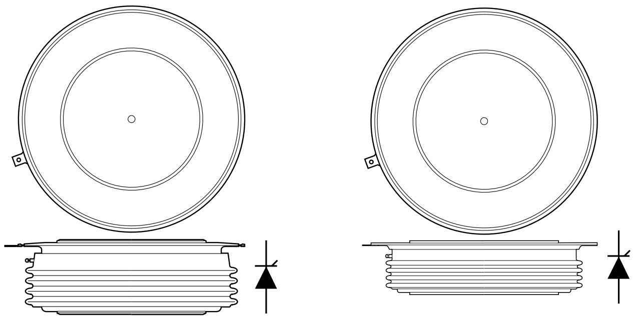
# DCR1574SY / DCR1574SV

## Phase Control Thyristor

Replaces July 2001 version, DS4400-4.0

DS4400-5.5 November 2002

## PACKAGE OUTLINE



Outline type code: Y

Outline type code: V

See Package Details for further information.

**Fig. 1 Package outline**

## KEY PARAMETERS

| | |
|---|---|
| $V_{DRM}$ | 2800V |
| $I_{T(AV)}$ | 3419A |
| $I_{TSM}$ | 54500A |
| dVdt | 1000V/µs |
| dI/dt | 300A/µs |

## VOLTAGE RATINGS

| Part Number | Repetitive Peak Voltages $V_{DRM}$ $V_{RRM}$ V | Conditions |
|---|---|---|
| DCR1574SY28<br>or<br>DCR1574SV28 | 2800<br><br>2800 | $T_{vj}$ = 0˚ to 125˚C.<br>$I_{DRM}$ = $I_{RRM}$ = 300mA.<br>$V_{DRM}$, $V_{RRM}$ = 10ms 1/2 sine.<br>$V_{DSM}$ & $V_{RSM}$ = $V_{DRM}$ & $V_{RRM}$ + 100V respectively. |

Lower voltage grades available.

## ORDERING INFORMATION

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

For example:

**DCR1574SY28** for a 2800V 'Y' outline variant

or

**DCR1574SV28** for a 2800V 'V' outline variant

If a lower voltage grade is required, then use $V_{DRM}$/100 for the grade required e.g.:

**DCR1574SY26** for a 2600V 'Y' outline variant etc.

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

## CURRENT RATINGS

$T_{case}$ = 60˚C unless stated otherwise

| Symbol | Parameter | Conditions | Max. | Units |
|---|---|---|---|---|
| **Double Side Cooled** | | | | |
| $I_{T(AV)}$ | Mean on-state current | Half wave resistive load | 3419 | A |
| $I_{T(RMS)}$ | RMS value | - | 5370 | A |
| $I_T$ | Continuous (direct) on-state current | - | 4836 | A |
| **Single Side Cooled (Anode side)** | | | | |
| $I_{T(AV)}$ | Mean on-state current | Half wave resistive load | 2197 | A |
| $I_{T(RMS)}$ | RMS value | - | 3451 | A |
| $I_T$ | Continuous (direct) on-state current | - | 2857 | A |

## CURRENT RATINGS

$T_{case}$ = 80˚C unless stated otherwise

| Symbol | Parameter | Conditions | Max. | Units |
|---|---|---|---|---|
| **Double Side Cooled** | | | | |
| $I_{T(AV)}$ | Mean on-state current | Half wave resistive load | 2667 | A |
| $I_{T(RMS)}$ | RMS value | - | 4189 | A |
| $I_T$ | Continuous (direct) on-state current | - | 3680 | A |
| **Single Side Cooled (Anode side)** | | | | |
| $I_{T(AV)}$ | Mean on-state current | Half wave resistive load | 1680 | A |
| $I_{T(RMS)}$ | RMS value | - | 2640 | A |
| $I_T$ | Continuous (direct) on-state current | - | 2140 | A |

## SURGE RATINGS

| Symbol | Parameter | Conditions | Max. | Units |
|---|---|---|---|---|
| $I_{TSM}$ | Surge (non-repetitive) on-state current | 10ms half sine; $T_{case}$ = 125°C<br>$V_R$ = 50% $V_{RRM}$ - 1/4 sine | 43.8 | kA |
| $I^2t$ | $I^2t$ for fusing | | 9.59 x $10^6$ | $A^2s$ |
| $I_{TSM}$ | Surge (non-repetitive) on-state current | 10ms half sine; $T_{case}$ = 125°C<br>$V_R$ = 0 | 54.5 | kA |
| $I^2t$ | $I^2t$ for fusing | | 14.85 x $10^6$ | $A^2s$ |

