

RP1A, RP1B



1-phase PCB mount solid state relays



Main features

- AC Solid State Relay for PCB mounting
- Zero-cross switching or instant-on
- Rated operational current: 3, 5 or 5.5 AACrms
- Rated operational voltage: up to 480 VACrms
- Surface mount technology
- Flexible encapsulation for extended life
- Control voltage: 3 to 32 VDC / 16 to 32 VAC
- Opto-isolation: > 4000 VACrms
- Blocking voltage: up to 1000 Vp
- Non-repetitive surge current: up to 250 Ap

Description

The **RP1** is an SSR series for socket or PCB mounting, providing an ideal interface between logic controls and AC loads.

The **RP1** is designed for resistive and inductive loads up to 480 VACrms.

Internally this new series enjoys an improved technical design with the introduction of stress-free flexible encapsulation and automated assembly of components.

The solid state technology used can withstand peak voltages of 1000 V, making the **RP1** series suitable to drive AC loads such as valve solenoids and small induction motors.

Specifications are at a surrounding temperature of 25°C unless otherwise specified.

Applications

These relays can be used to switch heaters, motors, lights, valves or solenoids.

Main functions

- Zero-cross or instant-on AC switching
- Ratings up to 480 VACrms, 5.5 AACrms
- 3-32 VDC or 16-32 VAC control voltage

Order code

 **RP1** ☐ ☐ ☐ ☐ ☐ ☐

Enter the code option instead of ☐. Refer to the Selection guide section for valid part numbers.

Code	Option	Description	Comments
R	-	Solid State Relay (PCB)	
P	-		
1	-	1-pole switching	
<input type="checkbox"/>	A	Switching mode: zero-cross switching	
<input type="checkbox"/>	B	Switching mode: instant-on switching	
<input type="checkbox"/>	23	Rated operational voltage: 230 VACrms	
<input type="checkbox"/>	40	Rated operational voltage: 400 VACrms	
<input type="checkbox"/>	48	Rated operational voltage: 480 VACrms	
<input type="checkbox"/>	D	Control voltage: 3 - 32 VDC	4 - 32 VDC for RP1A48.. 4 - 32 VDC for RP1B40.. and RP1B48..
<input type="checkbox"/>	A	Control voltage: 16 - 32 VAC	Only available for 230 V, 5.5 A
<input type="checkbox"/>	3	Rated operational current: 3 AACrms	
<input type="checkbox"/>	5	Rated operational current: 5 AACrms	
<input type="checkbox"/>	6	Rated operational current: 5.5 AACrms	
<input type="checkbox"/>	Mx	M1 = Mounting on DIN EN adaptor RPM1	Max. 250 V
		M2 = Mounting on DIN EN adaptor RPM2	Max. 600 V

Selection guide

Rated operational voltage	Blocking voltage	Control voltage	Rated operational current		
			3 AACrms	5 AACrms	5.5 AACrms
230 VACrms	650 Vp	3 - 32 VDC	RP1A23D3 RP1B23D3	RP1A23D5 RP1B23D5	RP1A23D6 RP1B23D6
		16 - 32 VAC	-	-	RP1A23A6
400 VACrms	850 Vp	3 - 32 VDC	RP1A40D3	RP1A40D5	RP1A40D6
		4 - 32 VDC	RP1B40D3	RP1B40D5	RP1B40D6
480 VACrms	1000 Vp	4 - 32 VDC	RP1A48D3 RP1B48D3	RP1A48D5 RP1B48D5	RP1A48D6 RP1B48D6



Selection guide: mounted on DIN EN adaptor

Rated operational voltage	Blocking voltage	Control voltage	Rated operational current		
			3 AACrms	5 AACrms	5.5 AACrms
230 VACrms	650 Vp	5 - 34 VDC	RP1A23D3M1 RP1B23D3M1	RP1A23D5M1 RP1B23D5M1	RP1A23D6M1 RP1B23D6M1
		16 - 32 VAC	-	-	RP1A23A6M1*
480 VACrms	1000 Vp	6 - 34 VDC	-	RP1A48D5M2	-

* Version RP1A23A6M1 does not include an LED on the DIN adaptor.

