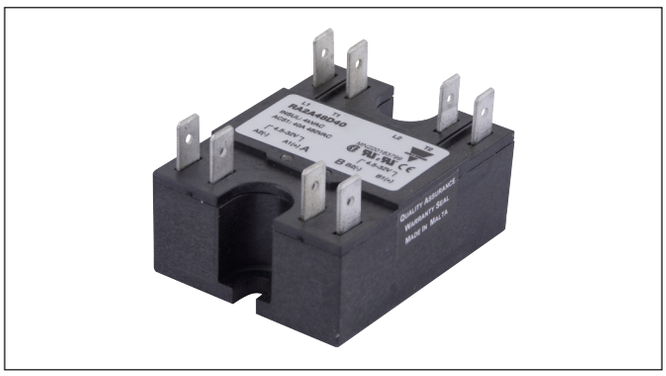
Solid State Relays
Industrial, 2-Pole ZS
Type RA2A



- 2-Pole AC Solid State Relay
- Zero switching
- For resistive and inductive AC loads
- Direct copper bonding (DCB) technology
- LED indication
- Rated operational current: 2 x 25 and 2 x 40 AACrms
- Rated operational voltage: 230 - 600 VACrms
- Input range: 4.5 - 32 VDC
- Blocking voltage: Up to 1200 Vp
- Opto-isolation: 4000 VACrms

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 semicondcutor 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 RA2A..M types have been specially customised for demanding inductive loads.

Ordering Key

RA 2 A 48 D 25 M

- Solid State Relay
- Number of poles
- Zero switching
- Rated operational voltage
- Control voltage
- Rated operational current
- Load type

Type Selection

Switching mode	Rated operational voltage	Rated operational current	Control voltage	Blocking voltage	Load type
A: Zero switching	23: 230 VACrms 48: 480 VACrms 60: 600 VACrms	25: 2 x 25 AACrms 40: 2 x 40 AACrms	D: 4.5 - 32 VDC	23: 650 V_p 48: 1200 V_p 60: 1200 V_p	M: Inductive

ZS = Zero Switching

Selection Guide

Rated operational voltage	Blocking voltage	Control voltage	Rated operational current 2 x 25 AACrms	2 x 40 AACrms
230 VACrms	650 V_p	4.5 - 32 VDC	RA2A23D25	RA2A23D40
			RA2A23D25M	RA2A23D40M
480 VACrms	1200 V_p	4.5 - 32 VDC	RA2A48D25	RA2A48D40
			RA2A48D25M	RA2A48D40M
600 VACrms	1200 V_p	4.5 - 32 VDC	RA2A60D25	RA2A60D40
			RA2A60D25M	RA2A60D40M

General Specifications

	RA2A23...	RA2A48...	RA2A60...
Operational voltage range	24 to 265 VACrms	42 to 530 VACrms	42 to 660 VACrms
Blocking voltage	650 V_p	1200 V_p	1200 V_p
Rated isolation input - output/output - heatsink	4 kV	4 kV	4 kV
Operational frequency range	45 to 65 Hz	45 to 65 Hz	45 to 65 Hz
LED ON indication (x2)	Yes (green)	Yes (green)	Yes (green)
Power factor RA2A RA2A..M	 ≥ 0.95 @ 230 VAC ≥ 0.50 @ 230 VAC	 ≥ 0.95 @ 480 VAC ≥ 0.50 @ 480 VAC	 ≥ 0.95 @ 600 VAC ≥ 0.50 @ 600 VAC
Zero voltage turn-on	< 15 V	< 15 V	< 15 V
Approvals	UR, cUR, CSA, EAC	UR, cUR, CSA, EAC	UR, cUR, CSA, EAC
CE-marking	Yes	Yes	Yes

