

FEATURES

- Double Side Cooling
- Fast Turn-on Characteristics

APPLICATIONS

- Fast Capacitor Discharge
- Pulse Power Applications
- Fast Crowbar Applications

VOLTAGE RATINGS

Part and Ordering Number	Repetitive Peak Voltages V_{DRM} (V)	Repetitive Peak Voltages V_{RRM} (V)
ACR300SG33	3300	10
$T_{vj} = -40^{\circ}\text{C}$ to 125°C , $I_{DRM} = I_{RRM} = 60\text{mA}$, $V_{DRM}, V_{RRM} t_p = 10\text{ms}$ $V_{DSM} = V_{DRM} + 100\text{V}$		

Lower voltage grades available.

ORDERING INFORMATION

When ordering, select the required part number shown in the Voltage Ratings selection table.

For example:

ACR300SG33

Note: Please use the complete part number when ordering and quote this number in any future correspondence relating to your order.

KEY PARAMETERS

V_{DRM}	3300V
$I_{T(AV)}$	550A
I_{TSM}	6500A
dV/dt	2000V/μs
dI/dt	2000A/μs
t_{on}	400ns

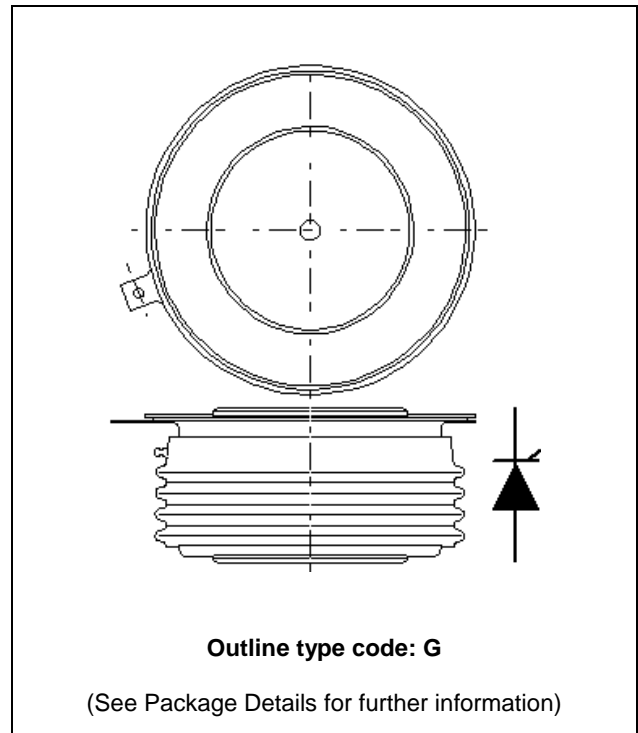


Fig. 1 Package outline

CURRENT RATINGS

T_{case} = 80°C unless stated otherwise

Symbol	Parameter	Test Conditions	Max.	Units
Double Side Cooled				
I _{T(AV)}	Mean on-state current	Half wave resistive load	550	A
I _{T(RMS)}	RMS value	-	860	A
I _r	Continuous (direct) on-state current	-	810	A
Single Side Cooled (Anode Side)				
I _{T(AV)}	Mean on-state current	Half wave resistive load	370	A
I _{T(RMS)}	RMS value	-	580	A
I _r	Continuous (direct) on-state current	-	490	A

SURGE RATINGS

Symbol	Parameter	Test Conditions	Max.	Units
I _{rSM}	Surge (non-repetitive) on-state current	10ms half sine, T _{case} = 125°C	6.5	kA
I ² t	I ² t for fusing	V _R = 0	210	kA ² s

THERMAL AND MECHANICAL RATINGS

Symbol	Parameter	Test Conditions	Min.	Max.	Units	
R _{th(j-c)}	Thermal resistance - junction to case	Double side cooled	DC	-	0.027	°C/W
		Single side cooled	Anode DC	-	0.053	°C/W
			Cathode DC	-	0.065	°C/W
R _{th(c-h)}	Thermal resistance - case to heatsink	Clamping force 7.0kN	Double side	-	0.007	°C/W
		(with mounting compound)	Single side	-	0.014	°C/W
T _{vj}	Virtual junction temperature	On-state (conducting)	-	135	°C	
		Blocking	-	125	°C	
T _{stg}	Storage temperature range		-55	125	°C	
F _m	Clamping force		6	8	kN	

