DCR1574SY

Phase Control Thyristor

Replaces January 2000 version, DS4400-3.0

DS4400-4.0 July 2001

FEATURES

- Double Side Cooling.
- High Surge Capability.
- High Current.
- Fatigue Free.

APPLICATIONS

- High Power Drives.
- High Voltage Power Supplies.
- DC Motor Control.

VOLTAGE RATINGS

Type Number	Repetitive Peak Voltages V_{DRM} V_{RRM} V	Conditions
DCR1574SY28	2800	T_{vj} = 0° to 125°C, I_{DRM} = I_{RRM} = 300mA, V_{DRM}, V_{RRM} t_p = 10ms, V_{DSM} & V_{RSM} = V_{DRM} & V_{RRM} + 100V respectively
DCR1574SY27	2700	
DCR1574SY26	2600	
DCR1574SY25	2500	
DCR1574SY24	2400	

Lower voltage grades available.

ORDERING INFORMATION

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

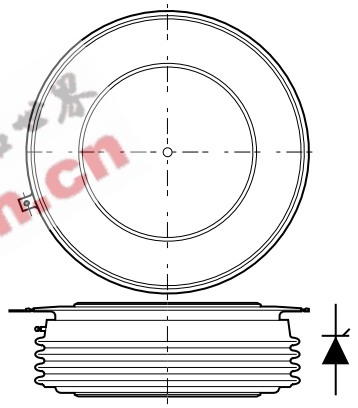
For example:

DCR1574SY25

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

KEY PARAMETERS

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



Outline type code: Y

See Package Details for further information.

(The DCR1574 is also available in a thin package, type code V.
Please contact Customer Services for more information).

Fig. 1 Package outline

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	43.8	kA
I^2t	I^2t for fusing	V_R = 50% V_{RRM} - 1/4 sine	9.59 x 10^6	A^2s
I_{TSM}	Surge (non-repetitive) on-state current	10ms half sine; T_{case} = 125°C	54.5	kA
I^2t	I^2t for fusing	V_R = 0	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 50.0kN 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			45.0	55.0	kN

DYNAMIC CHARACTERISTICS

Symbol	Parameter	Conditions		Typ.	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 80% V_{DRM} Gate source 20V, 10Ω t_r < 0.5µs. To JEDEC RS397	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 Rise time 0.5µs, T_j = 25°C		-	2	µs
I_L	Latching current	T_j = 25°C, V_D = 5V		-	350	mA
I_H	Holding current	T_j = 25°C, R_{g-k} = ∞		-	100	mA
t_q	Turn-off time	I_T = 400A, t_p = 1ms, T_j = 125°C, V_{RM} = 50V, dI_{RR}/dt = 40A/µs, V_{DR} = 900V, dV_{DR}/dt = 40V/µs linear		400	-	µs

