DF685

Fast Recovery Diode

Replaces March 1998 version, DS4303-1.3

DS4303-2.0 January 2000

APPLICATIONS

- Snubber Diode For GTO Applications

KEY PARAMETERS

V_{RRM}	4500V
$I_{F(AV)}$	445A
I_{FSM}	4500A
Q_r	650μC
t_{rr}	5μs

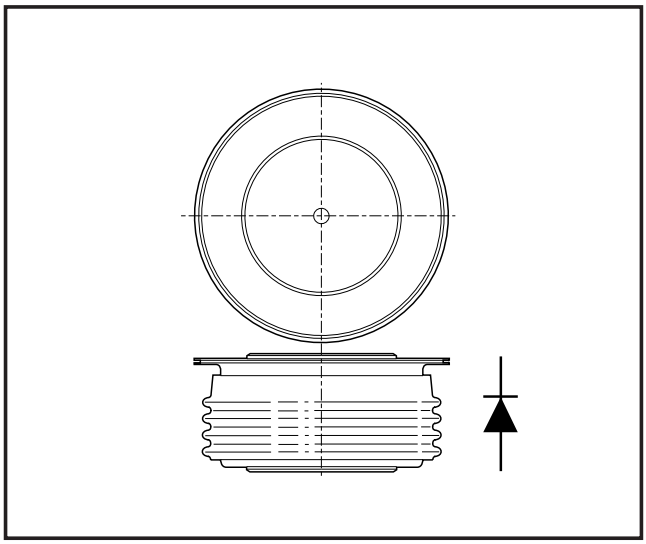
FEATURES

- Double Side Cooling
- High Surge Capability
- Low Recovery Charge

VOLTAGE RATINGS

Type Number	Repetitive Peak Reverse Voltage V_{RRM} V	Conditions
DF685 45	4500	$V_{RSM} = V_{RRM} + 100V$
DF685 44	4400	
DF685 43	4300	
DF685 42	4200	
DF685 41	4100	
DF685 40	4000	

Lower voltage grades available.



Outline type code: M779b.
See Package Details for further information.

CURRENT RATINGS

Symbol	Parameter	Conditions	Max.	Units
Double Side Cooled				
$I_{F(AV)}$	Mean forward current	Half wave resistive load, T_{case} = 65°C	445	A
$I_{F(RMS)}$	RMS value	T_{case} = 65°C	700	A
I_F	Continuous (direct) forward current	T_{case} = 65°C	610	A
Single Side Cooled (Anode side)				
$I_{F(AV)}$	Mean forward current	Half wave resistive load, T_{case} = 65°C	280	A
$I_{F(RMS)}$	RMS value	T_{case} = 65°C	440	A
I_F	Continuous (direct) forward current	T_{case} = 65°C	365	A

SURGE RATINGS

Symbol	Parameter	Conditions	Max.	Units
I_{FSM}	Surge (non-repetitive) forward current	10ms half sine; with 0% $V_{RRM,}$ T_j = 150°C	4.5	kA
I^2t	I^2t for fusing		$101.25x10^3$	A^2s
I_{FSM}	Surge (non-repetitive) forward current	10ms half sine; with 50% $V_{RRM,}$ T_j = 150°C	3.6	kA
I^2t	I^2t for fusing		$64.8x10^3$	A^2s
I_{FSM}	Surge (non-repetitive) forward current	10ms half sine; with 100% $V_{RRM,}$ T_j = 150°C	-	kA
I^2t	I^2t for fusing		-	A^2s

