ACR300SG33

Fast Turn-on Asymmetric Thyristor

DS5081-2.5 June 2006 (LN24670)

FEATURES

- Double Side Cooling
- Fast Turn-on characteristics

APPLICATIONS

- Fast capacitor discharge
- Pulse power Applications
- Fast crowbar application

VOLTAGE RATINGS

Part and Ordering Number	Repetitive Peak Off-state Voltage V_{DRM} V	Repetitive Peak Reverse Voltages V_{RRM} V
ACR300SG33	3300 T_{vj} = -40°C to 125°C, I_{DRM} = 50mA, V_{DRM}, t_p = 10ms, V_{DSM} = V_{DRM} + 100V	20 T_{vj} = -40°C to 125°C, I_{RRM} = 50mA, V_{RRM} t_p = 10ms, V_{RSM} = V_{RRM} + 100V

Lower voltage grades available.

ORDERING INFORMATION

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

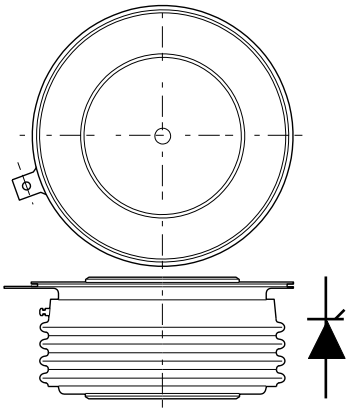
For example:

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
$I_{T(AV)}$	493A
I_{TSM}	6500A
dV/dt*	3000V/µs
dI/dt	2000A/µs
t_{on}	400ns



Outline type code: G

(See Package Details for further information)

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	493	A
$I_{T(RMS)}$	RMS value	-	774	A
I_T	Continuous (direct) on-state current	-	630	A
Single Side Cooled (Anode side)				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load	343	A
$I_{T(RMS)}$	RMS value	-	539	A
I_T	Continuous (direct) on-state current	-	420	A

SURGE RATINGS

Symbol	Parameter	Test Conditions	Max.	Units
I_{TSM}	Surge (non-repetitive) on-state current	10ms half sine, T_{case} = 125°C	6.5	kA
I^2t	I^2t for fusing	V_R = 0	180	kA^2s

THERMAL AND MECHANICAL RATINGS

Symbol	Parameter	Test Conditions		Min.	Max.	Units
$R_{th(j-c)}$	Thermal resistance – junction to case	Double side cooled	DC	-	0.042	°C/W
		Single side cooled	Anode DC	-	0.070	°C/W
			Cathode DC	-	0.092	°C/W
$R_{th(c-h)}$	Thermal resistance – case to heatsink	Clamping force 7.0kN	Double side	-	0.0018	°C/W
		(with mounting compound)	Single side	-	.036	°C/W
T_{vj}	Virtual junction temperature	Blocking V_{DRM} / $_{VRRM}$		-	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° C	-	2.0	V
I_{RRM}/I_{DRM}	Peak reverse and off-state current	At V_{RRM}/V_{DRM}, T_{case} = 125°C	-	60	mA
dV/dt	Max. linear rate of rise of off-state voltage	To V_D = 2000V, T_j = 125°C, gate open	3000		V/µs
dI/dt	Rate of rise of on-state current	From V_{DRM} to 125A Gate source 30V, 10Ω, Gate rise time $t_r \leq$ 100ns, T_j = 125°C		2000	A/µs
$V_{T(TO)}$	Threshold voltage	T_{vj} = 125°C	-	1.19	V
r_T	On-state slope resistance	T_{vj} = 125°C	-	0.81	mΩ
t_{gd}	Delay time	V_D = 3000V, gate source 30V, 10Ω Gate rise time t_r = 100ns, T_j = 25°C	-	300	ns
t_r	Rise time	As defined in Figure 2 T_j = 25°C		50	ns
I_L	Latching current	T_j = 25°C, V_D = 5V	-	600	mA
I_H	Holding current	T_j = 25°C, R_{G-K} = ∞, 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_{DWM} = 12V, R_L = 6Ω T_{case} = 25°C	5	V
I_{GT}	Gate trigger current	V_{DWM} = 12V, R_L = 6Ω T_{case} = 125°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 3mΩ ± 10%.

