

# Solid State Relays Industrial, 1Phase Peak Switching Type RM1C



- Ideal for switching of transformers and other highly inductive loads
- Direct copper bonding (DCB) technology
- Thyristor power units
- LED indication
- Clip-on IP20 protection cover
- Housing free of moulding mass
- Self lifting terminals
- Operational ratings up to 100AACrms and 600VACrms
- Blocking voltage up to 1400Vp
- Opto isolation: 4000 VACrms

## Product Description

The peak switching SSR is primarily used for transformer applications. By applying DC control voltage, the output semiconductor is activated at the peak of the line voltage.

The semiconductor switches OFF, when load current crosses zero, upon removal of the control voltage. The LED indicates when the output is activated.

## Ordering Key

**RM 1 C 60 D 50**

- Solid State Relay
- Number of poles
- Switching mode
- Rated operational voltage
- Control voltage
- Rated operational current

## Type Selection

Switching mode	Rated operational voltage	Control voltage	Rated operational current
C: Peak Switching	40: 400 VACrms 60: 600 VACrms	D: 4.25 - 32 VDC	25: 25 AACrms 50: 50 AACrms 75: 75 AACrms 100: 100 AACrms

## Selection Guide

Rated operational voltage	Blocking voltage	Control voltage	Rated operational current			
			25 AACrms	50 AACrms	75AACrms	100 AACrms
400 VACrms	850 V <sub>p</sub>	4.25 - 32 VDC	RM1C40D25	RM1C40D50	RM1C40D75	-
600 VACrms	1400 V <sub>p</sub>	4.25 - 32 VDC	RM1C60D25	RM1C60D50	-	RM1C60D100

## General Specifications

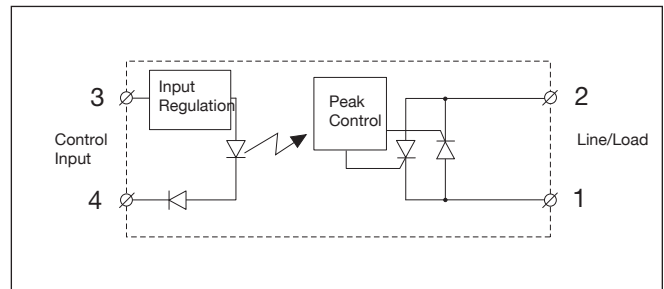
	RM1C40D..	RM1C60D..
Operational voltage range	100 to 440 VACrms	340 to 660 VACrms
Blocking voltage	850 V <sub>p</sub>	1400 V <sub>p</sub>
Zero voltage turn-on	< 10 V	< 10 V
Operational frequency range	45 to 65 Hz	45 to 65 Hz
Approvals	UL, cUL, CSA, EAC	UL, cUL, CSA, EAC
CE-marking	Yes	Yes*

\* Heatsink must be connected to ground for 600V types

## Input Specifications

Control voltage	4.25 - 32 VDC
Pick up voltage	4.25 VDC
Drop out voltage	1.0 VDC
Max. input current	20 mA
Response time pick up	
Power output	≤ 40 ms
Response time drop out	
Power output	≤ 10 ms

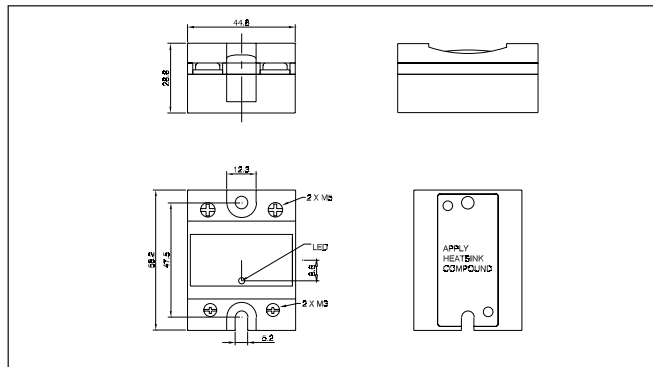
## Functional Diagram



## Output Specifications

	RM1C...25	RM1C...50	RM1C...75	RM1C...100
<b>Rated operational current</b>				
AC51 @ Ta=25°C	25 Arms	50 Arms	75 Arms	100 Arms
AC56 @ Ta=25°C	10 Arms	20 Arms	25 Arms	30 Arms
<b>Min. operational current</b>	150 mA	250 mA	400 mA	500 mA
<b>Rep. overload current t=1 s</b>	55 Arms	125 Arms	150 Arms	200 Arms
<b>Non-rep. surge current t=10 ms</b>	325 Ap	600 Ap	1150 Ap	1900 Ap
<b>Off-state leakage current @ rated voltage and frequency</b>	< 3 mA	< 3 mA	< 3 mA	< 3 mA
<b>I<sup>2</sup>t for fusing t=10 ms</b>	< 525 A <sup>2</sup> s	< 1800 A <sup>2</sup> s	< 6600 A <sup>2</sup> s	< 18000 A <sup>2</sup> s
<b>On-state voltage drop @ rated current</b>	1.4 Vrms	1.4 Vrms	1.4 Vrms	1.4 Vrms
<b>Critical dV/dt off-state min.</b>	1000 V/μs	1000 V/μs	1000 V/μs	1000 V/μs

