

# Solid State Relays Industrial, 2-Pole Zero Cross Switching Type RA2A..C



- 2 Pole AC Solid State Relay
- Zero Cross
- Resistive AC loads
- Direct copper bonding (DCB) technology
- LED indication
- Rated operational current: up to 2x 40 AACrms
- Rated operational voltage: up to 600 VACrms
- Input range: 4.5- 32 VDC
- Blocking voltage: Up to 1200 Vp
- Opto-isolation: 4000 VACrms
- Integrated overvoltage protection

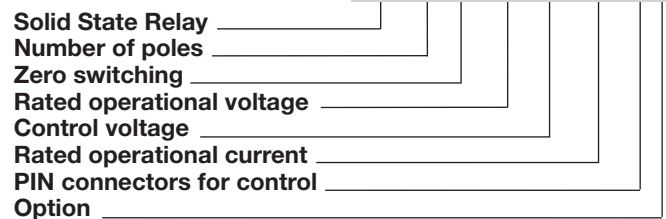


## Product Description

This 2-pole industrial relay minimises the space requirements in a control cabinet without compromising performance. By applying an input voltage on control A, the corresponding output semiconductor is activated at the first zero crossing of the line voltage. The same applies to control B. LEDs indicate the control status of each pole. The optimised design is free of moulding mass to reduce internal mechanical stress. The integrated varistor across each pole ensures protection against overvoltages.

## Ordering Key

**RA 2 A 23 D 40 C \_**



## Selection Guide

Rated operational voltage	Blocking voltage	Control voltage	Max. operational current (with suitable heatsink)	
			2 x 25 AACrms	2 x 40 AACrms
230 VACrms, ZC	650 V <sub>p</sub>	4.5 - 32 VDC	RA2A23D25C	RA2A23D40C
600 VACrms, ZC	1200 V <sub>p</sub>	4.5 - 32 VDC	RA2A60D25C	RA2A60D40C

ZC = Zero Cross Switching

## Selection Guide - RA2A..H53 (RA2A mounted on heatsink RHS38)

Rated operational voltage	Blocking voltage	Control voltage	Rated operational current at 40°C 2 x 20 AACrms*
230 VACrms, ZC	650 V <sub>p</sub>	4.5 - 32 VDC	RA2A23D40CH53

\* Refer to Derating Curve for other ratings

## Selection Guide - RA2A..S18 (attached thermal pad)

Rated operational voltage	Blocking voltage	Control voltage	Rated operational current (with suitable heatsink)	
			2 x 25 AACrms	2 x 40 AACrms
230 VACrms, ZC	650 V <sub>p</sub>	4.5 - 32 VDC	-	RA2A23D40CS18

## General Specifications

	RA2A23..	RA2A60..
Operational voltage range	24 to 265 VACrms	42 to 660 VACrms
Blocking voltage	650 Vp	1200 Vp
Rated isolation		
Input to Output	4 kVrms	4 kVrms
Output to heatsink	4 kVrms	4 kVrms
Operational frequency	45 to 65 Hz	45 to 65 Hz
Power factor	>0.95 @ 230 VACrms	>0.95 @ 600 VACrms
Zero voltage turn-on	<15 V	<15 V
LED ON indication (x2)	Yes (green)	Yes (green)
CE marking	Yes	Yes
Approvals	UR, cUR, EAC	UR, cUR, EAC

## Output Specifications

	RA2...25	RA2...40
Rated operational current AC 51	2 x 25 AACrms	2 x 40 AACrms
Minimum operational current	150 mA	250 mA
Non-rep. surge current t=10 ms	325 A <sub>p</sub>	600 A <sub>p</sub>
Off-state leakage current	< 3 mA	< 3 mA
I <sup>2</sup> t for fusing t=10 ms	525 A <sup>2</sup> s	1800 A <sup>2</sup> s
On-state voltage drop @ rated current	≤ 1.6 Vrms	≤ 1.6 Vrms
Critical dV/dt off-state min.	1000 V/μs	1000 V/μs
Zero crossing detection	Yes	Yes

