

### APPLICATIONS

- UPS
- Induction Heating
- A.C. Motor Drives
- Switch Mode Power Supplies
- Choppers

### KEY PARAMETERS

$V_{DRM}$	<b>1400V</b>
$I_{T(RMS)}$	<b>400A</b>
$I_{TSM}$	<b>4000A</b>
$dV/dt$	<b>1000V/<math>\mu</math>s</b>
$dI/dt$	<b>1000A/<math>\mu</math>s</b>
$t_q$	<b>10.0<math>\mu</math>s</b>

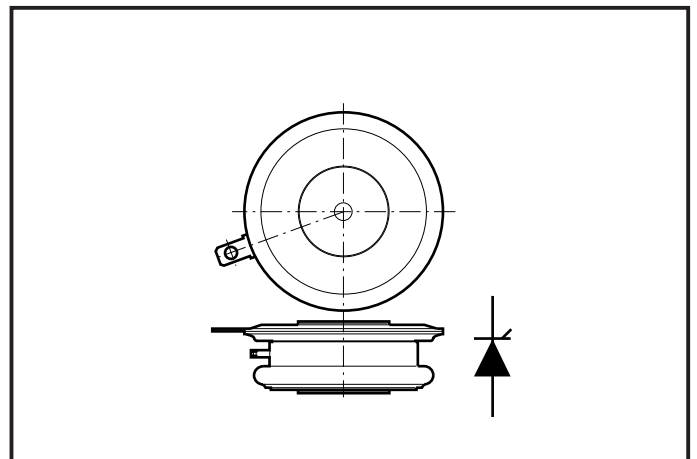
### FEATURES

- Low Loss Asymmetrical Diffusion Structure
- Fully Characterised For Operation up to 20kHz
- High  $dI/dt$  and  $dV/dt$  ratings

### VOLTAGE RATINGS

Type Number	Repetitive Peak Off-state Voltage $V_{DRM}$ V	Repetitive Peak Reverse Voltage $V_{RRM}$ V
TA449 14 W	1400	10
TA449 12 W	1200	10
TA449 10 W	1000	10

Lower voltage grades available.



Outline type code: MU86.  
See Package Details for further information.

### CURRENT AND SURGE RATINGS

Symbol	Parameter	Conditions	Max.	Units
<b>Double Side Cooled</b>				
$I_{T(AV)}$	Mean on-state current	Half sine wave, duty cycle 50%, $T_{case} = 80^{\circ}C, T_j = 125^{\circ}C.$	255	A
$I_{T(RMS)}$	RMS value		400	A
$I_{TSM}$	Surge (non-repetitive) on-state current	$T_j = 125^{\circ}C, t_p = 1ms, V_R = 0$	4000	A
$I^2t$	$I^2t$ for fusing	$t_p \geq 10ms$	$80 \times 10^3$	$A^2s$

## THERMAL AND MECHANICAL DATA

Symbol	Parameter	Conditions		Min.	Max.	Units
$R_{th(j-c)}$	Thermal resistance - junction to case	Double side cooled	dc	-	0.07	°C/W
		Single side cooled	Anode dc	-	0.133	°C/W
			Cathode dc	-	0.154	°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	-	0.04	°C/W
$T_{vj}$	Virtual junction temperature	On-state (conducting)		-	135	°C
		Reverse (blocking)		-	125	°C
$T_{stg}$	Storage temperature range			-40	150	°C
-	Clamping force			4.5	5.5	kN

## DYNAMIC CHARACTERISTICS

Symbol	Parameter	Conditions		Typ.	Max.	Units
$V_{TM}$	Maximum on-state voltage	At 600A peak, $T_{case} = 125^{\circ}C$		-	2.9	V
$I_{RRM}$	Peak reverse current	At $V_{RRM}$ , $T_{case} = 125^{\circ}C$		-	40	mA
$I_{DRM}$	Off-state current	At $V_{DRM}$ , $T_{case} = 125^{\circ}C$		-	1	mA
dV/dt	Maximum linear rate of rise of off-state voltage	To 60% $V_{DRM}$ , $T_j = 125^{\circ}C$ , Gate open circuit		-	1000	V/ $\mu$ s
dI/dt	Rate of rise of on-state current	Gate source 20V, 20 $\Omega$ $t_r \leq 5\mu$ s.	Non-repetitive	-	1000	A/ $\mu$ s
			Repetitive	-	500	A/ $\mu$ s
$I_H$	Holding current	$T_j = 25^{\circ}C$ , $I_{TM} = 1A$ , $V_D = 12V$		-	80	mA
$I_L$	Latching current	$T_j = 25^{\circ}C$ , $I_G = 0.5A$ , $V_D = 12V$		-	300	mA
$t_q$	Max. turn-off time	VR = DF451 voltage drop, $T_j = 125^{\circ}C$ , $I_{TM} = 200A$ , dV/dt = 400V/ $\mu$ s (linear to 60% $V_{DRM}$ ), tdI <sub>R</sub> /dt = 30A/ $\mu$ s Gate open.		-	10	$\mu$ s
$t_{gt}$	Typ. turn-on time (total)	$T_j = 25^{\circ}C$ , $I_T = 50A$ , $V_D = 300V$ , $I_G = 1A$ , dI/dt = 50A/ $\mu$ s, dI <sub>G</sub> /dt = 1A/ $\mu$ s		3	-	$\mu$ s
$t_{gd}$	Typ. delay time			1.5	-	$\mu$ s