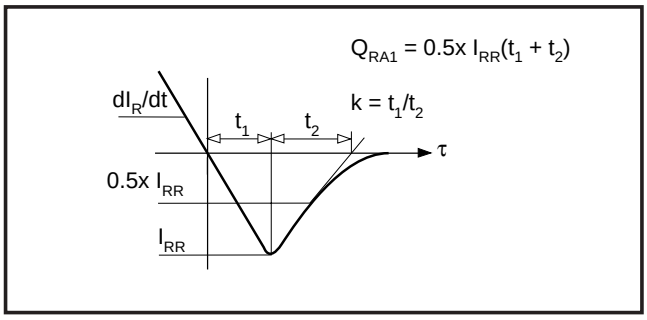
THERMAL AND MECHANICAL DATA

Symbol	Parameter	Conditions		Min.	Max.	Units
$R_{th(j-c)}$	Thermal resistance - junction to case	Double side cooled	dc	-	0.045	°C/W
		Single side cooled	Anode dc	-	0.086	°C/W
			Cathode dc	-	0.095	°C/W
$R_{th(c-h)}$	Thermal resistance - case to heatsink	Clamping force 10kN with mounting compound	Double side	-	0.01	°C/W
			Single side	-	0.02	°C/W
T_{vj}	Virtual junction temperature	On-state (conducting)		-	150	°C
T_{stg}	Storage temperature range			-55	150	°C
-	Clamping force			9.0	11.0	kN

CHARACTERISTICS

Symbol	Parameter	Conditions	Typ.	Max.	Units
V_{FM}	Forward voltage	At 1500A peak, T_{case} = 25°C	-	4.8	V
I_{RRM}	Peak reverse current	At V_{RRM}, T_{case} = 150°C	-	80	mA
t_{rr}	Reverse recovery time	I_F = 1000A, di_{RR}/dt = 100A/µs T_{case} = 150°C, V_R = 100V	5	-	µs
Q_{RA1}	Recovered charge (50% chord)		-	650	µC
I_{RM}	Reverse recovery current		270	-	A
K	Soft factor		1.8	-	-
V_{TO}	Threshold voltage	At T_{vj} = 150°C	-	2.0	V
r_T	Slope resistance	At T_{vj} = 150°C	-	1.76	mΩ
V_{FRM}	Forward recovery voltage	di/dt = 1000A/µs, T_j = 125°C	-	220	V

