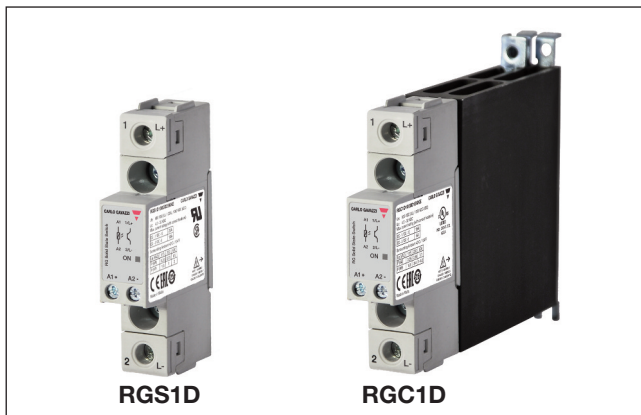


Solid State Relays DC Switching

Types RGC1D Solid State Contactor RGS1D Solid State Relay

CARLO GAVAZZI



- IGBT power semiconductor
- 17.5 mm product width, with or without integrated heatsink
- Rated Operational voltage: 1000 VDC
- Rated Operational current: Up to 25 ADC
- Control voltage: 4.5-32 VDC
- Input polarity protection
- Removable IP20 cover
- Integrated free-wheeling diode for output protection
- Max. transient peak voltage: 1200 V



Product Description

This product series is mainly intended to switch a string of photovoltaic panels with a maximum string voltage of 1000 VDC and up to 25 ADC in only 17.5 mm width. It may be used in other DC application as well.

the IGBT at the output is protected against back voltage with an integrated free-wheeling diode.

RGS1D is the panel mount version while the RGC1D has an integrated heatsink.

The control port is protected against reverse polarity while

Specifications are stated at 25°C unless otherwise noted.

Ordering Key RGC 1 D 1000 D 15 K K E

Solid State Relay	
Number of poles	
Switching mode	
Rated operational voltage	
Control voltage	
Rated operational current	
Connection type for control	
Connection type for power	
Connection configuration	
Options	

Ordering Key

1-Phase DC switching	Rated Voltage	Control Voltage	Rated Current	Connection Control	Connection Power	Connection Configuration
RGC1D: Contactor RGS1D: SSR	1000: 1000 VDC	D: 4.5 - 32 VDC	15: 15 ADC 25: 25 ADC	K: Screw	K: Screw	E: Contactor

Selection Guide (Integrated heatsink)

Rated Output voltage	Max. transient peak voltage	Control Voltage	Rated Operational Current @40°C
1000 VDC	1200 Vp	4.5 - 32 VDC	15 ADC RGC1D1000D15KKE

Selection Guide (Panel-mount Solid State Relay)

Rated Output voltage	Max. transient peak voltage	Control Voltage	Rated Operational Current
1000 VDC	1200 Vp	4.5 - 32 VDC	15 ADC RGS1D1000D15KKE
			25 ADC RGS1D1000D25KKE RGS1D1000D25KKEHT ¹

1: Option with attached thermal pad.

Output Voltage Specifications

Operational Voltage Range IEC ²	24 - 1000 VDC
UL508 ²	24 - 600 VDC
Maximum transient peak voltage	1200 VDC
Maximum Onstate Voltage Drop	1.6 VDC

2. -15% on lower voltage limit

General Specifications

Protection	IP20
Control input status	continuously ON Green LED, when control input is applied
Pollution degree	2 (non-conductive pollution with possibilities of condensation)
Over-voltage category	III (fixed installations)
Isolation	
Input to Output	4 kVrms
Input & Output to Case	4 kVrms