Carlo Gavazzi compatible components

Description	Component code	Notes
DIN adaptors	RPM1* RPM1V* RPM1P RPM1PD* RPM2	DIN adaptor 250 V with LED DIN adaptor 250 V with LED + varistor DIN adaptor 250 V with pins for removal of RP DIN adaptor 250 V with pins for removal of RP + LED DIN adaptor 600 V with LED

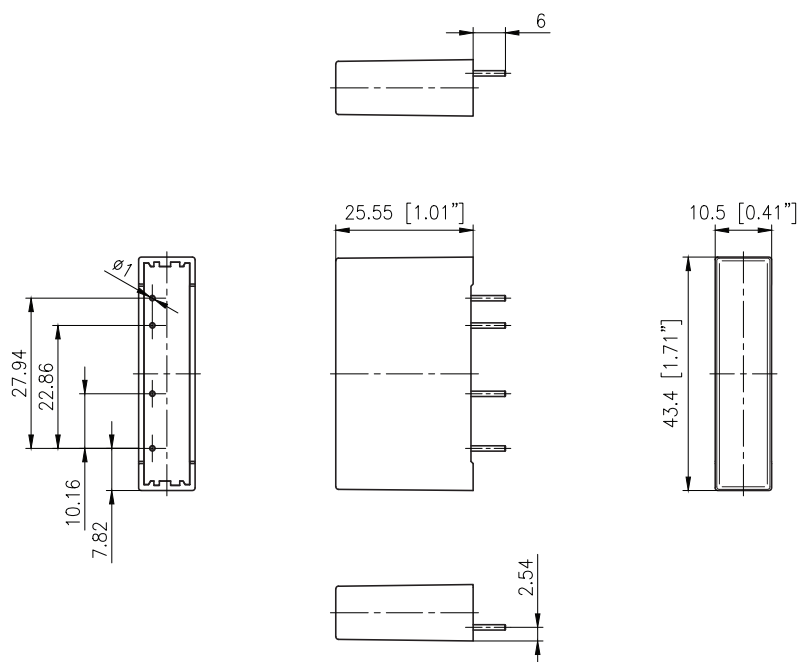
* not suitable for use with RP1A23A6

Features

General data

Material	PBT, RAL7035
Potting compound	Flame-retardant flexible silicone rubber
Weight	Approx. 20 g
Isolation	Input to output: ≥ 4000 VACrms
Insulation resistance	$10^{10} \Omega$
Insulation capacitance	8 pF

Dimensions



Dimensions in mm unless otherwise noted.
Tolerances +/- 0.5 mm.

Performance

Mains supply

	RP1..23..	RP1..40..	RP1..48..
Operational voltage range RP1A RP1B	12 - 265 VACrms 12 - 265 VACrms	20 - 440 VACrms 12 - 440 VACrms	20 - 530 VACrms 12 - 530 VACrms
Operational frequency range	45 - 65 Hz		
Blocking voltage	650 Vp	850 Vp	1000 Vp
Zero voltage turn-on	< 10 V		