DEFINITION OF K FACTOR AND Q_{RA1}



CURVES

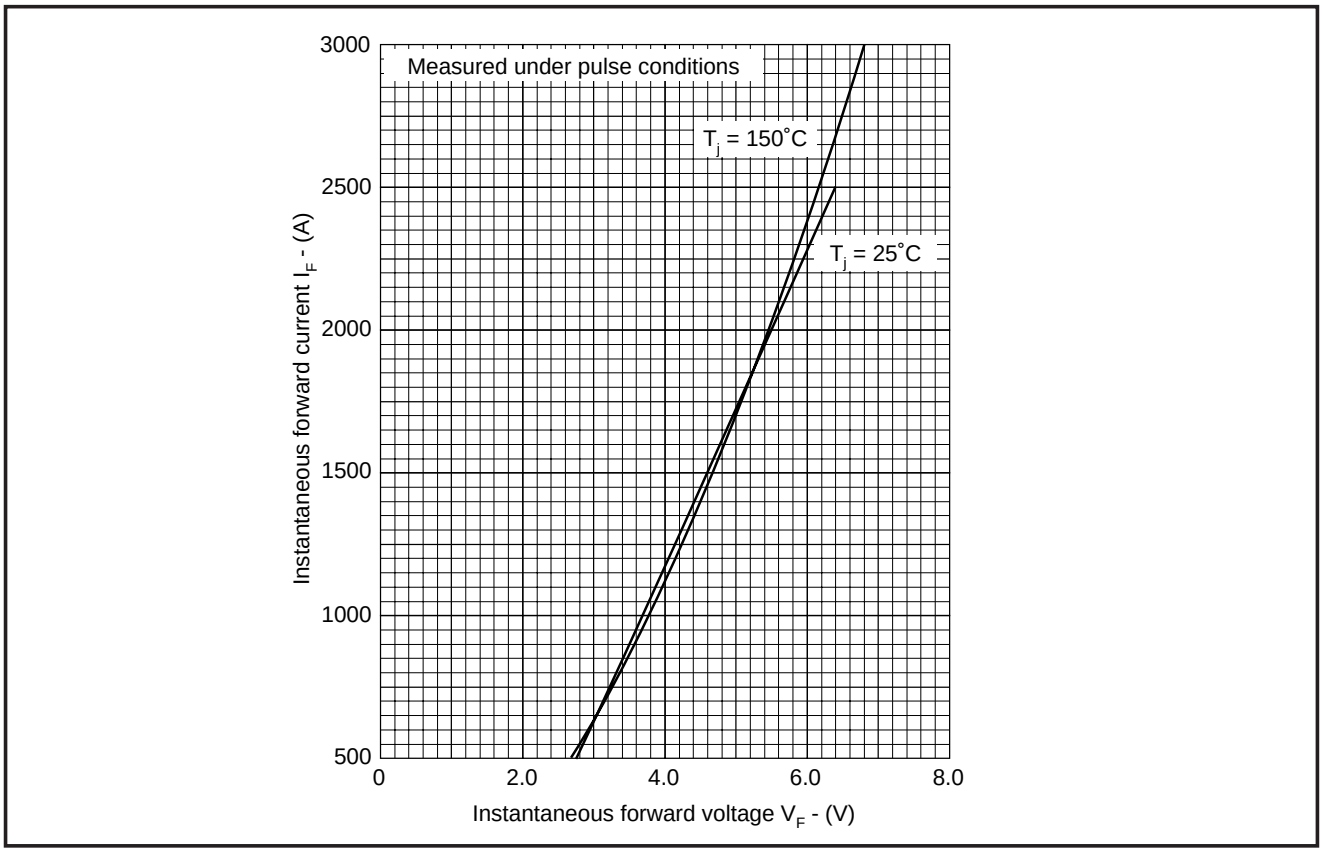


Fig. 1 Maximum (limit) forward characteristics