## GATE TRIGGER CHARACTERISTICS AND RATINGS

Symbol	Parameter	Conditions	Min.	Max.	Units
$V_{GT}$	Gate trigger voltage	$V_{DWM} = 12V, R_L = 3\Omega, T_{case} = 25^\circ C$	-	5	V
$I_{GT}$	Gate trigger current	$V_{DWM} = 12V, R_L = 3\Omega, T_{case} = 25^\circ C$	-	400	mA
$V_{GD}$	Min. non trigger voltage	-	0.2	-	V
$V_{RGM}$	Peak reverse gate voltage	-	-	5	V
$I_{FGM}$	Peak forward gate current	-	-	4	A
$P_{GM}$	Peak gate power	-	-	16	W
$P_{G(AV)}$	Average gate power	Average time 10ms max	-	3	W

CURVES

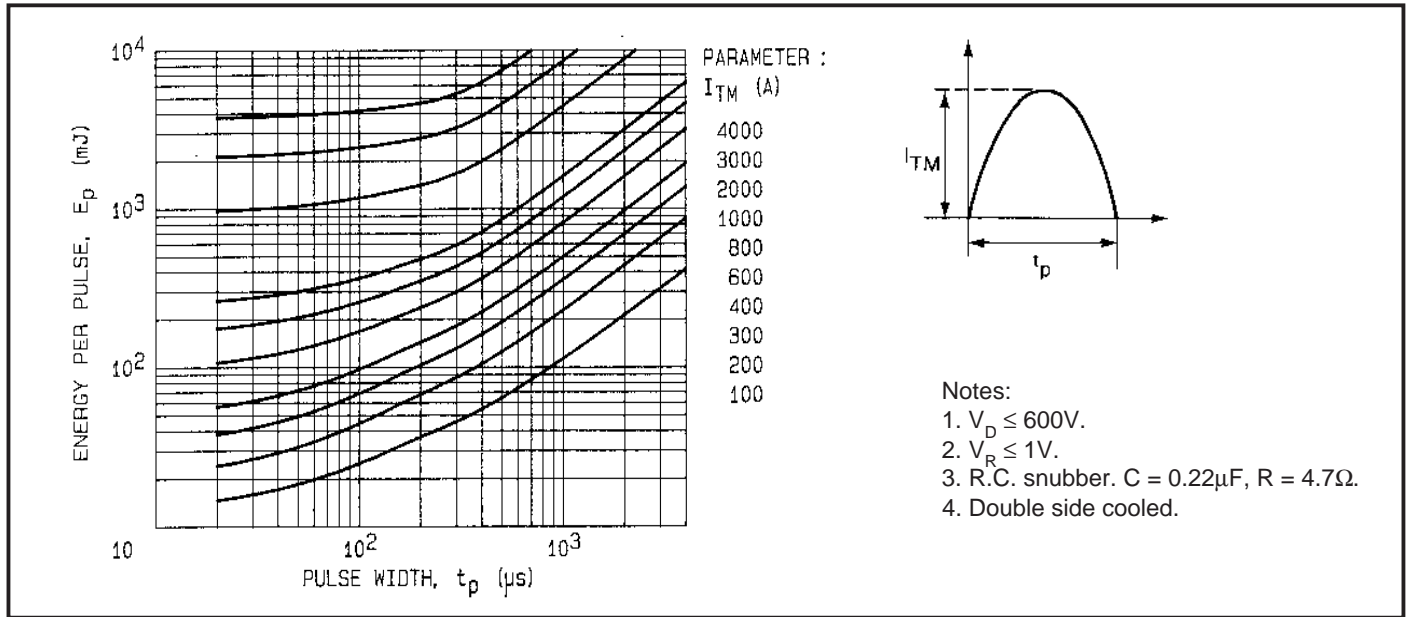


Fig.1 Energy per pulse for sinusoidal pulses.