## THERMAL AND MECHANICAL DATA

| Symbol | Parameter | Conditions | | Min. | Max. | Units |
|---|---|---|---|---|---|---|
| $R_{th(j-c)}$ | Thermal resistance - junction to case | Double side cooled | dc | - | 0.0095 | °C/W |
| | | Single side cooled | Anode dc | - | 0.019 | °C/W |
| | | | Cathode dc | - | 0.019 | °C/W |
| $R_{th(c-h)}$ | Thermal resistance - case to heatsink | Clamping force 50kN with mounting compound | Double side | - | 0.002 | °C/W |
| | | | Single side | - | 0.004 | °C/W |
| $T_{vj}$ | Virtual junction temperature | On-state (conducting) | | - | 135 | °C |
| | | Reverse (blocking) | | - | 125 | °C |
| $T_{stg}$ | Storage temperature range | | | –55 | 150 | °C |
| - | Clamping force | | | 45 | 55 | kN |

## DYNAMIC CHARACTERISTICS

| Symbol | Parameter | Conditions | | Max. | Units |
|---|---|---|---|---|---|
| $I_{RRM}/I_{DRM}$ | Peak reverse and off-state current | At $V_{RRM}/V_{DRM}$, $T_{case}$ = 125°C | | 300 | mA |
| dV/dt | Maximum linear rate of rise of off-state voltage | To 67% $V_{DRM}$ $T_j$ = 125°C. | | 1000 | V/µs |
| dI/dt | Rate of rise of on-state current | From 67% $V_{DRM}$ to 1000A<br>Gate source 20V, 10Ω<br>$t_r$ ≤ 0.5µs, $T_j$ = 125°C | Repetitive 50Hz | 250 | A/µs |
| | | | Non-repetitive | 500 | A/µs |
| $V_{T(TO)}$ | Threshold voltage | At $T_{vj}$ = 125°C | | 0.883 | V |
| $r_T$ | On-state slope resistance | At $T_{vj}$ = 125°C | | 0.11 | mΩ |
| $t_{gd}$ | Delay time | $V_D$ = 67% $V_{DRM}$, Gate source 30V, 15Ω,<br>$t_r$ ≤ 0.5µs, $T_j$ = 25°C | | 2 | µs |
| $t_q$ | Turn-off time | $I_T$ = 4000A, $t_p$ = 3ms, $T_j$ = 125˚C,<br>$V_{RM}$ = 200V, $dI_{RR}/dt$ = 6A/µs,<br>$V_{DR}$ = 67% $V_{DRM}$, $dV_{DR}/dt$ = 20V/µs linear | | 400 | µs |
| $I_L$ | Latching current | $T_j$ = 25°C, $V_D$ = 5V | | 1000 | mA |
| $I_H$ | Holding current | $T_j$ = 25°C, $R_{g-k}$ = ∞ | | 300 | mA |

## GATE TRIGGER CHARACTERISTICS AND RATINGS

| Symbol | Parameter | Conditions | Max. | Units |
|---|---|---|---|---|
| $V_{GT}$ | Gate trigger voltage | $V_{DRM}$ = 5V, $T_{case}$ = 25°C | 3.0 | V |
| $I_{GT}$ | Gate trigger current | $V_{DRM}$ = 5V, $T_{case}$ = 25°C | 300 | mA |
| $V_{GD}$ | Gate non-trigger voltage | At $V_{DRM}$ $T_{case}$ = 125°C | 0.25 | V |
| $V_{FGM}$ | Peak forward gate voltage | Anode positive with respect to cathode | 30 | V |
| $V_{FGN}$ | Peak forward gate voltage | Anode negative with respect to cathode | 0.25 | V |
| $V_{RGM}$ | Peak reverse gate voltage | | 5 | V |
| $I_{FGM}$ | Peak forward gate current | Anode positive with respect to cathode | 30 | A |
| $P_{GM}$ | Peak gate power | See figs. 7 and 8, gate characteristics table | 150 | W |
| $P_{G(AV)}$ | Mean gate power | | 10 | W |

