# DFS454

## Fast Recovery Diode

Replaces March 1998 version, DS4145-3.4

DS4145-4.0 January 2000

### APPLICATIONS

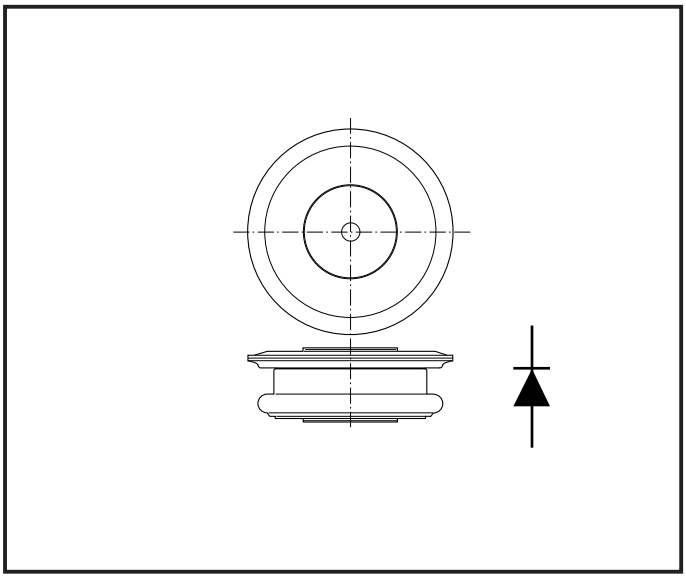
- Induction Heating
- A.C. Motor Drives
- Inverters And Choppers
- Welding
- High Frequency Rectification
- UPS

### KEY PARAMETERS

| | |
|---|---|
| $V_{RRM}$ | 2500V |
| $I_{F(AV)}$ | 365A |
| $I_{FSM}$ | 3500A |
| $Q_r$ | 200μC |
| $t_{rr}$ | 2.0μs |

### FEATURES

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



**Outline type code: M771.**
**See Package Detials for further information.**

### VOLTAGE RATINGS

| Type Number | Repetitive Peak Reverse Voltage $V_{RRM}$ V | Conditions |
|---|---|---|
| DFS454 25<br>DFS454 24<br>DFS454 22<br>DFS454 20 | 2500<br>2400<br>2200<br>2000 | $V_{RSM} = V_{RRM} + 100V$ |

### CURRENT RATINGS

| Symbol | Parameter | Conditions | Max. | Units |
|---|---|---|---|---|
| **Double Side Cooled** | | | | |
| $I_{F(AV)}$ | Mean forward current | Half wave resistive load, $T_{case}$ = 65°C | 365 | A |
| $I_{F(RMS)}$ | RMS value | $T_{case}$ = 65°C | 575 | A |
| $I_F$ | Continuous (direct) forward current | $T_{case}$ = 65°C | 525 | A |
| **Single Side Cooled (Anode side)** | | | | |
| $I_{F(AV)}$ | Mean forward current | Half wave resistive load, $T_{case}$ = 65°C | 242 | A |
| $I_{F(RMS)}$ | RMS value | $T_{case}$ = 65°C | 380 | A |
| $I_F$ | Continuous (direct) forward current | $T_{case}$ = 65°C | 335 | 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 | | $61 \times 10^3$ | $A^2s$ |
| $I_{FSM}$ | 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 | | $39.2 \times 10^3$ | $A^2s$ |
| $I_{FSM}$ | Surge (non-repetitive) forward current | 10ms half sine; with 100% $V_{RRM,}$ $T_j$ = 150°C | - | kA |
| $I^2t$ | $I^2t$ for fusing | | - | $A^2s$ |