## Dimensions



All dimensions in mm

## Isolation

<b>Rated isolation voltage</b>	
Input to output	≥ 4000 VACrms
Output to case	≥ 4000 VACrms

## Thermal Specifications

<b>Operating temperature range</b>	-30° to +80°C
<b>Storage temperature range</b>	-40° to +100°C
<b>Junction temperature</b>	< 125°C

## Housing Specifications

<b>Weight</b>	
25A, 50A	Approx. 60g
75A, 100A	Approx. 100g
<b>Housing material</b>	Noryl GFN 1, black
<b>Baseplate</b>	
25A, 50A	Aluminium
75A, 100A	Copper, nickel-plated
<b>Potting compound</b>	None

<b>Relay</b>	
Mounting screws	M5
Mounting torque	1.5-2.0Nm
<b>Control terminal</b>	
Mounting screws	M3 x 9
Mounting torque	0.5Nm
<b>Power terminal</b>	
Mounting screws	M5 x 9
Mounting torque	2.4Nm

## Electromagnetic Compatibility

<b>Immunity</b>	EN60947-4-3	<b>Radiated Radio Frequency Immunity</b>	IEC/EN 61000-4-3
<b>Electrostatic Discharge (ESD) Immunity</b>	IEC/EN 61000-4-2	10 V/m, 80 - 1000 MHz	Performance Criteria 1
Air discharge, 8 kV	Performance Criteria 2	10 V/m, 1.4 - 2.0 GHz	Performance Criteria 1
Contact, 4 kV	Performance Criteria 2	3 V/m, 2.0 - 2.7 GHz	Performance Criteria 1
<b>Electrical Fast Transient (Burst) Immunity</b>	IEC/EN 61000-4-4	<b>Conducted Radio Frequency Immunity</b>	IEC/EN 61000-4-6
Output: 2 kV, 5 kHz	Performance Criteria 1	10 V/m, 0.15 - 80 MHz	Performance Criteria 1
Input: 1 kV, 5 kHz	Performance Criteria 1	<b>Voltage Dips Immunity</b>	IEC/EN 61000-4-11
<b>Electrical Surge Immunity</b>	IEC/EN 61000-4-5	0% for 0.5 , 1 cycle	Performance Criteria 2
Output, line to line, 1 kV	Performance Criteria 2	40% for 10 cycles	Performance Criteria 2
Output, line to earth, 1 kV	Performance Criteria 2	70% for 25 cycles	Performance Criteria 2
Output, line to earth, 2 kV	Performance Criteria 2	80% for 250 cycles	Performance Criteria 2
Input, line to line, 1 kV	Performance Criteria 2	<b>Voltage Interruptions Immunity</b>	IEC/EN 61000-4-11
Input, line to earth, 2 kV	Performance Criteria 2	0% for 5000 ms	Performance Criteria 2
<b>EMC Emission</b>	EN60947-4-3	<b>Radio Interference Field Emission (Radiated)</b>	IEC/EN 55011
<b>Radio Interference Voltage Emission (Conducted)</b>	IEC/EN 55011	<b>30 - 1000 MHz</b>	Class B
<b>0.15 - 30 MHz</b>	Class A (industrial) with filters		

### Notes:

- 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. The capacitor values given inside the filtering specification tables should be taken only as indications, the filter attenuation will depend on the final application.
- The manufacturer has set the maximum allowable deviation under the influence of RFI to +/- 1.0% FSD or +/-1 step in distributed modes.
- Control input lines must be installed together to maintain products' susceptibility to Radio Frequency interference.
- Performance Criteria 1: No degradation of performance or loss of function is allowed when the product is operated as intended.
- Performance Criteria 2: 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: Temporary loss of function is allowed, provided the function can be restored by manual operation of the controls.