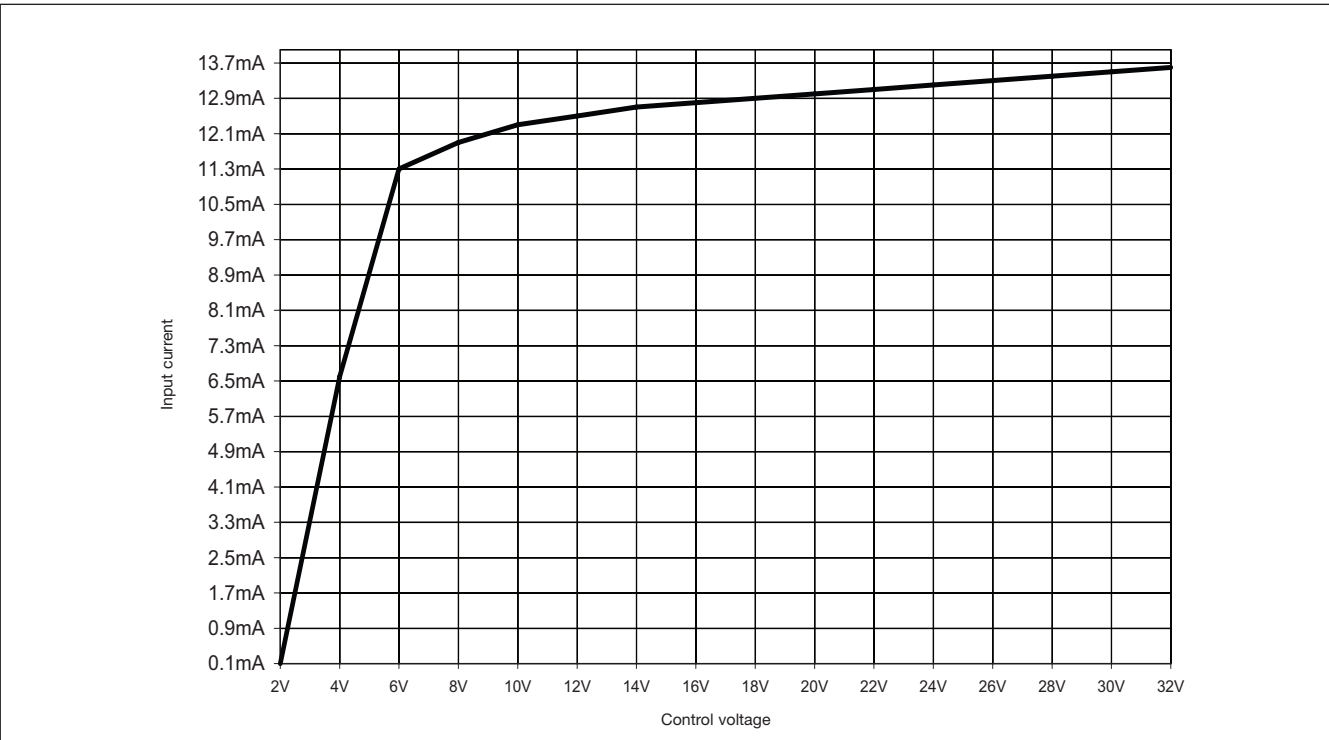
* Applicable only for RGC1D1000D15KKE

Specifications are subject to change without notice (20.11.2018)

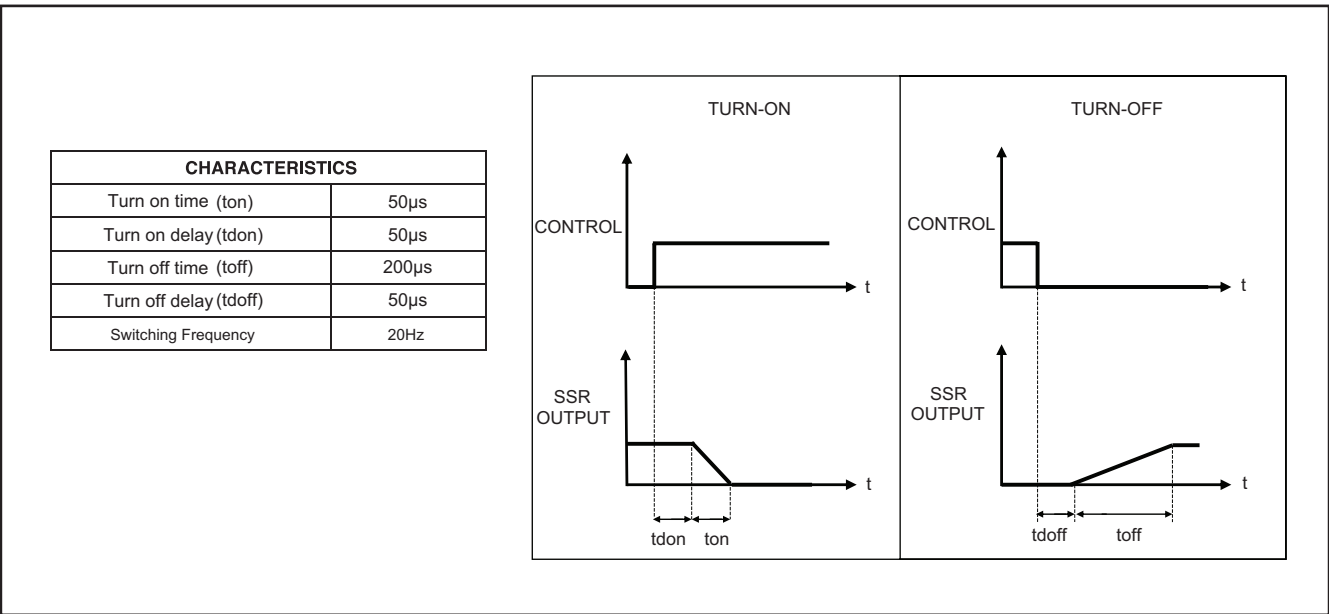
Input Specifications (@ 60°C)

