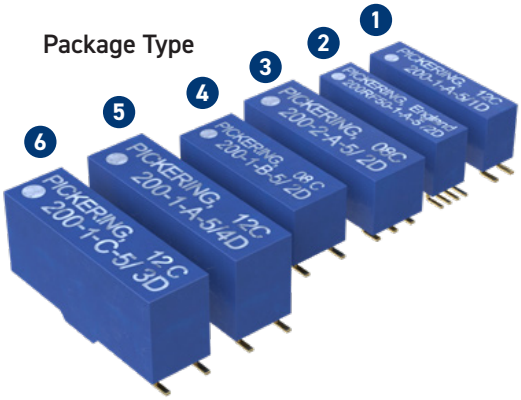
Surface Mount Reed Relays

Series **200**

- Including coaxial types for up to **5 GHz**
- Highest quality instrumentation grade switches
- Encapsulated in a plastic package with internal mu-metal magnetic screen
- Insulation **>10^{12} Ω** for dry Form A devices
- Dry switches
- Wide range of switch configurations - **1 Form A**, **2 Form A**, **1 Form B** and **1 Form C**
- For R.F. or high speed digital applications, **50** or **75 Ω** coaxial devices are available in the same small package
- **3**, **5** or **12 V** coils are standard, with optional internal diode
- Additional build options are available
- Many benefits compared to industry standard relays (see last page)



Please contact our technical department for supplementary RF data.

The special high temperature plastic package will withstand the temperatures associated with Infra-red or vapor phase reflow soldering processes. A flexible inner encapsulant protects the sensitive glass/metal reed switch seals - this is a very big advantage over the more usual hard moulded package.

The range features an internal mu-metal screen to minimize problems that would otherwise be experienced due to magnetic interaction when they are closely stacked. Form A and Form C versions may be stacked side-by-side. Due to the fact that the Form B types feature an internal biasing magnet, a gap of 3 mm minimum should be left between adjacent relays.

Series 200 User Guide

The Guide gives information on PCB Footprints, Handling Procedures, Packing Options, Soldering, Disposal & Standards.

Download your copy from
pickeringrelay.com/pdfs/series-200-smt-user-guide.pdf

Switch Ratings - Dry Switches

1 Form A (energize to make)	1 Form A Coaxial 50 Ω (energize to make)	1 Form A Coaxial 75 Ω (energize to make)	1 Form B (energize to break)	1 Form C (change-over)	2 Form A (energize to make)
10 W at 200 V 15 W at 200 V 20 W at 200 V 10 W at 500 V	10 W at 200 V	10 W at 200 V	10 W at 200 V	3 W at 200 V	10 W at 200 V

Dry Reed: Series 200 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	20 W (*15 W)	1.0 A	1.2 A	200	10^9	0.5 ms	0.2 ms	General purpose
2	A or B	10 W	0.5 A	1.2 A	200	10^9	0.5 ms	0.2 ms	Low level
3	C	3 W	0.25 A	1.2 A	200	10^7	1.0 ms	0.5 ms	Change over
4	A	10 W	0.5 A	1.2 A	500	10^8	0.5 ms	0.2 ms	High voltage

Note[1]: Life Expectancy

Relay life depends upon switch load and end of life criteria. 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 10^9 ops. At the maximum load (resistive), typical life is 1 x 10^7 ops. In abusive conditions (e.g. high capacitive inrush current) this figure reduces considerably. Pickering can perform life testing with any 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 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.

Mercury Relays

Mercury relays no longer form part of our standard range due to ROHS guidelines, although some exceptions may apply. For more information please visit pickeringrelay.com/mercuryreedrelays, email techsales@pickeringrelay.com, or call +44 (0) 1255 428141.