## Heatsink Dimensions (load current versus ambient temperature)

### RM1C..25

Load current [A]	Thermal resistance [°C/W]						Power dissipation [W]	
	20	30	40	50	60	70		
25.0	2.70	2.34	1.98	1.61	1.25	0.89	28	
22.5	3.10	2.69	2.28	1.86	1.45	1.04	24	
20.0	3.61	3.13	2.65	2.18	1.70	1.23	21	
17.5	4.26	3.70	3.14	2.59	2.03	1.47	18	
15.0	5.14	4.47	3.80	3.14	2.47	1.80	15	
12.5	6.38	5.56	4.73	3.91	3.09	2.27	12	
10.0	8.25	7.19	6.14	5.08	4.02	2.97	9	
7.5	11.4	9.94	8.49	7.04	5.59	4.14	7	
5.0	17.7	15.4	13.2	11.0	8.74	6.51	4	
2.5	-	-	-	-	18.2	13.6	2	

Ambient temp. [°C]

### RM1C..50

Load current [A]	Thermal resistance [°C/W]						Power dissipation [W]	
	20	30	40	50	60	70		
50.0	1.03	0.86	0.70	0.53	0.37	0.20	61	
45.0	1.27	1.09	0.90	0.71	0.52	0.33	53	
40.0	1.54	1.32	1.10	0.89	0.67	0.45	46	
35.0	1.85	1.59	1.34	1.08	0.82	0.57	39	
30.0	2.26	1.95	1.65	1.34	1.03	0.72	33	
25.0	2.85	2.47	2.08	1.70	1.32	0.94	26	
20.0	3.73	3.24	2.75	2.26	1.77	1.27	20	
15.0	5.22	4.54	3.86	3.19	2.51	1.83	15	
10.0	8.21	7.16	6.11	5.05	4.00	2.95	10	
5.0	17.2	15.0	12.9	10.7	8.51	6.33	5	

Ambient temp. [°C]

Junction to ambient thermal resistance, $R_{th\ j-a}$	< 20.0	°C/W
Junction to case thermal resistance, $R_{th\ j-c}$	< 0.80	°C/W
Case to heatsink thermal resistance, $R_{th\ c-s}$	< 0.20	°C/W
Maximum allowable case temperature	100	°C
Maximum allowable junction temperature	125	°C

Junction to ambient thermal resistance, $R_{th\ j-a}$	< 20.0	°C/W
Junction to case thermal resistance, $R_{th\ j-c}$	< 0.50	°C/W
Case to heatsink thermal resistance, $R_{th\ c-s}$	< 0.20	°C/W
Maximum allowable case temperature	100	°C
Maximum allowable junction temperature	125	°C

### RM1.60..50

Load current [A]	Thermal resistance [°C/W]						Power dissipation [W]	
	20	30	40	50	60	70		
50.0	0.99	0.81	0.63	0.44	0.26	0.08	55	
45.0	1.28	1.07	0.86	0.65	0.44	0.23	48	
40.0	1.64	1.40	1.15	0.91	0.67	0.42	41	
35.0	2.11	1.82	1.54	1.25	0.96	0.67	35	
30.0	2.60	2.25	1.90	1.55	1.20	0.85	29	
25.0	3.30	2.86	2.43	1.99	1.55	1.11	23	
20.0	4.36	3.79	3.22	2.65	2.08	1.51	18	
15.0	6.1	5.4	4.6	3.77	2.97	2.18	13	
10.0	9.76	8.52	7.3	6.0	4.8	3.54	8	
5.0	--	--	15.47	12.85	10.24	7.6	4	

Ambient temp. [°C]

### RM1C..75

Load current [A]	Thermal resistance [°C/W]						Power dissipation [W]	
	20	30	40	50	60	70		
75.0	0.91	0.78	0.65	0.52	0.39	0.26	77	
67.5	1.10	0.96	0.81	0.66	0.51	0.36	68	
60.0	1.34	1.17	1.00	0.83	0.66	0.49	59	
52.5	1.60	1.40	1.20	1.00	0.80	0.60	50	
45.0	1.93	1.68	1.44	1.20	0.96	0.72	42	
37.5	2.38	2.08	1.78	1.49	1.19	0.89	34	
30.0	3.06	2.68	2.30	1.91	1.53	1.15	26	
22.5	4.21	3.68	3.16	2.63	2.10	1.58	19	
15.0	6.51	5.70	4.88	4.07	3.26	2.44	12	
7.5	13.5	11.77	10.09	8.41	6.73	5.04	6	

Ambient temp. [°C]

Junction to ambient thermal resistance, $R_{th\ j-a}$	< 20.0	°C/W
Junction to case thermal resistance, $R_{th\ j-c}$	< 0.72	°C/W
Case to heatsink thermal resistance, $R_{th\ c-s}$	< 0.20	°C/W
Maximum allowable case temperature	100	°C
Maximum allowable junction temperature	125	°C

Junction to ambient thermal resistance, $R_{th\ j-a}$	< 20.0	°C/W
Junction to case thermal resistance, $R_{th\ j-c}$	< 0.35	°C/W
Case to heatsink thermal resistance, $R_{th\ c-s}$	< 0.10	°C/W
Maximum allowable case temperature	100	°C
Maximum allowable junction temperature	125	°C

## Heatsink Dimensions

(load current versus ambient temperature) cont.