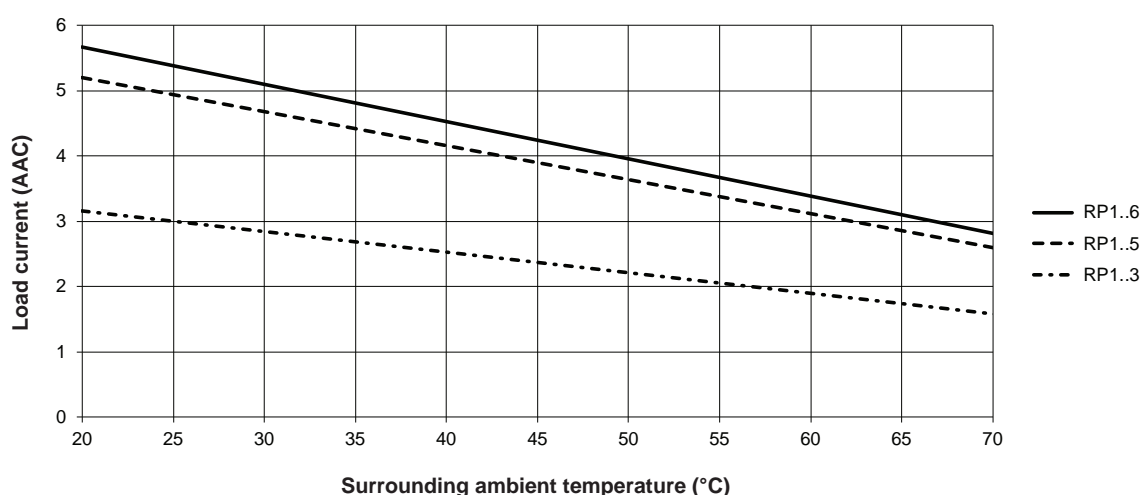
Outputs

	RP1..3	RP1..5	RP1..6
Rated operational current AC 51 @ T _a = 25°C AC 53a @ T _a = 25°C	3 A 2 A	5 A 3 A	5.5 A 5 A
Minimum operational current	20 mA		
Power factor	> 0.5		
Rep. overload current t=1 s	10 AACrms	12 AACrms	16 AACrms
Non-repetitive surge current (I _{TSM}), t=20 ms	65 Ap	80 Ap	250 Ap
Off-state leakage current	< 1 mA		
I²t for fusing (t=10 ms)	20 A²s	50 A²s	340 A²s
Critical dV/dt off state min.	250 V/µs	500 V/µs	
On-state voltage drop @ rated current	< 1.2 Vrms		

Inputs

	RP1..D..	RP1..D..M..	RP1A23A6
Control voltage RP1..23.. RP1A40.. RP1B40.. RP1..48..	3-32 VDC 4-32 VDC	5-34 VDC 6-34 VDC	16 - 32 VAC - -
Pick-up voltage RP1..23.. RP1A40.. RP1B40.. RP1..48..	2.8 VDC 3.8 VDC	4.8 VDC 5.8 VDC	10 VAC - -
Drop-out voltage	1.2 VDC		5 VAC
Max. input current RP1A RP1B	10 mADC 15 mADC		13 mAAC - -
Max. reverse voltage	32 VDC	34 VDC	-
Response time pick-up RP1A RP1B	< 10 ms < 160 μ s (12 VDC / 50 Hz) < 320 μ s (5 VDC / 50 Hz)		< 20 ms - -
Response time drop-out RP1A RP1B	< 10 ms < 10 ms		< 20 ms - -

