



DF051

Fast Recovery Diode

Replaces March 1998 version, DS4147-4.3

DS4147-5.0 January 2000

## APPLICATIONS

- Induction Heating
- A.C. Motor Drives
- Inverters And Choppers
- Welding
- High Frequency Rectification
- UPS

## FEATURES

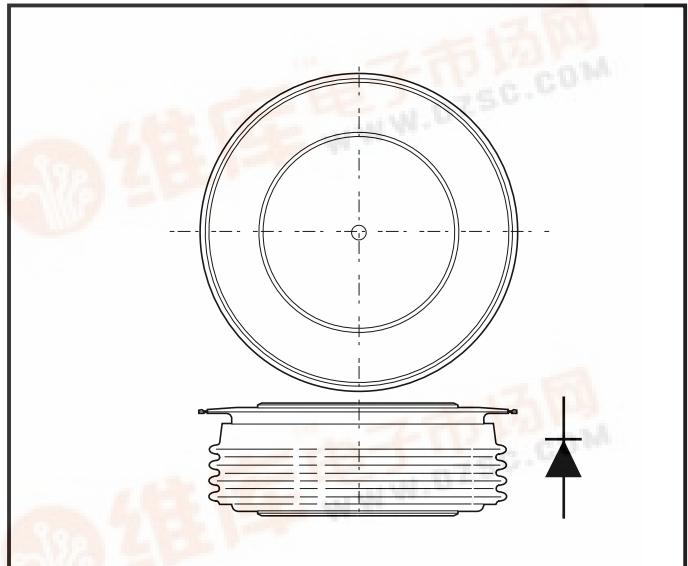
- Double side cooling
- High surge capability
- Low recovery charge

## VOLTAGE RATINGS

Type Number	Repetitive Peak Reverse Voltage $V_{RRM}$ V	Conditions
DF051 25	2500	$V_{RSM} = V_{RRM} + 100V$
DF051 24	2400	
DF051 22	2200	
DF051 20	2000	

Lower voltage grades available.

KEY PARAMETERS	
$V_{RRM}$	2500V
$I_{F(AV)}$	1490A
$I_{FSM}$	14000A
$Q_r$	800 $\mu$ C
$t_{rr}$	5.0 $\mu$ s



Outline type code: CB450.

See Package Details for further information.

## CURRENT RATINGS

Symbol	Parameter	Conditions	Max.	Units
<b>Double Side Cooled</b>				
$I_{F(AV)}$	Mean forward current	Half wave resistive load, $T_{case} = 65^\circ C$	1490	A
$I_{F(RMS)}$	RMS value	$T_{case} = 65^\circ C$	2340	A
$I_F$	Continuous (direct) forward current	$T_{case} = 65^\circ C$	2160	A
<b>Single Side Cooled (Anode side)</b>				
$I_{F(AV)}$	Mean forward current	Half wave resistive load, $T_{case} = 65^\circ C$	995	A
$I_{F(RMS)}$	RMS value	$T_{case} = 65^\circ C$	1560	A
$I_F$	Continuous (direct) forward current	$T_{case} = 65^\circ C$	1390	A

# DF051

## SURGE RATINGS

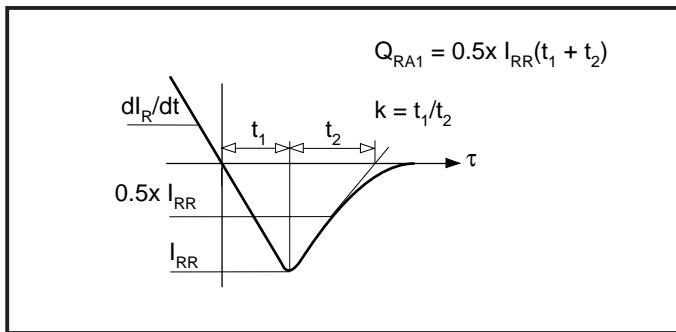
Symbol	Parameter	Conditions	Max.	Units
$I_{FSM}$	Surge (non-repetitive) forward current	10ms half sine; with 0% $V_{RRM}$ , $T_j = 150^\circ C$	14.0	kA
$I^2t$	$I^2t$ for fusing		$980 \times 10^3$	$A^2s$
$I_{FSM}$	Surge (non-repetitive) forward current	10ms half sine; with 50% $V_{RRM}$ , $T_j = 150^\circ C$	11.2	kA
$I^2t$	$I^2t$ for fusing		$627 \times 10^3$	$A^2s$