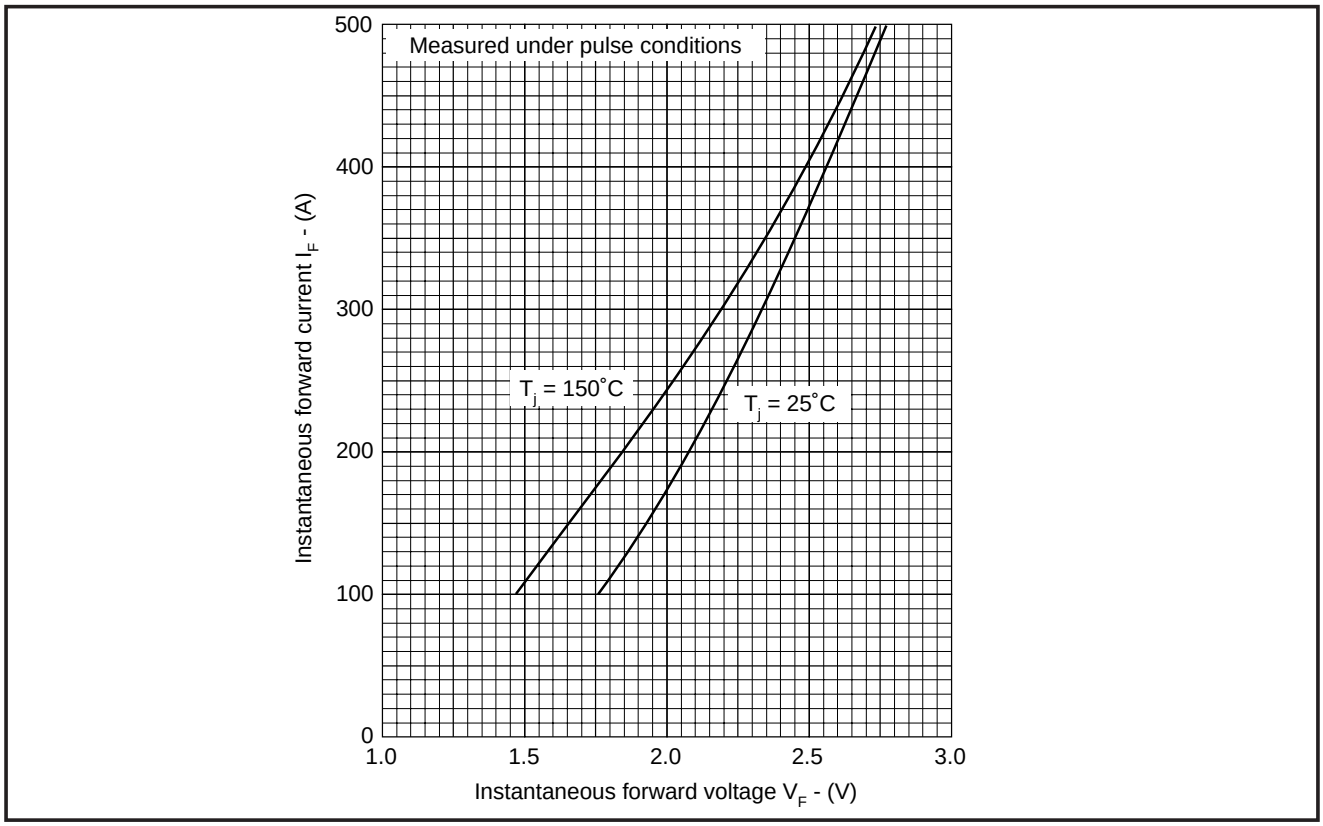


Fig. 2 Maximum (limit) forward characteristics

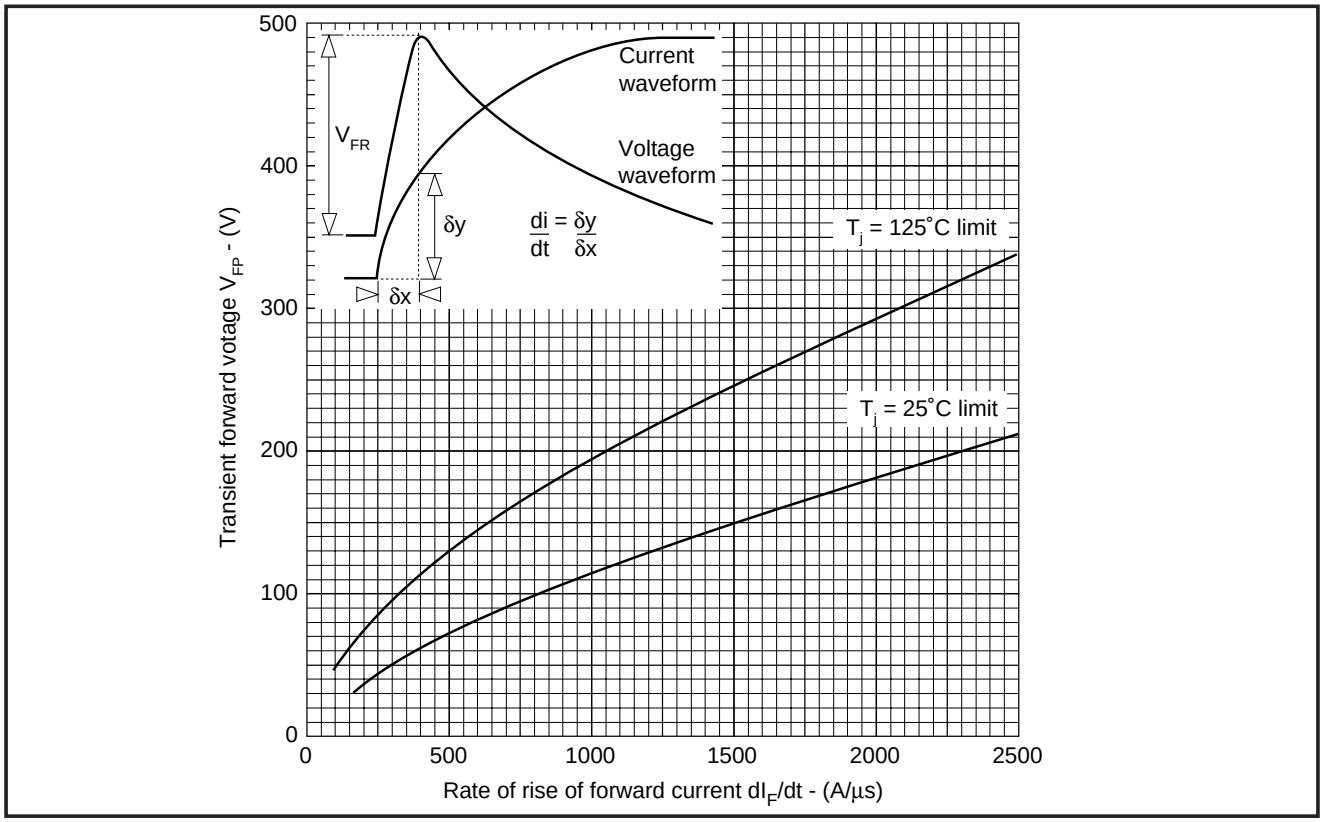


Fig. 3 Transient forward voltage