## Input Specifications

Control voltage range <sup>1</sup>	4.5 - 32 VDC
Pick-up voltage	4.25 VDC
Drop-out voltage	2 VDC
Reverse Protection	32 VDC
Input current per pole @ max. input voltage	≤10m A
Response time pick-up @ 50 Hz	≤10 ms
Response time drop-out @ 50 Hz	≤10 ms

1. DC control to be supplied by class 2 power source

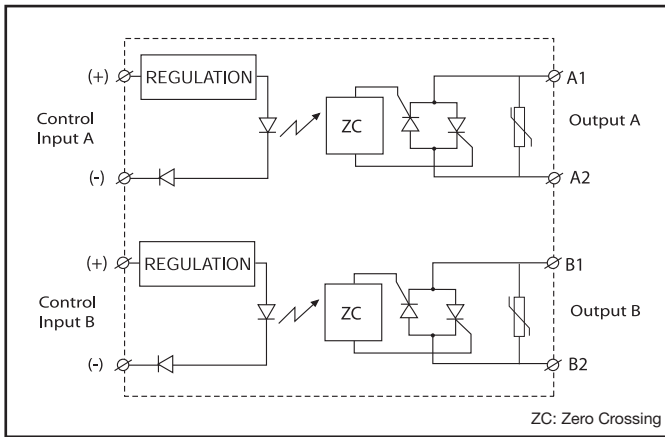
## Housing Specifications

Control terminals <sup>2</sup>	4 PIN connector 0.64 mm square pin with 2.54 mm centre distance
Power terminals	4 x Fastons; 6.35 x 0.8 mm
Baseplate	Aluminium
Weight	Approx. 85 g
Max. Pull out force for power terminals	130 N
Relay	
Mounting screws	M5
Mounting torque	1.5 - 2.0 Nm

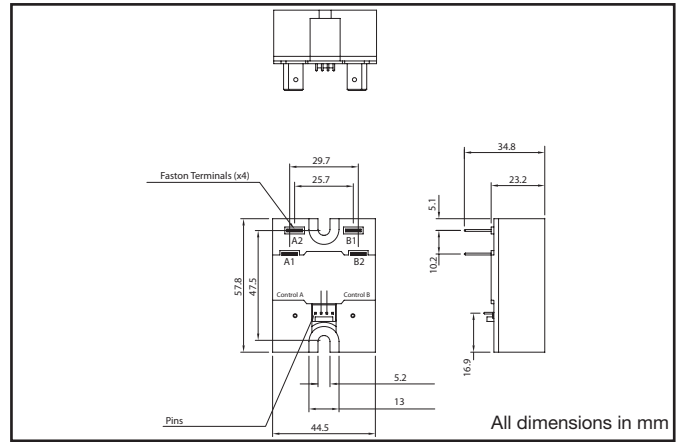
2. Possible mating connector model CE100F22-4-D from MAS-CON