## THERMAL AND MECHANICAL DATA

Symbol	Parameter	Conditions	Min.	Max.	Units
$R_{th(j-c)}$	Thermal resistance - junction to case	Double side cooled	dc	-	$^\circ C/W$
		Single side cooled	Anode dc	-	$^\circ C/W$
			Cathode dc	-	$^\circ C/W$
$R_{th(c-h)}$	Thermal resistance - case to heatsink	Clamping force 23.5kN with mounting compound	Double side	-	$^\circ C/W$
			Single side	-	$^\circ C/W$
$T_{vj}$	Virtual junction temperature	On-state (conducting)	-	150	$^\circ C$
$T_{stg}$	Storage temperature range		-55	150	$^\circ C$
-	Clamping force		21.0	25.0	kN

## CHARACTERISTICS

Symbol	Parameter	Conditions	Typ.	Max.	Units
$V_{FM}$	Forward voltage	At 1500A peak, $T_{case} = 25^\circ C$	-	1.85	V
$I_{RRM}$	Peak reverse current	At $V_{RRM}$ , $T_{case} = 150^\circ C$	-	100	mA
$t_{rr}$	Reverse recovery time	$I_F = 1000A$ , $di_{RR}/dt = 100A/\mu s$ $T_{case} = 150^\circ C$ , $V_R = 100V$	5.0	-	$\mu s$
$Q_{RA1}$	Recovered charge (50% chord)		-	800	$\mu C$
$I_{RM}$	Reverse recovery current		-	250	A
K	Soft factor		1.6	-	-
$V_{TO}$	Threshold voltage	At $T_{vj} = 150^\circ C$	-	1.1	V
$r_T$	Slope resistance	At $T_{vj} = 150^\circ C$	-	0.5	$m\Omega$
$V_{FRM}$	Forward recovery voltage	$di/dt = 1000A/\mu s$ , $T_j = 125^\circ C$	-	-	V

