

### APPLICATIONS

- Capacitor Discharge
- Pulse Power Applications

### FEATURES

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

### VOLTAGE RATINGS

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

Lower voltage grades available.

### 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

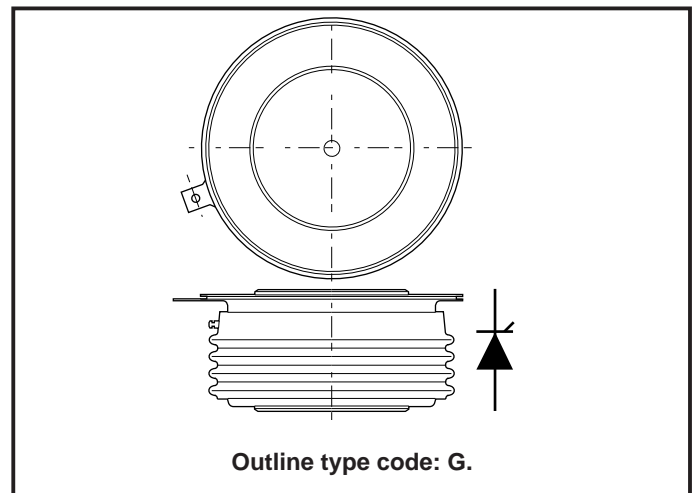


Fig. 1 See Package Details for further information

### 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; $T_{case} = 125^{\circ}C$<br>$V_R = 0$ | 6    | kA      |
| $I^2t$    | $I^2t$ for fusing                       |  | 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            |