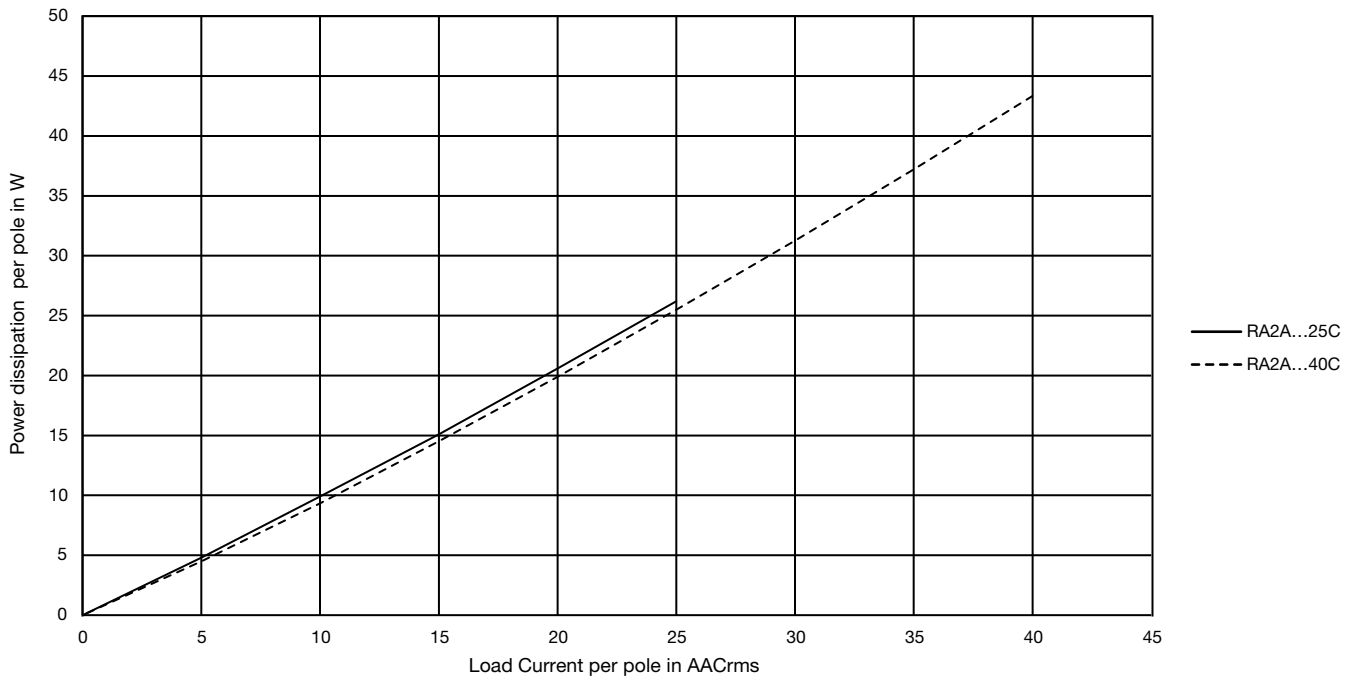
### Functional Diagram



### Dimensions



### Output Power Dissipation



## Heatsink Dimensions (load current versus ambient temperature)

Note: Add the currents of both poles and compare with datasheets for proper heatsink.  
 Each pole can handle up to the maximum current specified. Example: Each pole of the RA2A23D40C can handle a maximum of 40 A.

### RA 2....25

Load current [A]	Thermal resistance [°C/W]					
	20	30	40	50	60	70
50	1.11	0.94	0.78	0.62	0.46	0.29
45	1.36	1.17	0.99	0.80	0.61	0.43
40	1.68	1.47	1.25	1.03	0.81	0.60
35	2.06	1.80	1.54	1.29	1.03	0.77
30	2.5	2.2	1.87	1.56	1.25	0.94
25	3.1	2.7	2.3	1.9	1.6	1.7
20	4.0	3.5	3.0	2.5	2.0	1.52
15	6	5	4	3.5	2.8	2.1
10	9	8	7	6	4	3.3
5	18	16	14	12	9	7

Ambient temp. [°C]

### RA 2....40

Load current [A]	Thermal resistance [°C/W]					
	20	30	40	50	60	70
80	0.68	0.56	0.44	0.32	0.19	0.07
72	0.87	0.73	0.59	0.45	0.31	0.17
64	1.10	0.94	0.78	0.62	0.45	0.29
56	1.41	1.22	1.03	0.83	0.64	0.45
48	1.8	1.6	1.36	1.13	0.90	0.67
40	2.3	2.0	1.7	1.4	1.1	0.86
32	3.0	2.6	2.2	1.9	1.5	1.11
24	4	4	3	2.6	2.0	1.5
16	6	6	5	4	3	2.4
8	13	12	10	8	7	5

Ambient temp. [°C]

Note: The thermal resistance values indicated above are applicable if a fine layer of thermal paste, HTS02S, is applied between heatsink and SSR.