CURVES

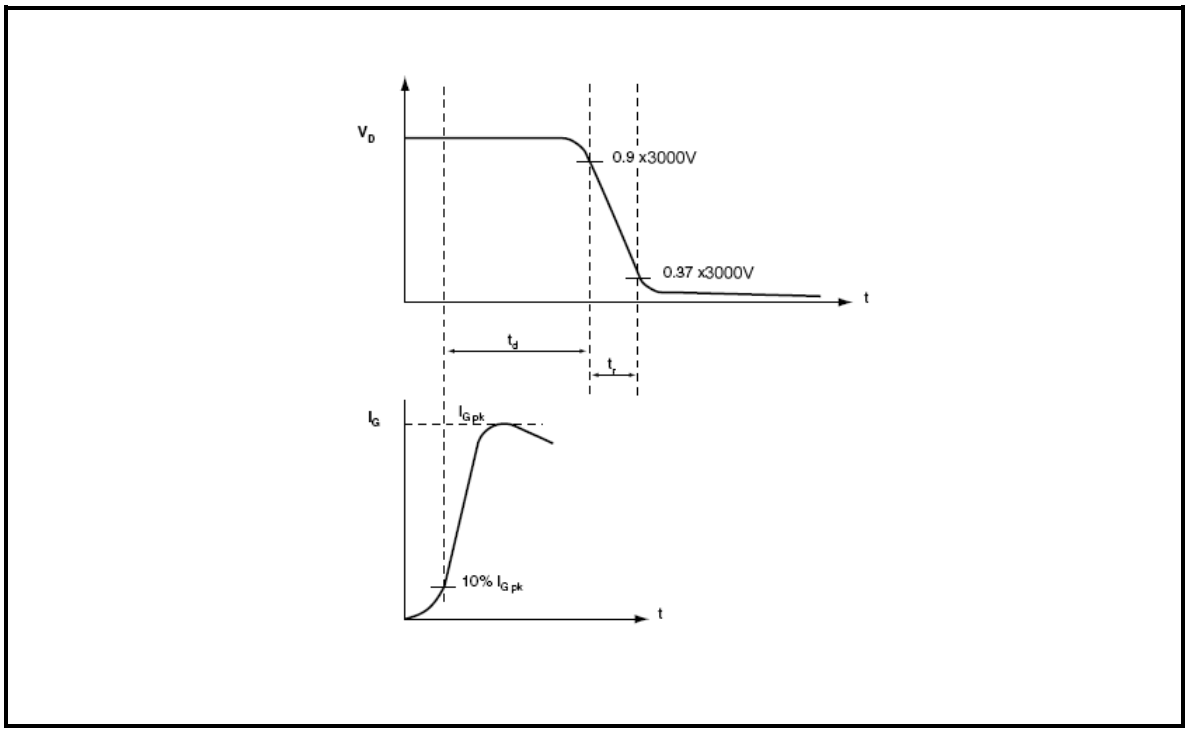


Fig.2 Turn-on time measurement

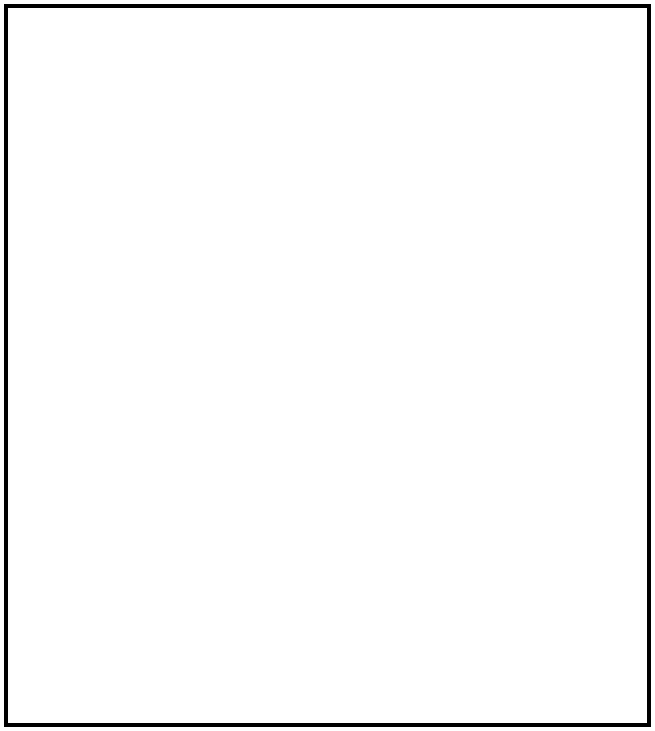


Fig.3 On-state power dissipation – sine wave

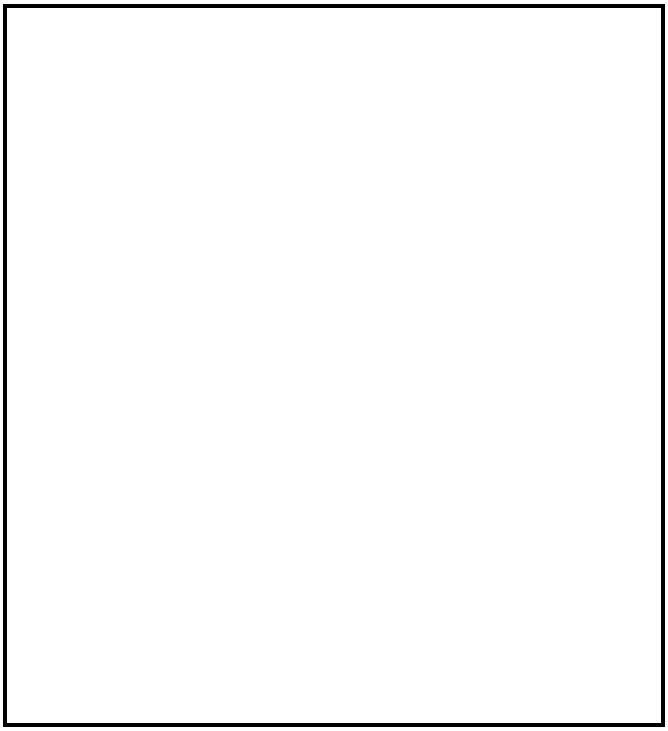


Fig.4 Maximum permissible case temperature, double side cooled – sine wave

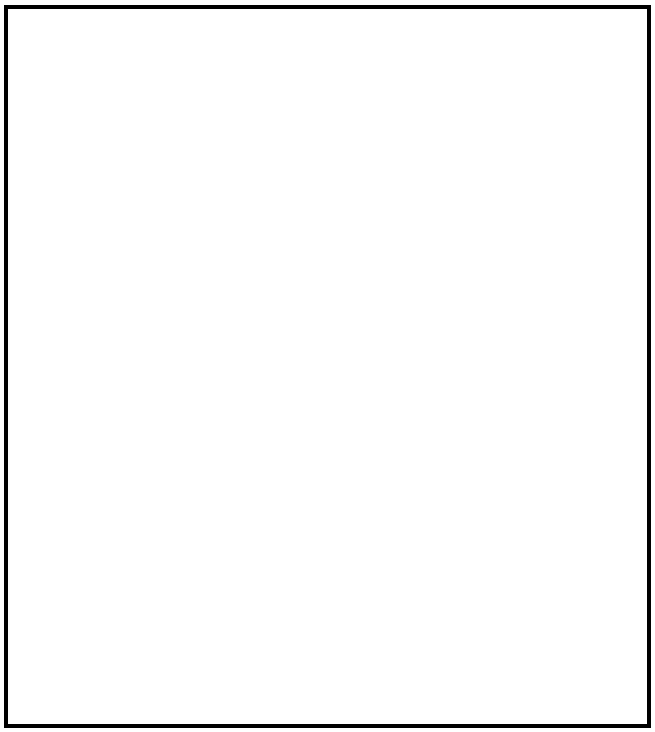