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

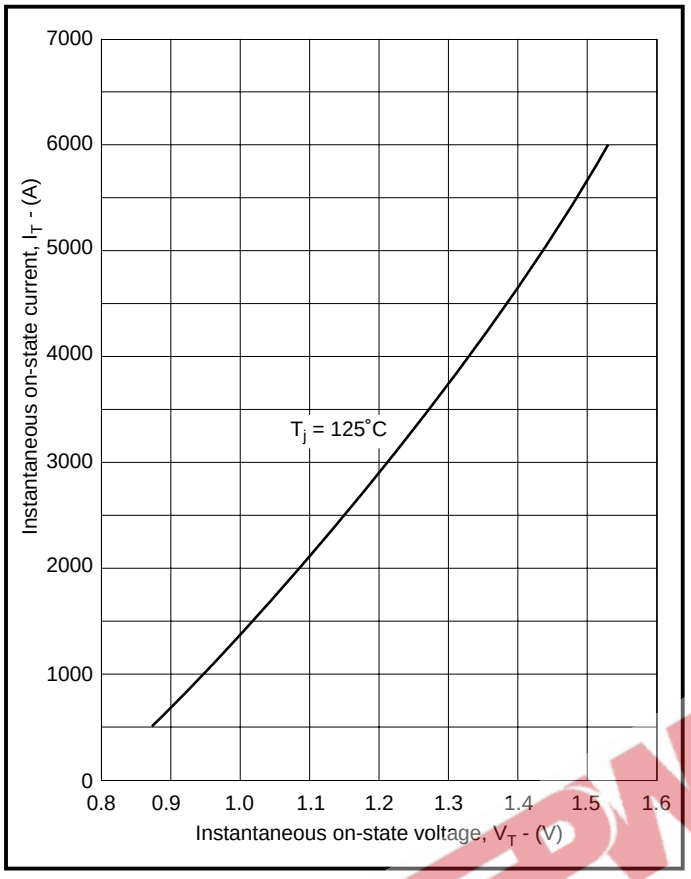


Fig.2 Maximum (limit) on-state characteristics

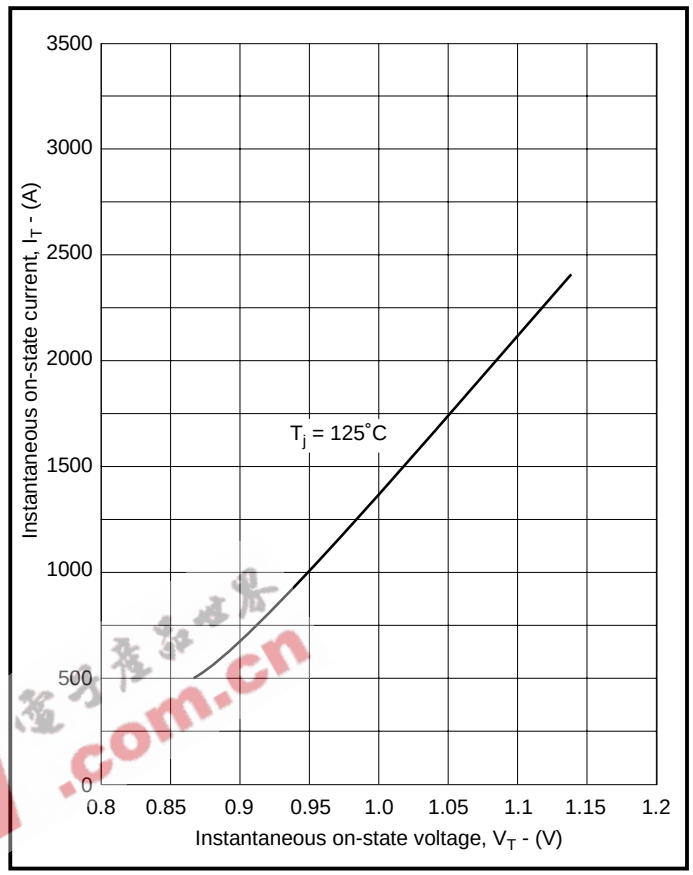


Fig.3 Maximum (limit) on-state characteristics

V_{TM} Equation:

