



# ACR300SG33

## Fast Turn-on Asymmetric Thyristor

Replaces April 2000 version, DS5081-2.2

DS5081-2.4 August 2000

### APPLICATIONS

- Capacitor Discharge
- Pulse Power Applications

### FEATURES

- The ACR300SG33 is a high voltage asymmetric thyristor which has exceptionally fast turn-on characteristics.

### KEY PARAMETERS

$V_{DRM}$  3300V  
 $I_{T(AV)}$  660A  
 $I_{TSM}$  6500A  
 $dV/dt$  3000V/ $\mu$ s  
 $dI/dt$  2000A/ $\mu$ s  
 $t_{on}$  700ns

### VOLTAGE RATINGS

Type Number	Repetitive Peak Off-state Voltage $V_{DRM}$ V	Repetitive Peak Reverse Voltage $V_{RRM}$ V
ACR300SG33	3300	20

Lower voltage grades available.

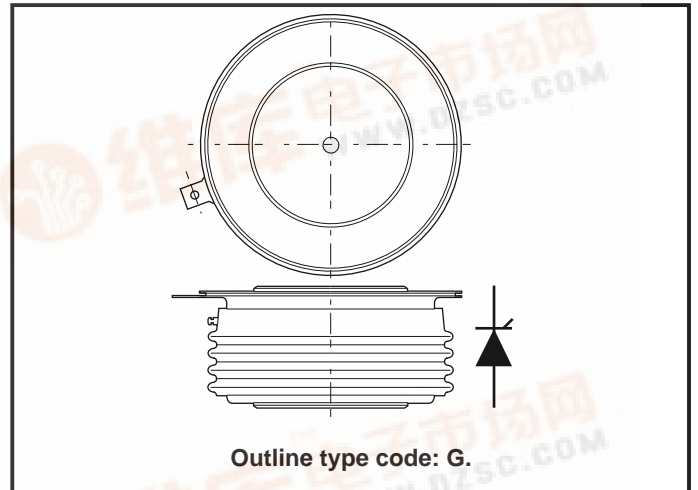


Fig. 1 See Package Details for further information

### CURRENT RATINGS

Symbol	Parameter	Conditions	Max.	Units
<b>Double Side Cooled</b>				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load, $T_{case} = 80^{\circ}C$	660	A
$I_{T(RMS)}$	RMS value	$T_{case} = 80^{\circ}C$	1040	A
$I_T$	Continuous (direct) on-state current	$T_{case} = 80^{\circ}C$	890	A
<b>Single Side Cooled (Anode side)</b>				
$I_{T(AV)}$	Mean on-state current	Half wave resistive load, $T_{case} = 80^{\circ}C$	470	A
$I_{T(RMS)}$	RMS value	$T_{case} = 80^{\circ}C$	745	A
$I_T$	Continuous (direct) on-state current	$T_{case} = 80^{\circ}C$	570	A

**SURGE RATINGS**

Symbol	Parameter	Conditions	Max.	Units
$I_{TSM}$	Surge (non-repetitive) on-state current	10ms half sine; $T_{case} = 125^{\circ}C$	6	kA
$I^2t$	$I^2t$ for fusing	$V_R = 0$	180	$kA^2s$

**THERMAL AND MECHANICAL DATA**

Symbol	Parameter	Conditions	Min.	Max.	Units	
$R_{th(j-c)}$	Thermal resistance - junction to case	Double side cooled	dc	-	0.042	$^{\circ}C/W$
		Single side cooled	Anode dc	-	0.070	$^{\circ}C/W$
			Cathode dc	-	0.092	$^{\circ}C/W$
$R_{th(c-h)}$	Thermal resistance - case to heatsink	Clamping force 7.0kN with mounting compound	Double side	-	0.018	$^{\circ}C/W$
			Single side	-	0.036	$^{\circ}C/W$
$T_{vj}$	Virtual junction temperature	On-state (conducting)	-	150	$^{\circ}C$	
		Reverse (blocking)	-	125	$^{\circ}C$	
$T_{stg}$	Storage temperature range		-55	125	$^{\circ}C$	
-	Clamping force		6.0	8.0	kN	