Output Specifications

	RA2A...25	RA2A...40	RA2A..D25M	RA2A..D40M
Rated operational current AC 51 AC 53a	2 x 25 AACrms -	2 x 40 AACrms -	2 x 25 AACrms 2 x 5 AACrms	2 x 40 AACrms 2 x 15 AACrms
Minimum operational current	150 mA	250 mA	150 mA	250 mA
Non-rep. surge current t=10 ms	325 A_p	600 A_p	325 A_p	600 A_p
Off-state leakage current	< 3 mA	< 3 mA	< 3 mA	< 3 mA
I^2t for fusing t=10 ms	525 A^2s	1800 A^2s	525 A^2s	1800 A^2s
Critical dV/dt off-state min.	500 V/µs	500 V/µs	500 V/µs	500 V/µs
Zero crossing detection	Yes	Yes	Yes	Yes

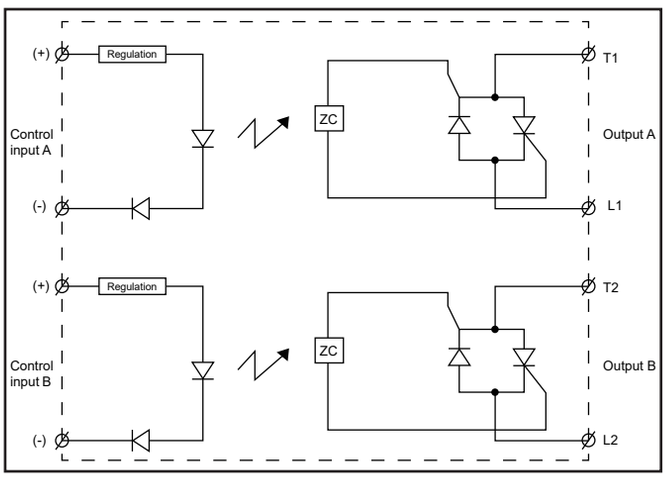
Input Specifications

Control voltage range	4.5 - 32 VDC
Pick-up voltage	4.25 VDC
Drop-out voltage	2 VDC
Input current per pole @ max. input voltage	≤10 mA
Response time pick-up @ 50 Hz	≤10 ms
Response time drop-out @ 50 Hz	≤10 ms

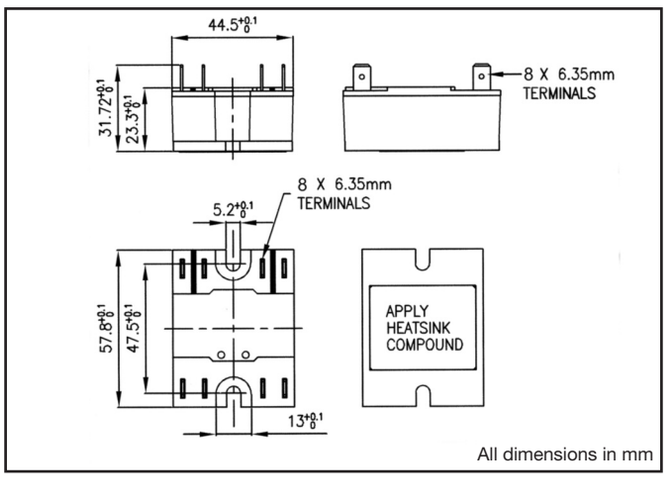
Housing Specifications

Weight	Approx. 85 g
Housing material	Noryl GFN 1, black
Base plate 25, 40 A 40 A (M type)	 Aluminium, nickel-plated Copper, nickel-plated
FASTON Terminal size	6.35 x 0.8 mm
Relay	
Mounting screws	M5
Mounting torque	1.5 - 2.0 Nm