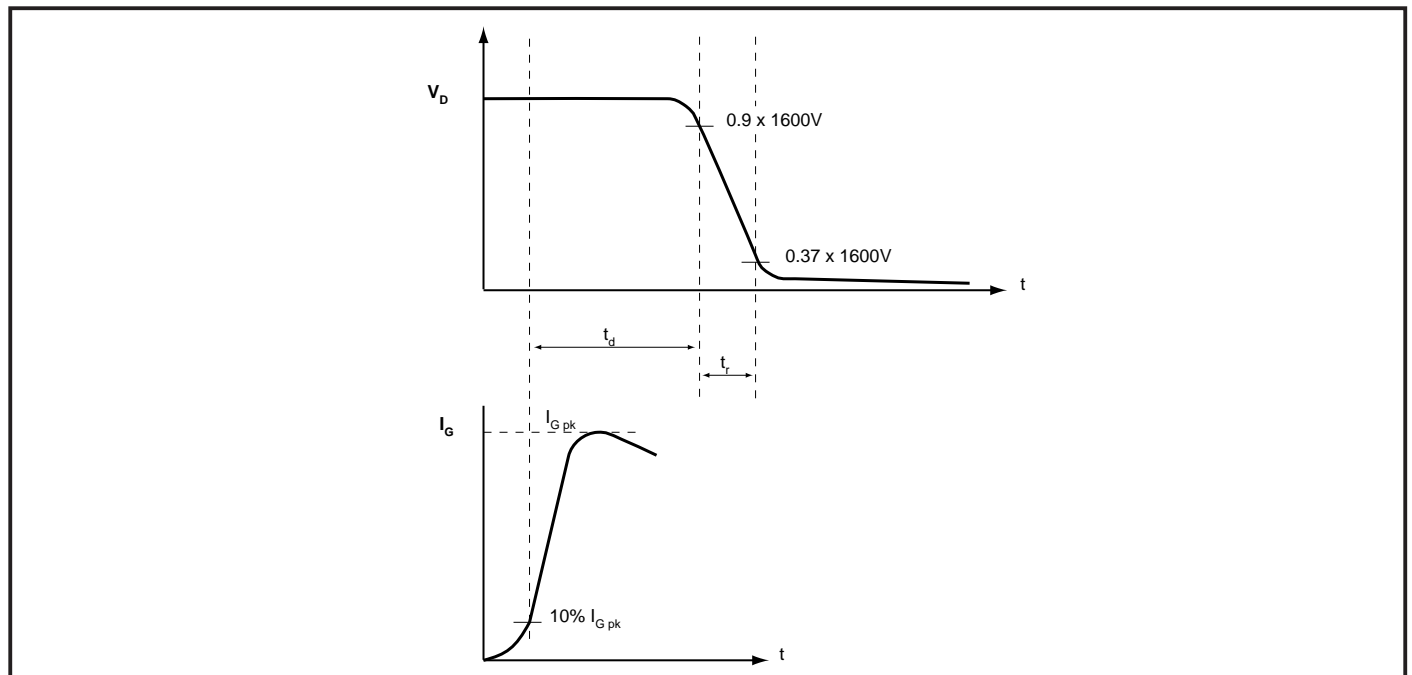


Fig.1 Turn-on time measurement

**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/ $\mu s$ |    |
| dI/dt             | Rate of rise of on-state current         | From $V_{DRM}$ to 125A<br>Gate source 30V, 10 $\Omega$<br>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                               | $V_D = 3000V$<br>Gate source = 30V, 10 $\Omega$<br>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