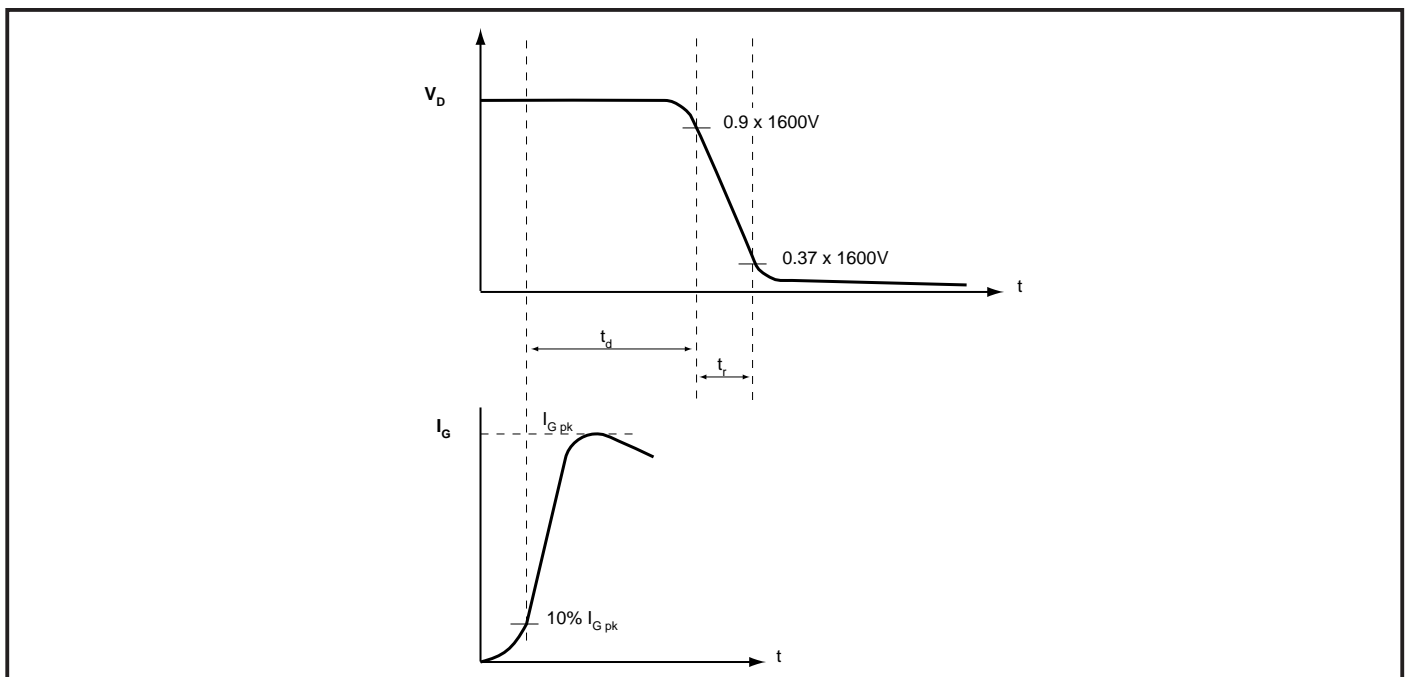


Fig.1 Turn-on time measurement

**DYNAMIC CHARACTERISTICS**

Symbol	Parameter	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 $V_D = 2000V$ , Gate open circuit, $T_j = 125^{\circ}C$	3000	-	V/ $\mu$ s	
dl/dt	Rate of rise of on-state current	From $V_{DRM}$ to 125A Gate source 30V, 10 $\Omega$ Gate rise time = 100ns, $T_j = 125^{\circ}C$	-	2000	A/ $\mu$ s	
$V_{T(TO)}$	Threshold voltage	At $T_{vj} = 125^{\circ}C$	-	1.19	V	
$r_T$	On-state slope resistance	At $T_{vj} = 125^{\circ}C$	-	0.81	m $\Omega$	
$I_L$	Latching current	$V_D = 5V$ , $T_j = 25^{\circ}C$	-	600	mA	
$I_H$	Holding current	$I_{TM} = 500A$ , $I_T = 5A$ , $T_j = 25^{\circ}C$	-	300	mA	
$t_d$	Delay time	$V_D = 3000V$ Gate source = 30V, 10 $\Omega$ Gate rise time = 100ns	$T_j = 25^{\circ}C$	-	350	ns
			$T_j = 70^{\circ}C$	-	-	ns
$t_r$	Rise time	See Fig.1. $T_j = 25 - 70^{\circ}C$ .	-	50	ns	

