DF451

Fast Recovery Diode

Replaces March 1999 version, DS4142-4.0

DS4143-5.0 January 2000

FEATURES

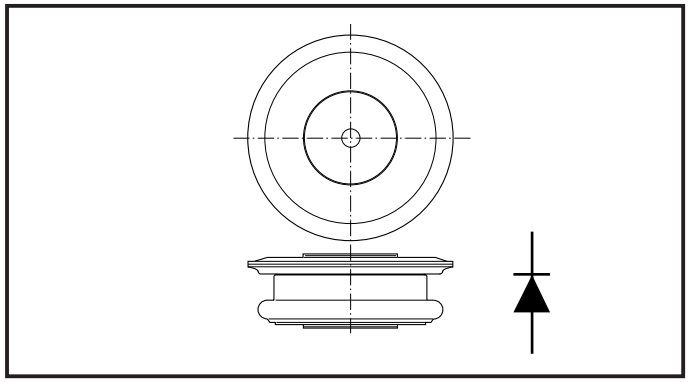
- Double Side Cooling
- High Surge Capability
- Low Recovery Charge

KEY PARAMETERS

V_{RRM}	1600V
$I_{F(AV)}$	295A
I_{FSM}	3500A
Q_r	25μC
t_{rr}	1.22μs

Applications

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



Outline type code: M771.
See Package Details for further information.

Voltage Ratings

Type Number	Repetitive Peak Reverse Voltage V_{RRM} V	Conditions
DF451 16	1600	$V_{RSM} = V_{RRM} + 100V$
DF451 14	1400	
DF451 12	1200	
DF451 10	1000	
DF451 08	800	
DF451 06	600	

CURRENT RATINGS

Symbol	Parameter	Conditions	Max.	Units
Double Side Cooled				
$I_{F(AV)}$	Mean forward current	Half wave resistive load, T_{case} = 65°C	295	A
$I_{F(RMS)}$	RMS value	T_{case} = 65°C	543	A
I_F	Continuous (direct) forward current	T_{case} = 65°C	391	A
Single Side Cooled (Anode side)				
$I_{F(AV)}$	Mean forward current	Half wave resistive load, T_{case} = 65°C	220	A
$I_{F(RMS)}$	RMS value	T_{case} = 65°C	348	A
I_F	Continuous (direct) forward current	T_{case} = 65°C	285	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	3.5	kA
I^2t	I^2t for fusing		61.25×10^3	A^2s
I_{FSM}	Surge (non-repetitive) forward current	10ms half sine; with 50% $V_{RRM,}$ T_j = 150°C	2.8	kA
I^2t	I^2t for fusing		39.2×10^3	A^2s

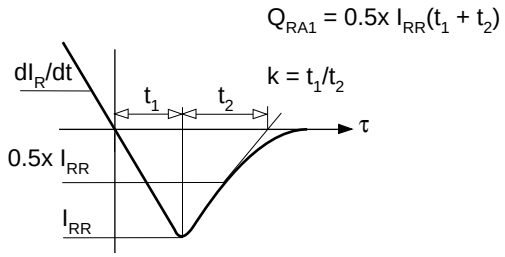
THERMAL AND MECHANICAL DATA

Symbol	Parameter	Conditions		-	Max.	Units
$R_{th(j-c)}$	Thermal resistance - junction to case	Double side cooled	dc	-	0.07	°C/W
		Single side cooled	Anode dc	-	0.133	°C/W
			Cathode dc	-	0.147	°C/W
$R_{th(c-h)}$	Thermal resistance - case to heatsink	Clamping force 5.0kN with mounting compound	Double side	-	0.02	°C/W
			Single side	-	0.02	°C/W
T_{vj}	Virtual junction temperature	Forward (conducting)		-	150	°C
T_{stg}	Storage temperature range			–55	150	°C
-	Clamping force			4.5	5.5	kN

CHARACTERISTICS

Symbol	Parameter	Conditions	Typ.	Max.	Units
V_{FM}	Forward voltage	At 600A peak, T_{case} = 25°C	-	2.65	V
I_{RRM}	Peak reverse current	At V_{RRM}, T_{case} = 125°C	-	100	mA
t_{rr}	Reverse recovery time	I_F = 500A, di_{RR}/dt = -80A/µs T_{case} = 125°C, V_R = 100V	1.22	-	µs
Q_{RA1}	Recovered charge (50% chord)		-	25	µC
I_{RM}	Reverse recovery current		-	40	A
K	Soft factor		1.7	-	-
V_{TO}	Threshold voltage	At T_{vj} = 125°C	-	1.6	V
r_T	Slope resistance	At T_{vj} = 125°C	-	1.5	mΩ
V_{FRM}	Forward recovery voltage	di/dt = 1000A/µs, T_j = 125°C	-	40	V