Fig.5 Maximum permissible heatsink temperature, double side cooled – sine wave

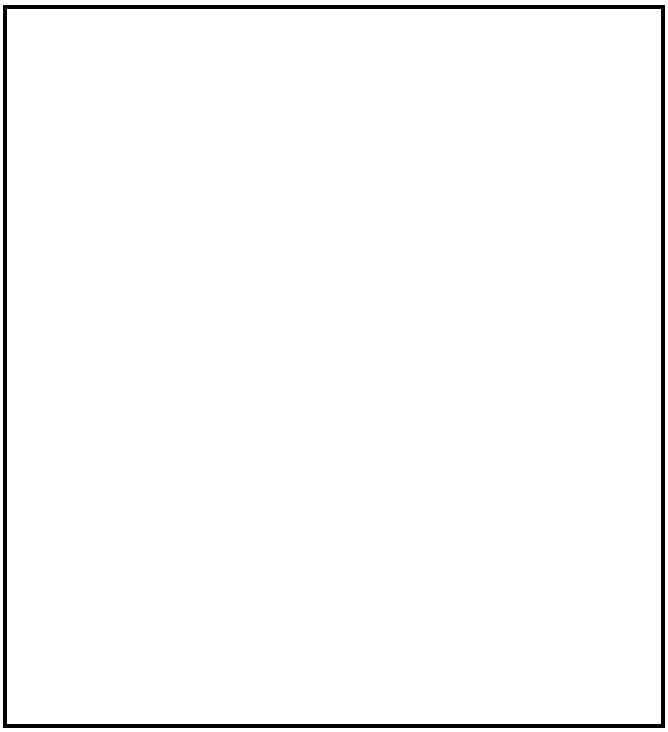
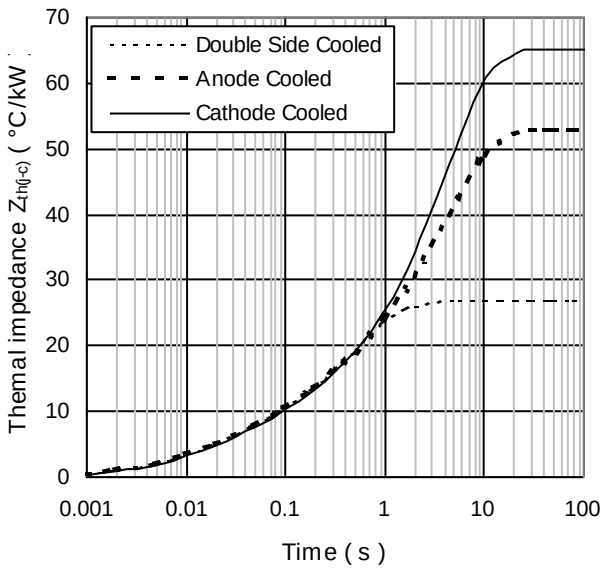


Fig.6 On-state power dissipation – rectangular wave

Fig.7 Maximum permissible case temperature, double side cooled – rectangular wave

Fig.8 Maximum permissible heatsink temperature, double side cooled – rectangular wave



		1	2	3	4
Double side cooled	R_i (°C/kW)	2.2995	5.4226	16.9074	2.1488
	T_i (s)	0.0066401	0.0457025	0.4962482	1.8248
Anode side cooled	R_i (°C/kW)	2.3214	5.2661	10.2686	34.8031
	T_i (s)	0.0066948	0.045528	0.3484209	4.582
Cathode side cooled	R_i (°C/kW)	2.4895	5.9105	7.4256	49.3432
	T_i (s)	0.0070404	0.052895	0.3933903	4.2295