## CURVES

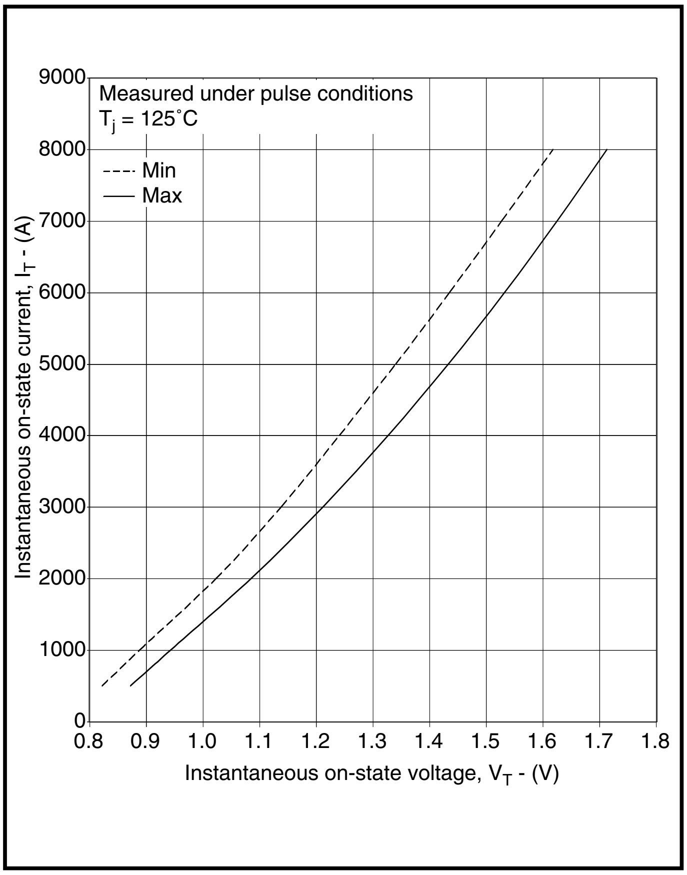



Fig.2 Maximum (limit) on-state characteristics

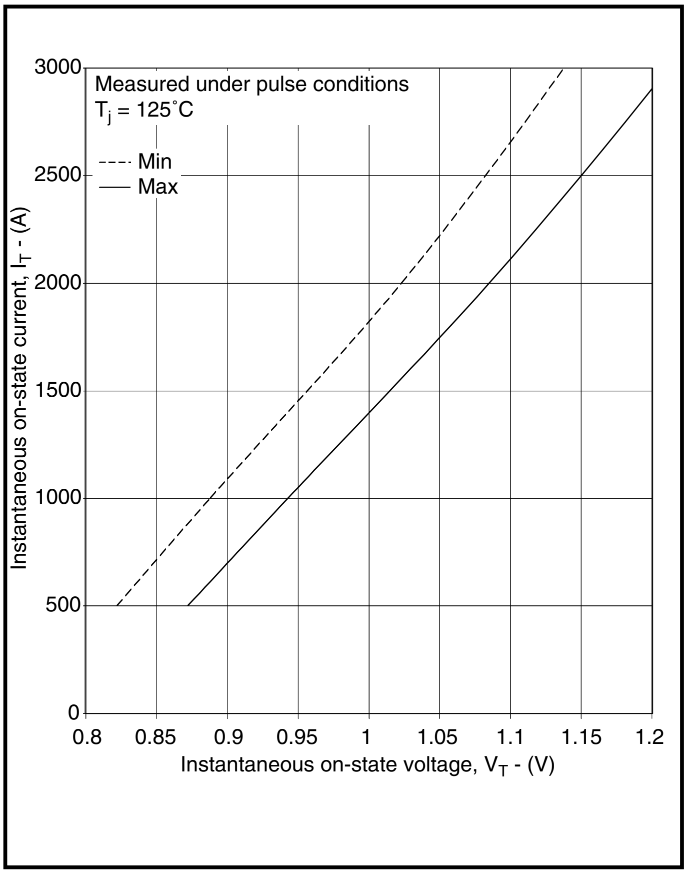



Fig.3 Maximum (limit) on-state characteristics

**$V_{TM}$ Equation:**

$V_{TM(max)} = A + B\ln(I_T) + C.I_T + D.\sqrt{I_T}$

Where A = 1.328994
B = –0.1381631
C = $3.565973 \times 10^{-6}$