### RA 2....25..S18

Load current [A]	Thermal resistance [°C/W]					
	20	30	40	50	60	70
50	0.61	0.44	0.28	0.12	---	---
45	0.86	0.67	0.49	0.30	0.11	---
40	1.18	0.97	0.75	0.53	0.31	0.10
35	1.60	1.35	1.09	0.83	0.57	0.32
30	2.17	1.86	1.55	1.24	0.93	0.61
25	2.98	2.59	2.20	1.81	1.43	1.04
20	4.04	3.54	3.03	2.53	2.02	1.52
15	5.62	4.92	4.22	3.51	2.81	2.11
10	9	8	7	6	4.40	3.30
5	18	16	14	12	9	7

Ambient temp. [°C]

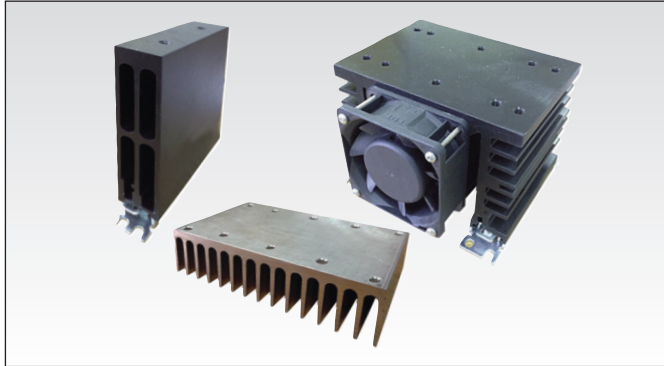
### RA 2....40..S18

Load current [A]	Thermal resistance [°C/W]					
	20	30	40	50	60	70
80	0.18	0.06	---	---	---	---
72	0.37	0.23	0.09	---	---	---
64	0.60	0.44	0.28	0.12	---	---
56	0.91	0.72	0.53	0.33	0.14	---
48	1.32	1.09	0.86	0.63	0.40	---
40	1.90	1.62	1.33	1.05	0.76	0.47
32	2.79	3.42	2.05	1.68	1.31	0.94
24	4.09	3.58	3.07	2.56	2.05	1.54
16	6	6	5	3.98	3.19	2.39
8	13	12	10	8	7	5

Ambient temp. [°C]

Note: The thermal resistance values indicated above are applicable for models which have an attached thermal pad, KK071CUT. Refer to Accessories section.

## Heatsink Selection



Heatsink Range Overview:  
[http://www.productselection.net/PDF/UK/ssr\\_accessories.pdf](http://www.productselection.net/PDF/UK/ssr_accessories.pdf)

Heatsink Selector Tool:  
<http://www.productselection.net/heatsink/heatsinkselector.php?LANG=UK>

### Ordering Key

**RHS..**

- Heatsinks and fans
- 5.40°C/W to 0.12°C/W thermal resistance
- DIN, panel or thru wall mounting
- Single or multiple SSR mounting

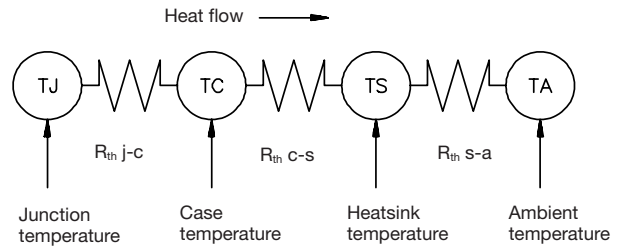
## Applications

Thermal stress will reduce the lifetime of the SSR. Care must be taken to ensure proper heatsinking when the relay is to be used at high sustained currents. Adequate electrical connection between relay terminals and cable must be ensured.

**Thermal characteristics**  
 The thermal design of Solid State Relays is very important. It is essential that the user

makes sure that cooling is adequate and that the maximum junction temperature of the relay is not exceeded.

If the heatsink is placed in a small closed room, control panel or the like, the power dissipation can cause the ambient temperature to rise. The heatsink is to be calculated on the basis of the ambient temperature and the increase in temperature.