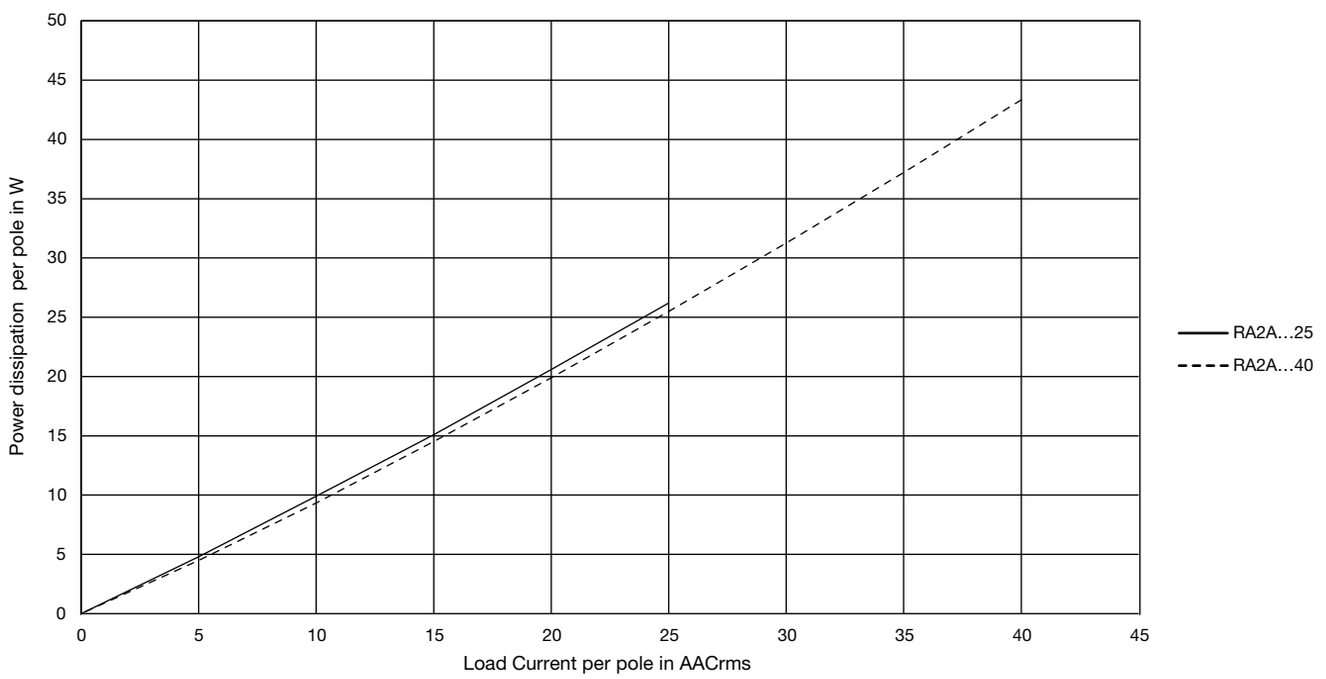
Functional Diagram



Dimensions



Output Power Dissipation



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Heatsink Dimensions (load current versus ambient temperature)

RA 2....25/25M

Load current [A] \ Thermal resistance [°C/W]	1.11	0.94	0.78	0.62	0.46	0.29
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	1.17
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
	20	30	40	50	60	70 T_A

Ambient temp. [°C]

RA 2....40

Load current [A] \ Thermal resistance [°C/W]	0.68	0.56	0.44	0.32	0.19	0.07
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
	20	30	40	50	60	70 T_A

Ambient temp. [°C]

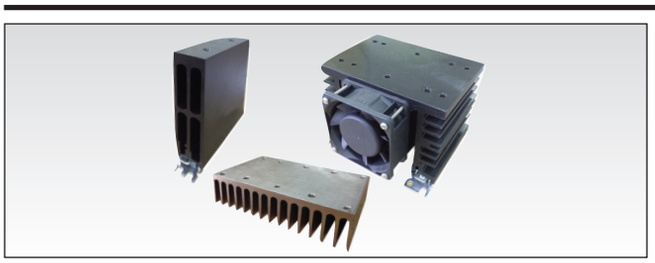
RA 2....40M

Load current [A] \ Thermal resistance [K/W]	0.41	0.32	0.23	0.13	0.04	-
100	0.41	0.32	0.23	0.13	0.04	-
90	0.55	0.44	0.34	0.23	0.13	0.02
80	0.72	0.60	0.48	0.35	0.23	0.11
70	0.95	0.80	0.66	0.52	0.37	0.23
60	1.25	1.08	0.90	0.73	0.56	0.39
50	1.7	1.5	1.25	1.04	0.83	0.61
40	2.2	1.9	1.6	1.4	1.1	0.82
30	3	2.7	2.3	1.9	1.5	1.14
20	5	4	4	2.9	2.3	1.8
10	10	9	7	6	5	3.6
5	20	17	15	12	10	7
	20	30	40	50	60	70 T_A

Ambient temp. [°C]

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 RA2A23D25 can handle a maximum of 25 A.