**GATE TRIGGER CHARACTERISTICS AND RATINGS**

Symbol	Parameter	Conditions	Typ.	Max.	Units	
$V_{GT}$	Gate trigger voltage	$V_{DWM} = 12V$ , $R_L = 6\Omega$ , $T_{case} = 25^{\circ}C$	-	5	V	
$I_{GT}$	Gate trigger current	$V_{DWM} = 12V$ , $R_L = 6\Omega$ , $T_{case} = 25^{\circ}C$	-	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	Forward	-	10	W

**CURRENT CARRYING CAPABILITY AFTER CHIP 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 $^{\circ}C$  or less.
3. A suitable high temperature clamp to be used.
4. Chip fault site resistance assumed to be 3m $\Omega \pm 10\%$ .

CURVES

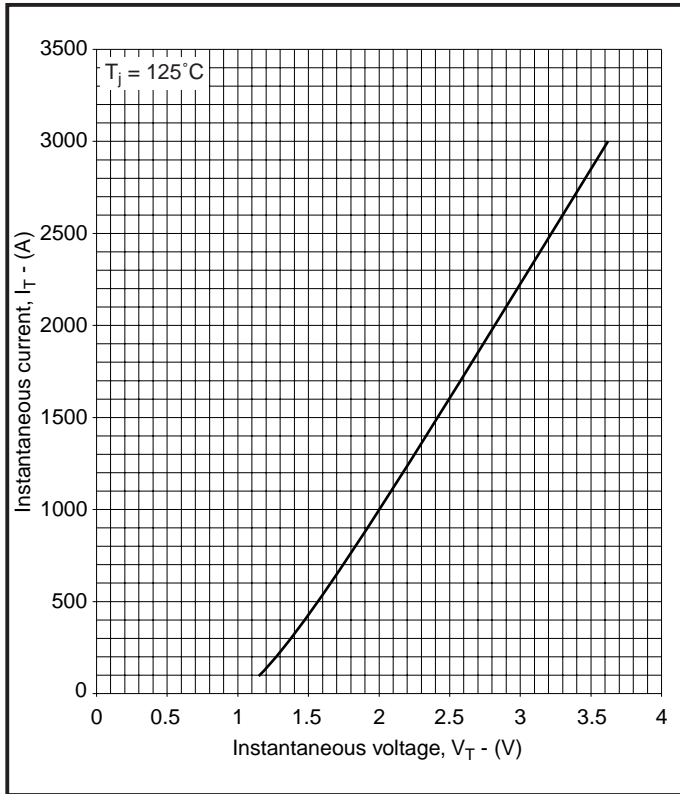


Fig.2 On-state characteristics

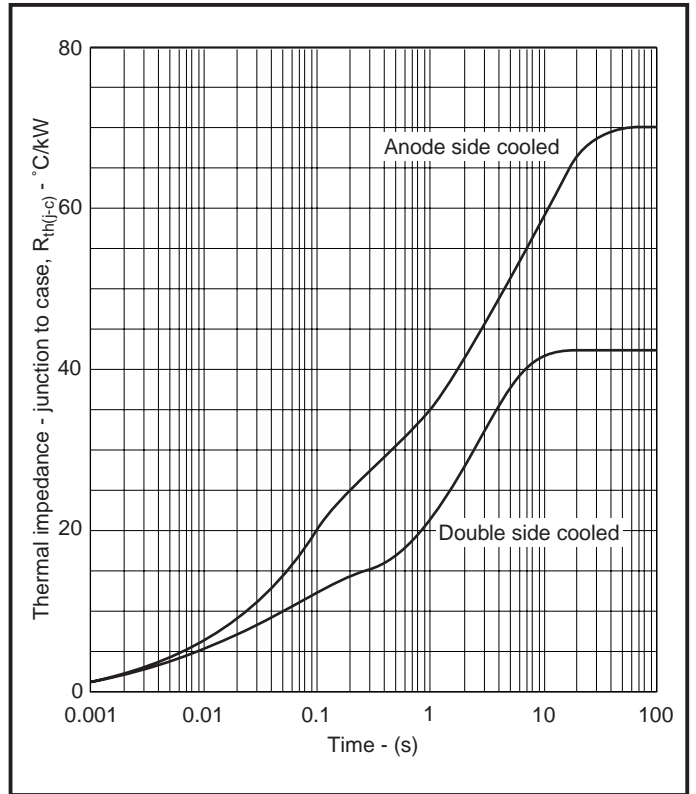