Thermal resistance:  
 $R_{th\ j-c}$  = junction to case  
 $R_{th\ c-s}$  = case to heatsink  
 $R_{th\ s-a}$  = heatsink to ambient

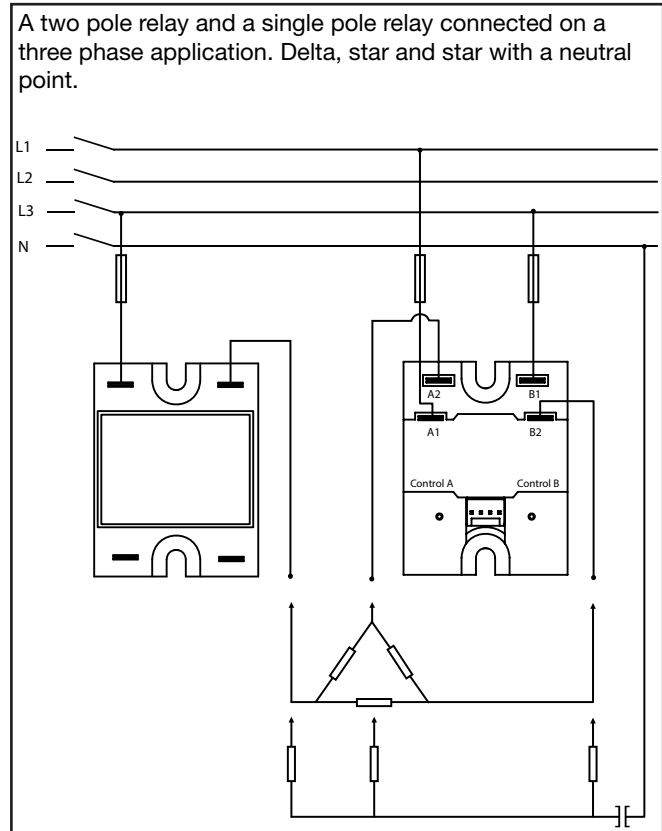
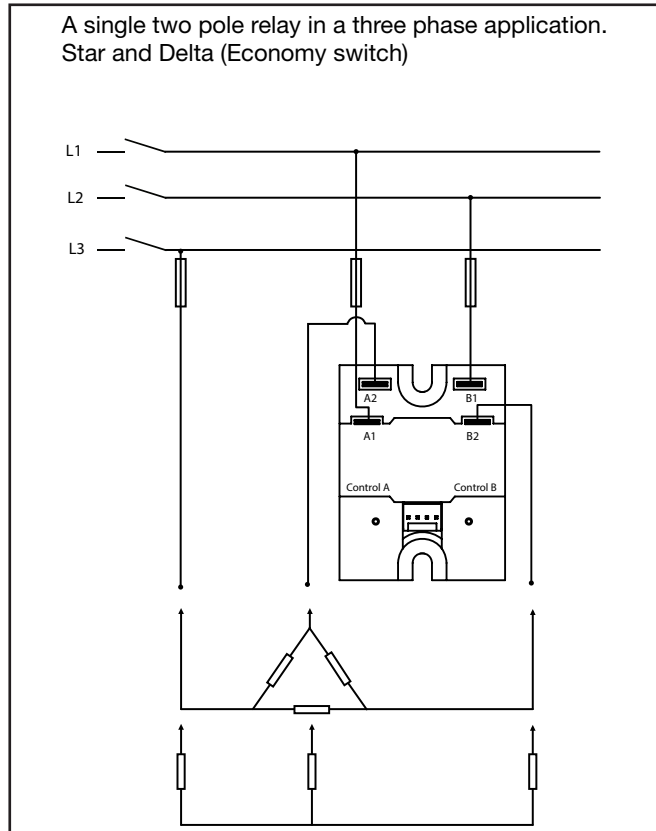
## Thermal Specifications

Operating temperature	-20° to 70°C (-4°F to +158°F)
Storage temperature	-20° to 80°C (-4°F to +176°F)
Junction temperature	≤ 125°C
$R_{th}$ junction to case	
1 pole	1°C/W
2 pole	0.5°C/W
$R_{th}$ junction to ambient	≤ 20°C/W