D = 0.01786171

These values are valid for $T_j$ = 125˚C for $I_T$ 500A to 6000A

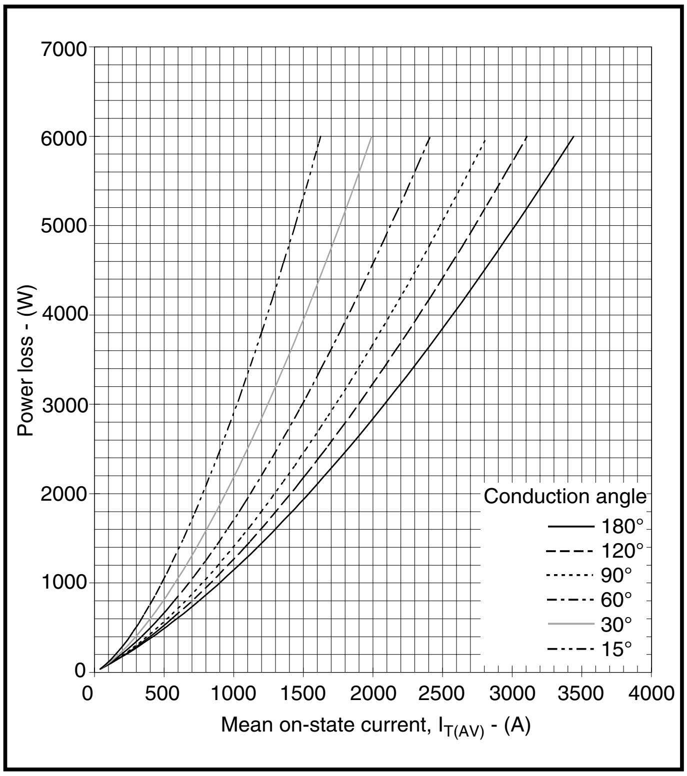



**Fig.4 Sine wave power dissipation curves**

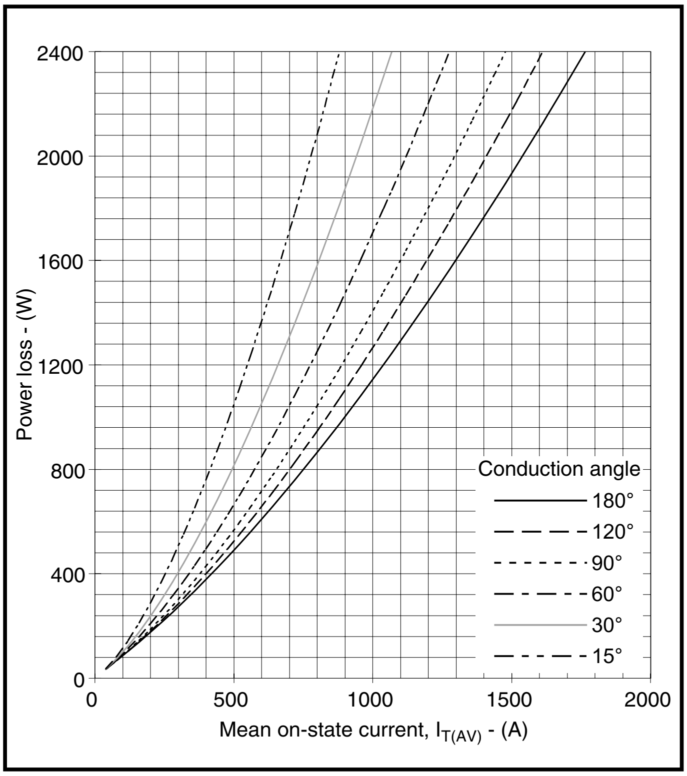



**Fig.5 Sine wave power dissipation curves**

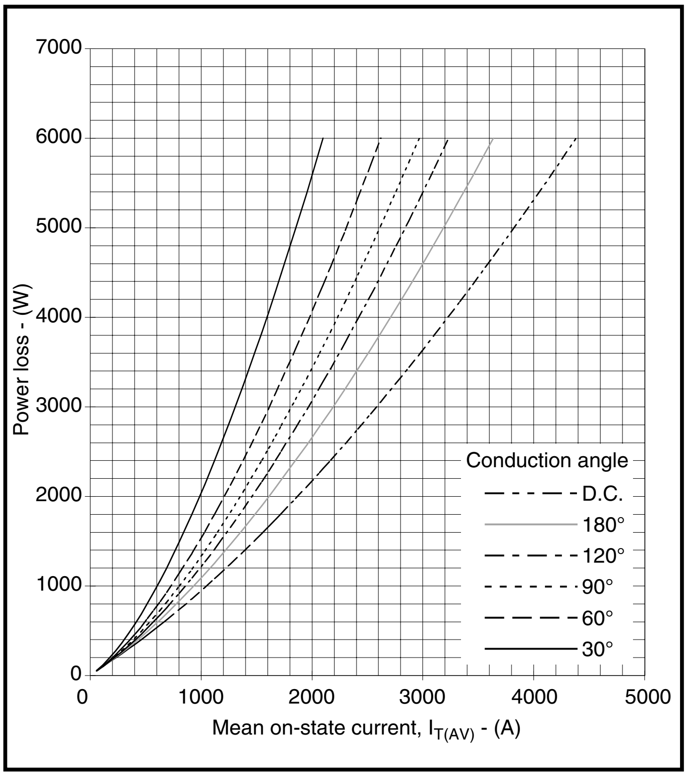