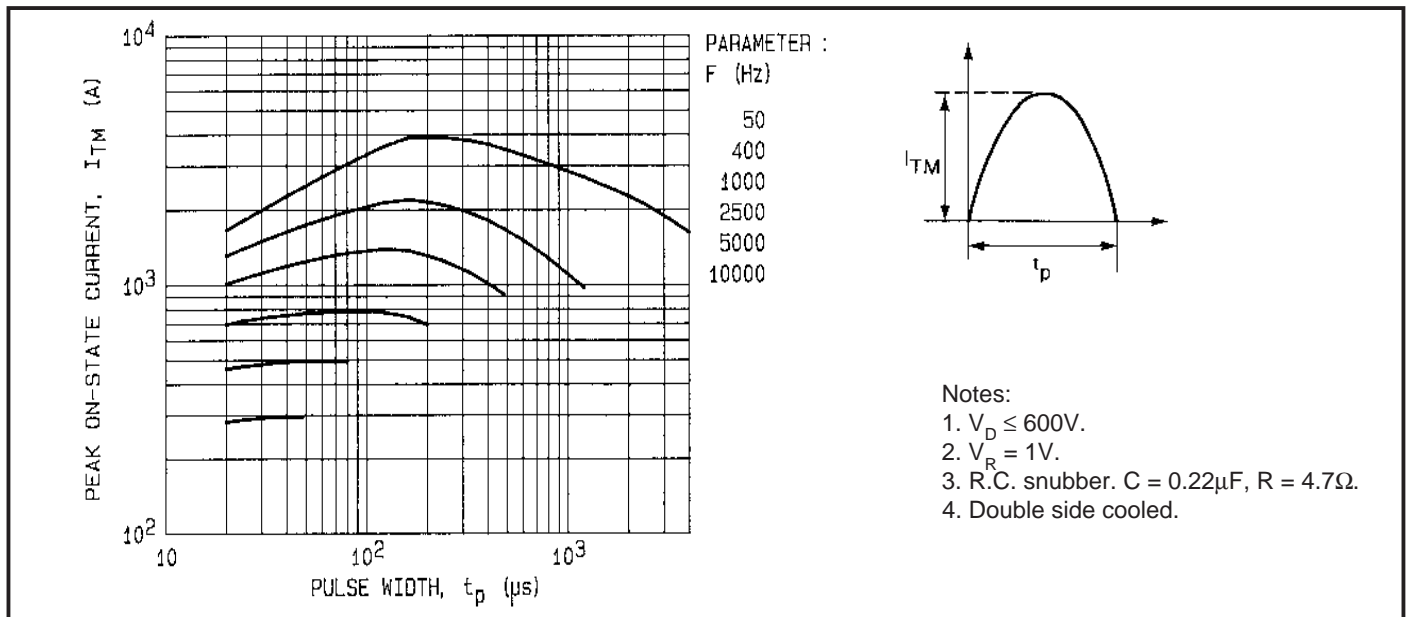


Fig.2 Maximum allowable peak on-state current vs pulse width for  $T_{case} = 65^\circ C$ .

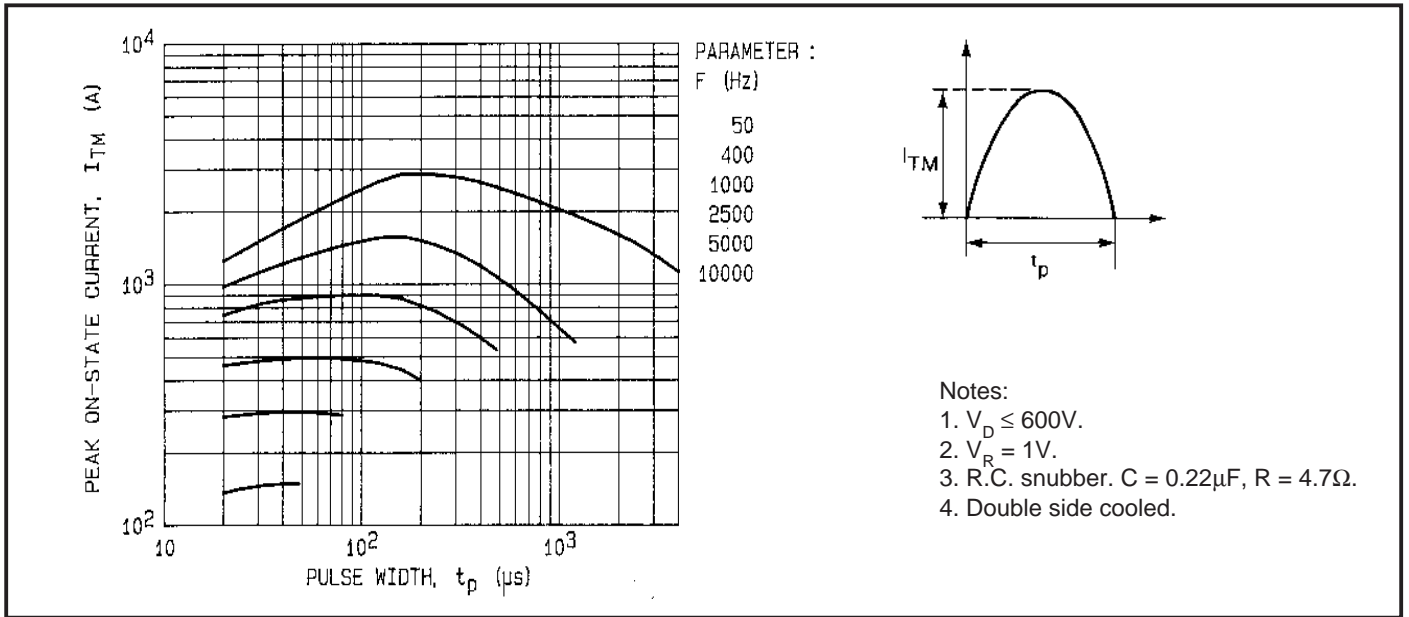


Fig.3 Maximum allowable peak on-state current vs pulse width for  $T_{case} = 90^\circ C$ .