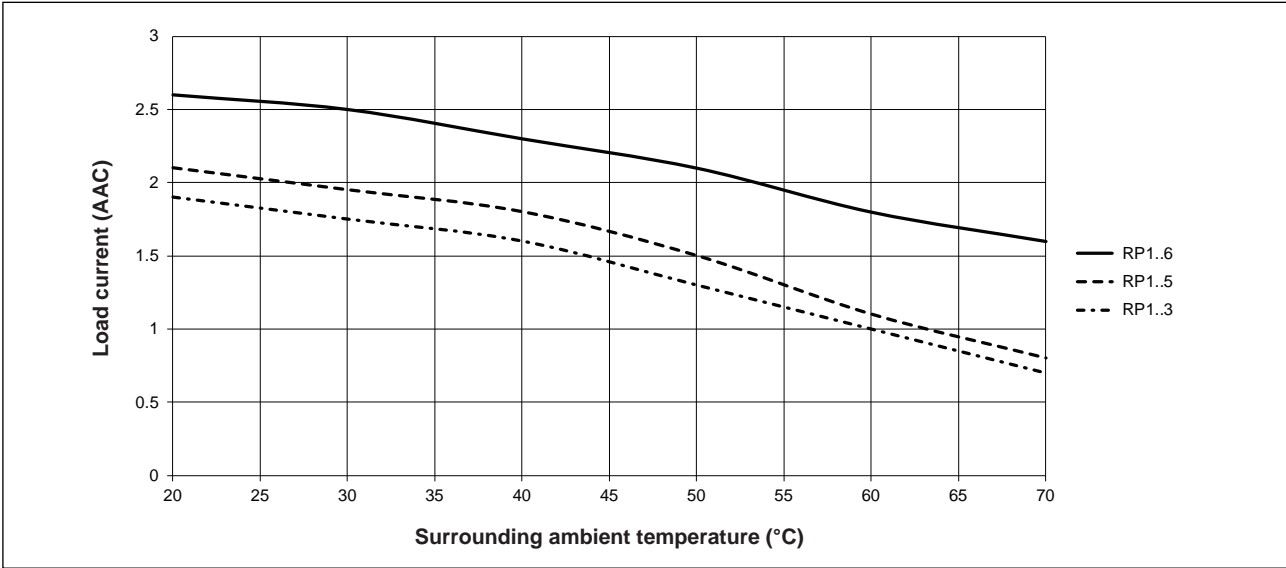
Current derating



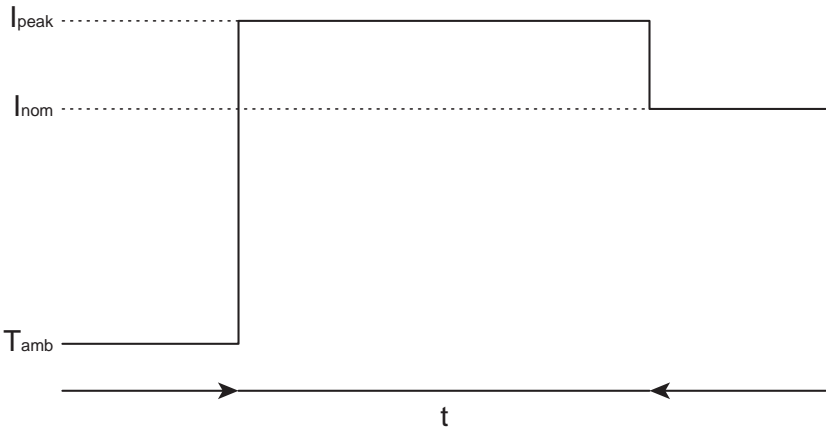
When used at full load current, the relays must be placed vertically. If more than one relay is mounted, please allow a minimum distance of 20 mm in between for sufficient air cooling.



▶ Current derating with 0 mm spacing








▶ Increased current options



I_{peak} (Amps)	6	8	10
D5 : t (minutes)	15	5	3
D6 : t (minutes)			

Note: even though the D3 can withstand a slight increase in current for a limited time, it is not recommended for this purpose.

Compatibility and conformance

Approvals	    
Standards compliance	LVD: EN 60947-4-3 EMCD: EN 60947-4-3 EE: EN 60947-4-3 EMC: EN 60947-4-3 cULus: UL508 Recognized (E80573), NRNT2, NRNT8 CSA: C22.2 No. 14 (204075) VDE: VDE 0600-100, VDE 0600-109 (excluding RP1A23A6)

Electromagnetic compatibility (EMC) - Immunity	
Electrostatic discharge (ESD)	EN/IEC 61000-4-2 8 kV air discharge, 4 kV contact (PC1)
Radiated radio frequency	EN/IEC 61000-4-3 10 V/m, from 80 MHz to 1 GHz (PC1) 10 V/m, from 1.4 to 2 GHz (PC1) 10 V/m, from 2 to 2.7 GHz (PC1)
Electrical fast transient (burst)	EN/IEC 61000-4-4 Output: 2 kV, 5 kHz (PC2) Input: 1 kV, 5 kHz (PC2)
Conducted radio frequency	EN/IEC 61000-4-6 10 V/m, from 0.15 to 80 MHz (PC1)
Electrical surge	EN/IEC 61000-4-5 Output, line to line: 1 kV (PC2) Output, line to earth: 1 kV (PC2) ¹ Input, line to line: 500 V (PC2) ² Input, line to earth: 500 V (PC2) ²
Voltage dips	EN/IEC 61000-4-11 0% for 0.5, 1 cycle (PC2) 40% for 10 cycles (PC2) 70% for 25 cycles (PC2)
Voltage interruptions	EN/IEC 61000-4-11 0% for 5000 ms (PC2)

1. A suppression device, such as a varistor, needs to be connected across the output terminals L1, T1 for immunity against higher voltage levels.
2. A suppression device, such as a transil, needs to be connected across the control terminals A1, A2 for immunity against higher voltage levels.


Electromagnetic compatibility (EMC) - Emissions	
Radio interference field emission (radiated)	EN/IEC 55011 Class A: from 30 to 1000 MHz
Radio interference voltage emissions (conducted)	EN/IEC 55011 Class A: from 0.15 to 30 MHz, with filter capacitor across the mains supply.*

* For conformance to EN/IEC 55011, an external capacitor class X1, 100 nF is to be connected across the output terminals 1-2.

Note:

- Control input lines must be installed together to maintain products' susceptibility to Radio Frequency interference.
- Use of AC solid state relays may, according to the application and the load current, cause conducted radio interferences.
- Use of mains filters may be necessary for cases where the user must meet E.M.C requirements.
- Performance Criteria 1 (PC1): No degradation of performance or loss of function is allowed when the product is operated as intended.
- Performance Criteria 2 (PC2): During the test, degradation of performance or partial loss of function is allowed. However when the test is complete the product should return operating as intended by itself.
- Performance Criteria 3 (PC3): Temporary loss of function is allowed, provided the function can be restored by manual operation of the controls.