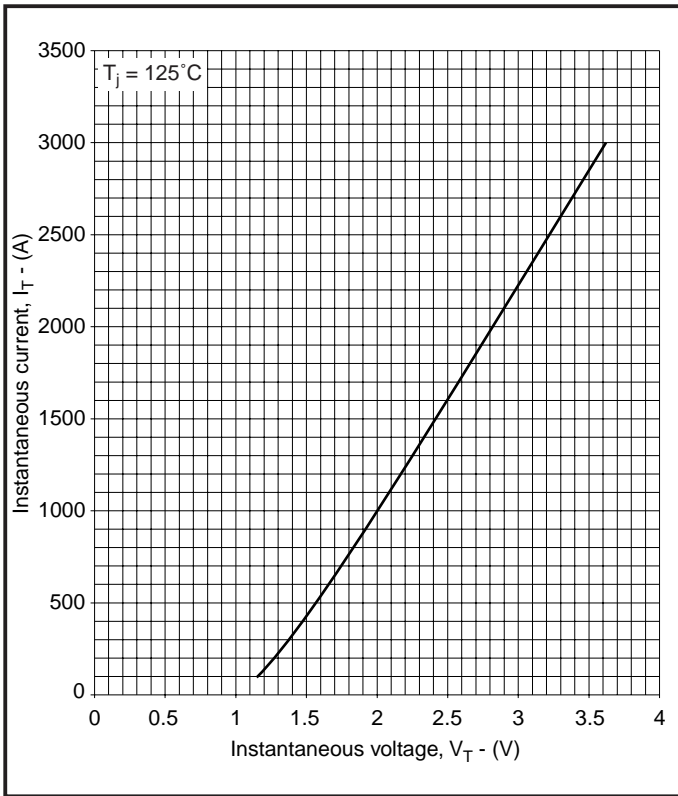


Fig.2 On-state characteristics

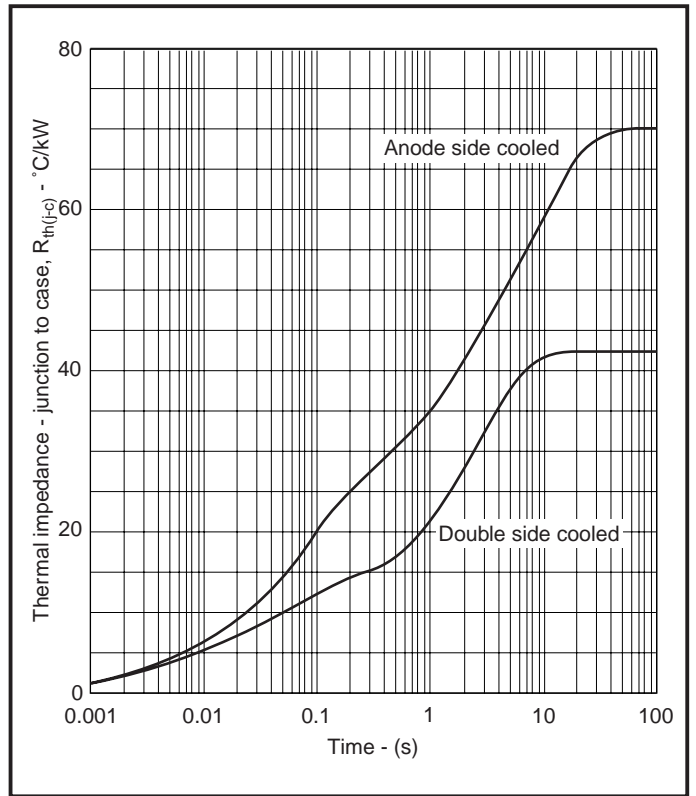


Fig.3 Transient thermal impedance - junction to case

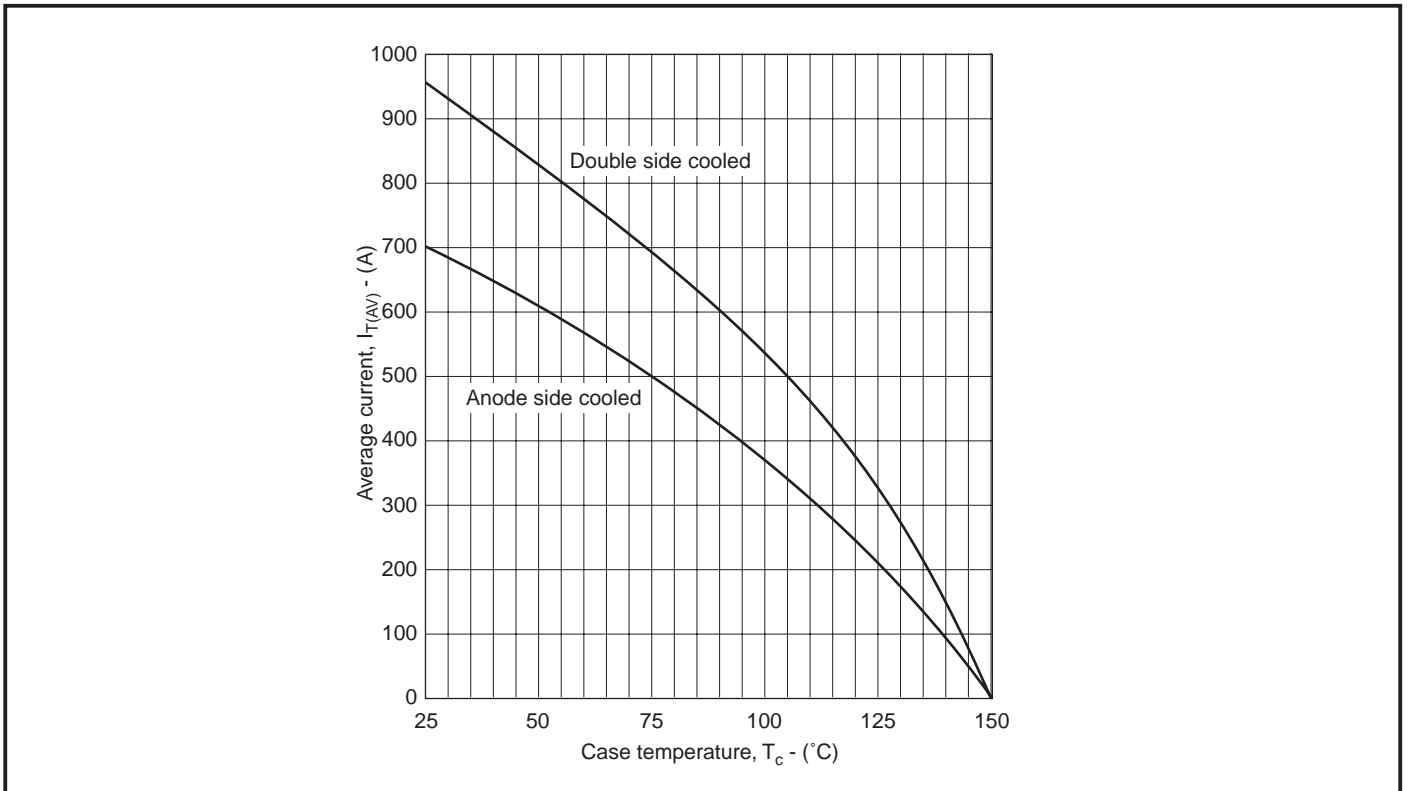
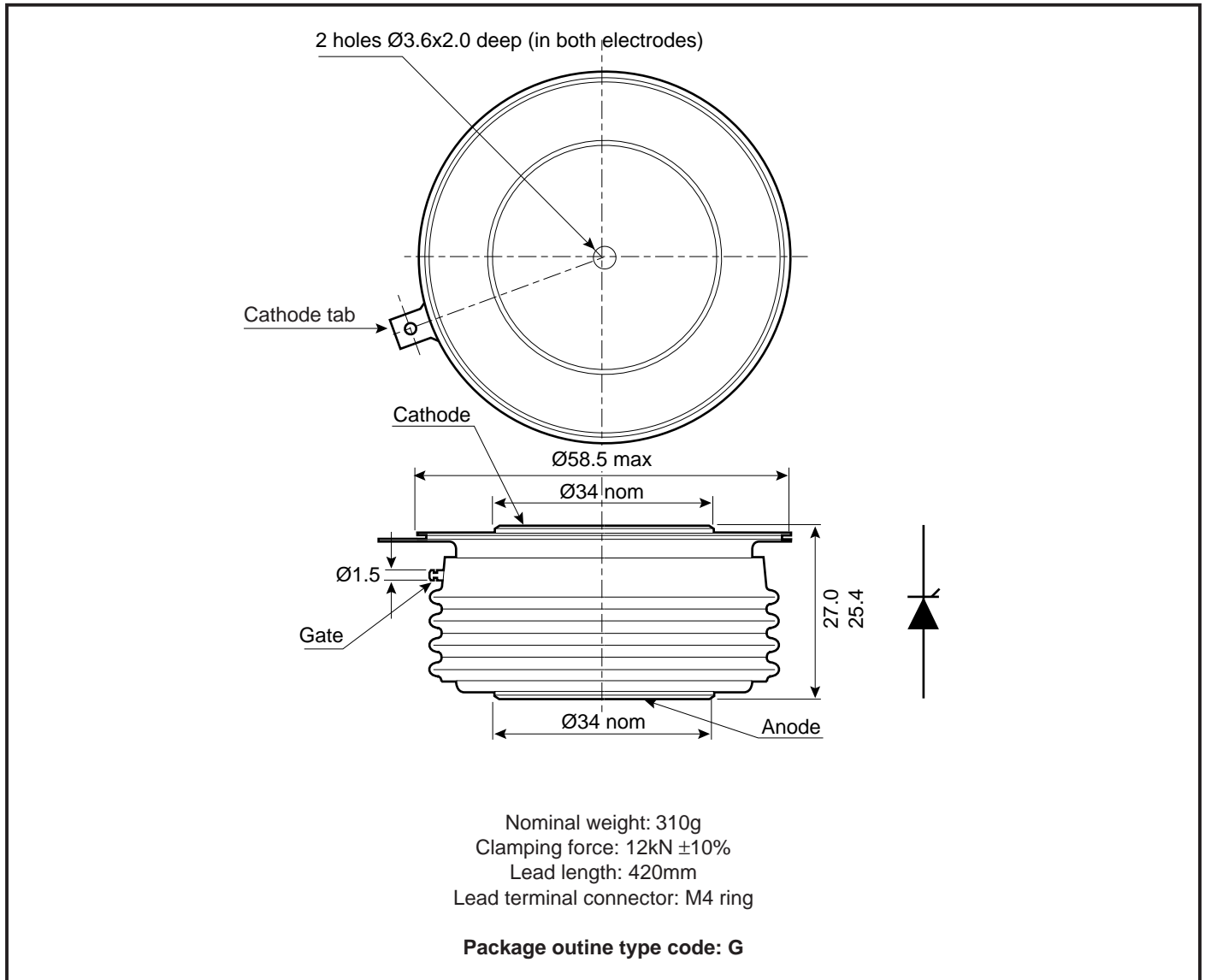


Fig.4 Average current rating vs temperature

**PACKAGE DETAILS**

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



## 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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**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.

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