Control voltage range	4.5 - 32 VDC	Maximum response time pick-up	Refer to Time characteristics
Pick-up voltage ³	4 VDC	Maximum response time drop-out	Refer to Time characteristics
Drop-out voltage	1 VDC	Input current	See diagram below
Maximum Reverse voltage	32 VDC		

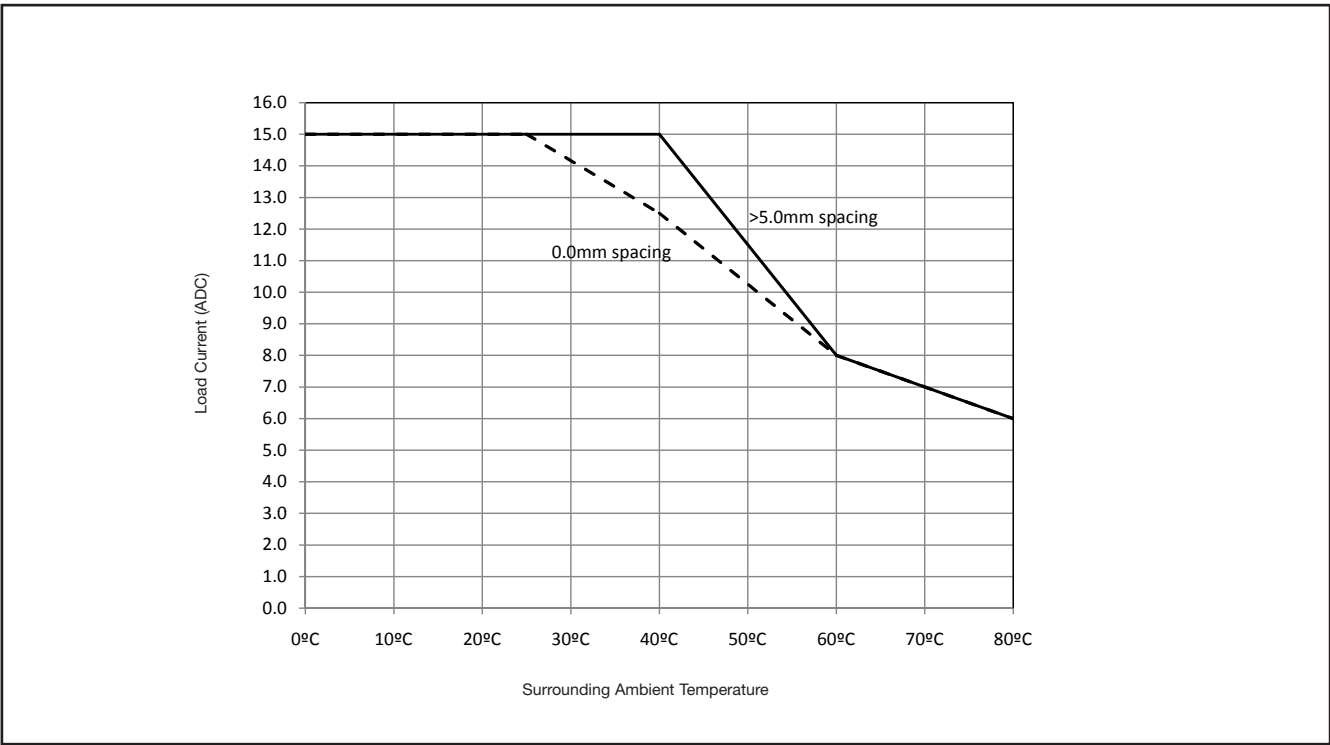
Note: Ideally control should be switched with a contactless switch (eg: open collector)
3. Pickup voltage should be minimum 6VDC for EMC conformance.



Time Characteristics



Current Derating for RGC1D



Output Specifications (@ 40°C unless otherwise specified)

	RGC1D..15	RGS1D..15	RGS1D..25
Current Rating	DC-1 @ 60°C DC-1 @ 40°C	15 ADC	25 ADC
Maximum offstate leakage at rated voltage	1.5 mA	1.5 mA	1.5 mA
Min. operational current	20 mADC	20 mADC	20 mADC
Maximum Transient Surge Current (t=10 µs)	200 ADC	200 ADC	200 ADC

Agency Approvals and Conformances

RGC1D

UL508 Listed (E172877)
cUL Listed (E172877)



RGS1D

UL508 Recognised (E172877)
CSA (204075)