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

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

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

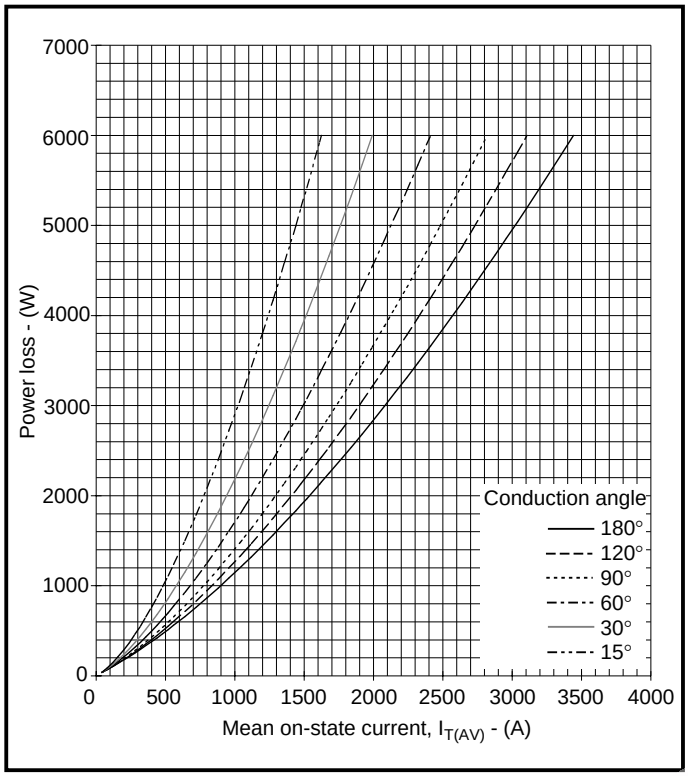


Fig.4 Sine wave power dissipation curves

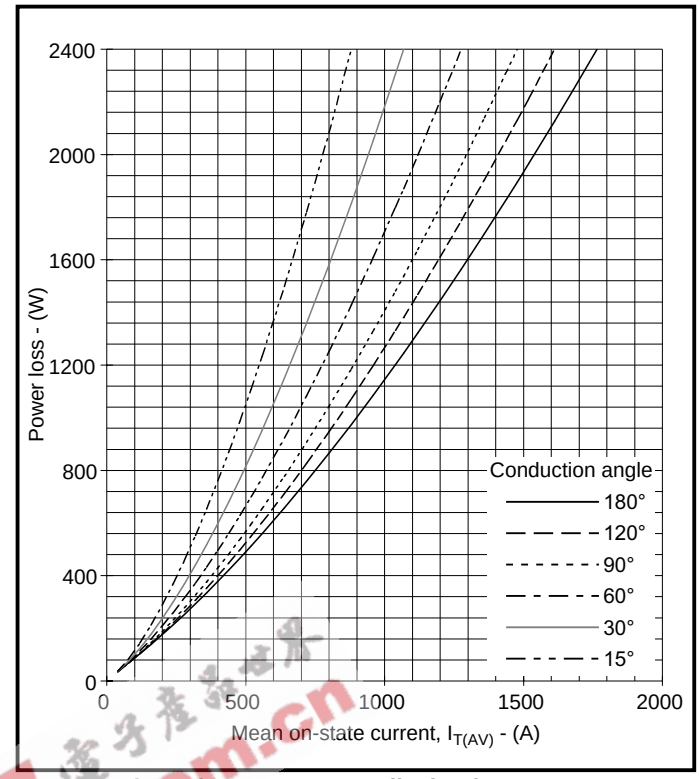


Fig.5 Sine wave power dissipation curves