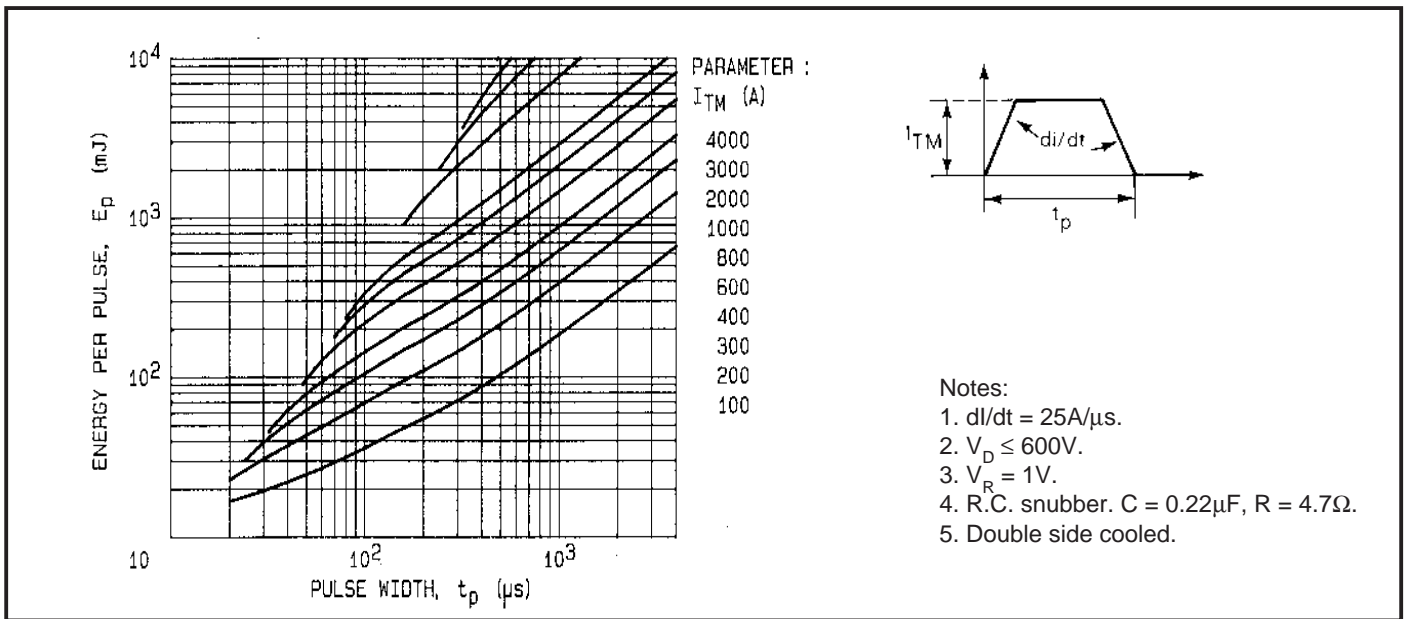


Fig.4 Energy per pulse for trapezoidal pulses

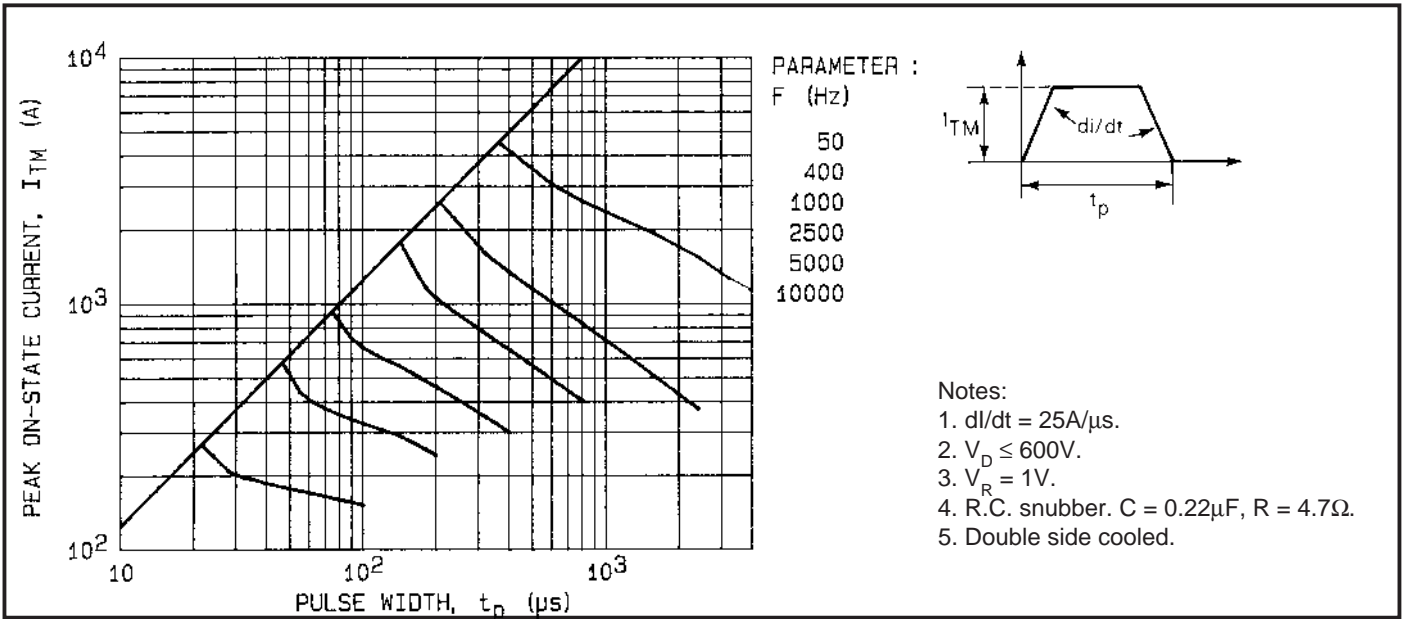


Fig.5 Maximum allowable peak on-state current vs pulse width for  $T_{case} = 65^\circ C$ .