DEFINITION OF K FACTOR AND  $Q_{RA1}$ 

## CURVES

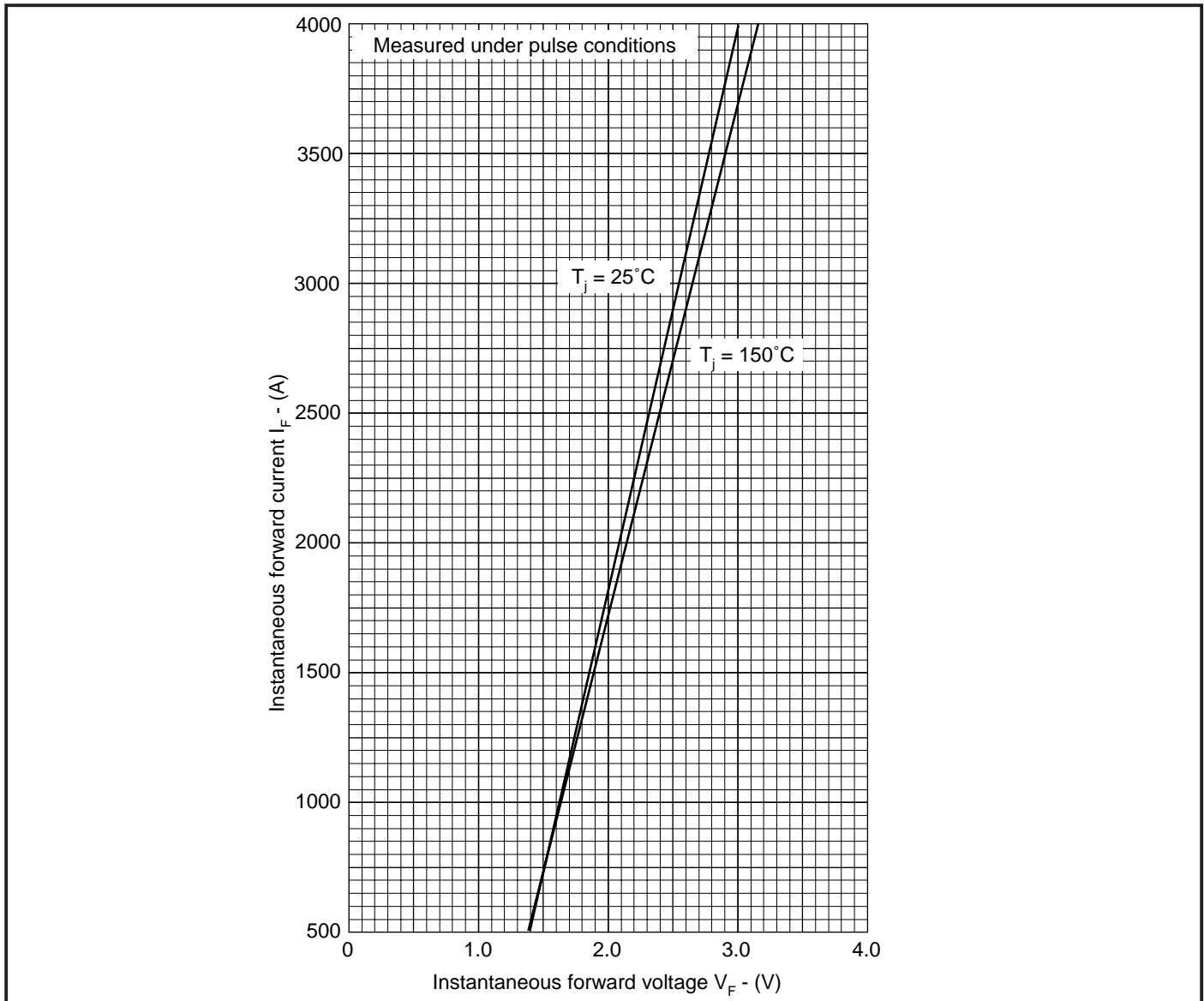


Fig.1 Maximum (limit) forward characteristics