Dry Relay: Series 200 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[4])		Capacitance (typical) (see Note[2])	
					Switch to coil	Across switch	Closed switch to coil	Across open switch
1 Form A, Switch No. 1 (*Note 15 W for 5 V coil) Package Type 1	200-1-A-5/1D *	5	500 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	200-1-A-12/1D	12	1000 Ω					
1 Form A Switch No. 2 Package Type 1	200-1-A-3/2D	3	330 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	200-1-A-5/2D	5	500 Ω					
	200-1-A-12/2D	12	1000 Ω					
1 Form A, Switch No. 2 (50 Ω Coaxial) Package Type 2	200RF50-1-A-5/2D	5	250 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
1 Form A, Switch No. 2 (75 Ω Coaxial) Package Type 2	200RF75-1-A-5/2D	5	250 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
1 Form A, HV Switch No. 4 Package Type 5	200-1-A-5/4D	5	500 Ω	0.15 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	200-1-A-12/4D	12	1000 Ω					
1 Form B, Switch No. 2 Package Type 4	200-1-B-5/2D	5	750 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	2.5 pF	0.1 pF
	200-1-B-12/2D	12	1000 Ω					
1 Form C Switch No. 3 Package Type 6	200-1-C-5/3D	5	500 Ω	0.20 Ω	10^{12} Ω	10^{11} Ω	See Note[3]	See Note[3]
	200-1-C-12/3D	12	1000 Ω					
2 Form A, Switch No. 2 Package Type 3	200-2-A-5/2D	5	400 Ω	0.12 Ω	10^{12} Ω	10^{12} Ω	See Note[3]	See Note[3]
	200-2-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[2]: Capacitance across open switch

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

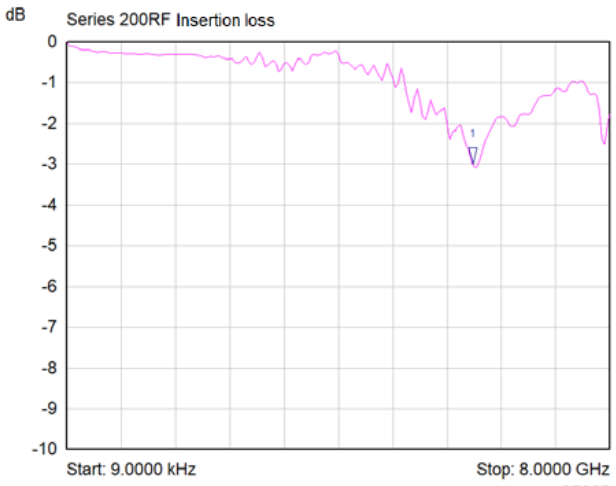
Note[3]: Capacitance values

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

Note[4]: Insulation resistance

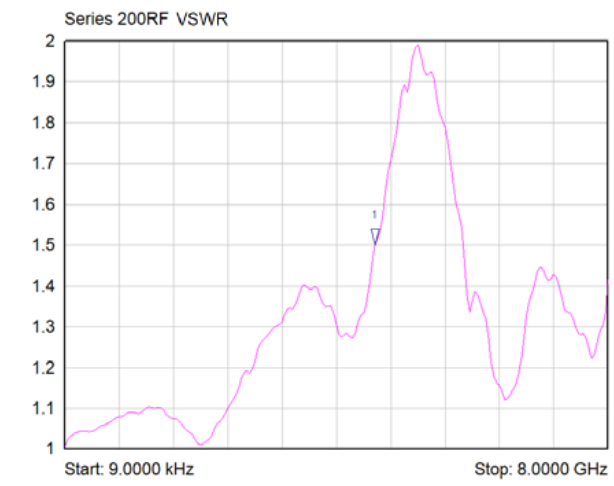
Insulation resistance will reduce at higher temperatures. For more information on temperature effects **click here**, or **contact Pickering** for more in depth guidance.

RF Plots for the 200RF Reed Relay



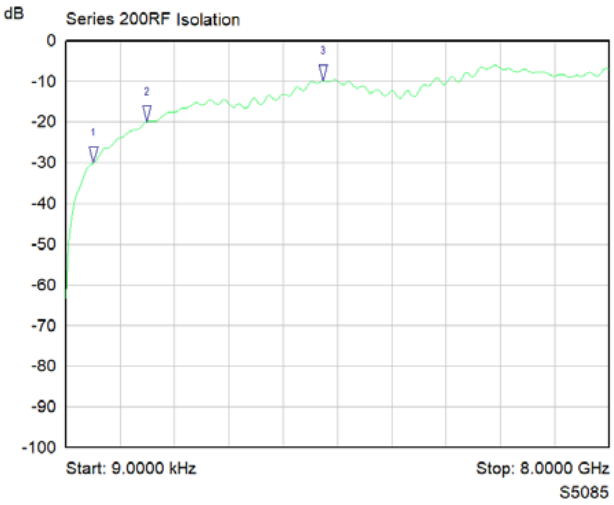
Mkr	Trace	X-Axis	Value
1	Series 200RF	5.9780 GHz	-3.00 dB