DYNAMIC CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min.	Max.	Units
V_{TM}	Maximum on-state voltage	At 1000A peak, $T_{case} = 25^{\circ}C$	-	2.0	V
I_{RRM}/I_{DRM}	Peak reverse and off-state current	At V_{RRM}/V_{DRM} , $T_{case} = 125^{\circ}C$	-	60	mA
dV/dt	Linear rate of rise of off-state voltage	To $V_D = 2000V$, $T_j = 125^{\circ}C$, gate open	2000	-	V/ μ s
dI/dt	Rate of rise of on-state current	From V_{DRM} to 125A, $T_j = 125^{\circ}C$ Gate source 30V, 10Ω , $t_r = 100ns$	-	2000	A/ μ s
$V_{T(ro)}$	Threshold voltage	$T_j = 125^{\circ}C$	-	1.20	V
r_T	On-state slope resistance	$T_j = 125^{\circ}C$	-	1.05	m Ω
t_{gd}	Delay time	$V_D = 3000V$, gate source 30V, 10Ω Gate rise time $t_r = 100ns$, $T_j = 25^{\circ}C$	-	350	ns
t_r	Rise time	As defined in Figure 2, $T_j = 25^{\circ}C$	-	50	ns
I_L	Latching current	$T_j = 25^{\circ}C$, $V_D = 5V$	-	600	mA
I_H	Holding current	$T_j = 25^{\circ}C$, $R_{G-K} = \infty$, $I_{TM} = 500A$, $I_T = 5A$	-	300	mA

GATE TRIGGER CHARACTERISTICS AND RATINGS

Symbol	Parameter	Test Conditions	Max.	Units
V_{GT}	Gate trigger voltage	$V_{DRM} = 12V$, $R_L = 6\Omega$, $T_{case} = 25^{\circ}C$	5	V
I_{GT}	Gate trigger current	$V_{DRM} = 12V$, $R_L = 6\Omega$, $T_{case} = 25^{\circ}C$	500	mA
V_{FGM}	Peak forward gate voltage		40	V
V_{RGM}	Peak reverse gate voltage		10	V
I_{FGM}	Peak forward gate current		20	A
P_{GM}	Peak gate power		40	W
$P_{G(AV)}$	Average gate power	Average time 10ms max.	10	W

CURRENT CARRYING CAPABILITY AFTER DEVICE SHORT CIRCUIT

In the event of a chip short-circuit due to excess anode-cathode voltage, the device will handle a high continuous RMS fault current without significant damage. Rating details are as follows:

Continuous current capability: 300A RMS, AC or DC in either direction

Conditions:

- 1. Device single or double-side cooled.
- 2. Case temperature to be held at 200°C or less.
- 3. A suitable high temperature clamp to be used.
- 4. Chip fault site resistance assumed to be $3m\Omega \pm 10\%$.