## Environmental Specifications

Pollution degree	2 (non-conductive pollution with possibilities of condensation)
EU RoHS compliant	Yes
China RoHS compliant	Refer to Environmental Information (Page 8)

## Connection Diagrams



For use in a circuit where devices or systems, including filters or air gaps, are used to control overvoltages at the maximum rated impulse withstand voltage peak of 6.0 kV. Devices or systems shall be evaluated using the requirements in the standard for Transient Voltage Surge Suppressors, UL1449 and shall also withstand the available short circuit current in accordance with UL 1449.

## Electromagnetic Compatibility

<b>Immunity</b>	EN61000-6-2	<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 2	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>	EN61000-6-4	<b>Radio Interference Field Emission (Radiated)</b>	IEC/EN 55011
<b>Radio Interference Voltage Emission (Conducted)</b>	IEC/EN 55011	30 - 1000 MHz	Class B
0.15 - 30 MHz	Class A (industrial) with filters		

Notes:

- 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.

## Short Circuit Protection - Co-ordination type 2 (IEC/EN 60947-4-3)

Part No.	Mersen* Max. size [A]	Size	Part number	Current [kA]	Voltage [VAC]
RA2A..25	25 A	10.3 x 38	6.9 gRC 10 - 25	10	600
RA2A..40	40 A	14 x 51	6.9xx CP gRC 14x51/40	10	600

\* Formerly Ferraz Shawmut  
 xx= 00 without fuse trip indication  
 xx = 21 with fuse trip indication

## Type 2 Protection with Miniature Circuit Breakers

Part No.	Model no. for Z - type M. C. B. (rated current)	Model no. for B - type M. C. B. (rated current)	Wire cross sectional area [mm <sup>2</sup> ]	Minimum length of Cu wire conductor [m] <sup>3</sup>
<b>RA2A..25</b> (525 A <sup>2</sup> s)	S201 - Z4 (4A)	S201-B2 (2A)	1.0	21.0
	S201 - Z6 UC (6A)	S201-B2 (2A)	1.5	21.0
			2.5	31.5
<b>RA2A..40</b> (1800 A <sup>2</sup> s)	S201 - Z10 (10A)	S201-B4 (4A)	1.0	7.6
			1.5	11.4
			2.5	19.0
	S201 - Z16 (16A)	S201-B6 (6A)	1.0	5.2
			1.5	7.8
			2.5	13.0
			4.0	20.8
	S201 - Z20 (20A)	S201-B10 (10A)	1.5	12.6
			2.5	21.0
	S201 - Z25 (25A)	S201-B13 (13A)	2.5	25.0
			4.0	40.0
	2-pole S202 - Z25 (25A)	S202-B13 (13A)	2.5	19.0
			4.0	30.4

3. Between MCB and Load (including return path which goes back to the mains)

Note: A prospective current of 6kA and a 230/400V power supply system is assumed for the above suggested specifications. For cables with different cross section than those mentioned above please consult Carlo Gavazzi's Technical Support Group. Specifications are per pole.



## 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: 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	○	○	○	○	○