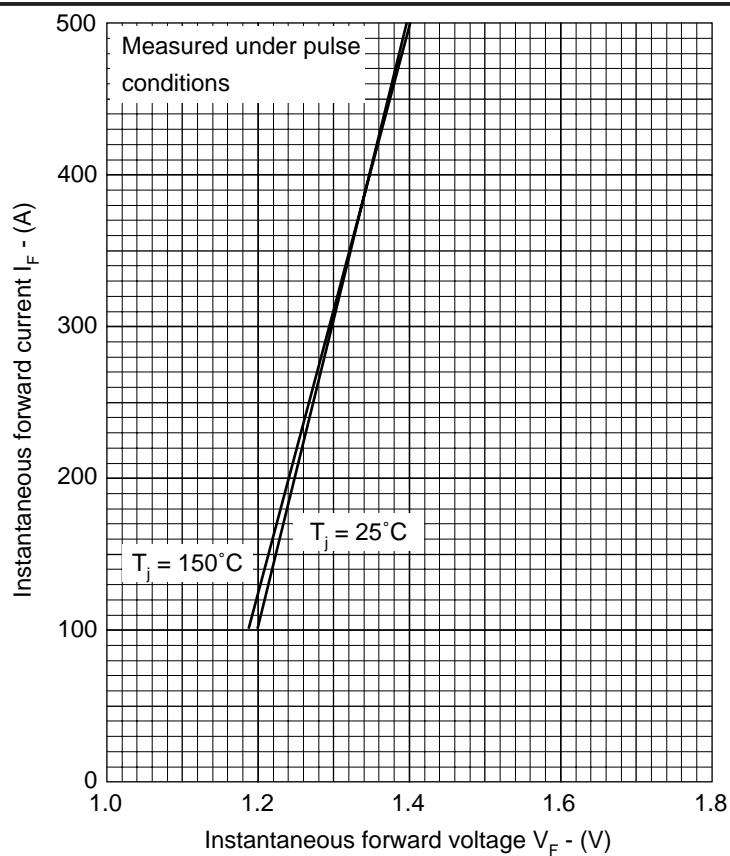


Fig.2 Maximum (limit) forward characteristics

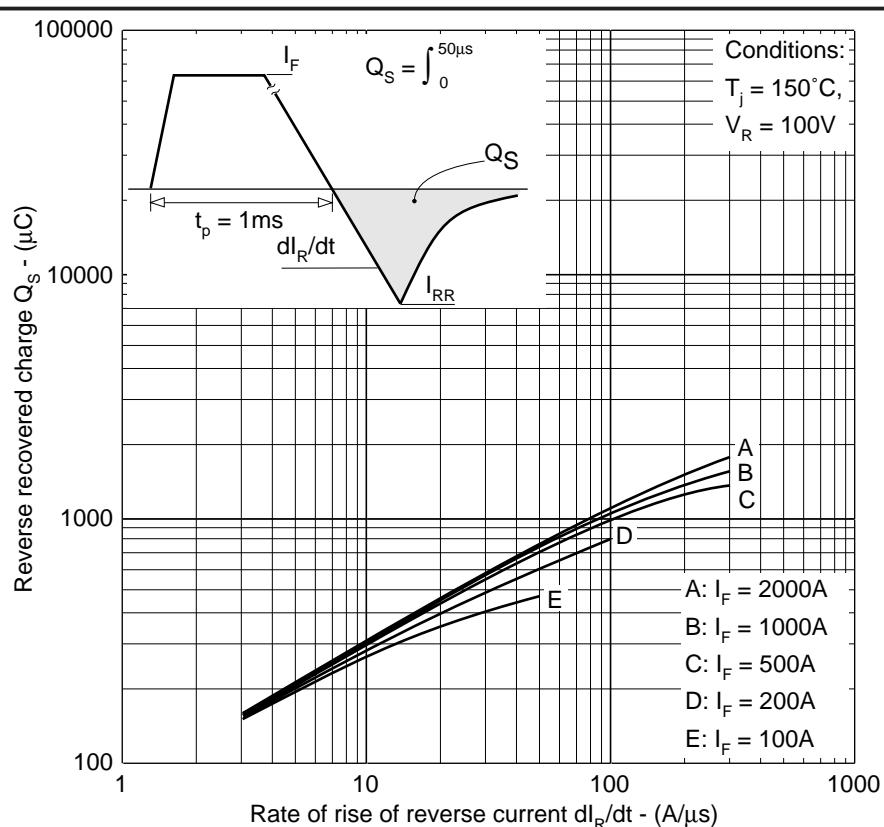