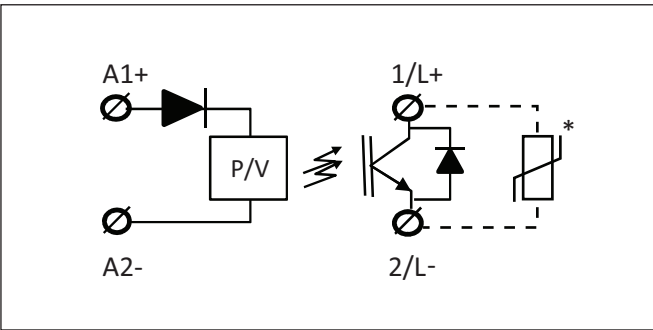
Electromagnetic Compatibility

EMC Immunity	IEC/EN 61000-6-2	Radiated Radio Frequency Immunity	IEC/EN 61000-4-3
Electrostatic Discharge (ESD) Immunity	IEC/EN 61000-4-2	10 V/m, 80 - 1000 MHz	Performance Criteria 1
Air discharge, 8 kV	Performance Criteria 1	10 V/m, 1.0 - 2.7 GHz	Performance Criteria 1
Air discharge, 16 kV	Performance Criteria 2	Conducted Radio Frequency Immunity	IEC/EN 61000-4-6
Contact, 4 kV	Performance Criteria 1	10 V/m, 0.15 - 80 MHz	Performance Criteria 1
Contact, 8 kV	Performance Criteria 2	Voltage Dips, Short Interruptions and Voltage Variations Immunity tests	IEC/EN 61000-4-11
Electrical Fast Transient (Burst) Immunity	IEC/EN 61000-4-4	0% @ 5000 ms	Performance Criteria 2
Output: 4 kV, 5 kHz /100 kHz	Performance Criteria 2	40% @ 200 ms	Performance Criteria 2
Input: 1 kV, 5 kHz / 100 kHz	Performance Criteria 1	60% @ 10, 30, 100, 300, 1000 ms	Performance Criteria 2
Electrical Surge Immunity	IEC/EN 61000-4-5	Voltage Dips, Short Interruptions and Voltage Variations on Input Lines Immunity tests	IEC/EN 61000-4-29
Output, line to line, 1 kV	Performance Criteria 1	0% @ 1, 3, 10, 30, 100, 300, 1000 ms	Performance Criteria 2
Output, line to earth, 2 kV	Performance Criteria 1	30% @ 10, 30, 100, 300, 1000 ms	Performance Criteria 2
Input, line to line, 1 kV	Performance Criteria 1	70% @ 10, 30, 100, 300, 1000 ms	Performance Criteria 2
Input, line to earth, 2 kV	Performance Criteria 1	-20% @ 10, 30, 100, 300, 1000ms, 3s, 10s	Performance Criteria 2
		+20% @ 10, 30, 100, 300, 1000ms, 3s, 10s	Performance Criteria 2
EMC Emission	IEC/EN 61000-6-3	Radio Interference Voltage Emission (Conducted)	IEC/EN 55011
Radio Interference field emission (Radiated)	IEC/EN 55011	0.15 - 30 MHz	Class B
30 - 1000 MHz	Class B		

Environmental Specifications

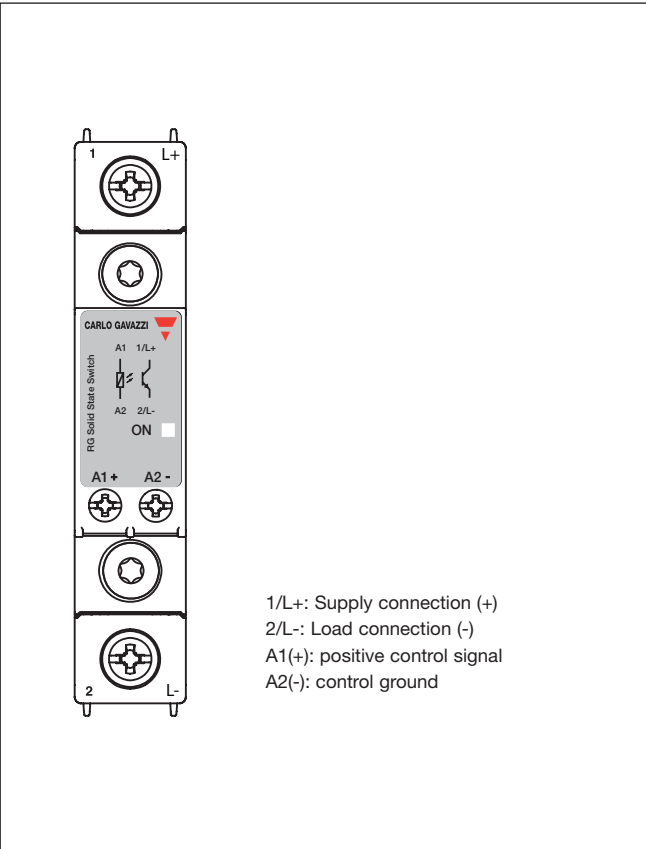
Operating Temperature	-40°C to 80°C (-40°F to +176°F)
Storage Temperature	-40°C to 100°C (-40°F to +212°F)
EU RoHS compliant	Yes
China RoHS compliant	Refer to Environmental Information (page 10)
Impact resistance (EN50155, EN61373)	15/11 g/ms
Vibration resistance (2-100Hz, IEC 60068-2-6, EN50155, EN61373)	2 g per axis (5 g for RGS)
Relative humidity	95% non-condensing @ 40°C
UL flammability rating (housing)	UL 94 V0