$Z_{th} = \sum [R_i \times (1\text{-exp. } (t/t_i))]$ **[1]**

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

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

Double side cooling		
	ΔZ_{th} (z)	
θ°	sine.	rect.
180	4.15	2.72
120	4.90	4.02
90	5.74	4.79
60	6.53	5.65
30	7.16	6.64
15	7.46	7.18

Anode Side Cooling		
	ΔZ_{th} (z)	
θ°	sine.	rect.
180	4.15	2.72
120	4.89	4.02
90	5.73	4.78
60	6.52	5.65
30	7.15	6.62
15	7.44	7.16

Cathode Sided Cooling		
	ΔZ_{th} (z)	
θ°	sine.	rect.
180	4.13	2.71
120	4.87	4.00
90	5.69	4.76
60	6.46	5.60
30	7.07	6.56
15	7.36	7.09

Fig.9 Maximum (limit) transient thermal impedance – junction to case (°C/kW)

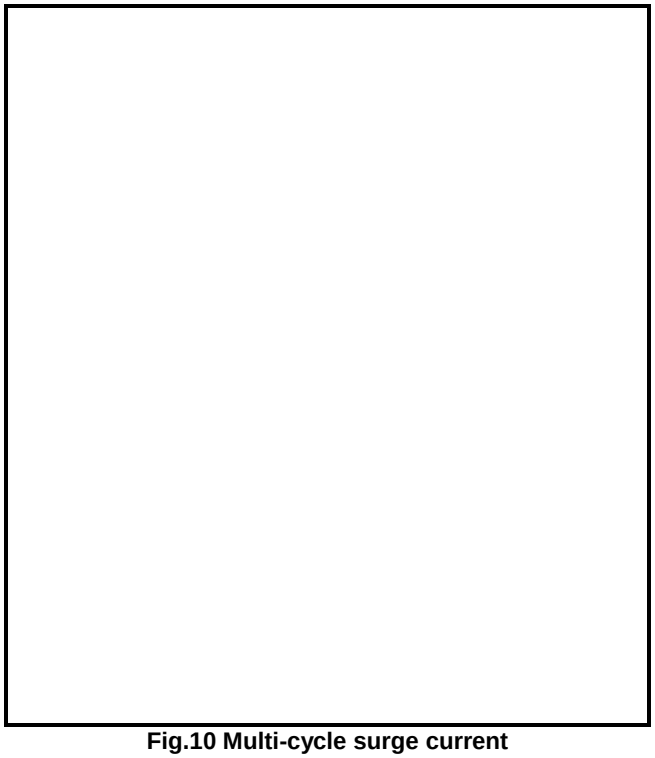


Fig.10 Multi-cycle surge current

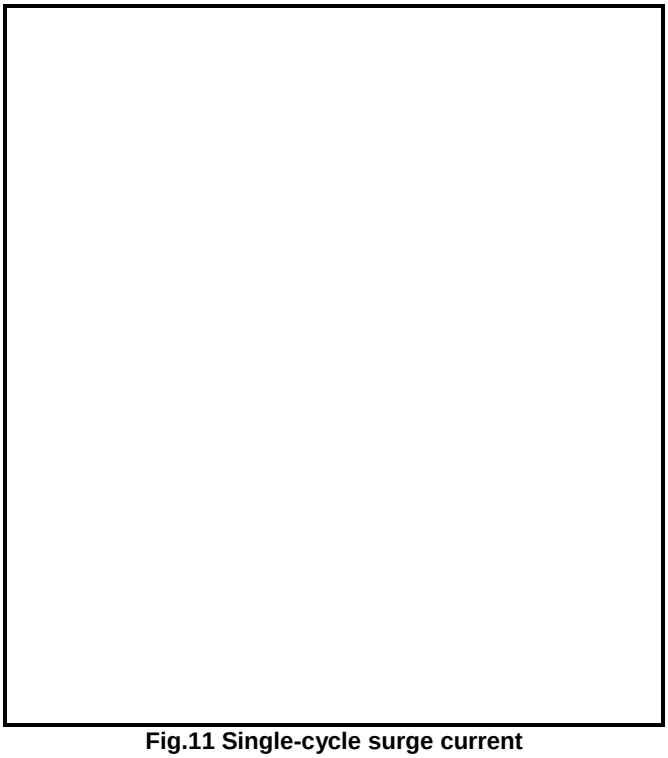
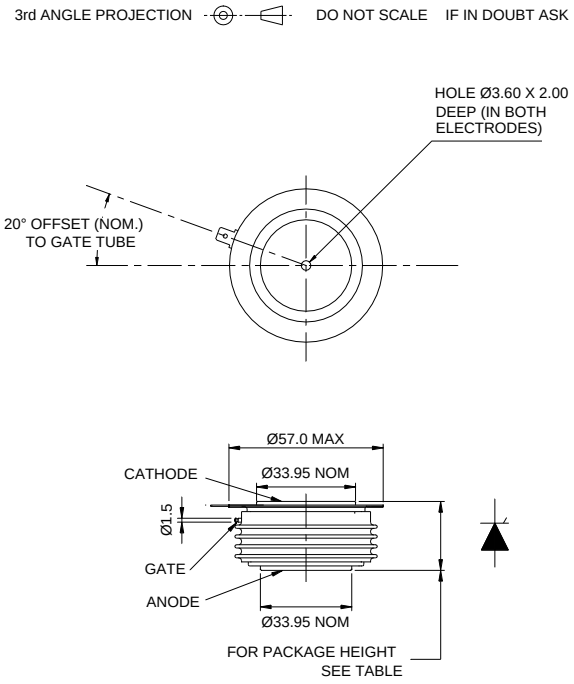


Fig.11 Single-cycle surge current

PACKAGE DETAILS

For further package information, please contact Customer Services. All dimensions in mm, unless stated otherwise. DO NOT SCALE.



Device	Maximum Thickness (mm)	Minimum Thickness (mm)
DCR803SG18	26.415	25.865
DCR806SG28	26.49	25.94
DCR818SG48	26.84	26.17
DCR820SG65	27.1	26.55
DCR1080G22	26.415	25.865
DCR960G28	**26.49**	**25.94**
DCR780G42	26.72	26.17
DCR690G52	26.84	26.29
DCR590G65	27.1	26.55
DCR470G85	27.46	26.91

Clamping force: 11.5 kN ±10%
Lead length: 420mm
Lead terminal connector: M4 ring

Package outline type code: G

Fig.15 Package outline

POWER ASSEMBLY CAPABILITY

The Power Assembly group was set up to provide a support service for those customers requiring more than the basic semiconductor, and has developed a flexible range of heatsink and clamping systems in line with advances in device voltages and current capability of our semiconductors.

We offer an extensive range of air and liquid cooled assemblies covering the full range of circuit designs in general use today. The Assembly group offers high quality engineering support dedicated to designing new units to satisfy the growing needs of our customers.

Using the latest CAD methods our team of design and applications engineers aim to provide the Power Assembly Complete Solution (PACs).

HEATSINKS

The Power Assembly group has its own proprietary range of extruded aluminium heatsinks which have been designed to optimise the performance of Dynex semiconductors. Data with respect to air natural, forced air and liquid cooling (with flow rates) is available on request.

For further information on device clamps, heatsinks and assemblies, please contact your nearest sales representative or Customer Services.

Stresses above those listed in this data sheet may cause permanent damage to the device. In extreme conditions, as with all semiconductors, this may include potentially hazardous rupture of the package. Appropriate safety precautions should always be followed.

http://www.dynexsemi.com

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