Fig.3 Transient thermal impedance - junction to case

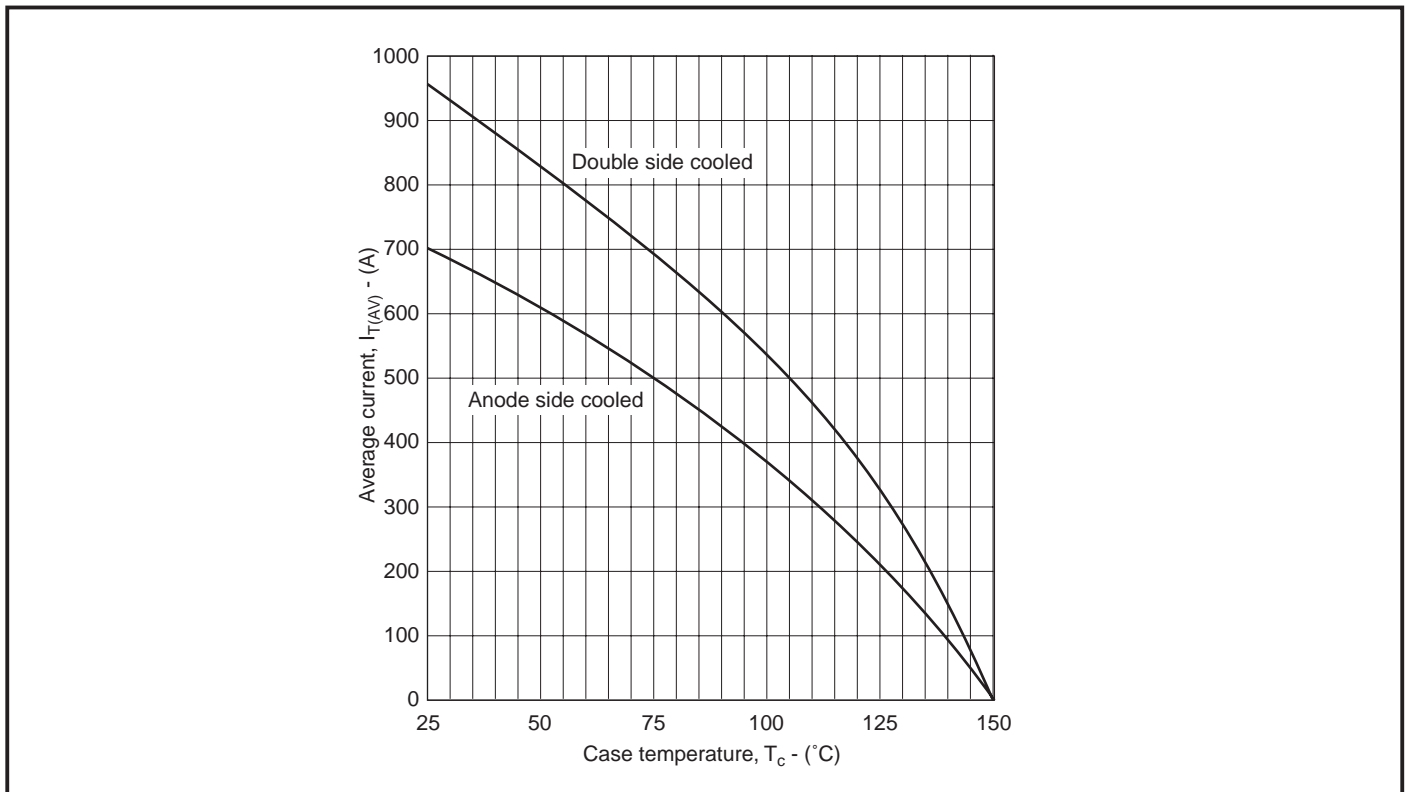
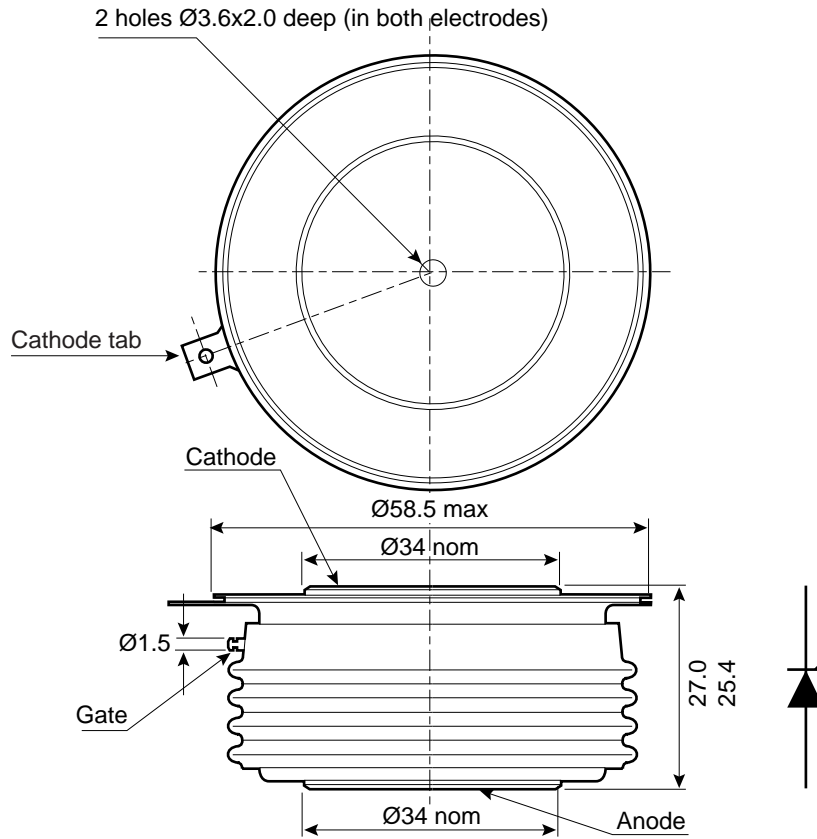


Fig.4 Average current rating vs temperature

**PACKAGE DETAILS**

For further package information, please contact your local Customer Service Centre. All dimensions in mm, unless stated otherwise. DO NOT SCALE.



Nominal weight: 310g  
Clamping force: 12kN ±10%  
Lead length: 420mm  
Lead terminal connector: M4 ring

**Package outline type code: G**

## 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 continues to offer 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).

## DEVICE CLAMPS

Disc devices require the correct clamping force to ensure their safe operation. The PACS range includes a varied selection of pre-loaded clamps to suit all of our manufactured devices. Types available include cube clamps for single side cooling of 'T' 22mm and 'E' 30mm discs, and bar clamps right up to 83kN for our 'Z' 100mm thyristors and diodes.

Clamps are available for single or double side cooling, with high insulation versions for high voltage assemblies.

Please refer to our application note on device clamping, AN4839

## HEATSINKS

The Power Assembly group has its own proprietary range of extruded aluminium heatsinks. They 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 service office.



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