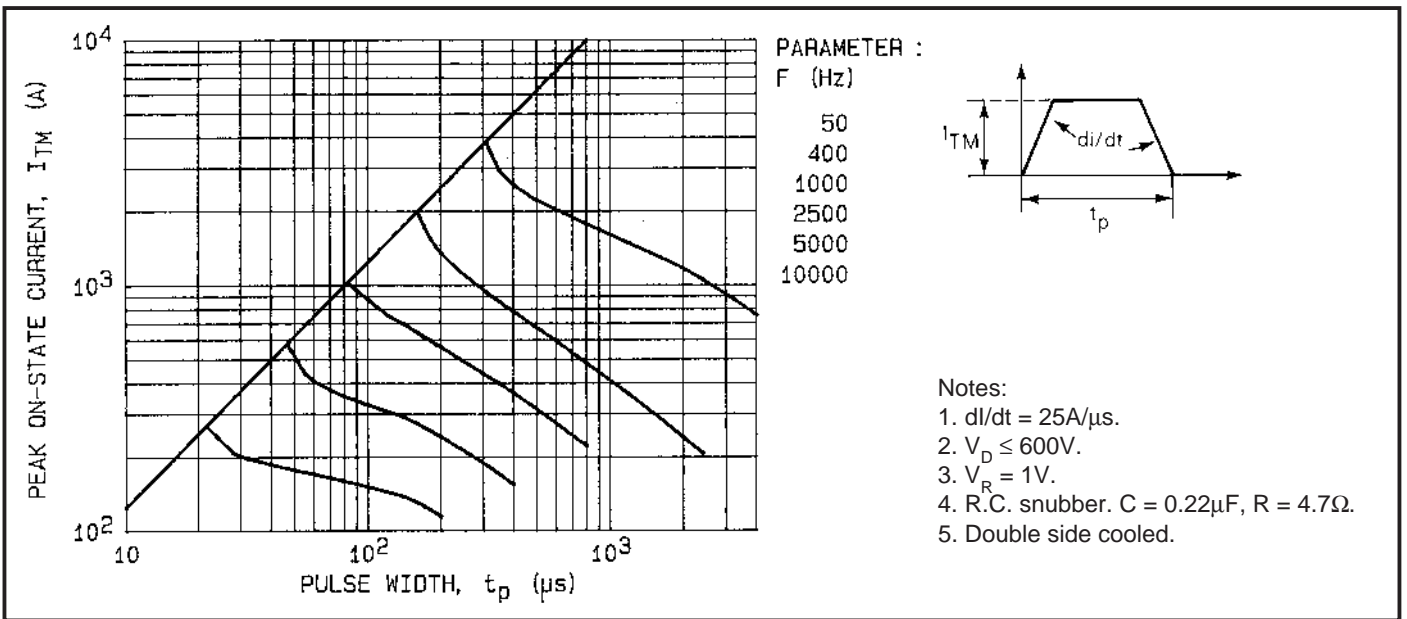


Fig.6 Maximum allowable peak on-state current vs pulse width for  $T_{case} = 90^\circ C$ .

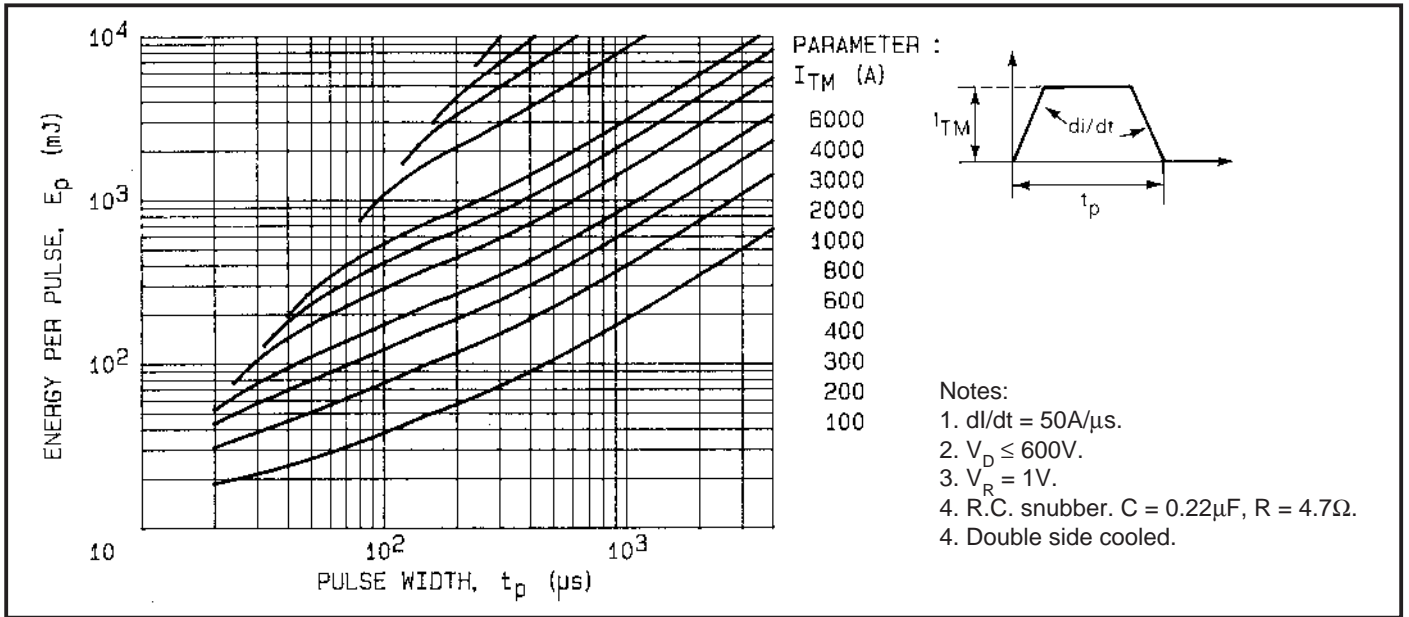


Fig.7 Energy per pulse for trapezoidal pulses.

