

Solid State Relays DC Switching

Types RGC1D Solid State Contactor RGS1D Solid State Relay



- IGBT power semiconductor
- 17.5mm 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
- UL508, CSA22.2 No. 14-10
- Input polarity protection
- Removable IP20 cover
- Integrated free-wheeling diode for output protection
- Max. transient peak voltage: 1200V
- RoHS compliant

Product Description

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

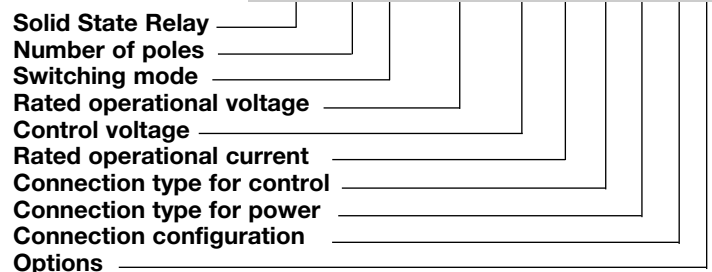
the IGBT at the output is protected against back voltage with an integrated free-wheeling diode.

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**



Ordering Key

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

Selection Guide (Integrated heatsink)

Rated Output voltage	Max. transient peak voltage	Control Voltage	Rated Operational Current @40°C
1000 VDC	1200Vp	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	1200Vp	4.5 - 32 VDC	15 ADC	25 ADC
			RGS1D1000D15KKE	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