Environmental specifications

Operating temperature	-20°C to +70°C (-4°F to +158°F)
Storage temperature	-40°C to +100°C (-40°F to +212°F)
Pollution degree	2
EU RoHS compliant	Yes
China RoHS	

The declaration in this section is prepared in compliance with People's Republic of China Electronic Industry Standard SJ/T11364-2014: Marking for the Restricted Use of Hazardous Substances in Electronic and Electrical Products.

Part Name	Toxic or Hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
Power Unit Assembly	x	O	O	O	O	O

O: Indicates that said hazardous substance contained in homogeneous materials for this part are below the limit requirement of GB/T 26572.

X: Indicates that said hazardous substance contained in one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.

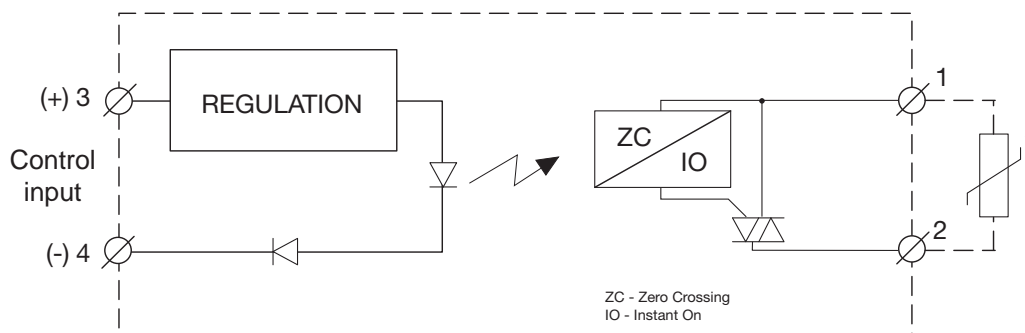
这份申明根据中华人民共和国电子工业标准
SJ/T11364-2014：标注在电子电气产品中限定使用的有害物质

零件名称	有毒或有害物质与元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴化联苯 (PBB)	多溴联苯醚 (PBDE)
功率单元	x	O	O	O	O	O

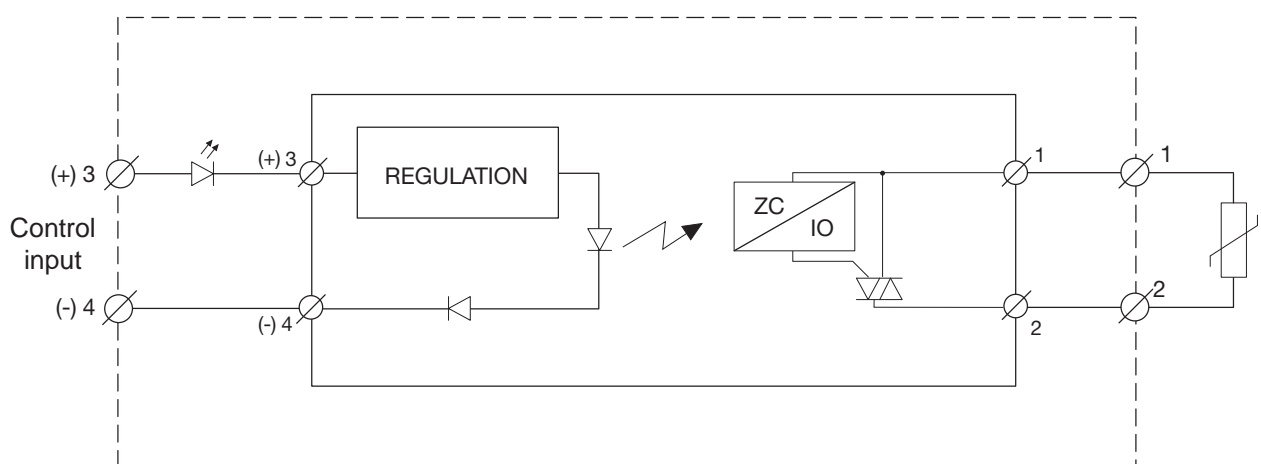
O:此零件所有材料中含有的该有害物低于GB/T 26572的限定。

X: 此零件某种材料中含有的该有害物高于GB/T 26572的限定。

Functional diagram: RP1..



Functional diagram: RP1..Mx



* The varistor is not included in the solid state relay. Connecting a varistor across terminals 1-2 helps protect the solid state relay against damages by over-voltage.

Connection specifications

Terminals	Copper alloy, tin-plated
Terminals soldering temperature	Max. 300°C for 5 seconds



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