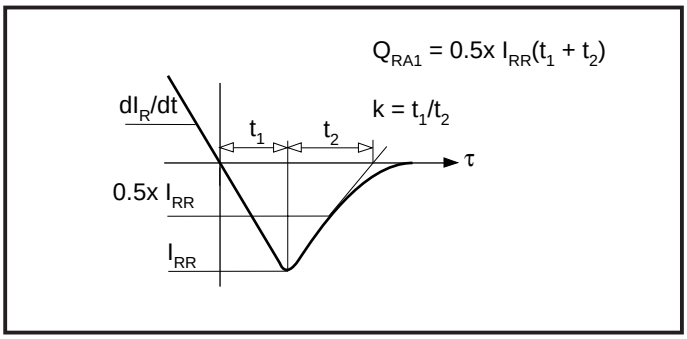
## THERMAL AND MECHANICAL DATA

| Symbol | Parameter | Conditions | | Min. | Max. | Units |
|---|---|---|---|---|---|---|
| $R_{th(j-c)}$ | Thermal resistance - junction to case | Double side cooled | dc | - | 0.07 | °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 3.5kN with mounting compound | Double side | - | 0.02 | °C/W |
| | | | Single side | - | 0.04 | °C/W |
| $T_{vj}$ | Virtual junction temperature | On-state (conducting) | | - | 150 | °C |
| $T_{stg}$ | Storage temperature range | | | -55 | 175 | °C |
| - | Clamping force | | | 3.0 | 4.0 | kN |

## CHARACTERISTICS

| Symbol | Parameter | Conditions | Typ. | Max. | Units |
|---|---|---|---|---|---|
| $V_{FM}$ | Forward voltage | At 1000A peak, $T_{case}$ = 25°C | - | 3.1 | V |
| $I_{RRM}$ | Peak reverse current | At $V_{RRM}$, $T_{case}$ = 150°C | - | 50 | mA |
| $t_{rr}$ | Reverse recovery time | $I_F$ = 750A, $di_{RR}/dt$ = 100A/µs<br>$T_{case}$ = 125°C, $V_R$ = 100V | 2.0 | - | µs |
| $Q_{RA1}$ | Recovered charge (50% chord) | | - | 200 | µC |
| $I_{RM}$ | Reverse recovery current | | 150 | - | A |
| K | Soft factor | | 1.3 | - | - |
| $V_{TO}$ | Threshold voltage | At $T_{vj}$ = 150°C | - | 1.64 | V |
| $r_T$ | Slope resistance | At $T_{vj}$ = 150°C | - | 1.54 | mΩ |
| $V_{FRM}$ | Forward recovery voltage | di/dt = 1000A/µs, $T_j$ = 125°C | - | 120 | V |