Fig.3 Recovered charge

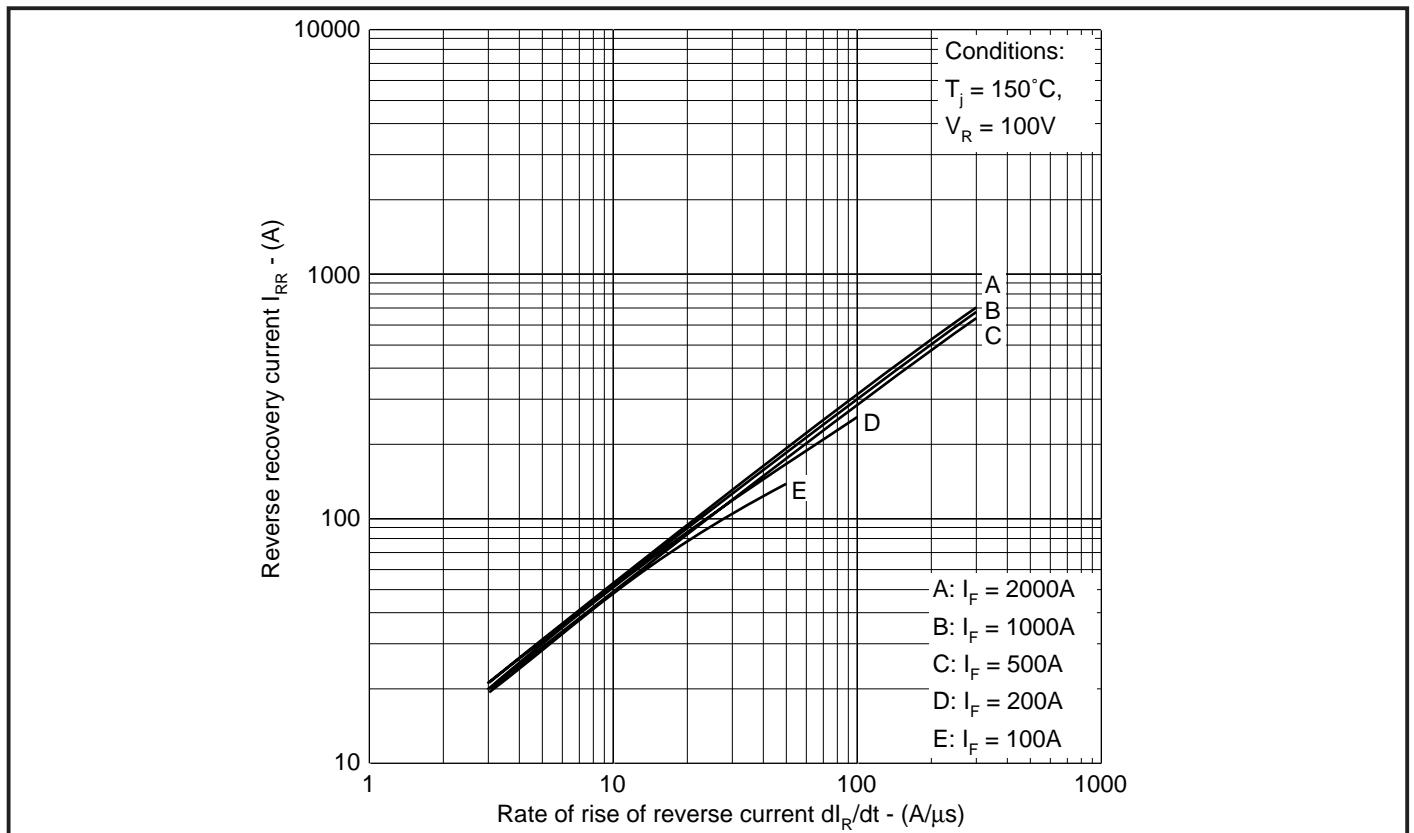
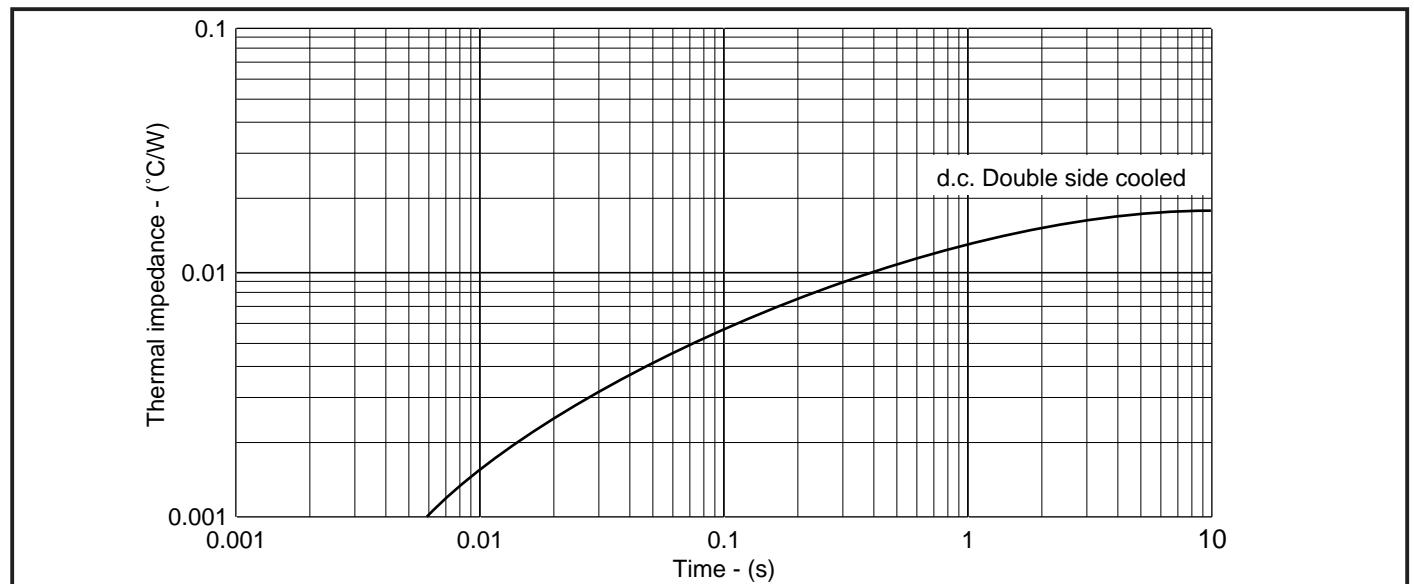