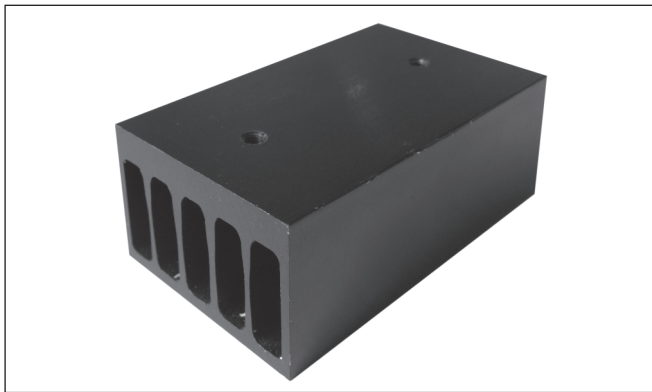
O:此零件所有材料中含有的该有害物低于GB/T 26572的限定。

X: 此零件某种材料中含有的该有害物高于GB/T 26572的限定。





## Heatsink RHS38



### Ordering Key

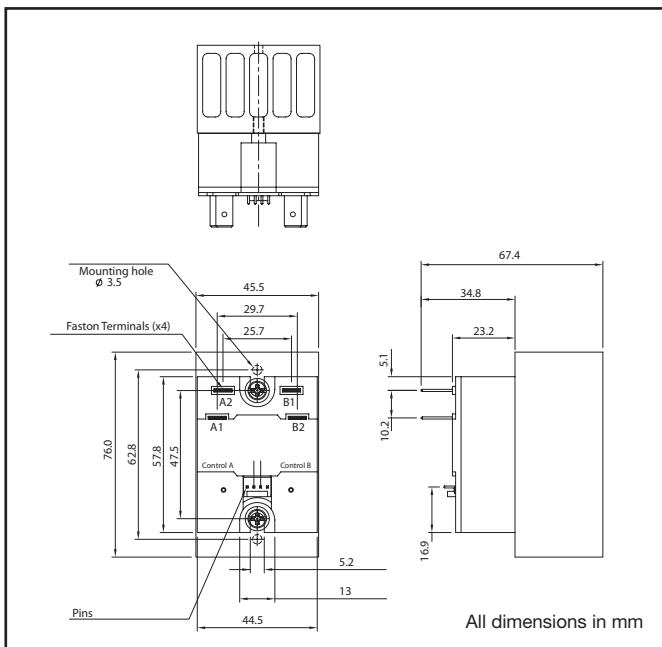
Heatsink

**RHS38AD**

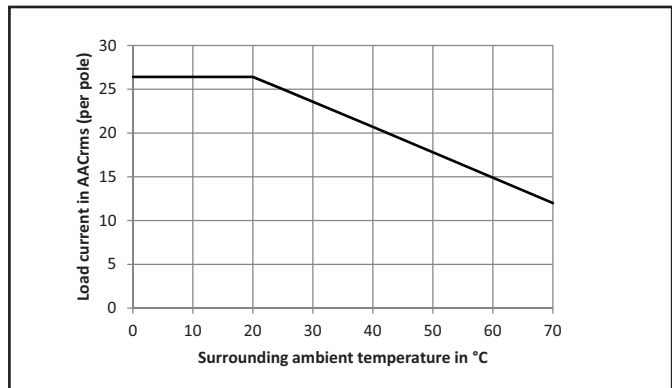
Factory mounted heatsink to RA2A

**RA2A...H53**

### Dimensions

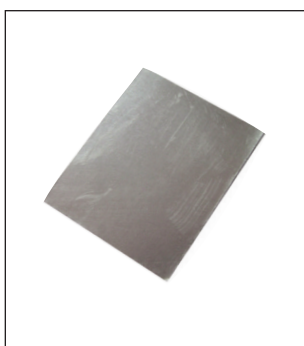


### Derating Curve for RA2A..H53

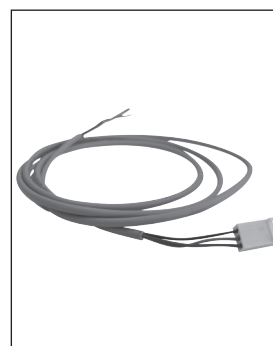


Applicable for vertical mounting

### Other Accessories



- Graphite thermal pad with adhesive on one side
- Type KK071CUT
- Dimensions: 35 x 43 x 0.25mm
- Packing quantity: 50pcs.



- Cable accessory for RA2A..C
- Type RCS4-xxx-1

xxx = 100 for 100cm length  
xxx = 400 for 400cm length

Other accessories include DIN rail adaptors, varistors and spacers.

For further information refer to Accessories datasheets at: [www.productselection.net/PDF/UK/SSR\\_Accessories.pdf](http://www.productselection.net/PDF/UK/SSR_Accessories.pdf)