## DEFINITION OF K FACTOR AND $Q_{RA1}$




## CURVES

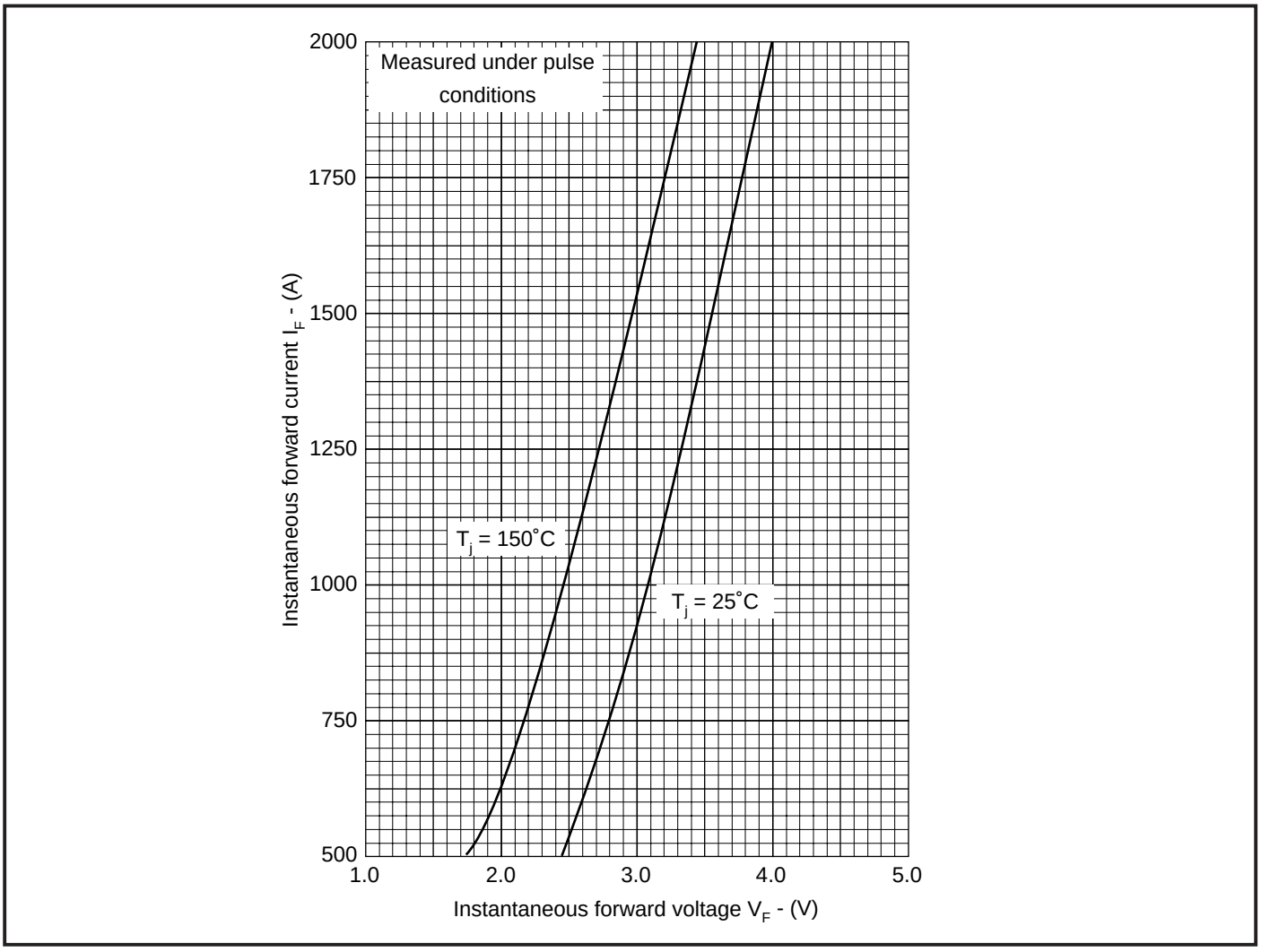



**Fig. 1 Maximum (limit) forward characteristics**

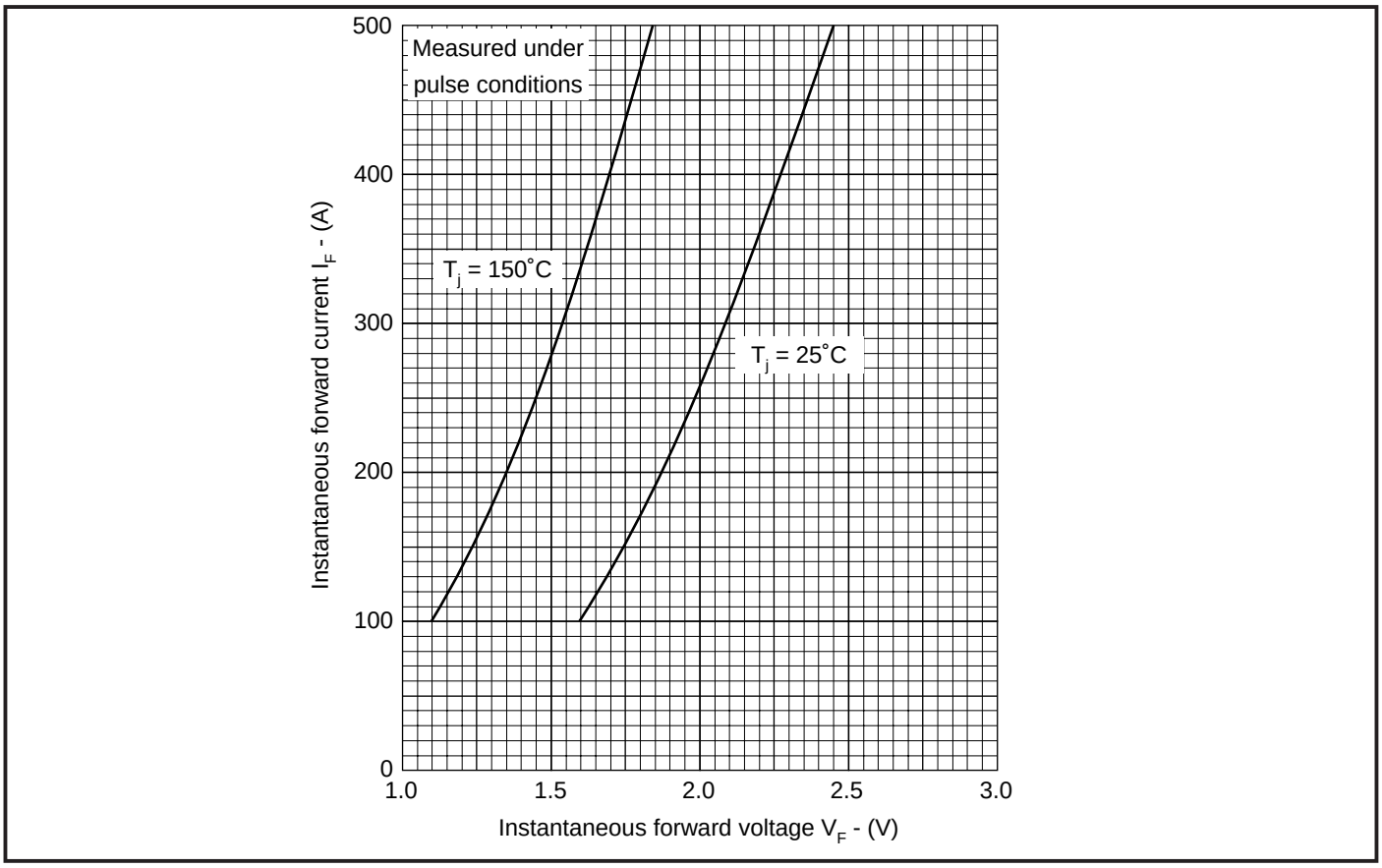