vs rate of rise of forward current

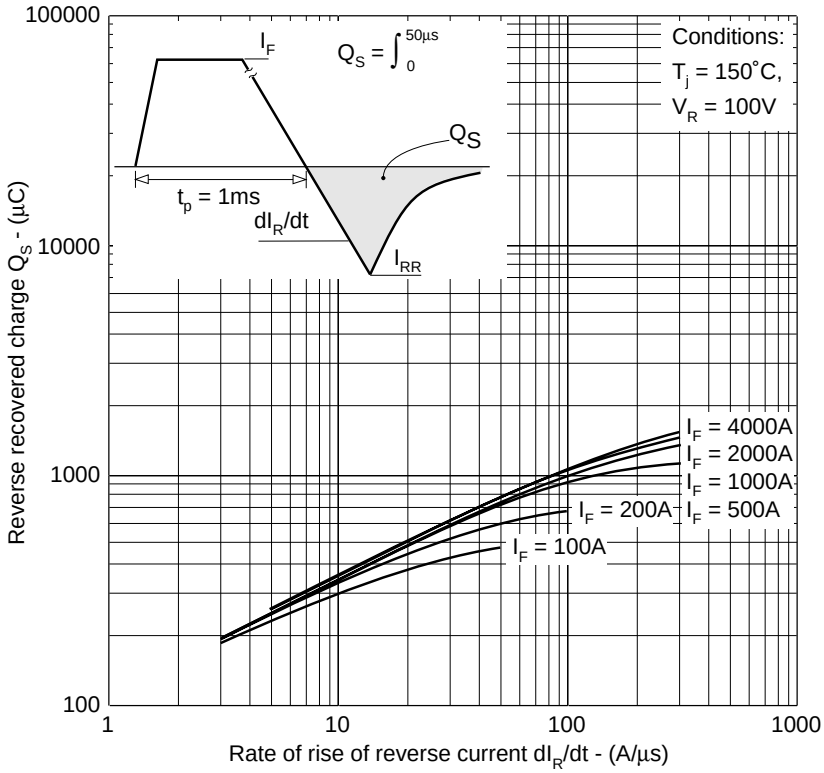


Fig. 4 Recovered charge

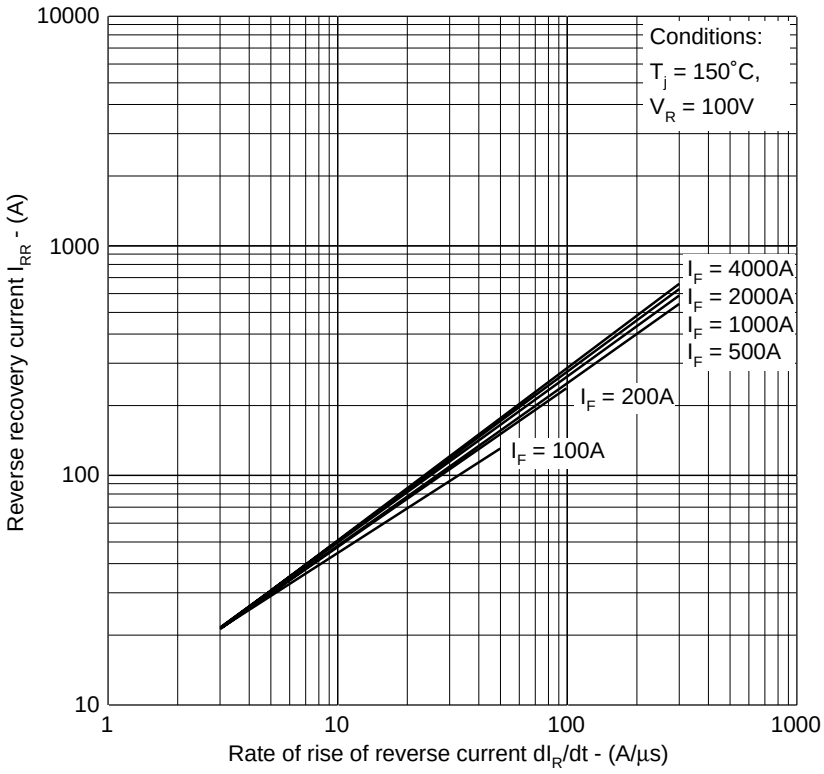