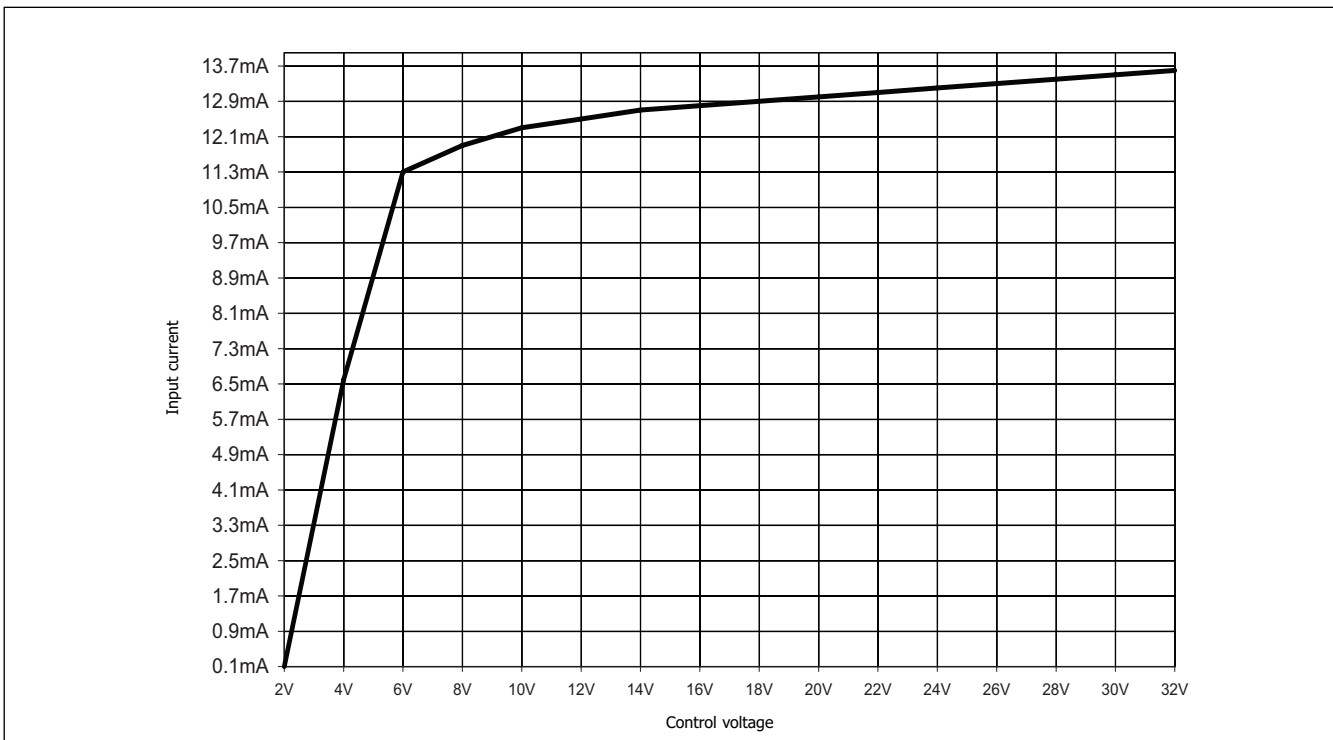
General Specifications

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	4kVrms
Input&Output to Case	4kVrms

Input Specifications (@ 60°C)

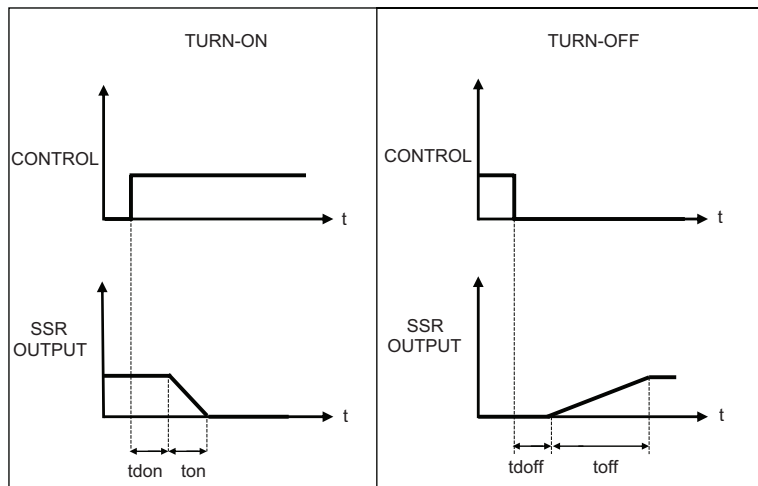
Control voltage range	4.5 - 32 VDC	Maximum response time pick-up	Refer to Time characteristics
Pick-up voltage ³	4 VDC	Maximum response time drop-out	Refer to Time characteristics
Drop-out voltage	1 VDC	Input current	See diagram below
Maximum Reverse voltage	32 VDC		