Connection Diagram

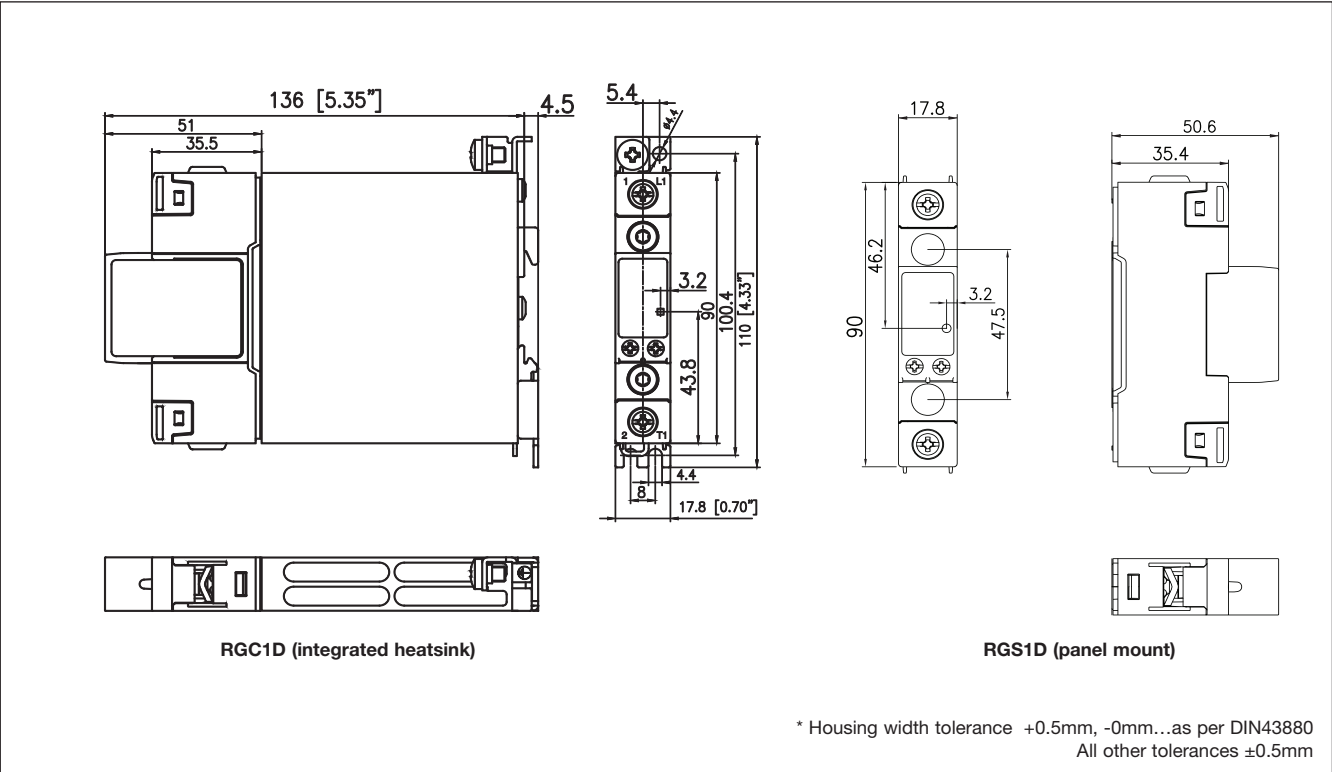


* varistor not included

Terminal Layout



Dimensions




All dimensions in mm

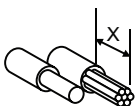


Connection Specifications

POWER CONNECTIONS: 1/L+, 2 /L-

Use 75°C copper (Cu) conductors
Torque specifications

 IEC: 1.5 - 2.0 Nm (13.3 - 17.7 lb-in)
UL: 2.0 Nm (17.7 lb-in)
M4, Pozidriv 2
Stripping Length (X) = 12 mm

Rigid (Solid & Stranded)
UL/ CSA rated data

		
	2 x 2.5..6 mm ² 2 x 14..10 AWG	1 x 2.5..6 mm ² 1 x 14..10 AWG


Flexible with end sleeve	2 x 1.0..2.5 mm ² 2 x 2.5..4 mm ² 2 x 14..12 AWG	1 x 1.0..4 mm ² 1 x 18..12 AWG
	2 x 2.5..6 mm ² 2 x 18..14 AWG	1 x 18..12 AWG