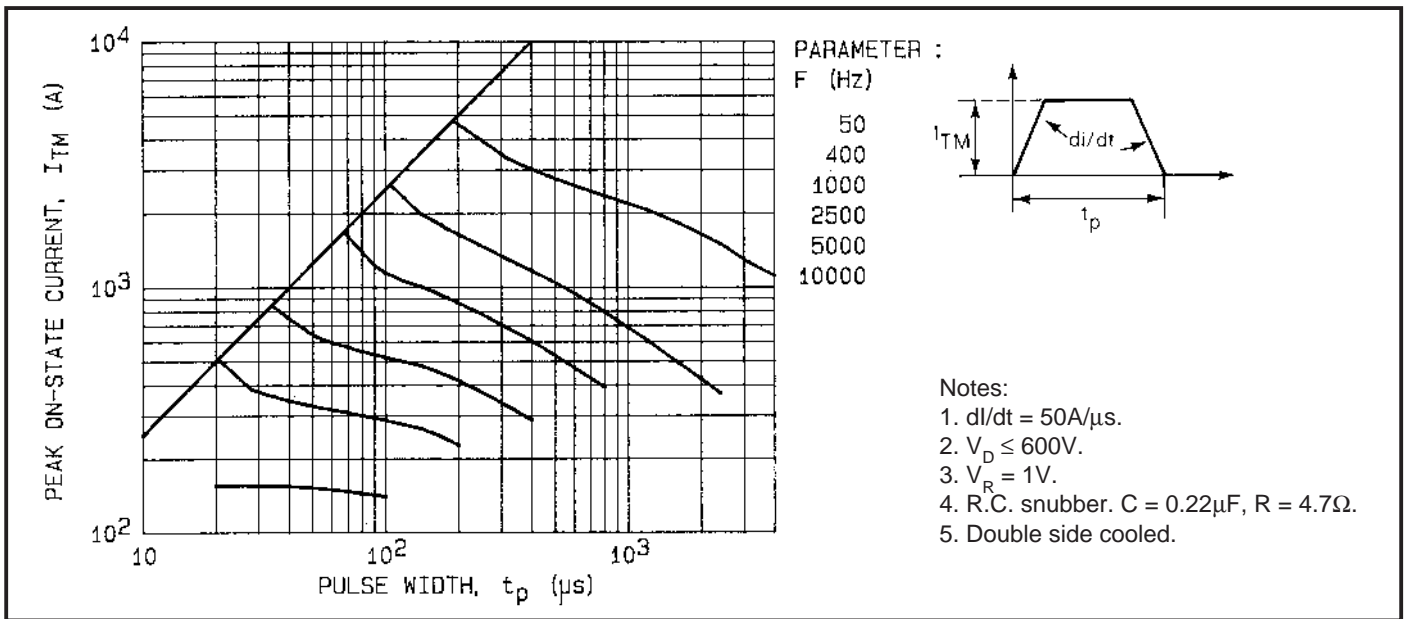


Fig.6 Maximum allowable peak on-state current vs pulse width for  $T_{case} = 90^\circ C$ .

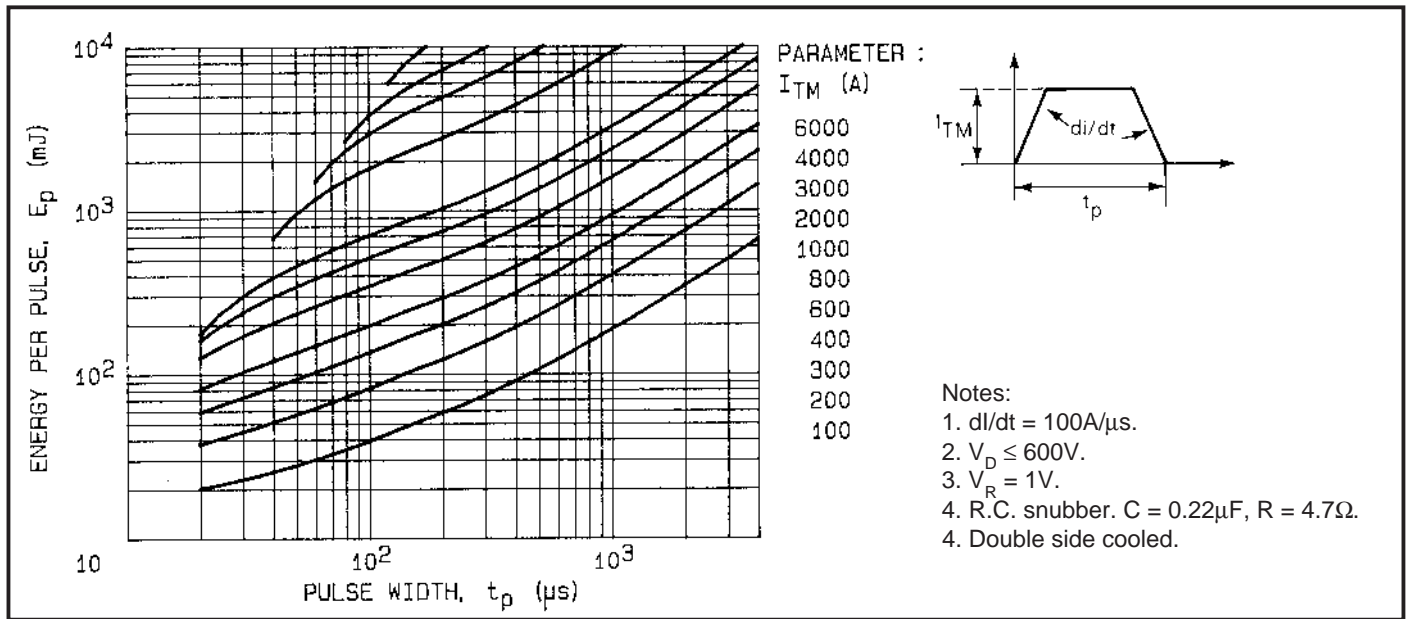


Fig.10 Energy per pulse for trapezoidal pulses.