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

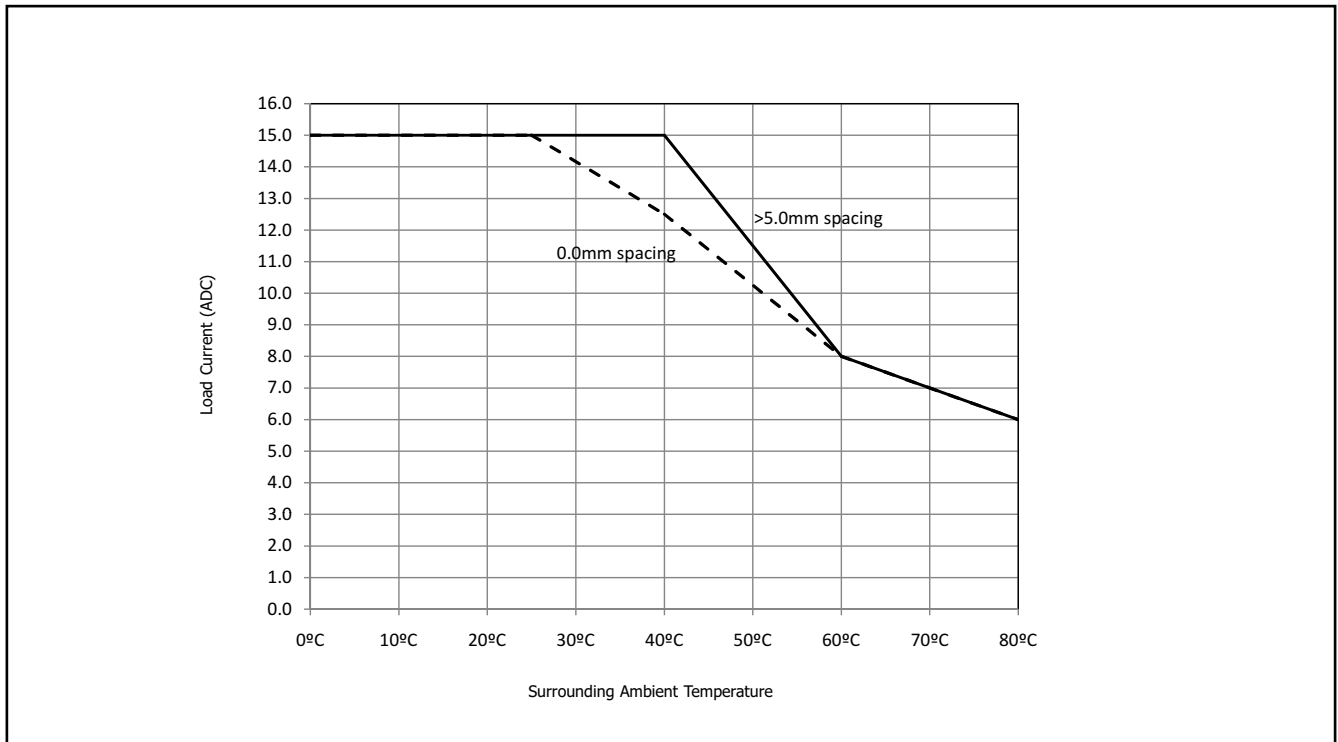


Time Characteristics

CHARACTERISTICS	
Turn on time (ton)	50µs
Turn on delay (tdon)	50µs
Turn off time (toff)	200µs
Turn off delay (tdoff)	50µs
Switching Frequency	20Hz



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	1.5mA	1.5mA	1.5mA
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)



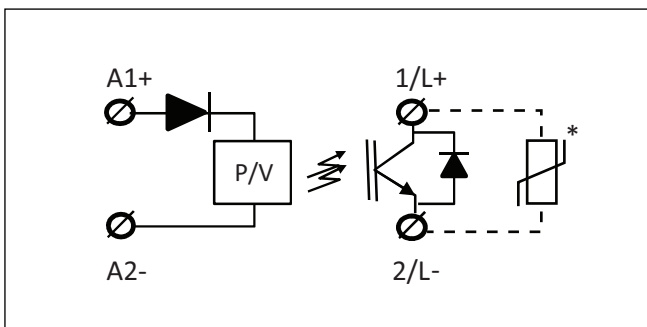
Electromagnetic Compatibility

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	10V/m, 80 - 1000 MHz	Performance Criteria 1
Air discharge, 8kV	Performance Criteria 1	10V/m, 1.0 - 2.7GHz	Performance Criteria 1
Air discharge, 16kV	Performance Criteria 2	Conducted Radio Frequency Immunity	IEC/EN 61000-4-6
Contact, 4kV	Performance Criteria 1	10V/m, 0.15 - 80 MHz	Performance criteria 1
Contact, 4kV	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% @ 5000ms	Performance Criteria 2
Output: 4kV, 5kHz/100 kHz	Performance Criteria 2	40% @ 200ms	Performance Criteria 2
Input: 1kV, 5kHz/ 100kHz	Performance Criteria 1	60% @ 10, 30, 100, 300, 1000ms	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, 1kV	Performance Criteria 1	0% @ 1, 3, 10, 30, 100, 300, 1000ms	Performance Criteria 2
Output, line to earth, 2kV	Performance Criteria 1	30% @ 10, 30, 100, 300, 1000ms	Performance Criteria 2
Input, line to line, 1kV	Performance Criteria 1	70% @ 10, 30, 100, 300, 1000ms	Performance Criteria 2
Input, line to earth, 2kV	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 61000-6-4	Voltage Emission (Conducted)	IEC/EN 55011
Radio Interference field emission (Radiated)	IEC/EN 55011	0.15 - 30MHz	Class B
30 - 1000MHz	Class B		
Radio Interference			