DEFINITION OF K FACTOR AND Q_{RA1}



CURVES

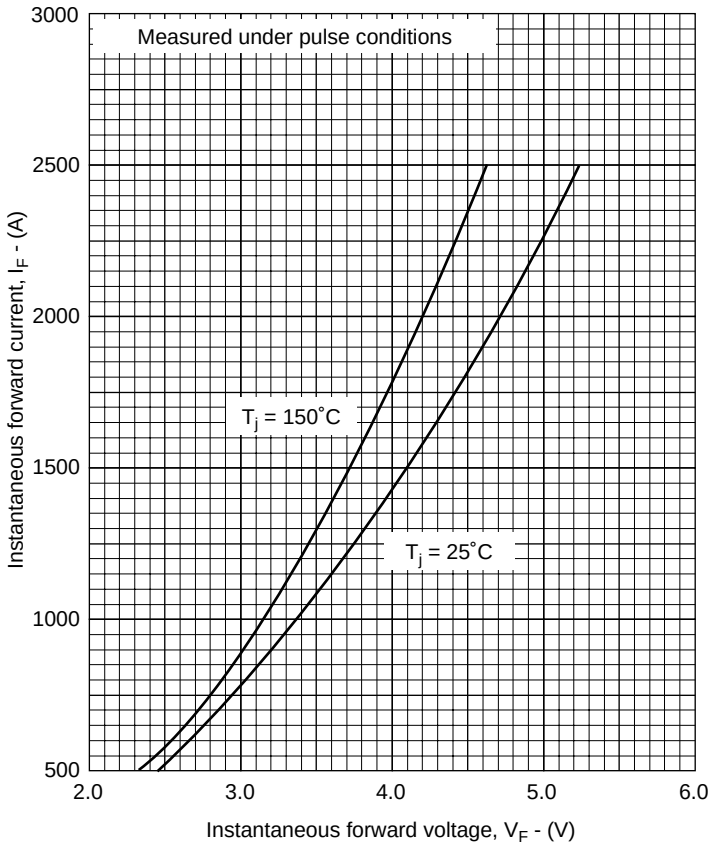


Fig.1 Maximum (limit) forward characteristics

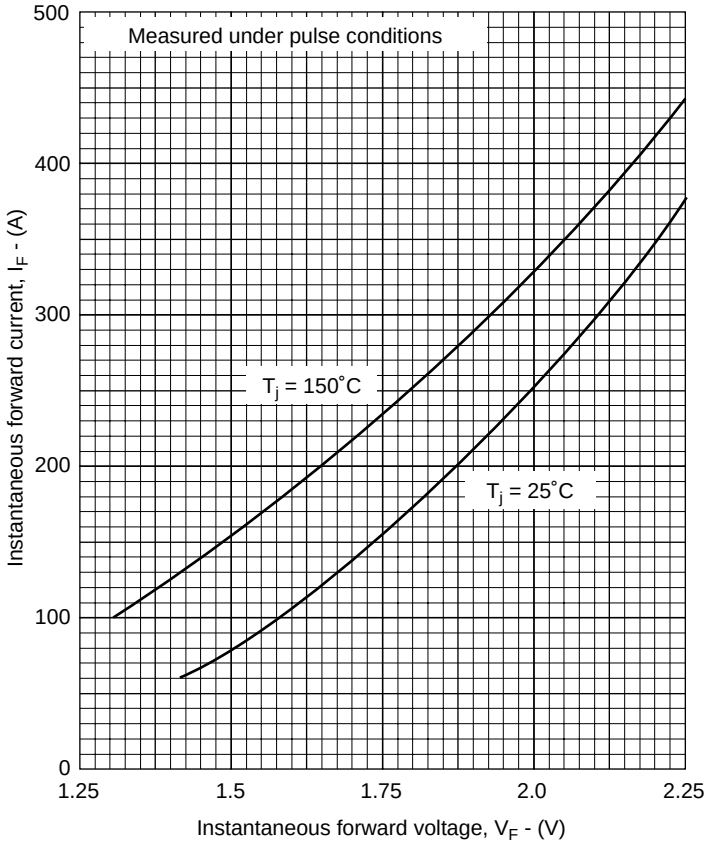


Fig.2 Maximum (limit) forward characteristics

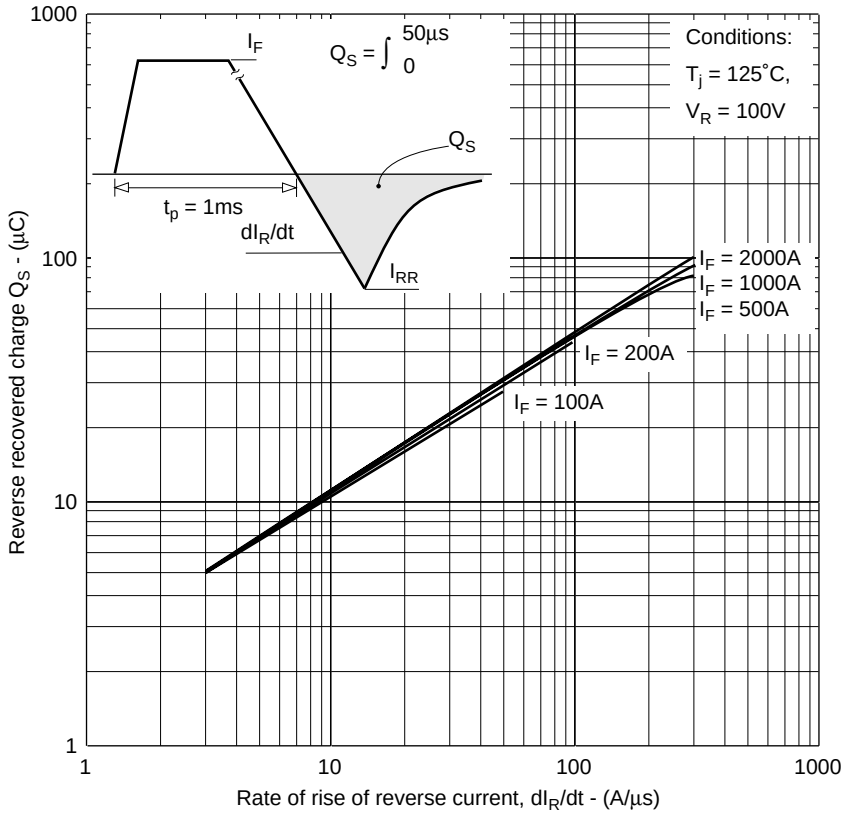