CURVES

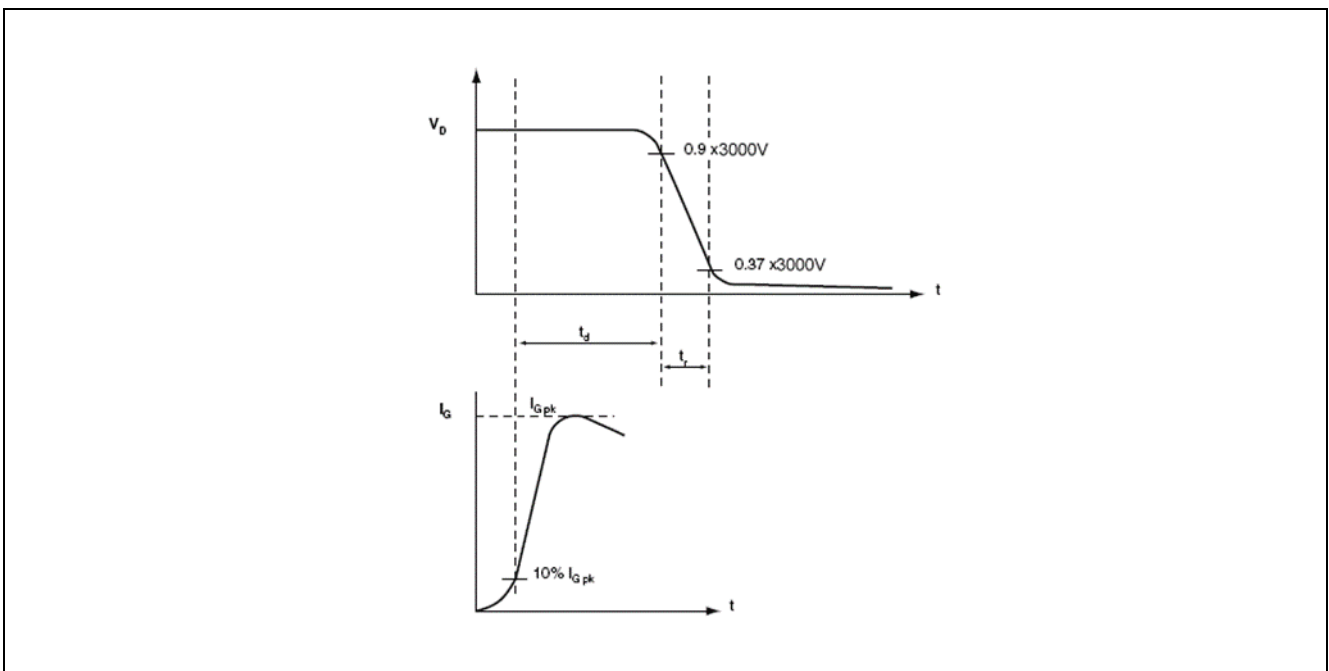


Fig. 2 Turn-on time measurement

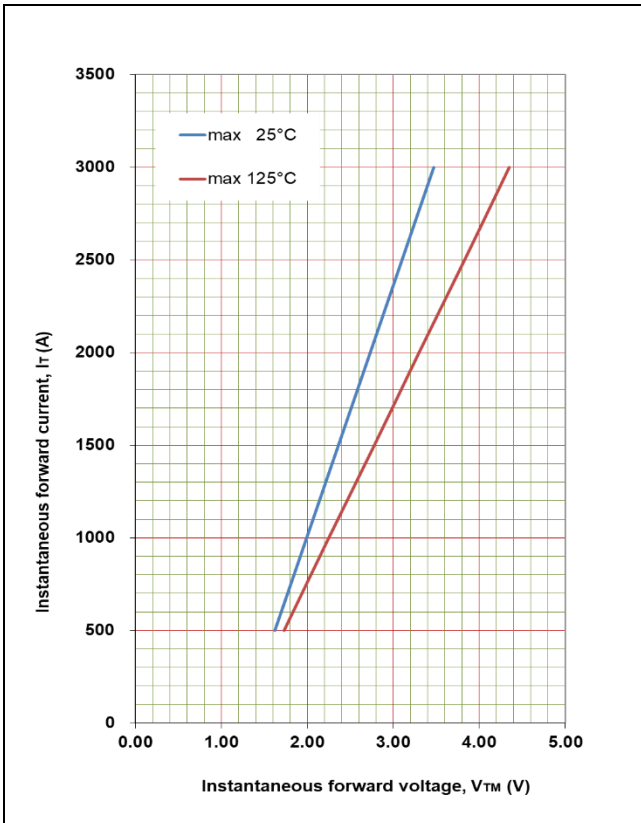


Fig. 3 Maximum on-state characteristics

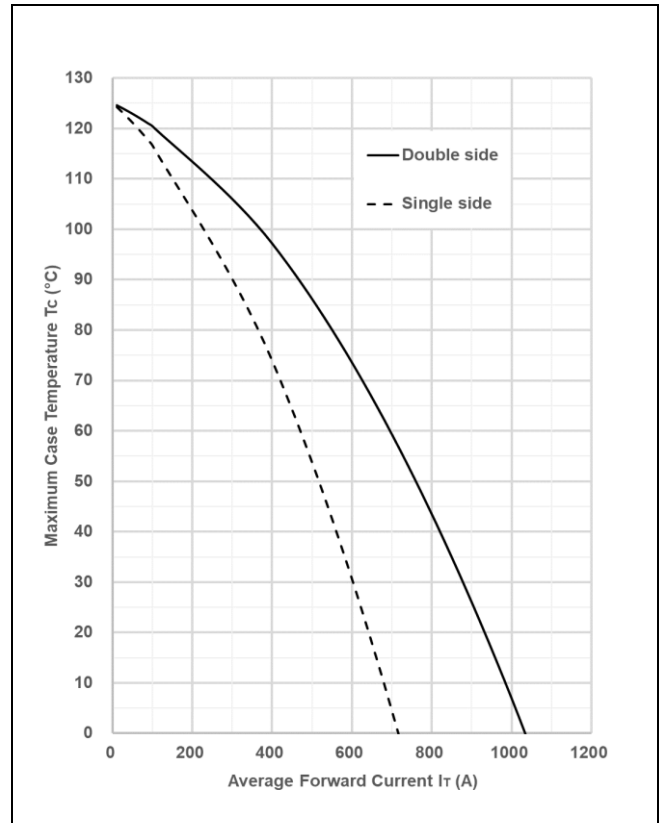


Fig. 4 Average current rating vs temperature

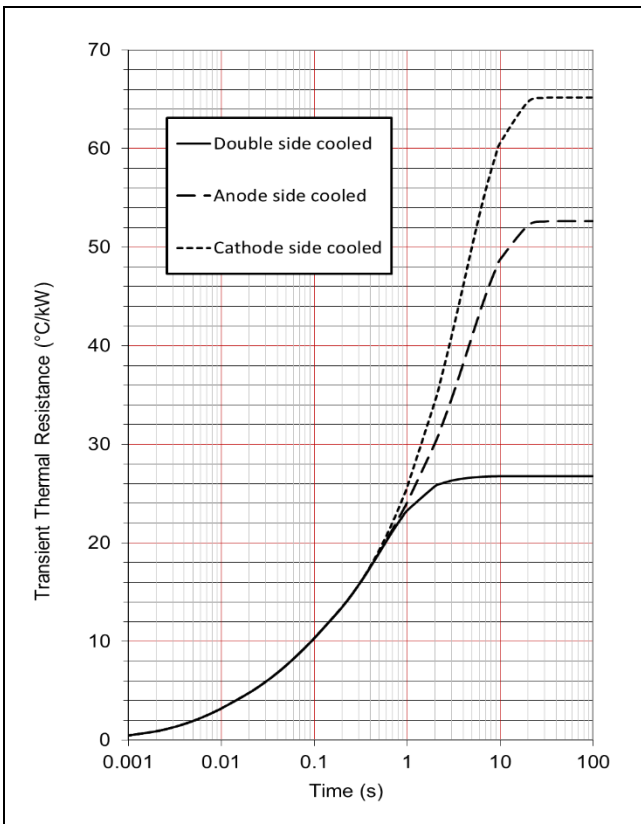


Fig. 5 Maximum (limit) transient thermal impedance – junction to case (degC/kW)

		1	2	3	4
Double side cooled	Ri(°C/kW)	2.2995	5.4226	16.9074	2.1488
	Ti(s)	0.006640	0.04570	0.4962	1.8248
Anode side cooled	Ri(°C/kW)	2.3214	5.2661	10.2686	34.8031
	Ti(s)	0.006695	0.04553	0.3484	4.5820
Cathode side cooled	Ri(°C/kW)	2.4895	5.9105	7.4256	49.3432
	Ti(s)	0.007040	0.05290	0.3934	4.2295

$$Z_{th} = \sum_{i=1}^{i=4} R_i \cdot \left(1 - \exp\left(-\frac{T}{T_i}\right)\right)$$

$\Delta R_{\theta(j-c)}$ Conduction

Tables show the increments of thermal resistance $R_{\theta(j-c)}$ when the device operates at conduction angles other than d.c.