Environmental Specifications

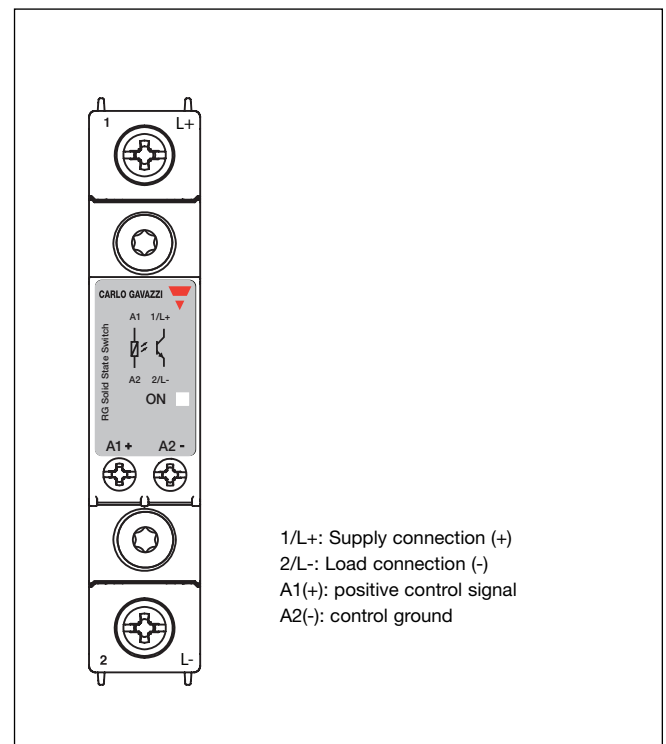
Operating Temperature	-40°C to 80°C (-40°F to +176°F)
Storage Temperature	-40°C to 100°C (-40°F to +212°F)
RoHS (2002/95/EC)	Compliant
Impact resistance (EN50155, EN61373)	15/11 g/ms
Vibration resistance (2-100Hz, IEC 60068-2-26, EN50155, EN61373)	2g per axis (5g for RGS)
Relative humidity	95% non-condensing @ 40°C
UL flammability rating (housing)	UL 94 V0