**Fig. 2 Maximum (limit) forward characteristics**

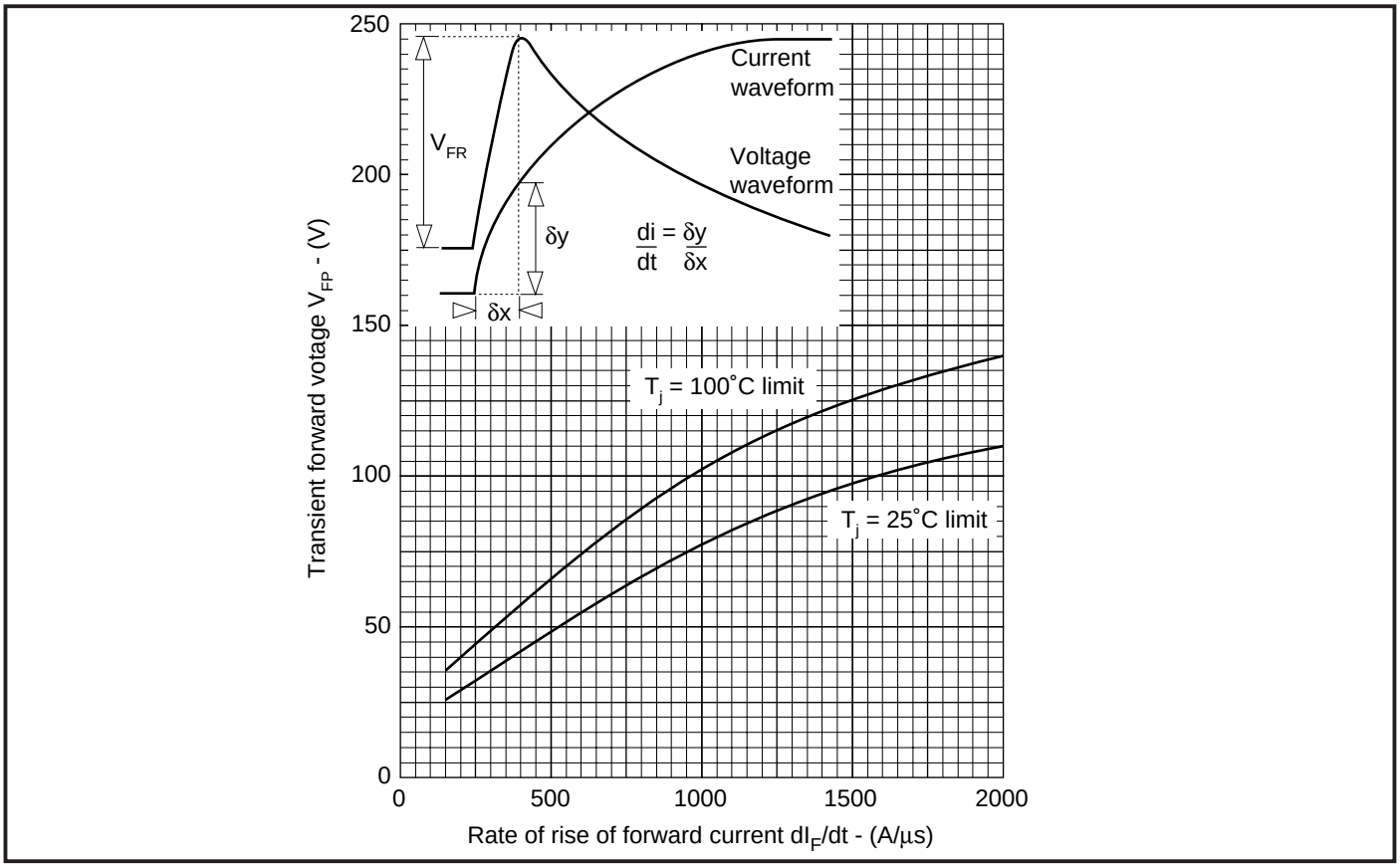



**Fig. 3 Transient forward voltage vs rate of rise of forward current**

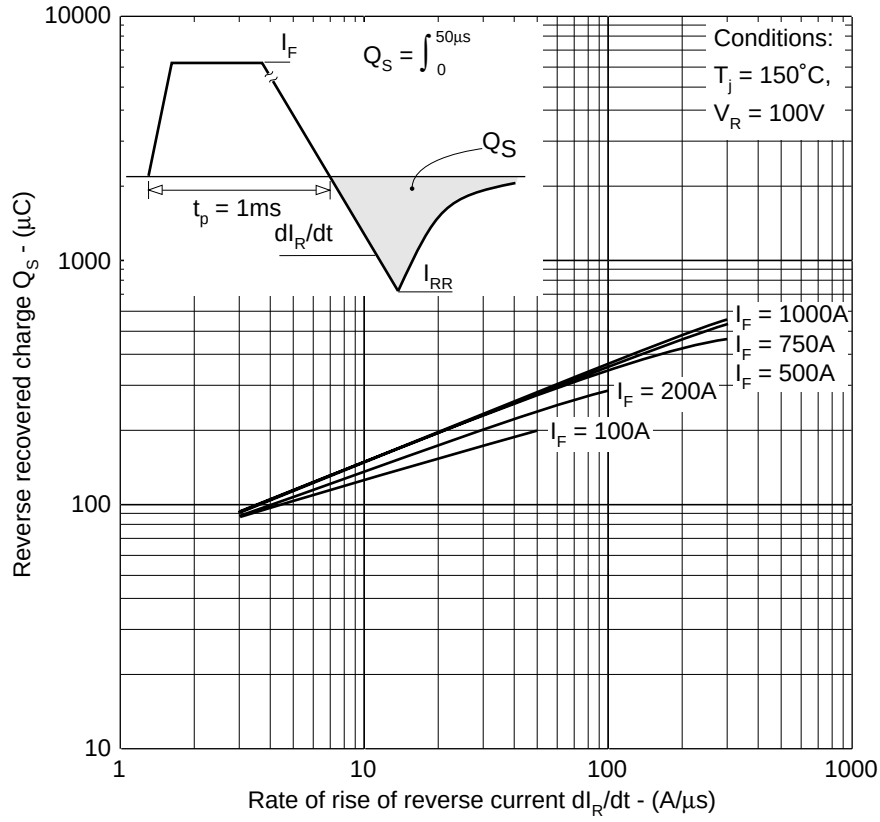



