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.

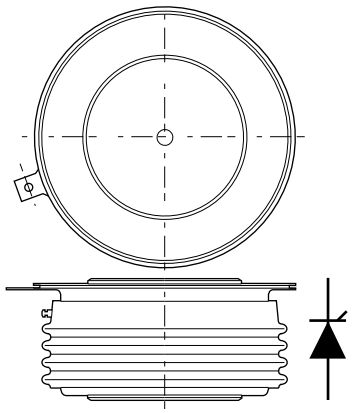
KEY PARAMETERS

V_{DRM} 3300V
$I_{T(AV)}$ 660A
I_{TSM} 6500A
dVdt 3000V/μs
dI/dt 2000A/μs
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.



Outline type code: G.

Fig. 1 See Package Details for further information

CURRENT RATINGS

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

SURGE RATINGS

Symbol	Parameter	Conditions	Max.	Units
I_{TSM}	Surge (non-repetitive) on-state current	10ms half sine; T_{case} = 125°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	°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 with mounting compound	Double side	-	0.018	°C/W
			Single side	-	0.036	°C/W
T_{vj}	Virtual junction temperature	On-state (conducting)		-	150	°C
		Reverse (blocking)		-	125	°C
T_{stg}	Storage temperature range			-55	125	°C
-	Clamping force			6.0	8.0	kN

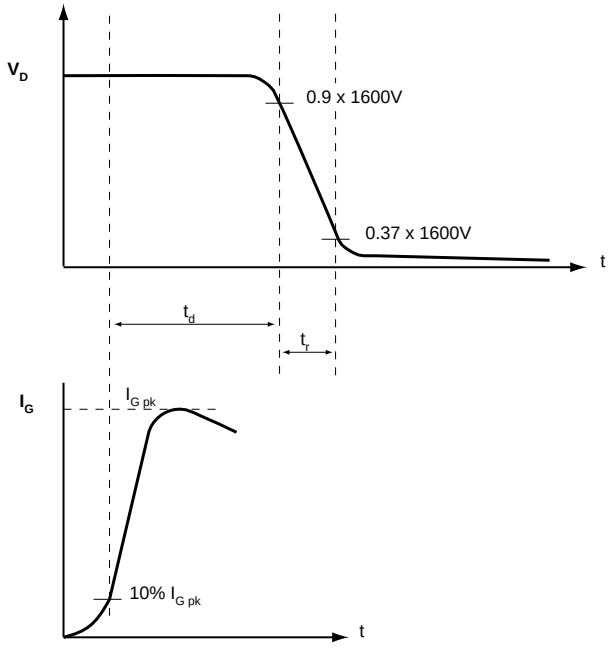


Fig.1 Turn-on time measurement

DYNAMIC CHARACTERISTICS

Symbol	Parameter	Conditions		Min.	Max.	Units
V_{TM}	Maximum on-state voltage	At 1000A peak, T_{case} = 25°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	Linear rate of rise of off-state voltage	To V_D = 2000V, Gate open circuit, T_j = 125°C		3000	-	V/µs
dI/dt	Rate of rise of on-state current	From V_{DRM} to 125A Gate source 30V, 10Ω Gate rise time = 100ns, T_j = 125˚C		-	2000	A/µs
$V_{T(TO)}$	Threshold voltage	At T_{vj} = 125°C		-	1.19	V
r_T	On-state slope resistance	At T_{vj} = 125°C		-	0.81	mΩ
I_L	Latching current	V_D = 5V, T_j = 25˚C		-	600	mA
I_H	Holding current	I_{TM} = 500A, I_T = 5A, T_j = 25˚C		-	300	mA
t_d	Delay time	V_D = 3000V Gate source = 30V, 10Ω Gate rise time = 100ns	T_j = 25˚C	-	350	ns
			T_j = 70˚C	-	-	ns
t_r	Rise time	See Fig.1. T_j = 25 - 70˚C.		-	50	ns

GATE TRIGGER CHARACTERISTICS AND RATINGS

Symbol	Parameter	Conditions		Typ.	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} = 25°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˚C or less.
3. A suitable high temperature clamp to be used.
4. Chip fault site resistance assumed to be 3mΩ ± 10%.