Connection Diagram

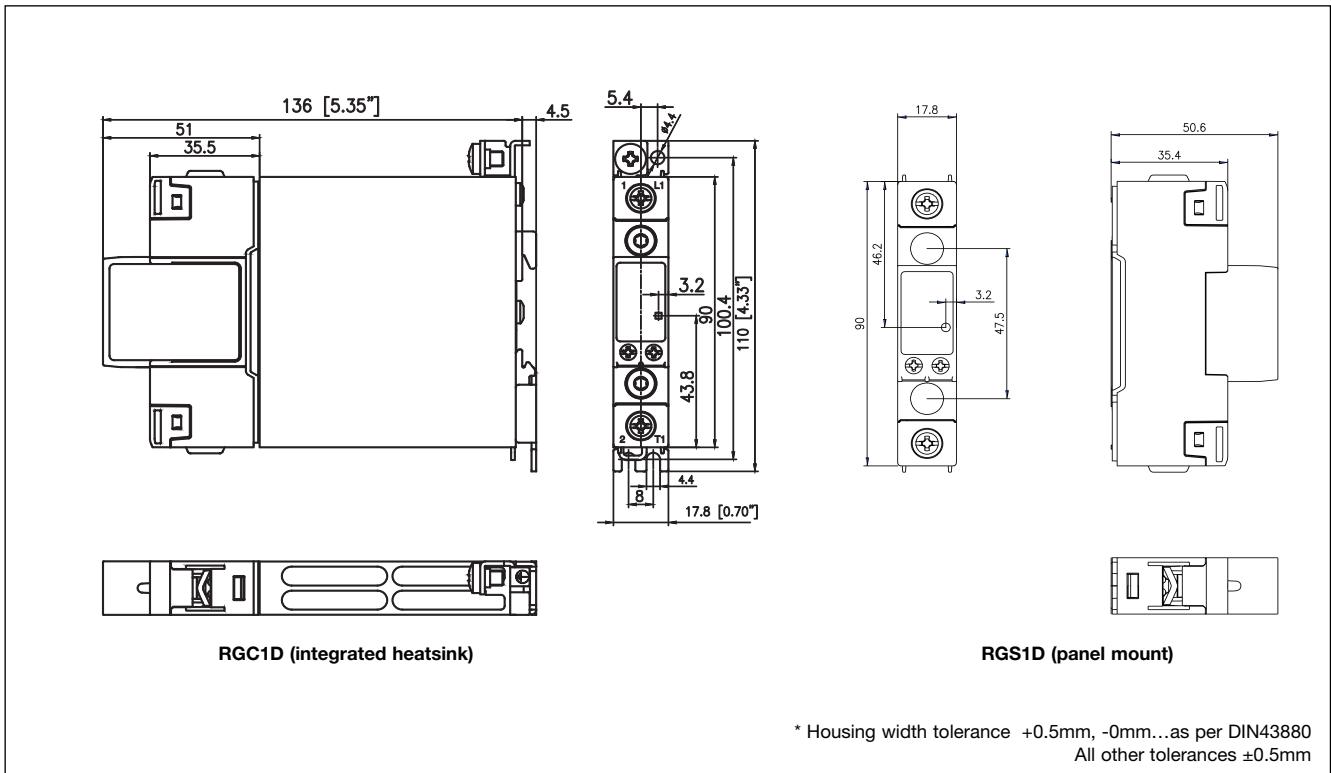


* varistor not included

Terminal Layout



Dimensions



* Housing width tolerance +0.5mm, -0mm...as per DIN43880
All other tolerances ±0.5mm

All dimensions in mm

Connection Specifications

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

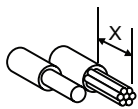
Torque specifications



IEC: 1.5 - 2.0Nm (13.3 - 17.7 lb-in)
UL: 2.0Nm (17.7lb-in)
M4, Pozidriv 2
Use 75°C copper (Cu) conductors
Stripping Length (X) = 12mm

Rigid (Solid & Stranded)

UL/ CSA rated data



2 x 2.5..6 mm² 1 x 2.5..6 mm²
2 x 14..10 AWG 1 x 14..10 AWG

Flexible with end sleeve

2 x 1.0..2.5mm²
2 x 2.5..4mm²
2 x 14..12AWG 1 x 1.0..4mm²
2 x 18..14AWG 1 x 18..12AWG



Flexible without end sleeve

2 x 1.0..2.5mm²
2 x 2.5..6 mm²
2 x 2.5..6 mm² 1 x 1.0..6 mm²
2 x 18..14AWG 1 x 18..10 AWG



Aperture for termination lug

12.3mm

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

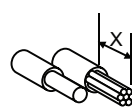
Torque specifications



IEC: 0.5 - 0.6Nm (4.4 - 5.3 lb-in)
UL: 0.5Nm (4.4lb-in)
M3, Pozidriv 1
Use 60/75°C copper (Cu) conductors
Stripping Length (X) = 8mm

Rigid (Solid & Stranded)

UL/ CSA rated data



2 x 0.5..2.5mm² 1 x 0.5..2.5mm²
2 x 18..12 AWG 1 x 18..12 AWG

Flexible with end sleeve



2 x 0.5..2.5mm² 1 x 0.5..2.5mm²
2 x 18..12AWG 1 x 18..12AWG

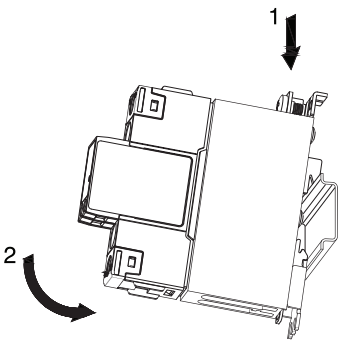
Protective Earth Connection (RGC)



M5, 1.5Nm (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.