**Fig. 4 Recovered charge**

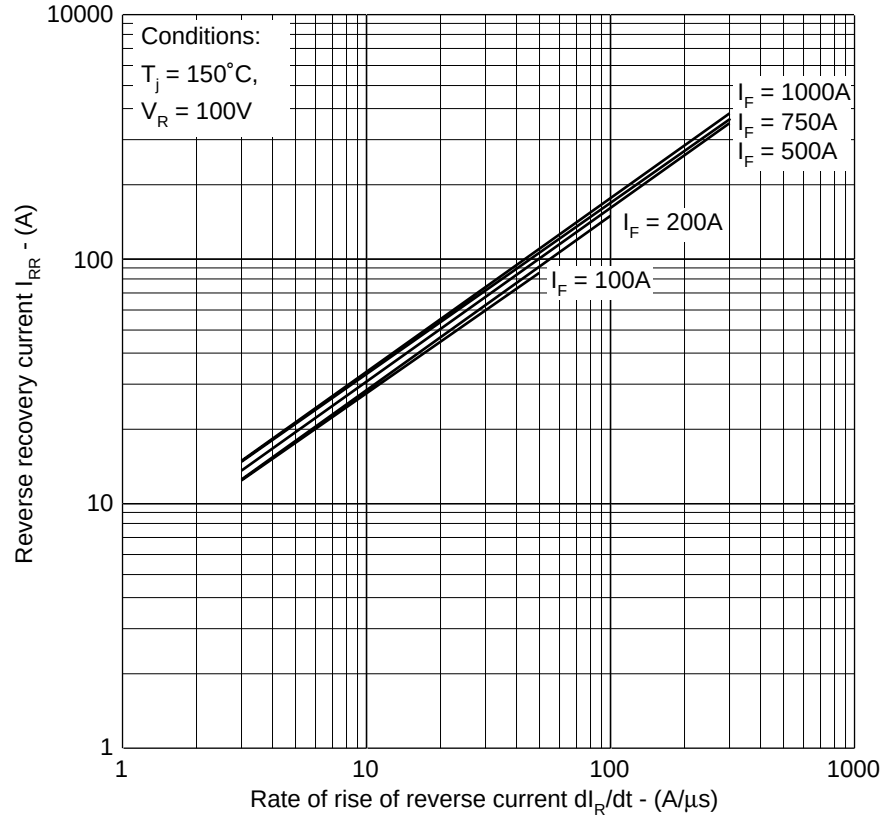



**Fig. 5 Typical reverse recovery current vs rate of rise of reverse current**

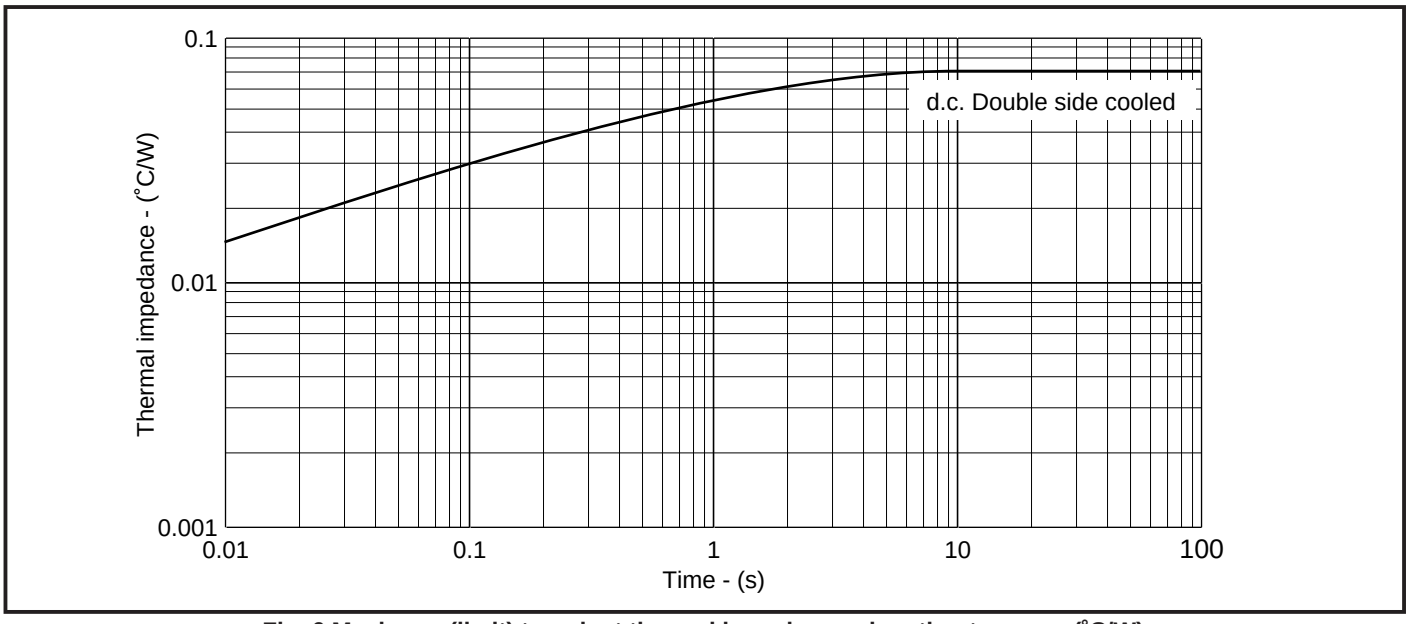