### RM1C...100

Load current [A]	Thermal resistance [°C/W]						Power dissipation [W]	T <sub>A</sub> Ambient temp. [°C]
	20	30	40	50	60	70		
100.0	0.54	0.45	0.36	0.27	0.18	0.09	111	
90.0	0.68	0.58	0.47	0.37	0.27	0.17	97	
80.0	0.86	0.74	0.62	0.50	0.38	0.26	84	
70.0	1.08	0.94	0.80	0.66	0.52	0.38	71	
60.0	1.37	1.20	1.03	0.85	0.68	0.51	59	
50.0	1.70	1.49	1.28	1.06	0.85	0.64	47	
40.0	2.21	1.93	1.66	1.38	1.10	0.83	36	
30.0	3.06	2.68	2.30	1.91	1.53	1.15	26	
20.0	4.78	4.18	3.59	2.99	2.39	1.79	17	
10.0	9.98	8.73	7.49	6.24	4.99	3.74	8	

Junction to ambient thermal resistance, R <sub>th j-a</sub>	< 20.0	K/W
Junction to case thermal resistance, R <sub>th j-c</sub>	< 0.30	K/W
Case to heatsink thermal resistance, R <sub>th c-s</sub>	< 0.10	K/W
Maximum allowable case temperature	100	deg.C
Maximum allowable junction temperature	125	deg.C

## Heatsink Selection

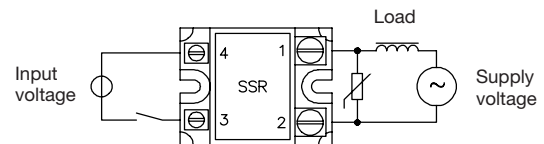
Carlo Gavazzi Heatsink (see Accessories)	Thermal resistance...	...for power dissipation
No heatsink required	---	N/A
RHS 300	5.00 K/W	> 0 W
RHS 100	3.00 K/W	> 25 W
RHS 45C	2.70 K/W	> 60 W
RHS 45B	2.00 K/W	> 60 W
RHS 90A	1.35 K/W	> 60 W
RHS 45C plus fan	1.25 K/W	> 0 W
RHS 45B plus fan	1.20 K/W	> 0 W
RHS 112A	1.10 K/W	> 100 W
RHS 301	0.80 K/W	> 70 W
RHS 90A plus fan	0.45 K/W	> 0 W
RHS 112A plus fan	0.40 K/W	> 0 W
RHS 301 plus fan	0.25 K/W	> 0 W
Consult your distribution	> 0.25 K/W	N/A
Infinite heatsink - No solution	---	N/A

## Applications

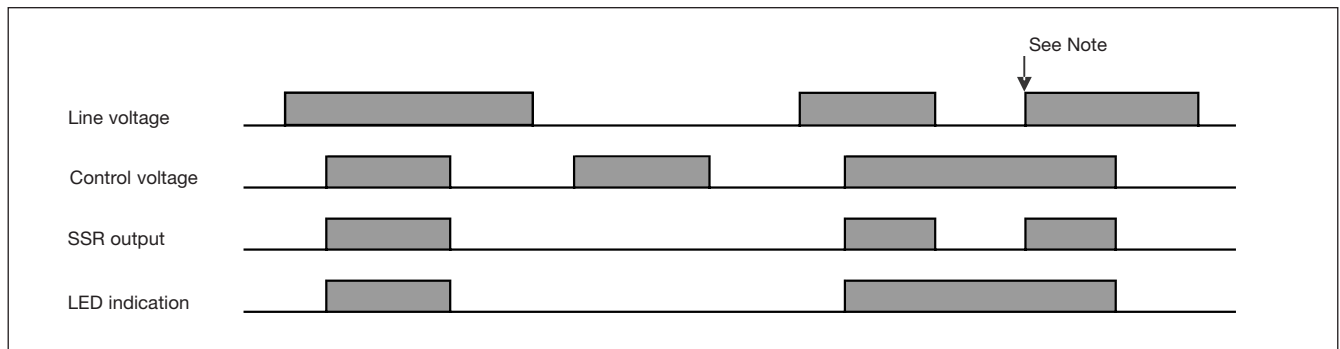
### Overvoltage protection

As transformers can have va-rying stray inductances and stray capacitances, it is always advisable to use external overvoltage protection.

Varistor diameter: ≤ 20 mm  
 Varistor voltage for 400 V SSR: 460 VAC (RV 02)  
 Varistor voltage for 600V SSR: 680 VAC (RV 05)



## Operational Diagram



Note: At this point (i.e., when switching of the mains is done rather than the control lines) no peak switching occurs but only instantaneous switching.



## Environmental Information

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 Harardous 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.

## 环境特性

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质低于GB/T 26572的限定。

X: 此零件某种材料中含有的该有害物质高于GB/T 26572的限定。



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