Heatsink Selection



Heatsink Range Overview:
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

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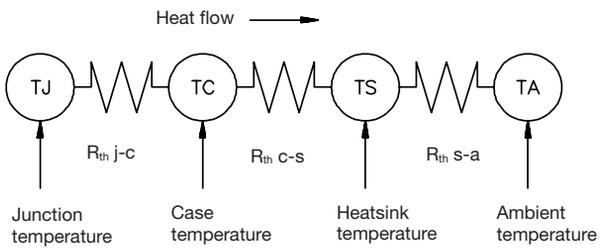
Applications

Care must be taken to ensure proper heatsinking when the relay is to be used at high sustained currents. Ade-quate 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

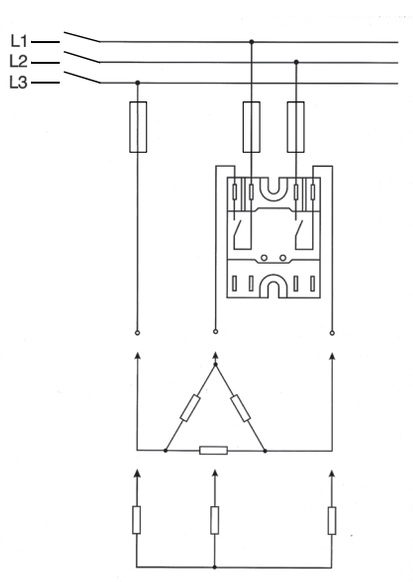
	RA2A...25.	RA2A...40	RA2A...40M
Operating temperature	-20° to 70°C	-20° to 70°C	-20° to 70°C
Storage temperature	-20° to 80°C	-20° to 80°C	-20° to 80°C
Junction temperature	≤ 125°C	≤ 125°C	≤ 125°C
R_{th} junction to case 1 pole 2 pole	 1°C/W 0.5°C/W	 1°C/W 0.5°C/W	 0.92°C/W 0.46°C/W
R_{th} junction to ambient	≤ 20°C/W	≤ 20°C/W	≤ 20°C/W

Environmental Specifications

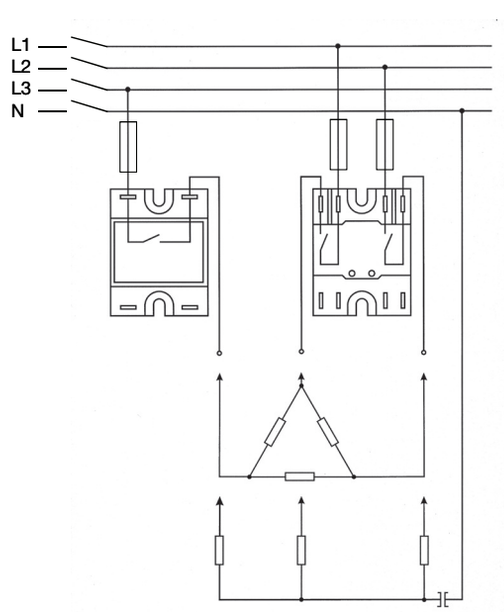
Pollution degree	2 (non-conductive pollution with possibilites of condensation)
EU RoHS compliant	Yes
China RoHS compliant	Refer to Environmental Information (Page 8)

Connection Diagram

A single two pole relay in a three phase application.
Star and Delta (Economy switch)



A two pole relay and a single pole relay connected on a three phase application. Delta, star and star with a neutral point.