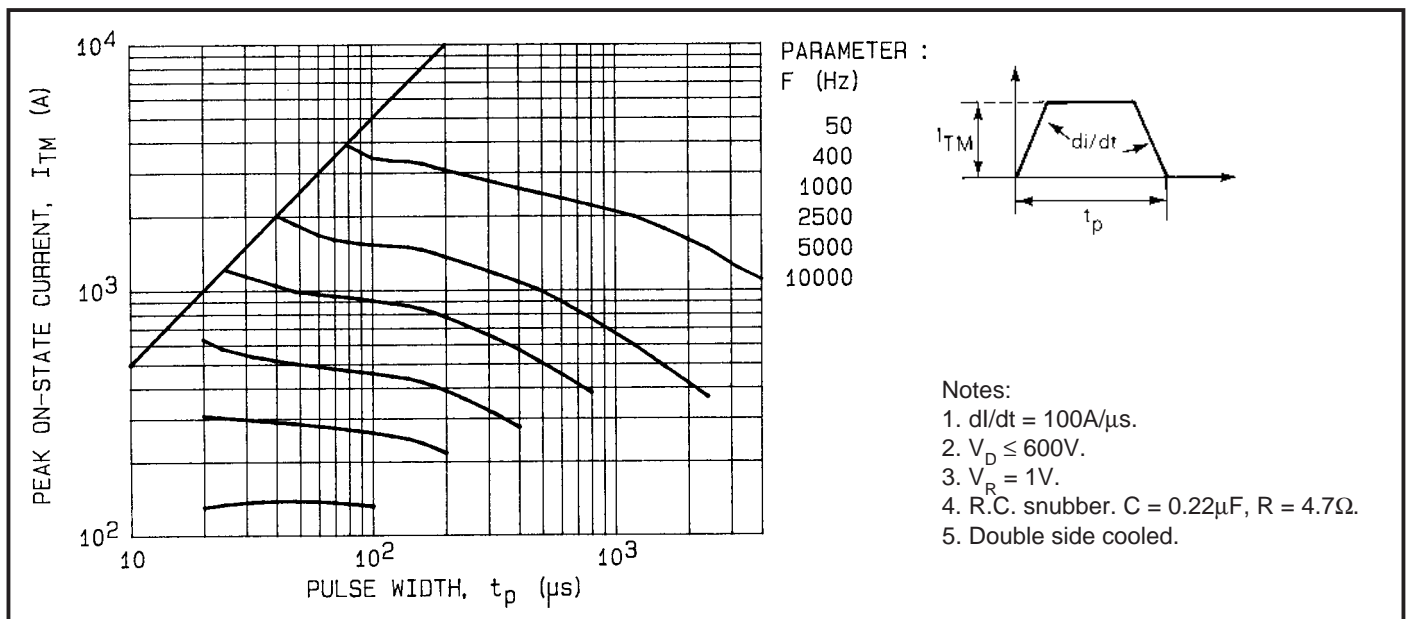


Fig.11 Maximum allowable peak on-state current vs pulse width for  $T_{case} = 65^\circ C$ .