Flexible without end sleeve	2 x 1.0..2.5 mm ² 2 x 2.5..6 mm ² 2 x 18..14 AWG	1 x 1.0..6 mm ² 1 x 18..10 AWG

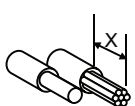


Aperture for termination lug 12.3 mm

CONTROL CONNECTIONS: A1(+), A2(-)

Use 60/75°C copper (Cu) conductors
Torque specifications



 IEC: 0.5 - 0.6 Nm (4.4 - 5.3 lb-in)
UL: 0.5Nm (4.4 lb-in)
M3, Pozidriv 1
Stripping Length (X) = 8 mm

Rigid (Solid & Stranded)
UL/ CSA rated data

		
	2 x 0.5..2.5 mm ² 2 x 18..12 AWG	1 x 0.5..2.5 mm ² 1 x 18..12 AWG

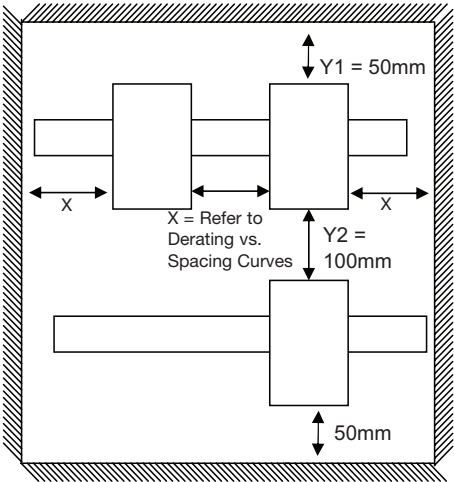
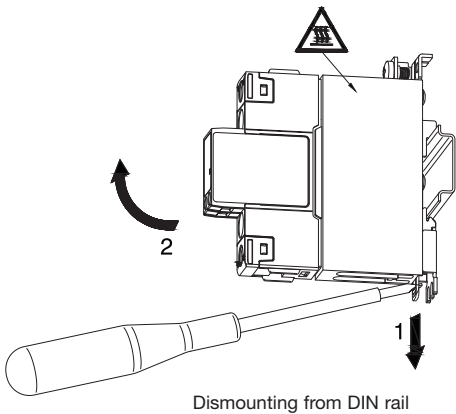
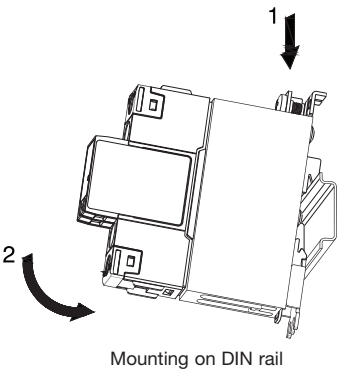
Flexible with end sleeve	2 x 0.5..2.5 mm ² 2 x 18..12 AWG	1 x 0.5..2.5 mm ² 1 x 18..12 AWG

Protective Earth Connection (RGC)

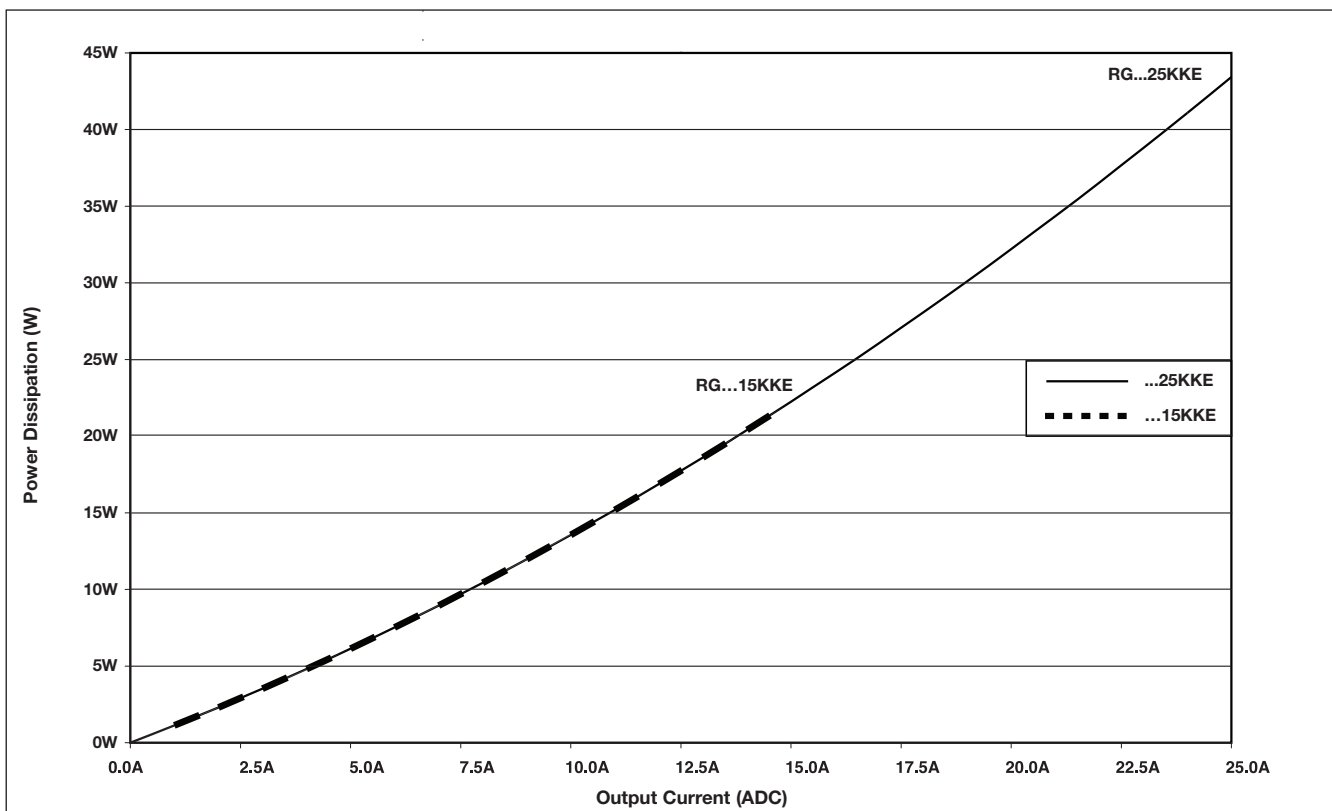
  M5, 1.5 Nm (13.3 in-lb)
(not provided with SSR)