Fig.3 Recovered charge

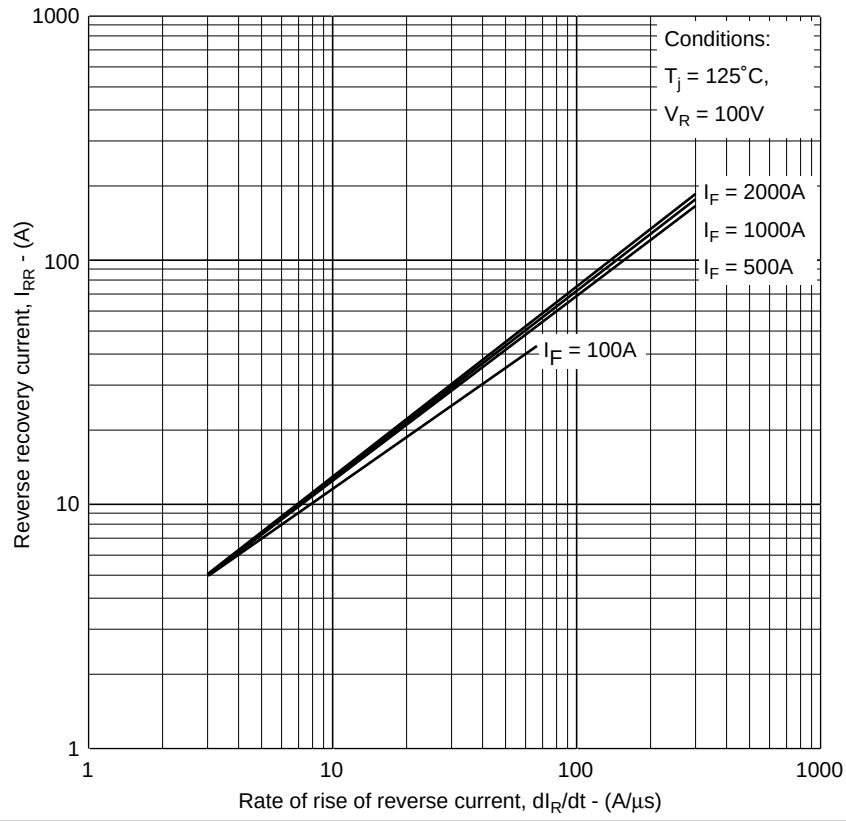


Fig.4 Typical reverse recovery current vs rate of rise of forward current

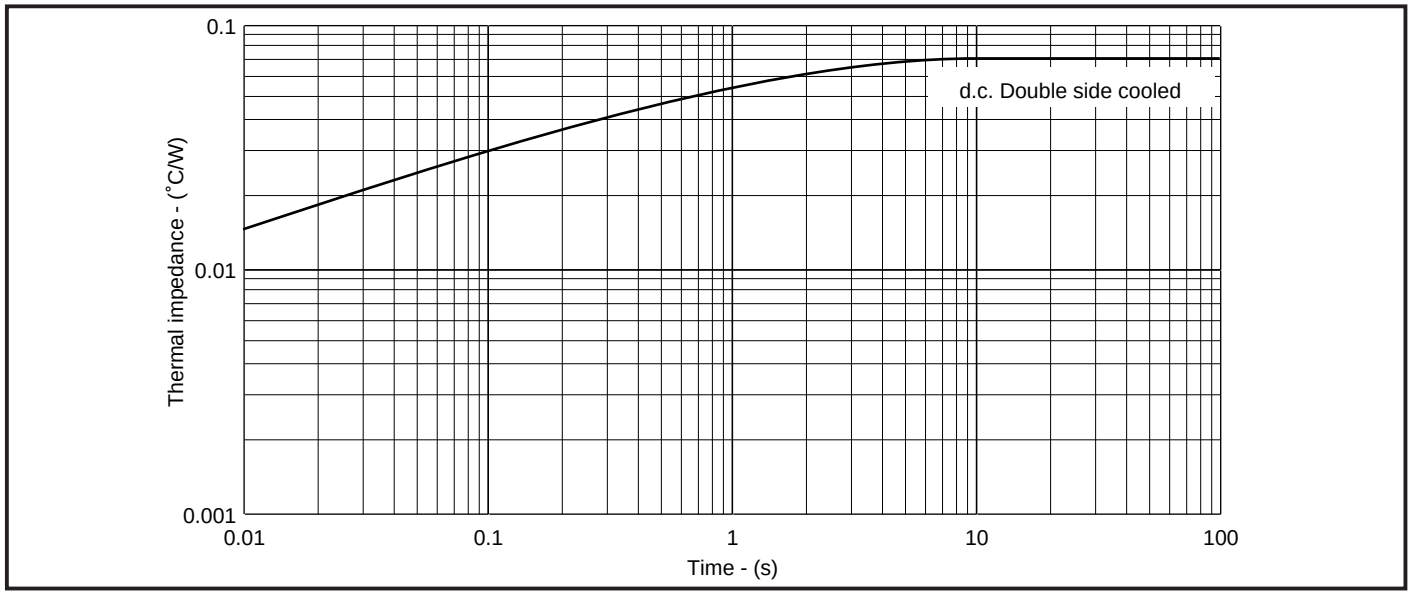
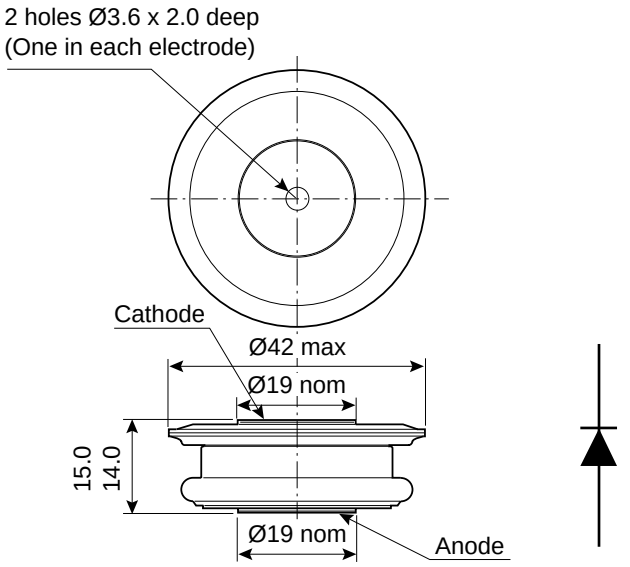


Fig.5 Maximum (limit) transient thermal impedance - junction to case - (˚C/W)

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: 50g
Clamping force: 5kN ±10%

Package outine type code: M771

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.



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