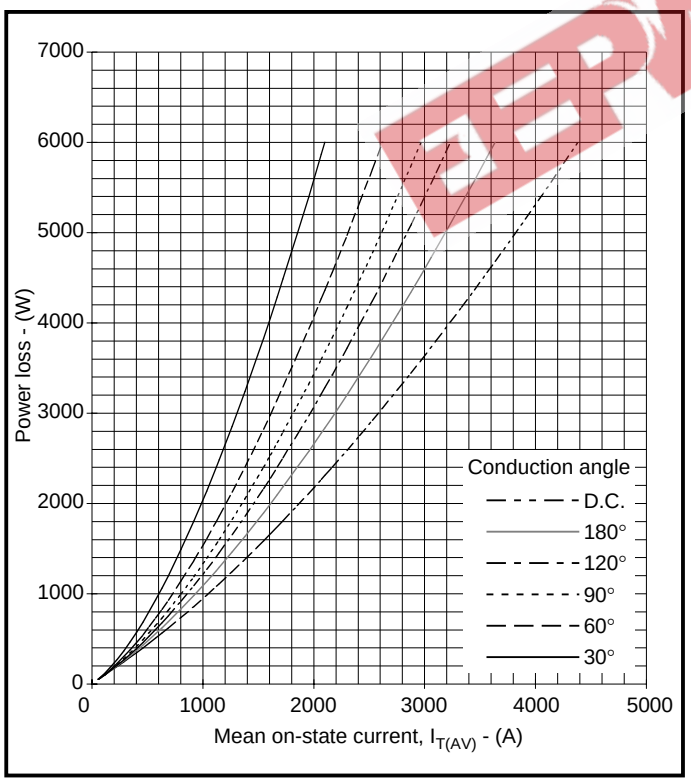


Fig.6 Square wave power dissipation curves

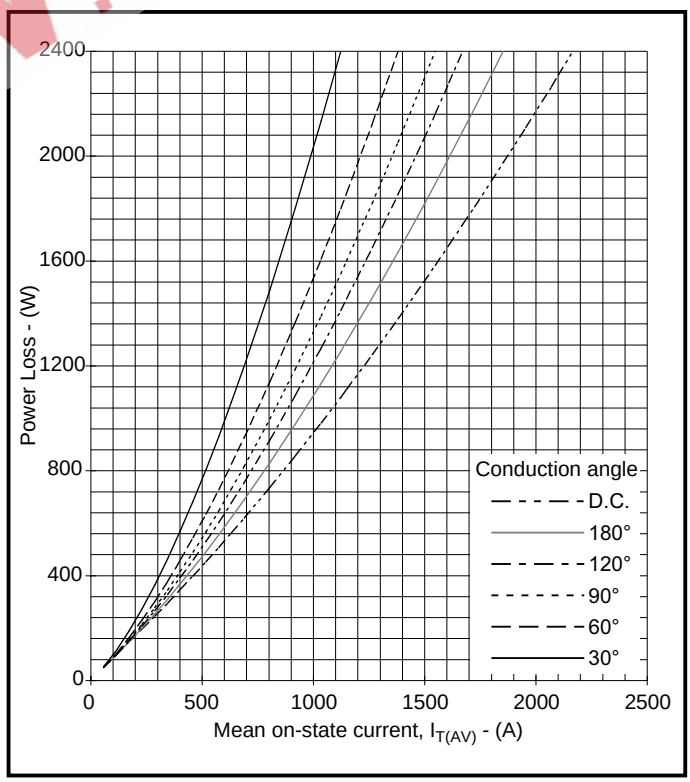


Fig.7 Square wave power dissipation curves

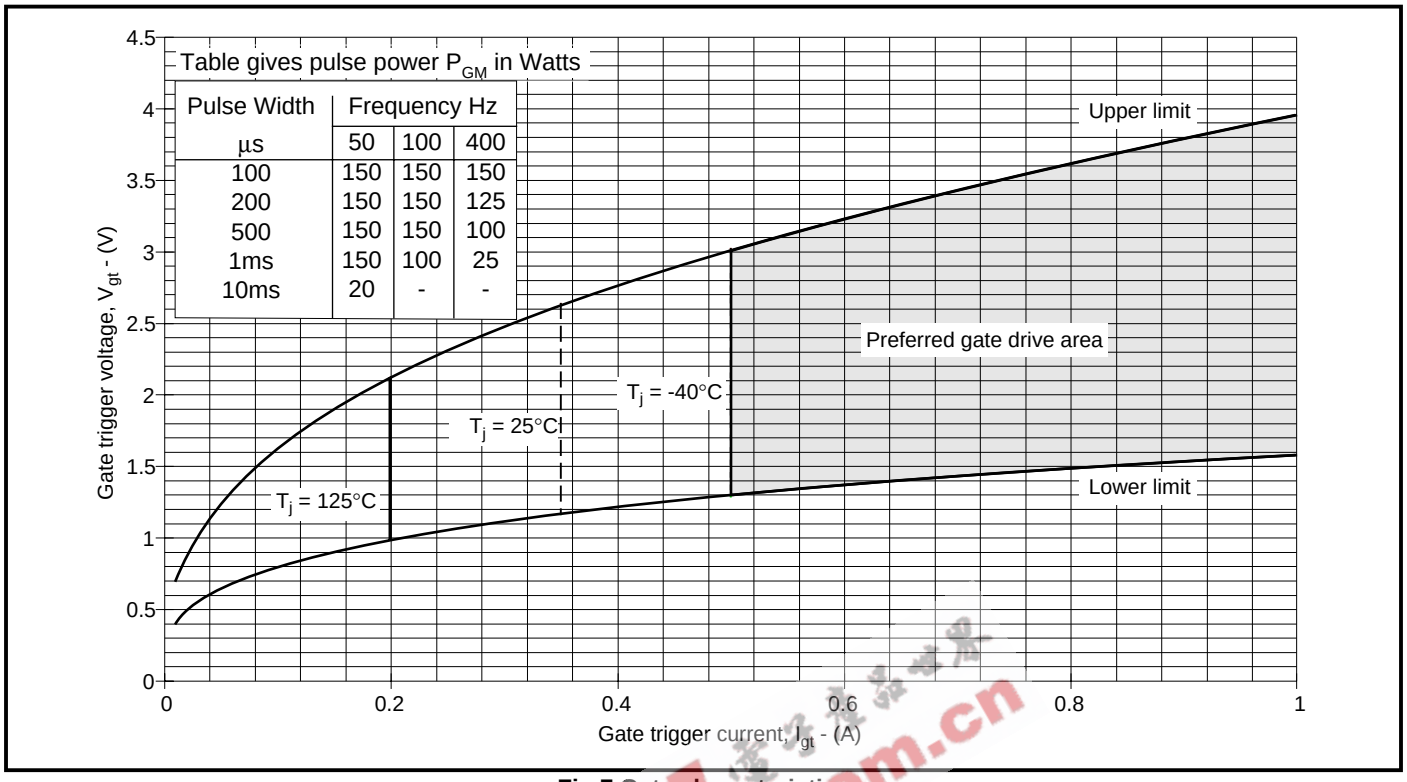


Fig.7 Gate characteristics

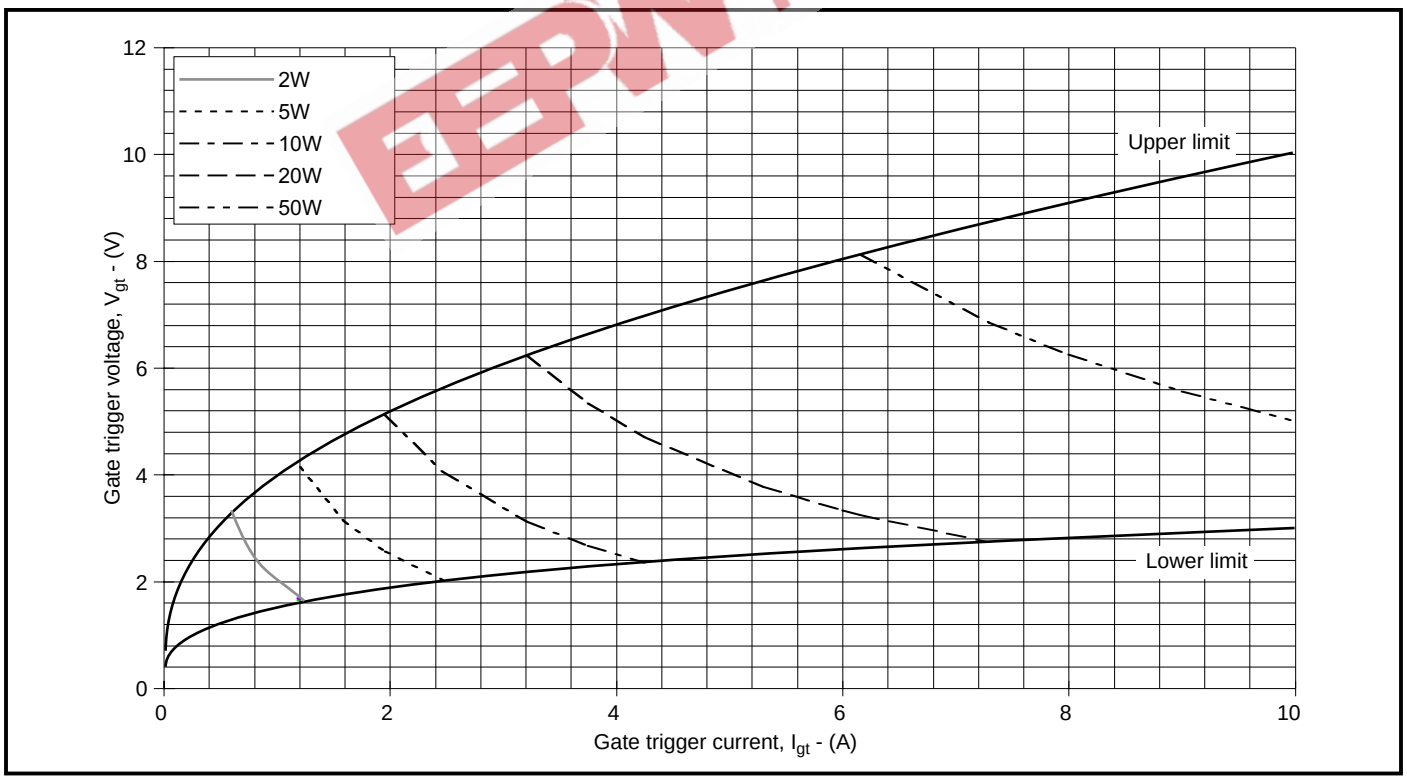