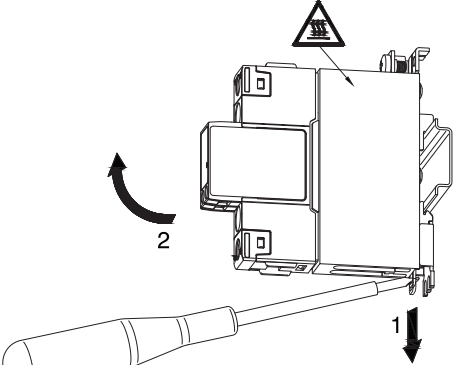

Installation Instructions for RGC1D



1 ↓

2 ↻

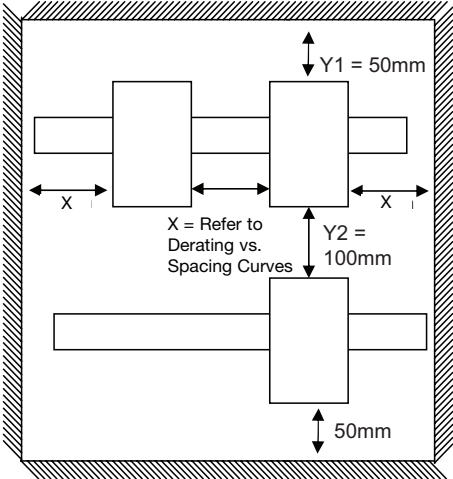
Mounting on DIN rail



2 ↻

1 ↓

Dismounting from DIN rail



Y1 = 50mm

X

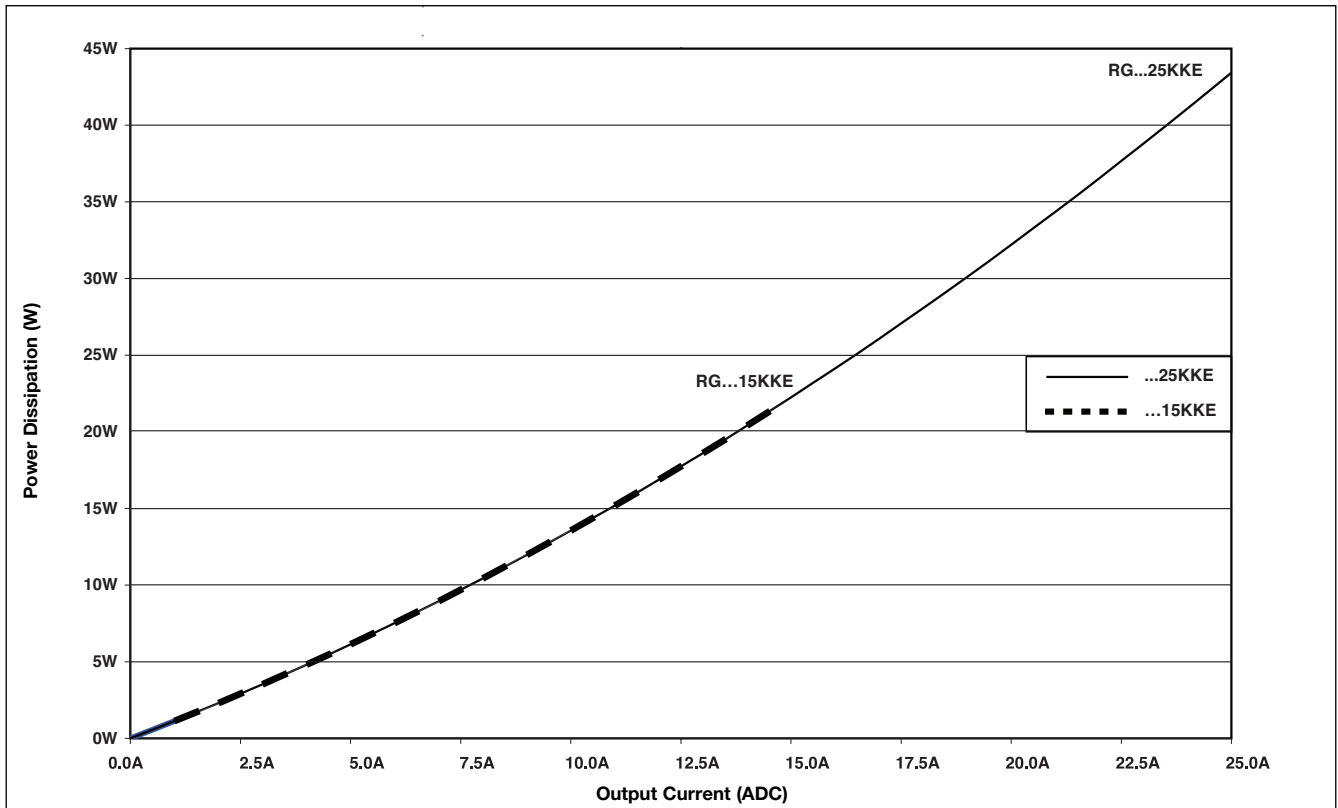
X = Refer to Derating vs. Spacing Curves