200RF Typical Insertion Loss Plot



Mkr	Trace	X-Axis	Value
1	Series 200RF	4.5734 GHz	1.50

200RF Typical VSWR Plot



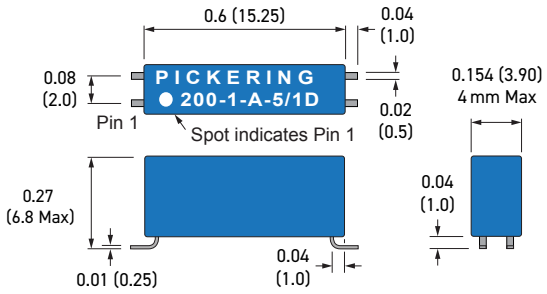
Mkr	Trace	X-Axis	Value
1	Series 200RF	412.3787 MHz	-30.00 dB
2	Series 200RF	1.1868 GHz	-20.00 dB
3	Series 200RF	3.7935 GHz	-10.00 dB

200RF Typical Isolation Plot

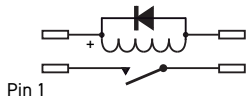
Pin Configuration, Weights and Dimensional Data (dimensions in inches, millimeters in brackets)

Package Type 1

Weight: Typical 0.75 g



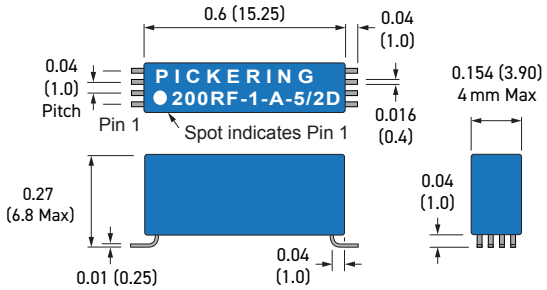
1 Form A



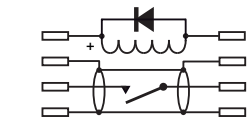
Schematic shown from top of relay

Package Type 2

Weight: Typical 0.74 g



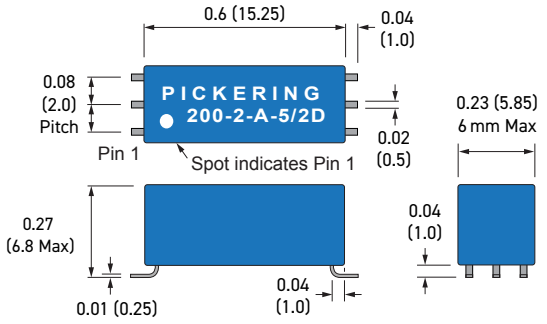
1 Form A Coaxial



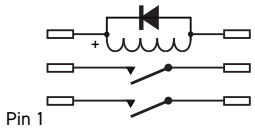
Schematic shown from top of relay

Package Type 3

Weight: Typical 1.13 g



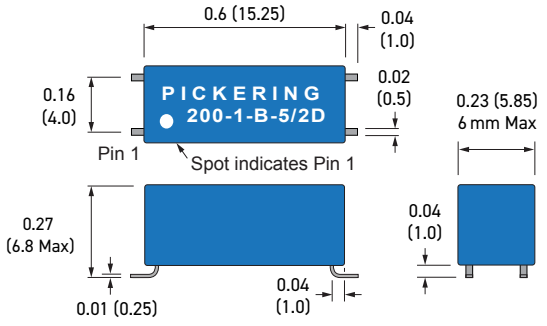
2 Form A



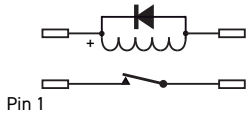
Schematic shown from top of relay

Package Type 4

Weight: Typical 1.10 g



1 Form B

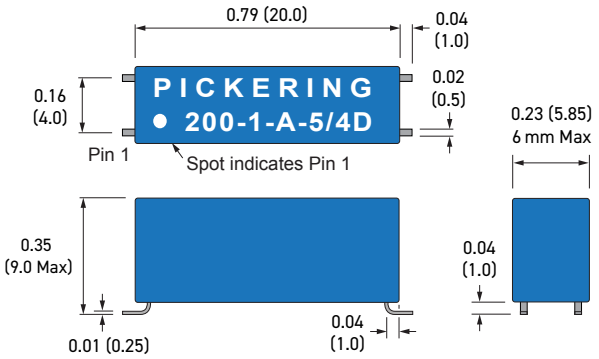


Schematic shown from top of relay

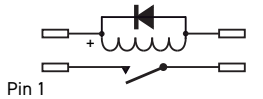
Important: When an optional internal diode is fitted the orientation spot end of the relay forms the positive connection.

Package Type 5

Weight: Typical 1.81 g



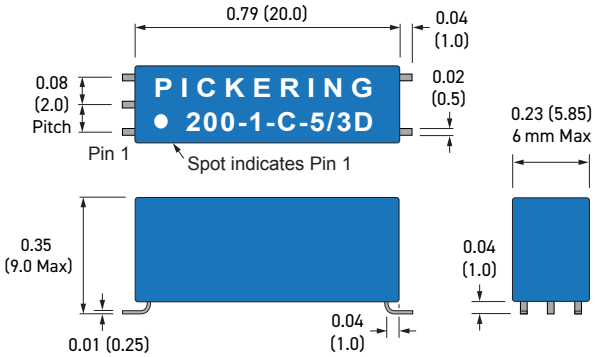
1 Form A



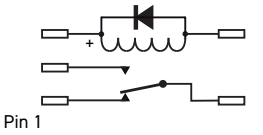
Schematic shown from top of relay

Package Type 6

Weight: Typical 1.89 g



1 Form C



Schematic shown from top of relay

Important: When an optional internal diode is fitted the orientation spot end of the relay forms the positive connection.