**Fig.6 Square wave power dissipation curves**

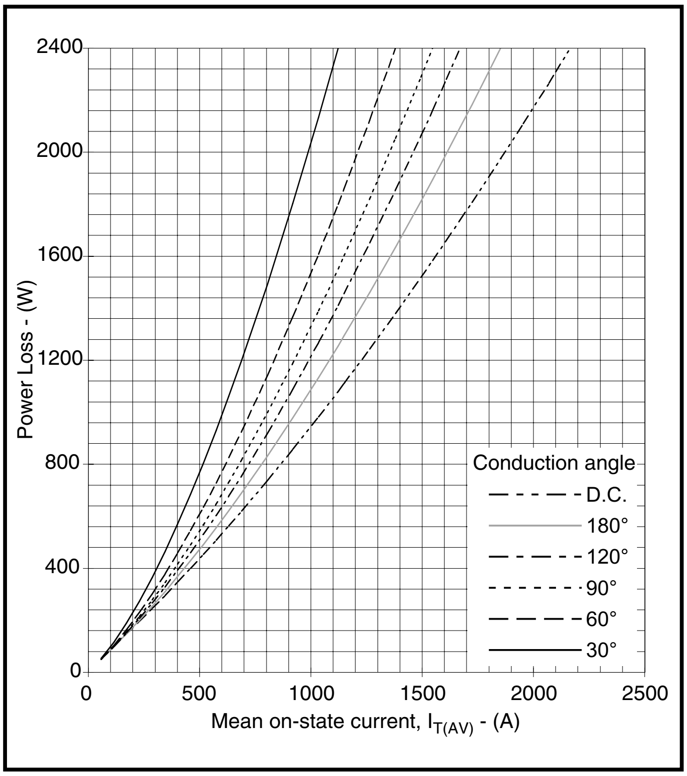
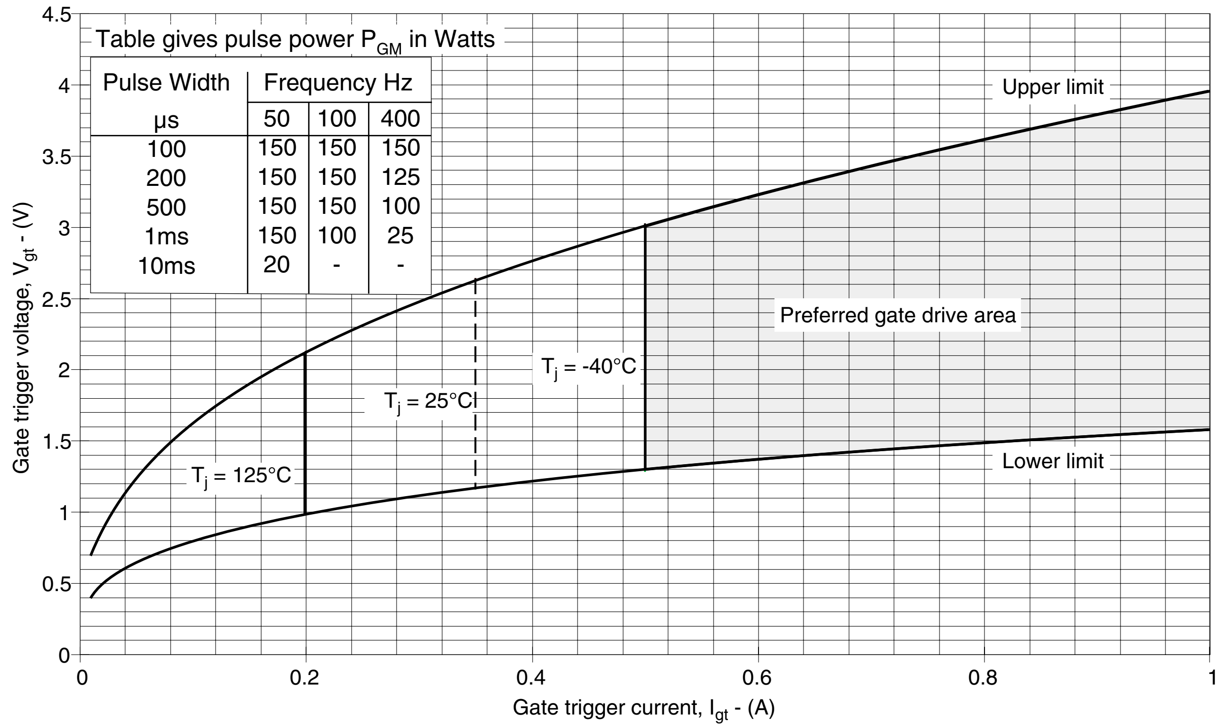



**Fig.7 Square wave power dissipation curves**




| Pulse Width μs | Frequency Hz 50 | 100 | 400 |
|---|---|---|---|
| 100 | 150 | 150 | 150 |
| 200 | 150 | 150 | 125 |
| 500 | 150 | 150 | 100 |
| 1ms | 150 | 100 | 25 |
| 10ms | 20 | - | - |