Electromagnetic Compatibility

Immunity	EN 61000-6-2
Electrostatic Discharge (ESD) Immunity	IEC/EN 61000-4-2
Air discharge, 8 kV	Performance Criteria 2
Contact, 4 kV	Performance Criteria 2
Electrical Fast Transient (Burst) Immunity	IEC/EN 61000-4-4
Output: 2 kV, 5 kHz	Performance Criteria 2
Input: 1 kV, 5 kHz	Performance Criteria 1
Electrical Surge Immunity	IEC/EN 61000-4-5
Output, line to line, 1 kV	Performance Criteria 2
Output, line to earth, 1 kV	Performance Criteria 2
Output, line to earth, 2 kV	Performance Criteria 2 with external varistor
Input, line to line, 1 kV	Performance Criteria 2
Input, line to earth, 2 kV	Performance Criteria 2

Radiated Radio Frequency Immunity	IEC/EN 61000-4-3
10 V/m, 80 - 1000 MHz	Performance Criteria 1
10 V/m, 1.4 - 2.0 GHz	Performance Criteria 1
3 V/m, 2.0 - 2.7 GHz	Performance Criteria 1
Conducted Radio Frequency Immunity	IEC/EN 61000-4-6
10 V/m, 0.15 - 80 MHz	Performance Criteria 1
Voltage Dips Immunity	IEC/EN 61000-4-11
0% for 0.5 , 1 cycle	Performance Criteria 2
40% for 10 cycles	Performance Criteria 2
70% for 25 cycles	Performance Criteria 2
80% for 250 cycles	Performance Criteria 2
Voltage Interruptions Immunity	IEC/EN 61000-4-11
0% for 5000 ms	Performance Criteria 2

EMC Emission	EN 61000-6-4
Radio Interference Voltage Emission (Conducted)	IEC/EN 55011
0.15 - 30 MHz	Class A (industrial) with filters

Radio Interference Field Emission (Radiated)	IEC/EN 55011
30 - 1000 MHz	Class B

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.

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Short Circuit Protection

Protection Co-ordination, Type 1 vs. Type 2:

Type 1 protection implies that after a short circuit, the device under test will no longer be in a functioning state. In type 2 co-ordination the device under test will still be functional after the short circuit. In both cases, however, the short circuit has to be interrupted. The fuse between enclosure and supply shall not open. The door or cover of the enclosure shall not be blown open. There shall be no damage to conductors of terminals and the conductors shall not separate from terminals. Therese shall be no breakage or cracking of insulating bases to the extent that the integrity of the mounting of live parts is impaired. Discharge of parts or any risk of fire shall not occur.

The product variants listed in the table hereunder are suitable for use on a circuit capable of delivering not more than 65,000A rms Symmetrical Amperes, 600Volts maximum when protected by fuses. Tests at 65,000A were performed with Class J, fast acting: please refer to the table below for maximum allowed ampere rating of the fuse. Use fuses only.

Co-ordination type 1 (UL508)

Type	Prospective short circuit current [kArms]	Max. fuse size [A]	Class	Voltage [VAC]
RA2A..25..	65	30	J / CC	600
RA2A..40..	65	40	J	600
		20	HSJ20 (Mersen*)	600

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

Protection co-ordination Type 2 with Minature Circuit Breakers (M.C.B.s)

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 [mm²]	Minimum length of Cu wire conductor [m][1]
RA2A..25 (525 A²s)	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
RA2A..40 (1800 A²s)	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

1: 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.

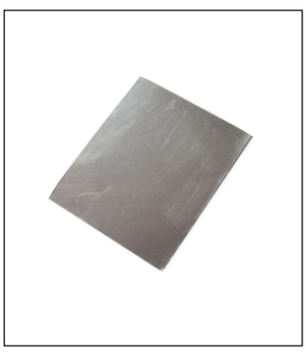
Part Name	Toxic or Harardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
Power Unit Assembly	x	O	O	O	O	O
O: Indicates that said hazardous substance contained in homogeneous materials fot 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。						

Accessories



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

All accessories can be ordered pre-assembled with Solid State Relays.
Other accessories include DIN rail adaptors and varistors

For futher information refer to Accessories datasheets at:
www.productselection.net/PDF/UK/SSR_Accessories.pdf

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