Similar Relays Comparison

The Series 200 is unique in the Pickering range of reed relays. Pickering do not manufacture another series of standard voltage surface mount relays. For higher voltage applications please see our Series 219 range.

Reed Relay Selection Tool

Pickering has created the Reed Relay Selector to assist you in selecting the correct high quality reed relay for your application from our extensive range. To try the tool today go to: pickeringrelay.com/reed-relay-selector-tool

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

Standard Build Options

The Series 200 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.

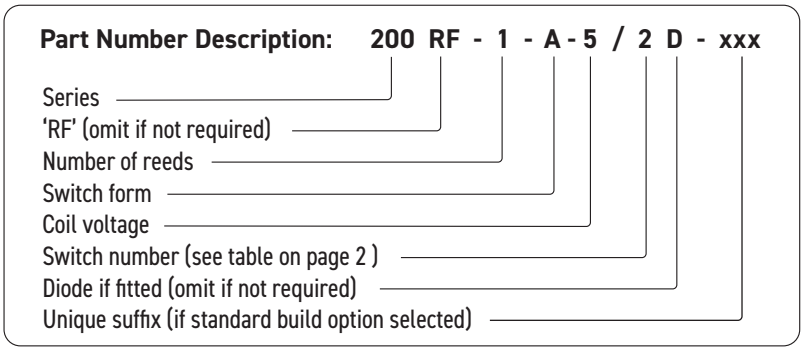
Mechanical Build Options	Electrical Build Options
Special pin configurations or pin lengths	Different coil resistance
Special print with customer's own part number or logo	Operate or de-operate time
	Pulse capability
	Enhanced specifications
	Non-standard coil voltages and resistance figures
	Special 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 SLDPRT 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 are happy to discuss any enquires with you. email: techsales@pickeringrelay.com

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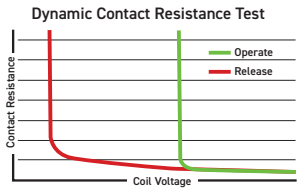
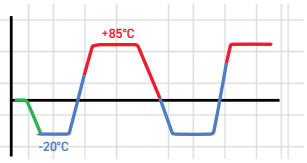
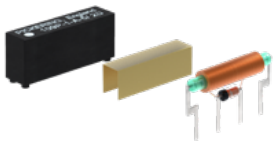
For a full list of agents, distributors and representatives visit: pickeringrelay.com/agents

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.	
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