

# 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

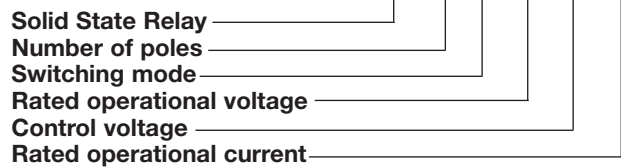
## Product Description

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**



## 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

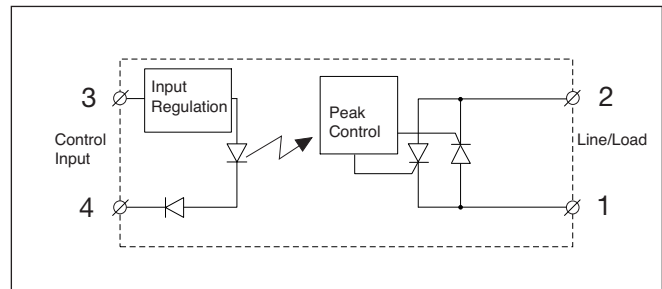
	RM1C40D..	RM1C60D..
Operational voltage range	100 to 440 VACrms	340 to 660 VACrms
Blocking voltage	850 V <sub>p</sub>	1400 V <sub>p</sub>
Zero voltage turn-on	< 10 V	< 10 V
Operational frequency range	45 to 65 Hz	45 to 65 Hz
Approvals	UL, cUL, CSA	UL, cUL, CSA
CE-marking	Yes	Yes*

\* 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

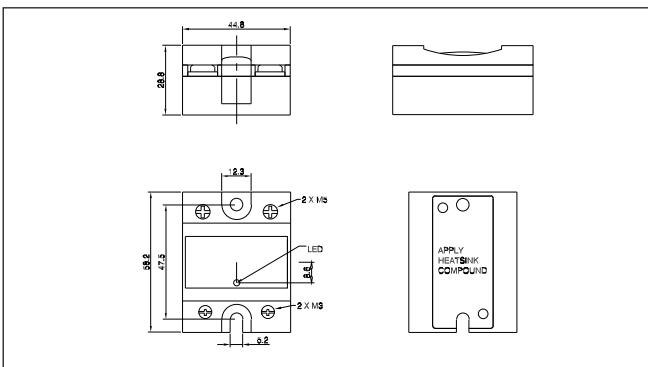
## Functional Diagram



## 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
AC56a @ 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 A <sub>p</sub>	600 A <sub>p</sub>	1150 A <sub>p</sub>	1900 A <sub>p</sub>
<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 75A, 100A	Approx. 60g Approx. 100g	<b>Relay</b> Mounting screws Mounting torque	M5 1.5-2.0Nm
<b>Housing material</b>	Noryl GFN 1, black	<b>Control terminal</b> Mounting screws Mounting torque	M3 x 9 0.5Nm
<b>Baseplate</b> 25A, 50A 75A, 100A	Aluminium Copper, nickel-plated	<b>Power terminal</b> Mounting screws Mounting torque	M5 x 9 2.4Nm
<b>Potting compound</b>	None		



## Heatsink Dimensions (load current versus ambient temperature)

### RM1C...25

Load current [A]	Thermal resistance [K/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

T<sub>A</sub>  
Ambient temp. [°C]

### RM1C...50

Load current [A]	Thermal resistance [K/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

T<sub>A</sub>  
Ambient temp. [°C]

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>	< 0.80	K/W
Case to heatsink thermal resistance, R <sub>th c-s</sub>	< 0.20	K/W
Maximum allowable case temperature	100	deg.C
Maximum allowable junction temperature	125	deg.C

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>	< 0.50	K/W
Case to heatsink thermal resistance, R <sub>th c-s</sub>	< 0.20	K/W
Maximum allowable case temperature	100	deg.C
Maximum allowable junction temperature	125	deg.C

### RM1.60..50

Load current [A]	Thermal resistance [K/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

T<sub>A</sub>  
Ambient temp. [°C]

### RM1C...75

Load current [A]	Thermal resistance [K/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

T<sub>A</sub>  
Ambient temp. [°C]

Junction to ambient thermal resistance, R <sub>th j-a</sub>	< 20.0	K/W
Junction to baseplate case thermal resistance, R <sub>th j-c</sub>	< 0.72	K/W
Case to heatsink thermal resistance, R <sub>th c-s</sub>	< 0.20	K/W
Maximum allowable heatsink temperature	100	deg.C
Maximum allowable junction temperature	125	deg.C

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>	< 0.35	K/W
Case to heatsink thermal resistance, R <sub>th c-s</sub>	< 0.10	K/W
Maximum allowable heatsink temperature	100	deg.C
Maximum allowable junction temperature	125	deg.C

## Heatsink Dimensions

(load current versus ambient temperature) cont.

### RM1C...100

Load current [A]	Thermal resistance [K/W]						Power dissipation [W]
	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

T<sub>A</sub>  
Ambient temp. [°C]

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 heatsink temperature	100	deg.C
Maximum allowable junction temperature	125	deg.C

## Heatsink Selection

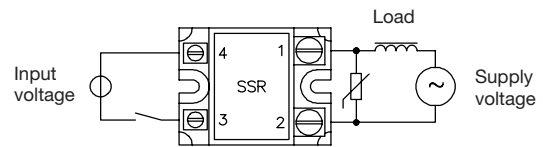
Carlo Gavazzi Heatsink (see Accessories)	Thermal resistance...	...for power dissipation
No heatsink required	---	N/A
RHS 300	5.00 K/W	> 0 W
RHS 100	3.00 K/W	> 25 W
RHS 45C	2.70 K/W	> 60 W
RHS 45B	2.00 K/W	> 60 W
RHS 90A	1.35 K/W	> 60 W
RHS 45C plus fan	1.25 K/W	> 0 W
RHS 45B plus fan	1.20 K/W	> 0 W
RHS 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

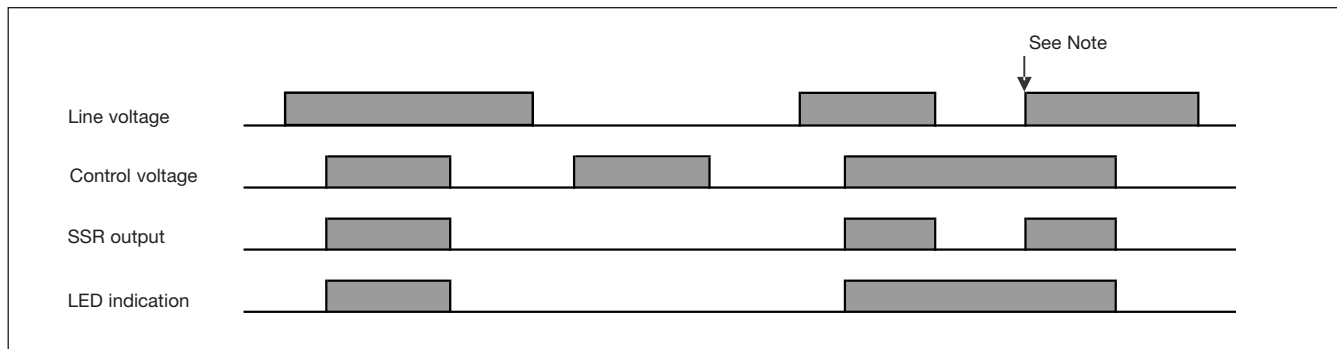
### Overvoltage protection

As transformers can have varying 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.