**Fig.7 Gate characteristics**

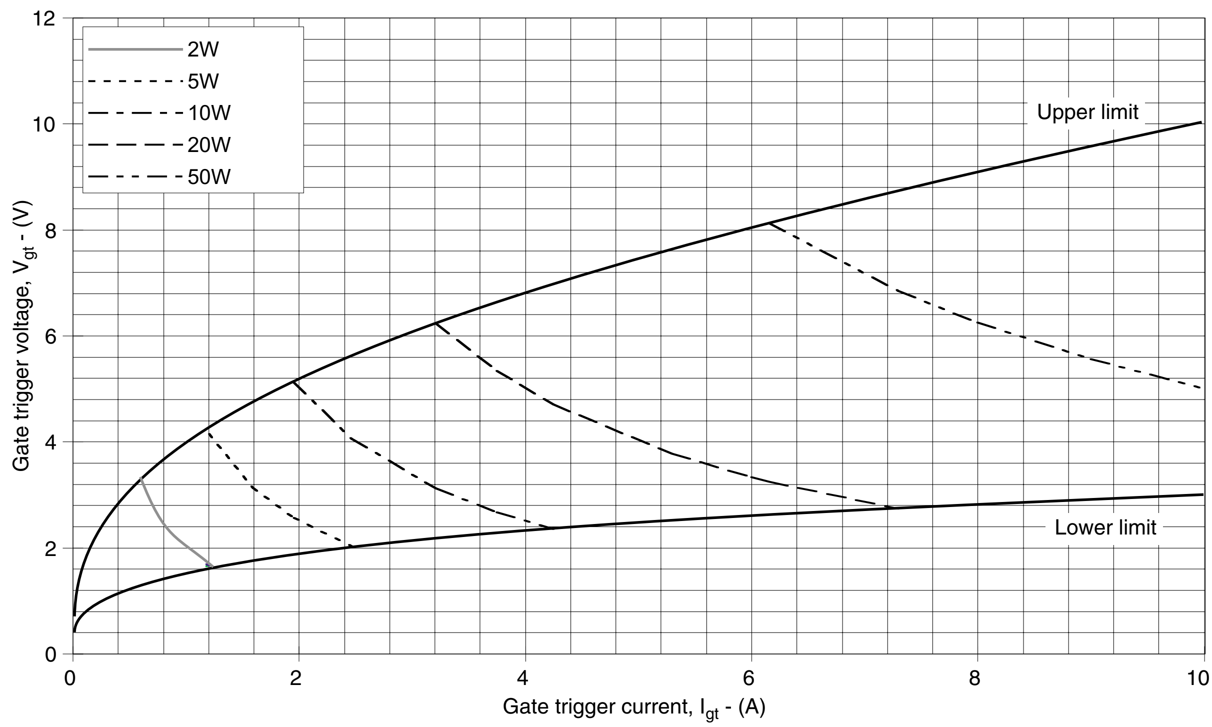



**Fig.8 Gate characteristics**

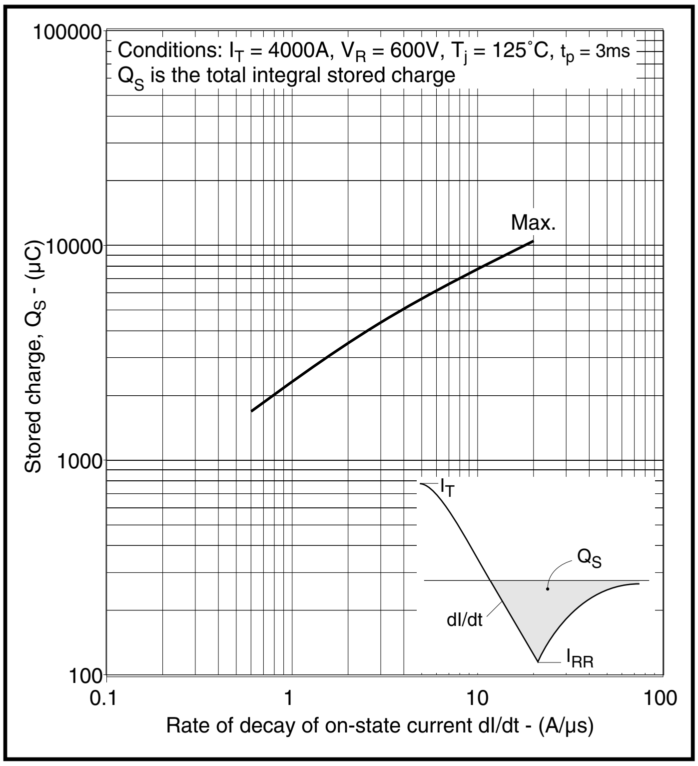



**Fig.9 Stored charge**

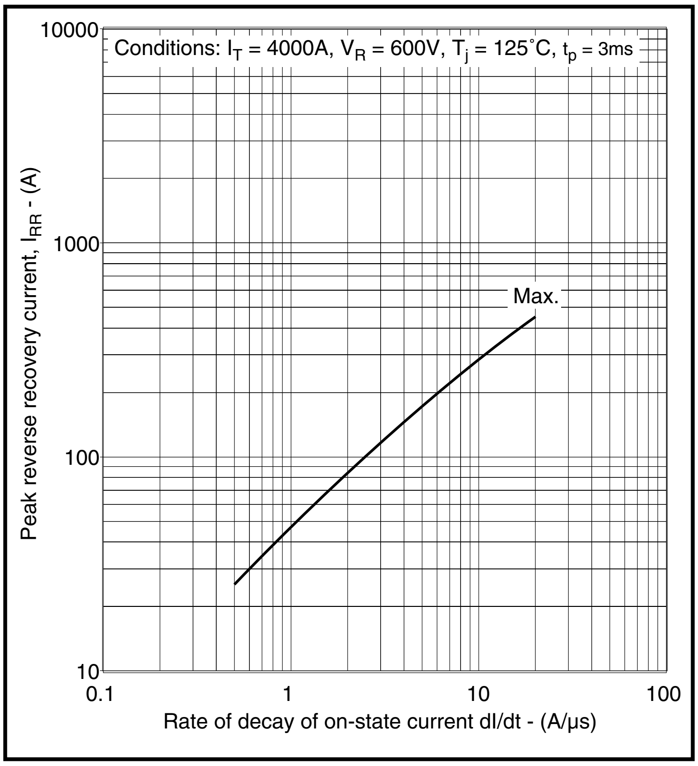
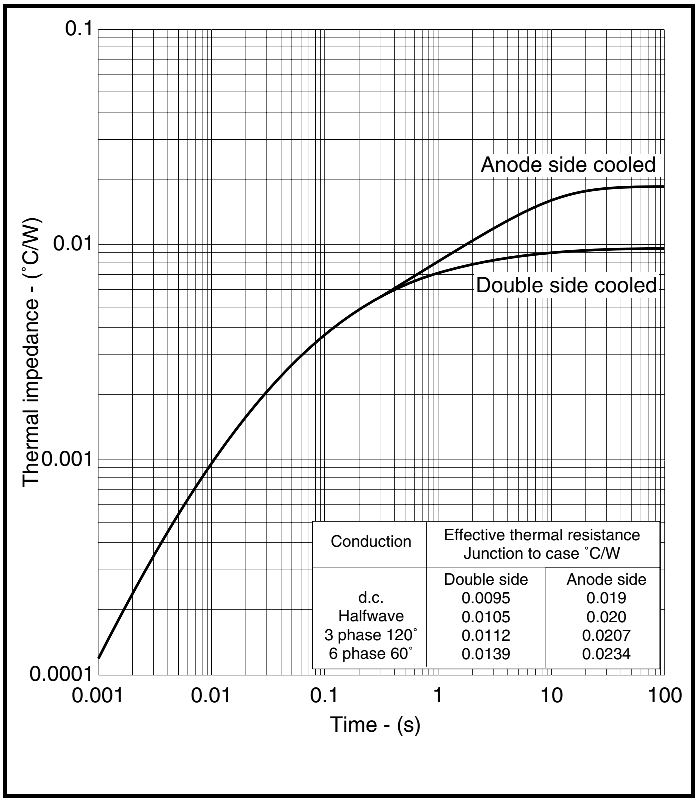



**Fig.10 Reverse recovery current**




| Conduction | Effective thermal resistance Junction to case ˚C/W | |
|---|---|---|
| | Double side | Anode side |
| d.c. | 0.0095 | 0.019 |
| Halfwave | 0.0105 | 0.020 |
| 3 phase 120˚ | 0.0112 | 0.0207 |
| 6 phase 60˚ | 0.0139 | 0.0234 |