Fig. 5 Typical reverse recovery current vs rate of rise of reverse current

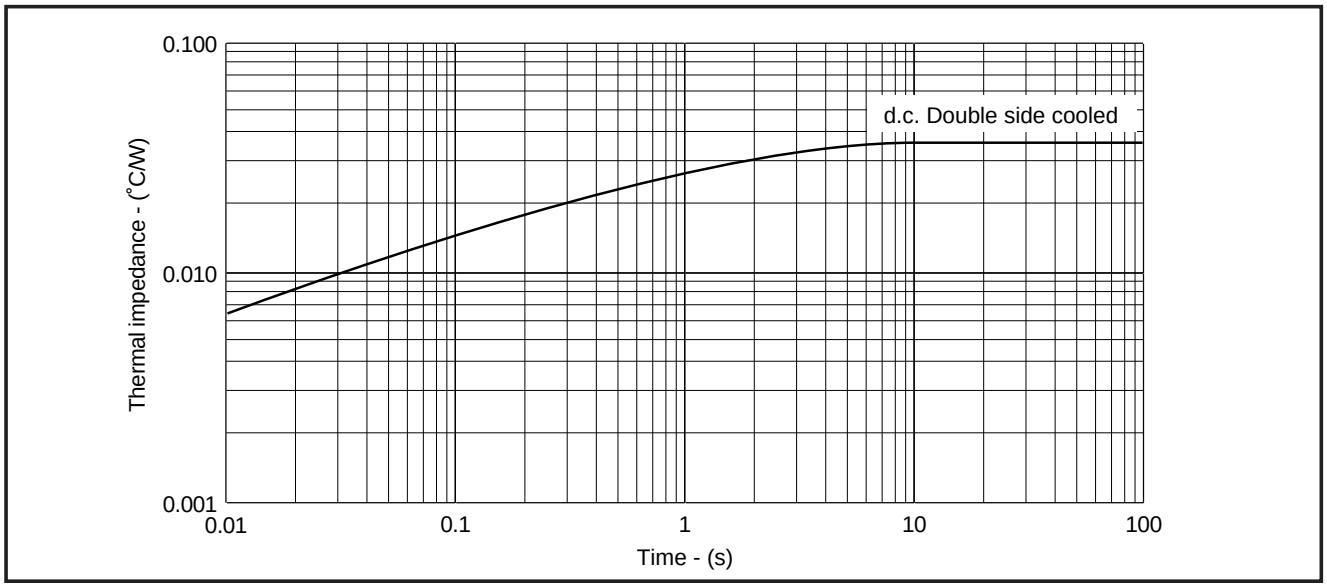
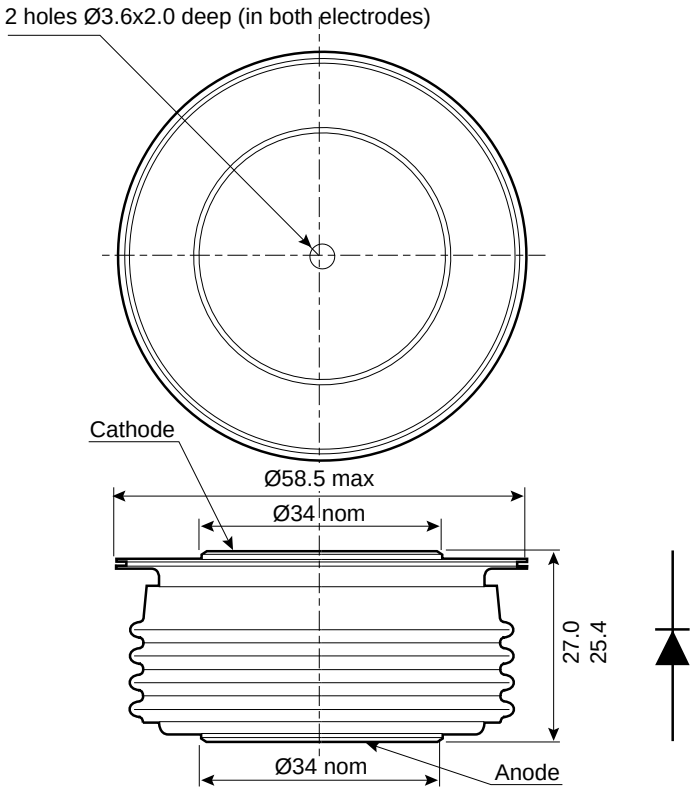