Y2 = 100mm

50mm

Detailed description: The diagram shows the RGC1D device being mounted onto a DIN rail. Step 1 is indicated by a downward arrow, and step 2 by a curved arrow. A photograph of the device is shown to the right. The dismounting diagram shows a screwdriver being used to lift the device, with step 1 indicated by a downward arrow and step 2 by a curved arrow. The derating spacing diagram shows two devices with dimensions Y1 = 50mm, Y2 = 100mm, and X, with a note 'X = Refer to Derating vs. Spacing Curves'.

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 30mm screws. Gradually

tighten each screw (alternating between the two) until both are tightened with a torque of 0.75Nm. Then tighten both screws to their final mounting torque of 1.5Nm.

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 1.5Nm.





Heatsink Selection for RGS1D

RGS1D..15

Load current [A]	Thermal resistance [K/W]							Power dissipation [W]
	20	30	40	50	60	70	80	
15	3.60	3.15	2.70	2.25	1.80	1.35	0.90	22
13.5	4.10	3.59	3.08	2.56	2.05	1.54	1.03	19
12	4.74	4.15	3.56	2.96	2.37	1.78	1.19	17
10.5	5.57	4.87	4.18	3.48	2.79	2.09	1.39	14
9	6.69	5.85	5.01	4.18	3.34	2.51	1.67	12
7.5	8.26	7.23	6.20	5.16	4.13	3.10	2.07	10
6	10.64	9.31	7.98	6.65	5.32	3.99	2.66	8
4.5	14.63	12.81	10.98	9.15	7.32	5.49	3.66	5
3	----	----	----	14.17	11.33	8.50	5.67	4
1.5	----	----	----	----	----	----	11.71	2

Ambient temp [°C]

RGS1D..25

Load current [A]	Thermal resistance [K/W]							Power dissipation [W]
	20	30	40	50	60	70	80	
25	1.82	1.59	1.36	1.13	0.90	0.67	0.44	43
22.5	2.12	1.86	1.59	1.33	1.06	0.80	0.53	38
20	2.48	2.17	1.86	1.55	1.24	0.93	0.62	32
17.5	2.96	2.59	2.22	1.85	1.48	1.11	0.74	27
15	3.60	3.15	2.70	2.25	1.80	1.35	0.90	22
12.5	4.51	3.95	3.38	2.82	2.26	1.69	1.13	18
10	5.90	5.17	4.43	3.69	2.95	2.21	1.48	14
7.5	8.26	7.23	6.20	5.16	4.13	3.10	2.07	10
5	13.03	11.41	9.78	8.15	6.52	4.89	3.26	6
2.5	----	----	----	----	13.75	10.31	6.87	3

Ambient temp [°C]