CURVES

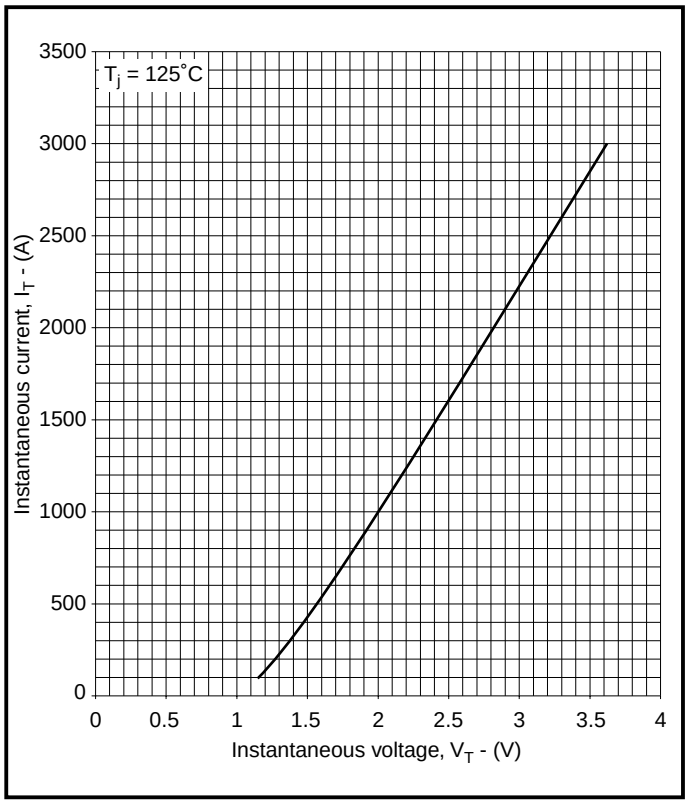


Fig.2 On-state characteristics

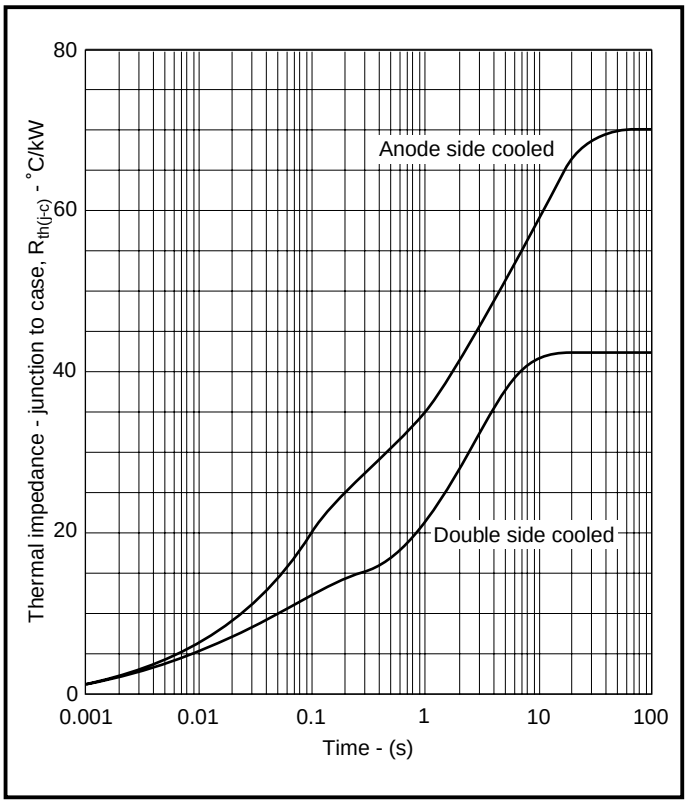


Fig.3 Transient thermal impedance - junction to case

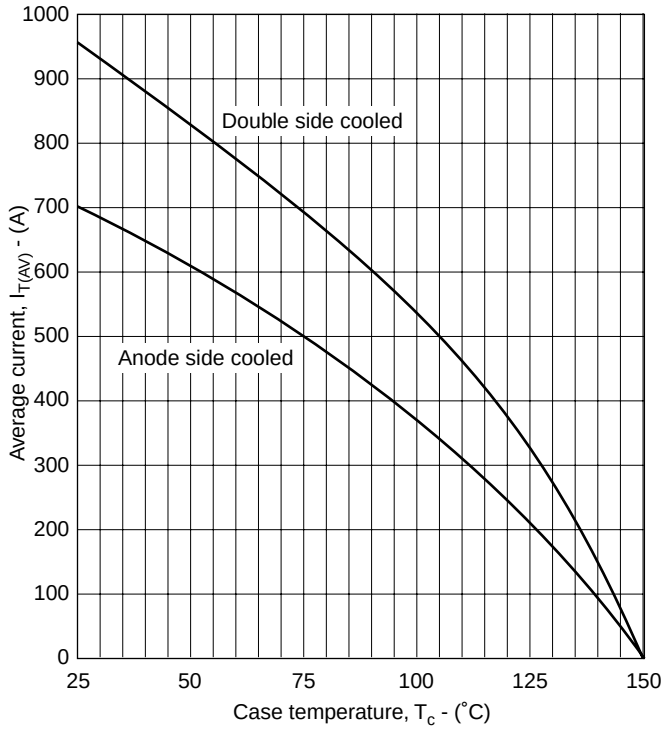
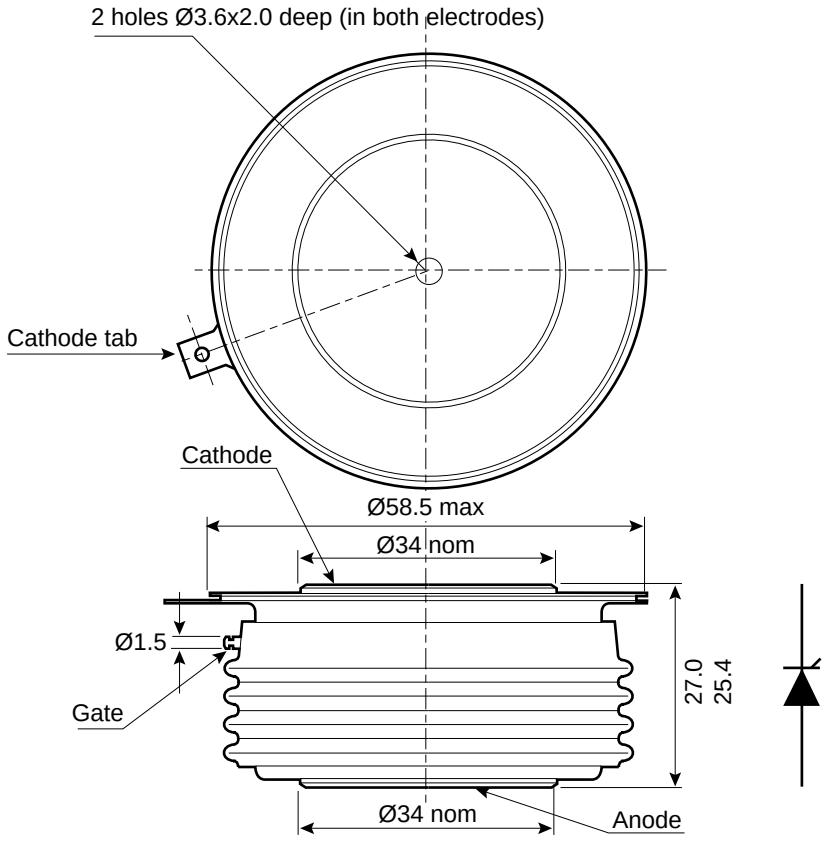


Fig.4 Average current rating vs temperature

PACKAGE DETAILS

For further package information, please contact Customer Services. 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 outine 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 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.

DYNEX SEMICONDUCTOR

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Target Information: This is the most tentative form of information and represents a very preliminary specification. No actual design work on the product has been started.

Preliminary Information: The product is in design and development. The datasheet represents the product as it is understood but details may change.

Advance Information: The product design is complete and final characterisation for volume production is well in hand.

No Annotation: The product parameters are fixed and the product is available to datasheet specification.