Fig. 6 Maximum (limit) transient thermal impedance - junction to case - (˚C/W)

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: 310g
Clamping force: 12kN ±10%

Package outine type code: M779b

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 or 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.

http://www.dynexsemi.com

e-mail: power_solutions@dynexsemi.com

HEADQUARTERS OPERATIONS
DYNEX SEMICONDUCTOR LTD
Doddington Road, Lincoln.
Lincolnshire. LN6 3LF. United Kingdom.
Tel: 00-44-(0)1522-500500
Fax: 00-44-(0)1522-500550

DYNEX POWER INC.
Unit 7 - 58 Antares Drive,
Nepean, Ontario, Canada K2E 7W6.
Tel: 613.723.7035
Fax: 613.723.1518
Toll Free: 1.888.33.DYNEX (39639)

CUSTOMER SERVICE CENTRES
France, Benelux, Italy and Spain Tel: +33 (0)1 69 18 90 00. Fax: +33 (0)1 64 46 54 50
North America Tel: 011-800-5554-5554. Fax: 011-800-5444-5444
UK, Germany, Scandinavia & Rest Of World Tel: +44 (0)1522 500500. Fax: +44 (0)1522 500020

SALES OFFICES
France, Benelux, Italy and Spain Tel: +33 (0)1 69 18 90 00. Fax: +33 (0)1 64 46 54 50
Germany Tel: 07351 827723
North America Tel: (613) 723-7035. Fax: (613) 723-1518. Toll Free: 1.888.33.DYNEX (39639) /
Tel: (831) 440-1988. Fax: (831) 440-1989 / Tel: (949) 733-3005. Fax: (949) 733-2986.
UK, Germany, Scandinavia & Rest Of World Tel: +44 (0)1522 500500. Fax: +44 (0)1522 500020
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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.