50

111RF Typical VSWR Plot



Mkr	Trace	X-Axis	Value
1 ▾	Series 111RF	356.7777 MHz	-30.00 dB
2 ▾	Series 111RF	1.3368 GHz	-20.00 dB
3 ▾	Series 111RF	3.5691 GHz	-10.00 dB

111RF Typical Isolation Plot

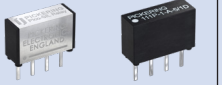

Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)


<p>Package Type 1 Mu-metal Weight: Typical 0.51 g</p>			<p>1 Form A</p>	
<p>Package Type 2 Plastic with Internal Mu-metal Screen Weight: Typical 0.44 g</p>			<p>1 Form A</p>	
<p>Package Type 3 Mu-metal Weight: Typical 0.56 g</p>			<p>1 Form A Coaxial</p>	

Important: Where the optional internal diode is fitted the correct coil polarity must be observed, as shown by the + symbol on the schematics.

Similar Relays Comparison

If the Series 111 is unsuitable for your application, Pickering also manufactures two other series of reed relays with similar characteristics, but in different package sizes.

Series Name		111-1-A	111P-1-A	111RF-1-A	113-1-A	113SP-1-A	113RF-1-A	113-1-C	113-2-A	
Physical Outline										
Depth	mm (inches)	3.7 (0.145)			3.7 (0.145)					
Width		10.0 (0.39)			12.5 (0.49)					
Height		6.6 (0.26)			6.6 (0.26)				8.9 (0.35)	
Package Volume (mm ³)	① 245	② 245	③ 245	306		306	306	306	412	
Typical Weights (g)	0.51	0.44	0.56	0.52		0.58	0.47	0.69		
Contact Configuration	1-A (SPST)			1-A (SPST)			1-C (SPDT)	2-A (DPST)		
Reed Switch Type	Dry			Dry		Dry	Dry	Dry	Dry	
Switching Voltage (V)	170			200	200	200	200	30	200	200
Switching Current (A)	0.5			1.0	0.5	0.5	0.5	0.1	1.0	0.5
Carry Current (A)	0.5			1.0	0.5	0.5	0.5	0.1	1.0	0.5
Switch Power (W)	10			20 (15)	10	10	10	2	20 (15)	10

Series Name		109-1-A	109RF50-1-A	109RF75-1-A	109-1-B	109-1-C	109-2-A	109P-1-A					
Physical Outline													
Depth	mm (inches)	3.7 (0.145)				3.7 (0.145)							
Width		15.1 (0.595)				15.1 (0.595)							
Height		6.6 (0.26)				8.9 (0.35)	6.6 (0.26)	8.9 (0.35)	6.6 (0.26)				
Package Volume (mm ³)	369		369		498	369	498	369					
Typical Weights (g)	0.80		0.88		0.87	1.14	0.77	1.03	0.68				
Contact Configuration	1-A (SPST)		1-A (SPST) 50 Ω Coaxial		1-A (SPST) 75 Ω Coaxial	1-B (SPNC)	1-C (SPDT)	2-A (DPST)	1-A (SPST)				
Reed Switch Type	Dry		Dry		Dry	Dry	Dry	Dry					
Switching Voltage (V)	200		200		200	200	30	200	200				
Switching Current (A)	1.0	1.0	0.5	1.0	0.5	1.0	0.5	0.1	0.5	1.0	1.0	0.5	
Carry Current (A)	1.2		1.2		1.2	1.2	0.1	1.2	1.2				
Switch Power (W)	20	15	10	20	10	20	10	10	2	10	20	15	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

Standard Build Options

The Series 111 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.

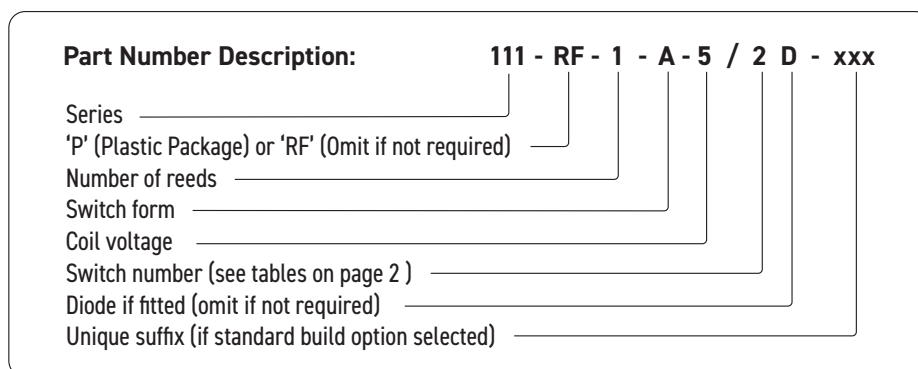
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
Custom packaging possibility	Pulse capability
Equivalents to competitors discontinued parts	Enhanced specifications
	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

3D Models

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



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



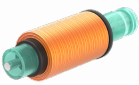
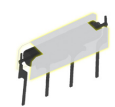
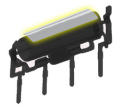


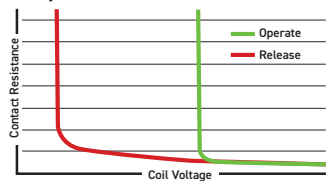

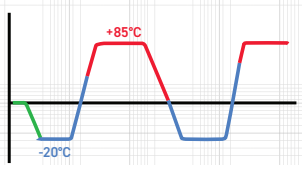

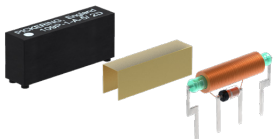

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For a full list of agents, distributors and representatives visit: pickeringrelay.com/agents



10 Key Benefits of Pickering Reed Relays

Key Benefit	Pickering Reed Relays	Typical Industry Reed Relays	
1 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.	
2 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
3 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. Pickering Mu-Metal magnetic screen - interaction approx. 5%	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. Typical industry screen - interaction approx. 30%	  X-Ray of Pickering mu-metal magnetic screen X-Ray of typical industry magnetic screen
4 SoftCenter™ Technology	SoftCenter™ 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
5 100% 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.	Dynamic Contact Resistance Test 
6 100% Inspection at Every Stage of Manufacturing	Inspection at every stage of manufacturing maintaining high levels of quality.	Often limited batch inspection.	
7 100% 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.	
8 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.	
9 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.	
10 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