Fig.8 Gate characteristics

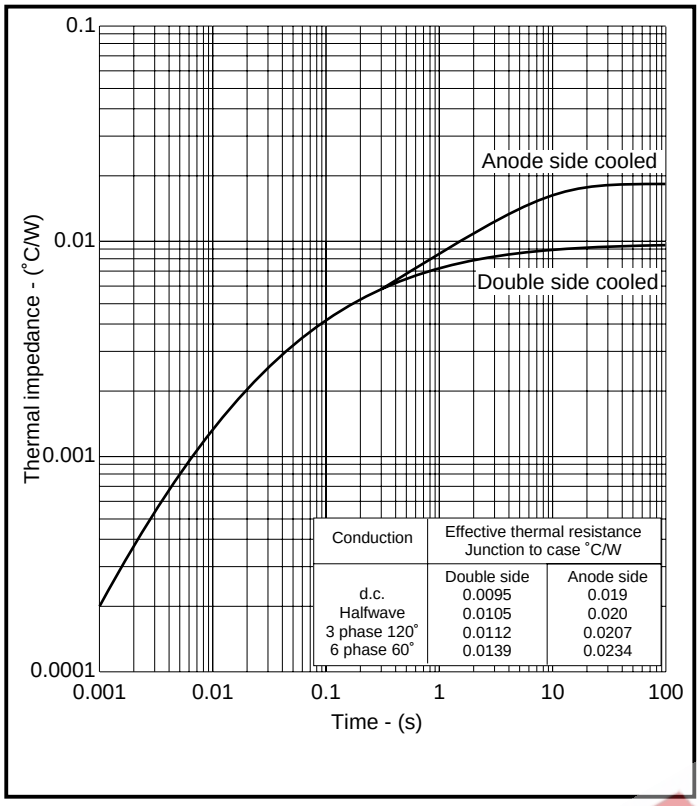


Fig.9 Maximum (limit) transient thermal impedance - junction to case

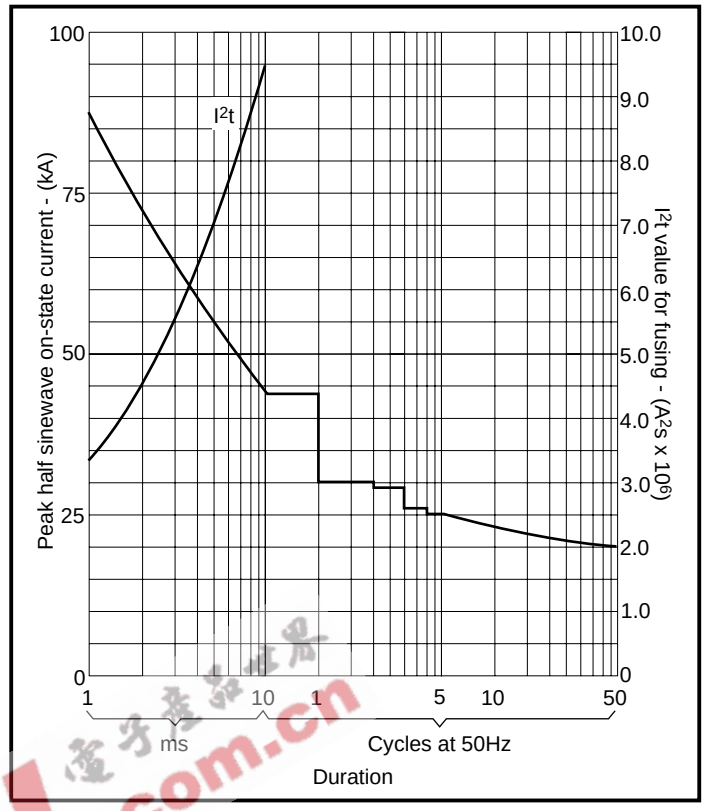
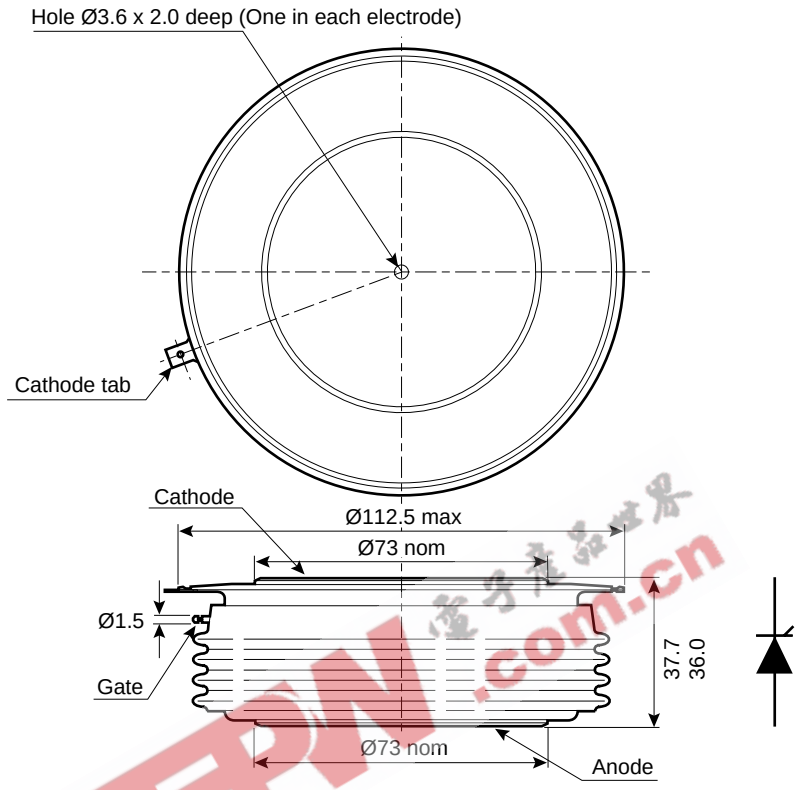


Fig.10 Surge (non-repetitive on-state current vs time

PACKAGE DETAILS

For further package information, please contact your nearest Customer Service Centre. 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

(The DCR1574 is also available in a thin package, type code V. Please contact Customer Services for more information).

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' 23mm 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.

http://www.dynexsemi.com

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Dynex Semiconductor annotate datasheets in the top right hard corner of the front page, to indicate product status. The annotations are as follows:-

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.