Note: M5 PE screw not provided with SSR. PE connection required when product is intended to be used in Class 1 applications according to EN/IEC 61140.

Installation Instructions for RGC1D



Output Power Dissipation



Mounting Instructions for RGS1D

Thermal stress will reduce the lifetime of the SSR. Therefore it is necessary to select the appropriate heatsinks, taking into account the surrounding temperature, load current and the duty cycle.

A fine layer of thermally conductive silicone paste must be applied to the back of the SSR. RGS should be mounted on the heatsink with two M5 x 30 mm screws. Gradually tighten each screw (alternating between the two) until both are tightened with a torque of 0.75 Nm. Then tighten both screws to their final mounting torque of 1.5 Nm.

In case of a thermal pad attached to the back of the SSR, no thermal paste is required. The RGS is gradually tightened (alternating between the 2 screws) to a maximum torque of 1.5 Nm.



Heatsink Selection for RGS1D

RGS1D..15

Load current [A]	Thermal resistance [°C/W]						
	20	30	40	50	60	70	80
15	3.60	3.15	2.70	2.25	1.80	1.35	0.90
13.5	4.10	3.59	3.08	2.56	2.05	1.54	1.03
12	4.74	4.15	3.56	2.96	2.37	1.78	1.19
10.5	5.57	4.87	4.18	3.48	2.79	2.09	1.39
9	6.69	5.85	5.01	4.18	3.34	2.51	1.67
7.5	8.26	7.23	6.20	5.16	4.13	3.10	2.07
6	10.64	9.31	7.98	6.65	5.32	3.99	2.66
4.5	14.63	12.81	10.98	9.15	7.32	5.49	3.66
3	----	----	----	14.17	11.33	8.50	5.67
1.5	----	----	----	----	----	----	11.71

T_A
Ambient temp [°C]

RGS1D..25

Load current [A]	Thermal resistance [°C/W]						
	20	30	40	50	60	70	80
25	1.82	1.59	1.36	1.13	0.90	0.67	0.44
22.5	2.12	1.86	1.59	1.33	1.06	0.80	0.53
20	2.48	2.17	1.86	1.55	1.24	0.93	0.62
17.5	2.96	2.59	2.22	1.85	1.48	1.11	0.74
15	3.60	3.15	2.70	2.25	1.80	1.35	0.90
12.5	4.51	3.95	3.38	2.82	2.26	1.69	1.13
10	5.90	5.17	4.43	3.69	2.95	2.21	1.48
7.5	8.26	7.23	6.20	5.16	4.13	3.10	2.07
5	13.03	11.41	9.78	8.15	6.52	4.89	3.26
2.5	----	----	----	----	13.75	10.31	6.87

T_A
Ambient temp [°C]

Maximum junction temperature	125°C
Heatsink temperature	100°C
Junction to case thermal resistance, R _{thjc}	<0.36 °C/W
Case to heatsink thermal resistance, R _{thcs} ⁴	< 0.32 °C/W

Maximum junction temperature	125°C
Heatsink temperature	100°C
Junction to case thermal resistance, R _{thjc}	<0.36 °C/W
Case to heatsink thermal resistance, R _{thcs} ⁴	< 0.32 °C/W