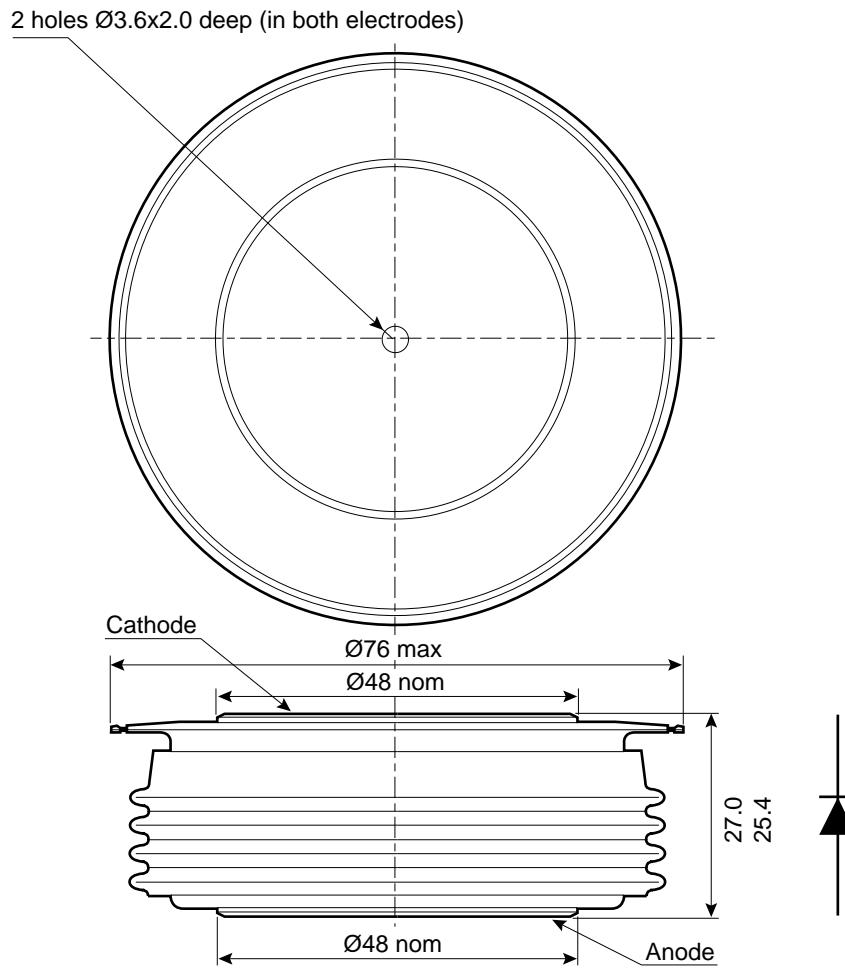
Fig.4 Typical reverse recovery current vs rate of rise of reverse current

Fig.5 Maximum (limit) transient thermal impedance - junction to case - ( $^\circ\text{C/W}$ )

## DF051

### 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: 500g  
Clamping force: 19.6kN ± 10%

Package outline type code: CB450

### ASSOCIATED PUBLICATIONS

Title	Application Note Number
Calculating the junction temperature or power semiconductors	AN4506
Recommendations for clamping power semiconductors	AN4839
Thyristor and diode measurement with a multi-meter	AN4853
Use of $V_{TO}$ , $r_T$ on-state characteristic	AN5001

## 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 / clamping systems in line with advances in device types and the voltage 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 up to date 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 offers a varied selection of pre-loaded clamps to suit all of our manufactured devices. This include cube clamps for single side cooling of 'T' 22mm

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

Power Assembly has it's own proprietary range of extruded aluminium heatsinks. They have been designed to optimise the performance of our 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 the factory.



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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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