Maximum junction temperature	125°C
Heatsink temperature	100°C
Junction to case thermal resistance, Rthjc	<0.36 K/W
Case to heatsink thermal resistance, Rthcs ⁴	< 0.32 K/W

Maximum junction temperature	125°C
Heatsink temperature	100°C
Junction to case thermal resistance, Rthjc	<0.36 K/W
Case to heatsink thermal resistance, Rthcs ⁴	< 0.32 K/W

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

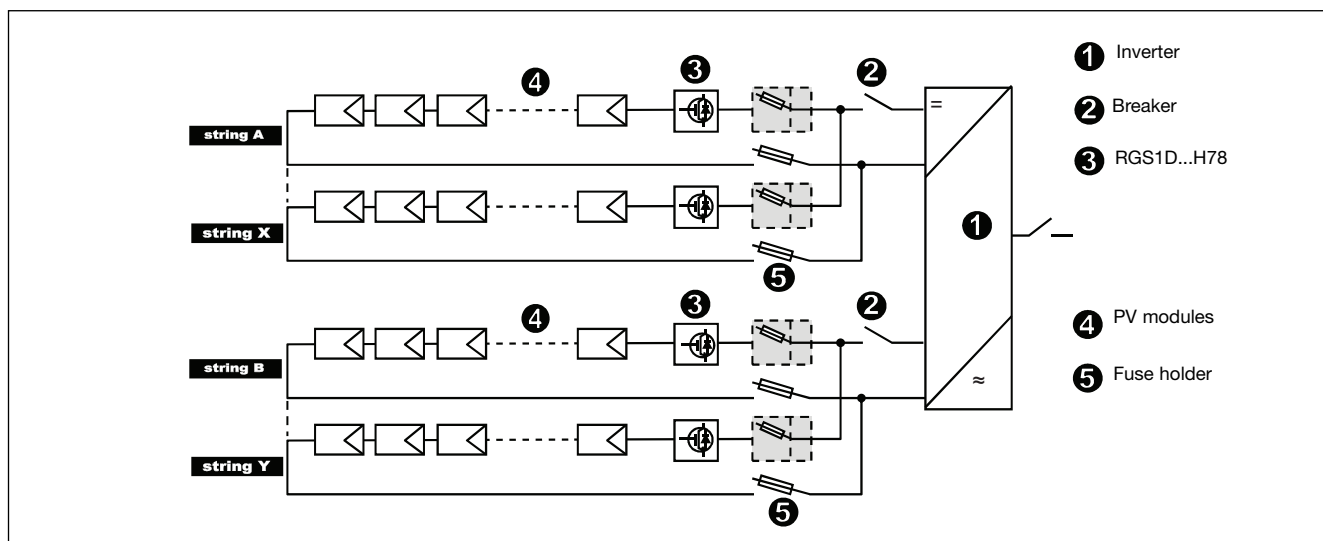
Load current [A]	Thermal resistance [K/W]							Power dissipation [W]
	20	30	40	50	60	70	80	
25.0	1.16	0.93	0.70	0.47	0.24	--	--	43
22.5	1.53	1.26	1.00	0.73	0.47	0.20	--	38
20.0	2.00	1.69	1.38	1.07	0.76	0.45	0.14	32
17.5	2.62	2.25	1.88	1.51	1.14	0.77	0.40	27
15.0	3.46	3.01	2.56	2.11	1.66	1.21	0.76	22
12.5	4.51	3.95	3.38	2.82	2.26	1.69	1.13	18
10.0	5.90	5.17	4.43	3.69	2.95	2.21	1.48	14
7.5	8.26	7.23	6.20	5.16	4.13	3.10	2.07	10
5.0	13.03	11.41	9.78	8.15	6.52	4.89	3.26	6
2.5	---	---	---	---	13.75	10.31	6.87	3

Ambient temp [°C]

Maximum junction temperature	125°C
Heatsink temperature	100°C
Junction to case thermal resistance, Rthjc	<0.36 K/W
Case to heatsink thermal resistance, Rthcs	< 0.90 K/W

4. Thermal resistance case to heasink 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