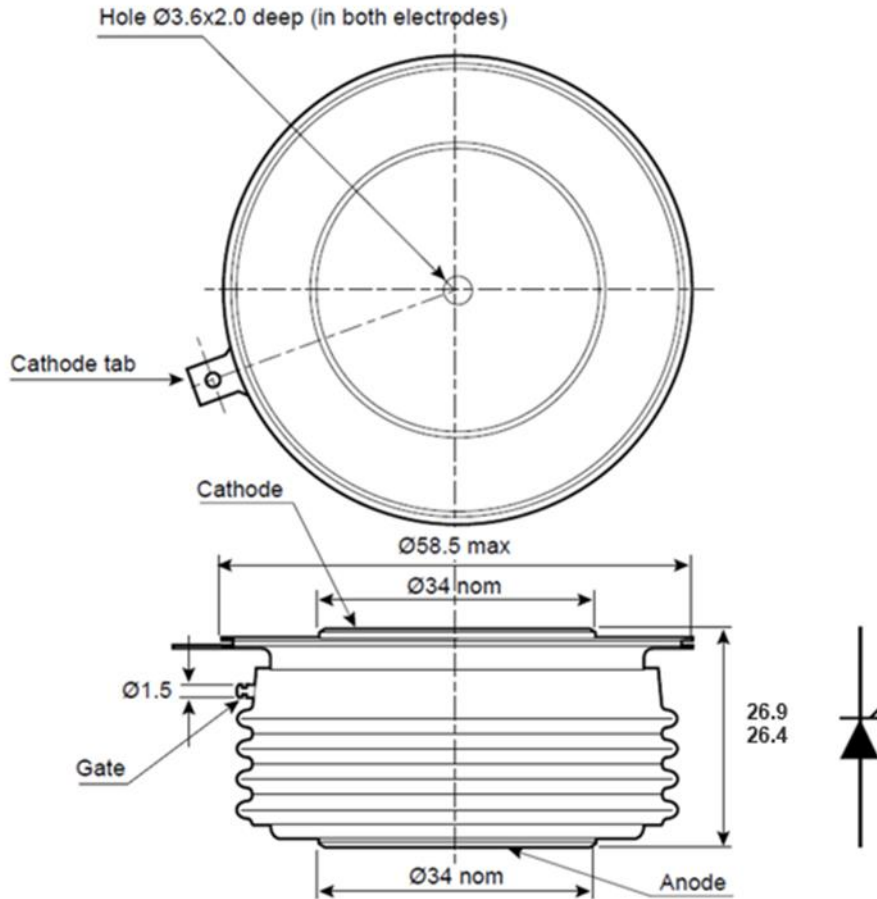
Double side cooling			Anode Side Cooling			Cathode Sided Cooling		
θ°	$\Delta Z_{\theta}(z)$		θ°	$\Delta Z_{\theta}(z)$		θ°	$\Delta Z_{\theta}(z)$	
	sine.	rect.		sine.	rect.		sine.	rect.
180	4.15	2.72	180	4.15	2.72	180	4.13	2.71
120	4.90	4.02	120	4.89	4.02	120	4.87	4.00
90	5.74	4.79	90	5.73	4.78	90	5.69	4.76
60	6.53	5.65	60	6.52	5.65	60	6.46	5.60
30	7.16	6.64	30	7.15	6.62	30	7.07	6.56
15	7.46	7.18	15	7.44	7.16	15	7.36	7.09

PACKAGE DETAILS

For further package information, please contact Customer services.

All dimensions in mm, unless stated otherwise.

DO NOT SCALE



Nominal weight: 250g
Clamping force: 7kN ± 1kN
Lead length: 420mm
Lead terminal connector: M4 ring

Package outline type code: G

Fig. 6 Package outline

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The products must not be touched when operating because there is a danger of electrocution or severe burning. Always use protective safety equipment such as appropriate shields for the product and wear safety glasses. Even when disconnected any electric charge remaining in the product must be discharged and allowed to cool before safe handling using protective gloves.

Extended exposure to conditions outside the product ratings may affect reliability leading to premature product failure. Use outside the product ratings is likely to cause permanent damage to the product. In extreme conditions, as with all semiconductors, this may include potentially hazardous rupture, a large current to flow or high voltage arcing, resulting in fire or explosion. Appropriate application design and safety precautions should always be followed to protect persons and property.

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Provisional Information:	Some initial development work has been performed. The datasheet represents a view of the end product based on very limited information. Certain details will change.
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