**Fig.11 Maximum (limit) transient thermal impedance - junction to case**

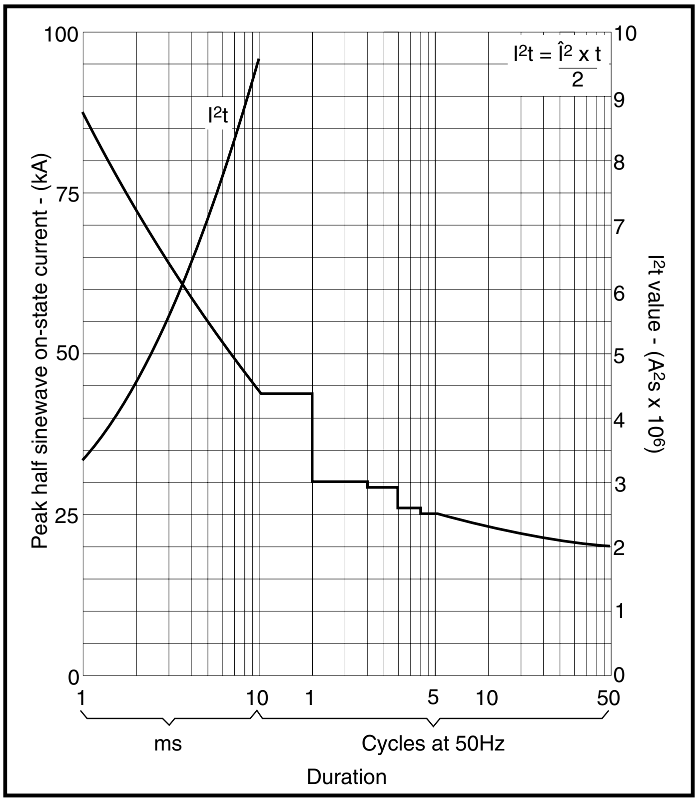
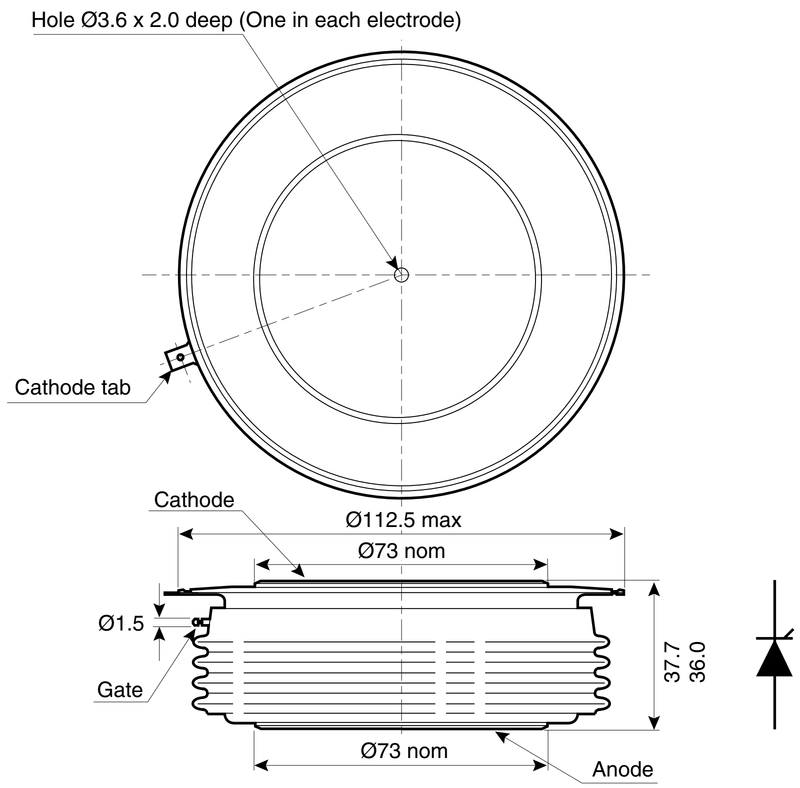



**Fig.12 Surge (non-repetitive) on-state current vs time (with 50% $V_{RRM}$ at $T_{case}$ = 125˚C)**

## PACKAGE DETAILS

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




Nominal weight: 1600g
Clamping force: 50kN ±10%
Lead length: 420mm
Lead terminal connector: M4 ring

**Package outine type code: Y**

**Fig.12 Package details**

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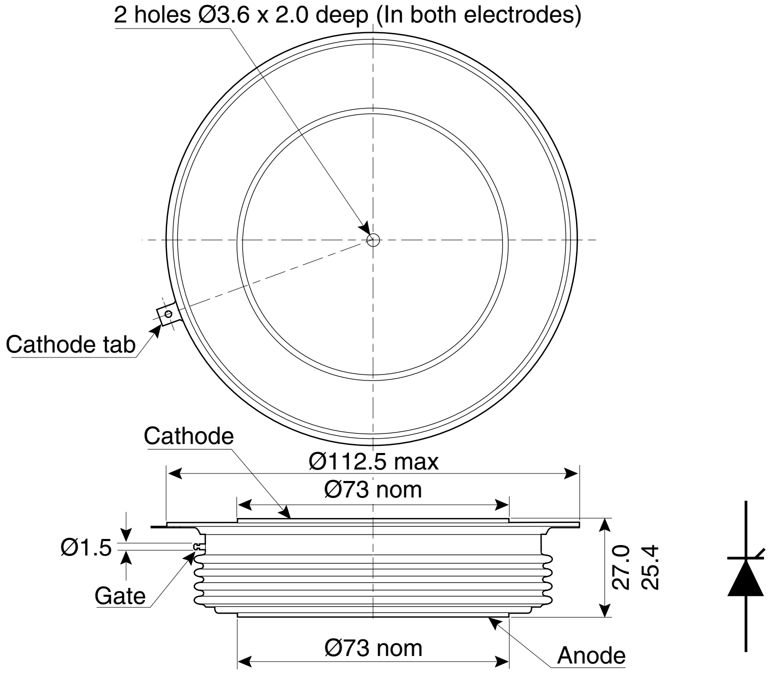
For further package information, please contact Customer Services. All dimensions in mm, unless stated otherwise. DO NOT SCALE.




Nominal weight: 1100g
Clamping force: 50kN ±10%
Lead length: 420mm
Lead terminal connector: M4 ring

**Package outline type code: V**

**Fig.12 Package details**

## 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.

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