RGS1D..25..HT (with attached thermal pad)

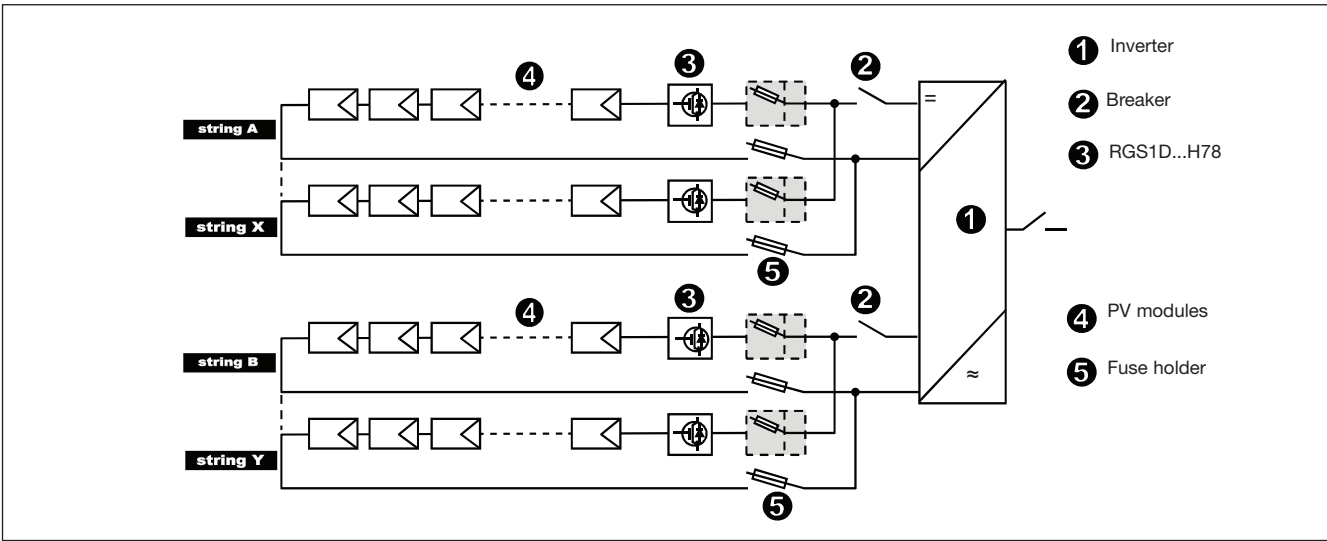
Load current [A]	Thermal resistance [°C/W]						
	20	30	40	50	60	70	80
25.0	1.16	0.93	0.70	0.47	0.24	--	--
22.5	1.53	1.26	1.00	0.73	0.47	0.20	--
20.0	2.00	1.69	1.38	1.07	0.76	0.45	0.14
17.5	2.62	2.25	1.88	1.51	1.14	0.77	0.40
15.0	3.46	3.01	2.56	2.11	1.66	1.21	0.76
12.5	4.51	3.95	3.38	2.82	2.26	1.69	1.13
10.0	5.90	5.17	4.43	3.69	2.95	2.21	1.48
7.5	8.26	7.23	6.20	5.16	4.13	3.10	2.07
5.0	13.03	11.41	9.78	8.15	6.52	4.89	3.26
2.5	---	---	---	---	13.75	10.31	6.87

T_A
Ambient temp [°C]

Maximum junction temperature	125°C
Heatsink temperature	100°C
Junction to case thermal resistance, R _{thjc}	<0.36 °C/W
Case to heatsink thermal resistance, R _{thcs}	< 0.90 °C/W

4. Thermal resistance case to heatsink values are applicable upon application of a fine layer of silicon based thermal paste HTS02S from electrolube between SSR and heatsink.

Connection in Application



Short Circuit Protection

Protection Co-ordination, Type 1:

Type 1 protection implies that after a short circuit, the device under test will no longer be in a functioning state.

In case, 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 or terminals and the conductors shall not separate from terminals. There 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 5,000ADC, 600Volts maximum when protected by fuses. Tests at 5,000A were performed with RK5 fuses, time delay; please refer to the table below for maximum allowed ampere rating of the fuse. Use fuses only.

Co-ordination type 1 (UL508)

Part no.	Max. fuse size [A]	Class	Current [kA]	Voltage [VDC]
RGC..15	25	RK5	5	Max. 600
RGS..15	25	RK5	5	Max. 600
RGS..25	25	RK5	5	Max. 600

Co-ordination type 1 (IEC/EN 60947-4-1)

Part no.	Max. fuse size [A]	SIBA part no.	Current [kA]	Voltage [VDC]
RGC..15	16	9008010.16	5	Max. 600
RGS..15	16	9008010.16	5	Max. 600
RGS..25	25	9008010.25	5	Max. 600



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 require- ment 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。						