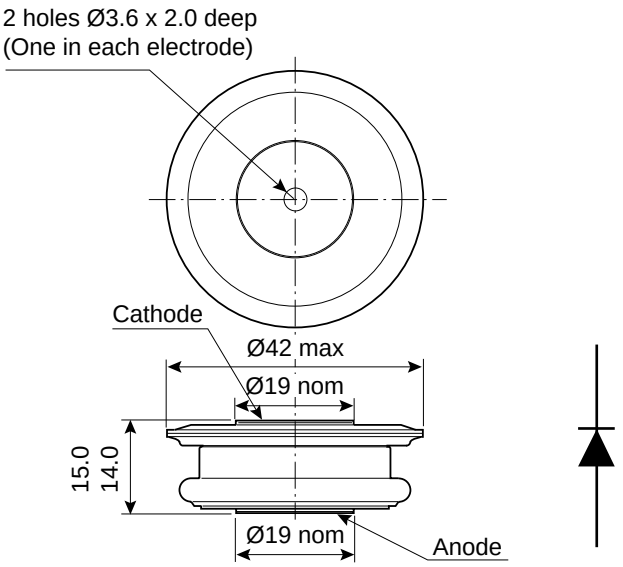



**Fig. 6 Maximum (limit) transient thermal impedance - junction to case - (˚C/W)**

## 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: 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.

**http://www.dynexsemi.com**

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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.