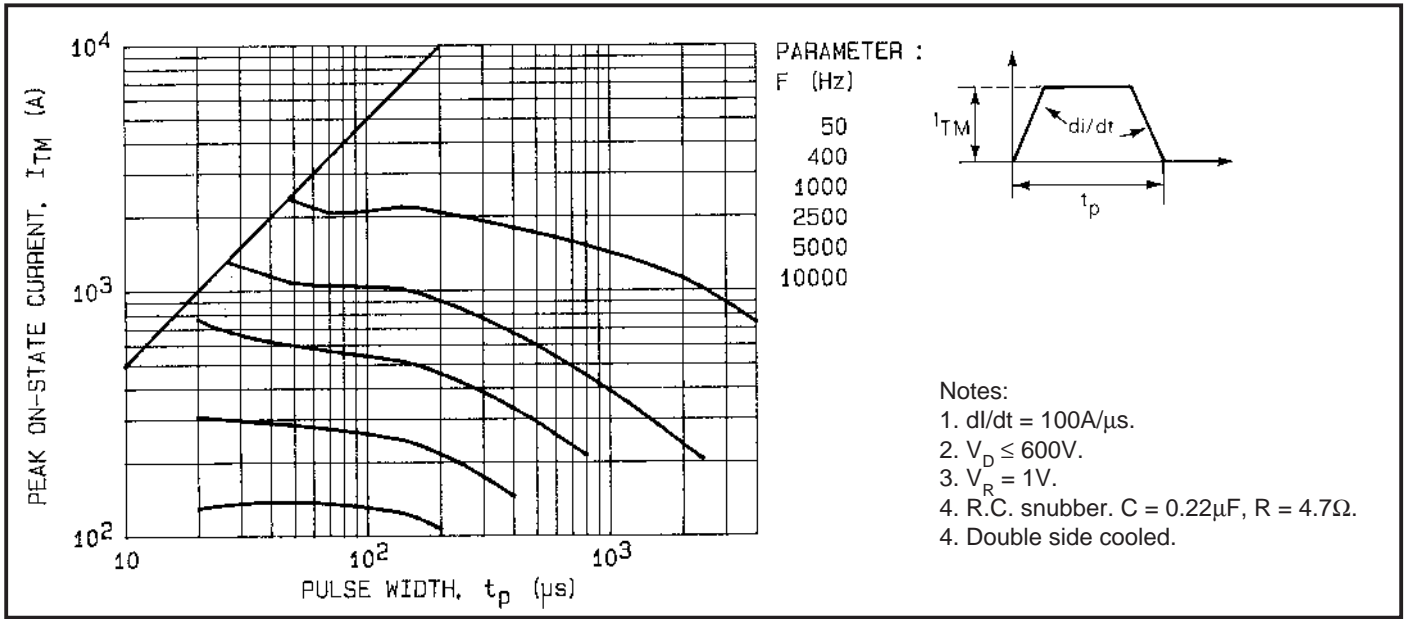


Fig.12 Maximum allowable peak on-state current vs pulse width for  $T_{case} = 90^\circ C$ .

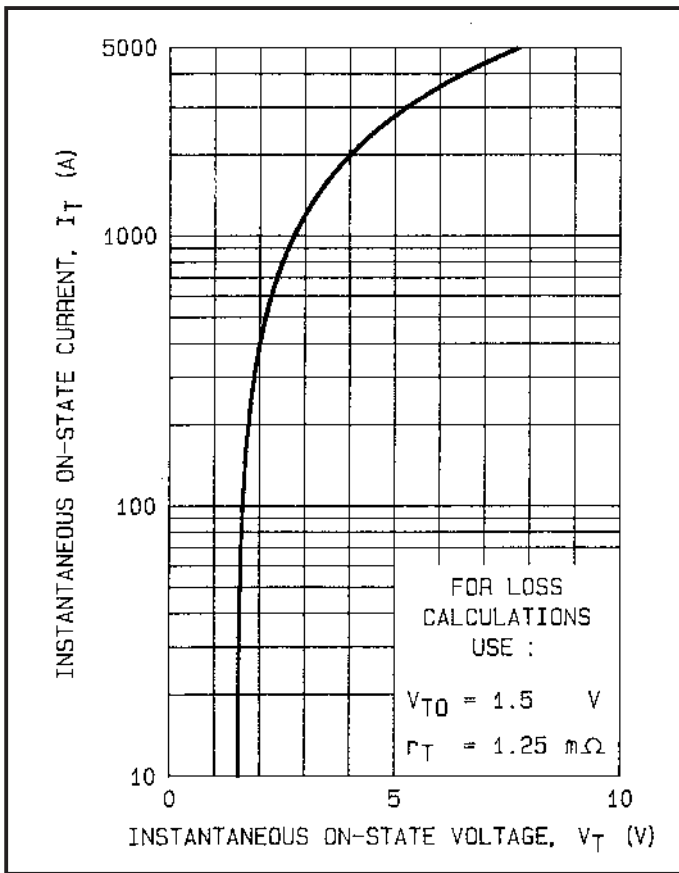


Fig.13 Maximum on-state conduction characteristic ( $T_j = 125^\circ C$ )

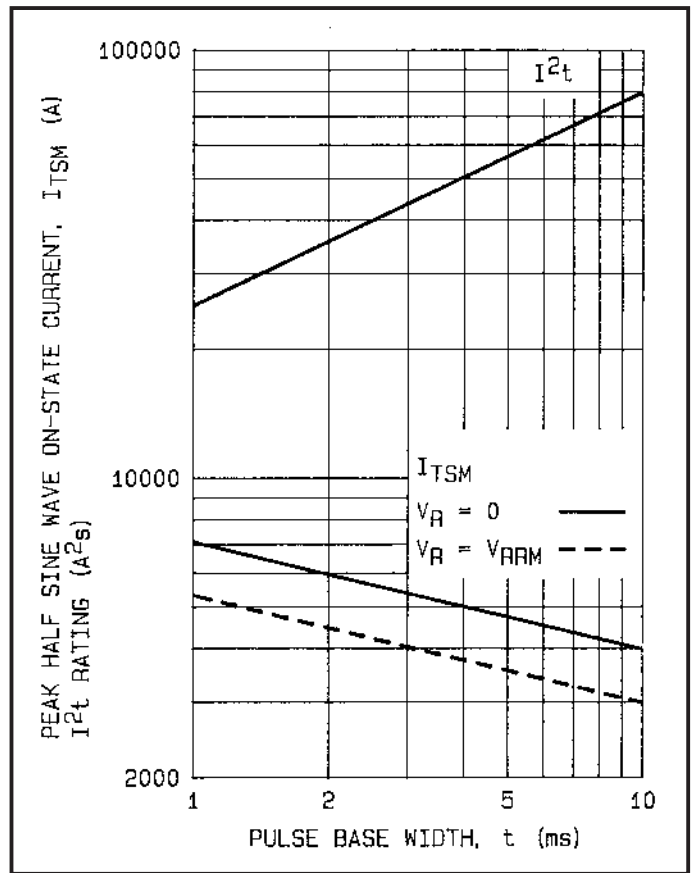


Fig.14 Non-repetitive sub-cycle surge on-state current and  $I^2t$  rating. (Initial  $T_j = 125^\circ C$ )

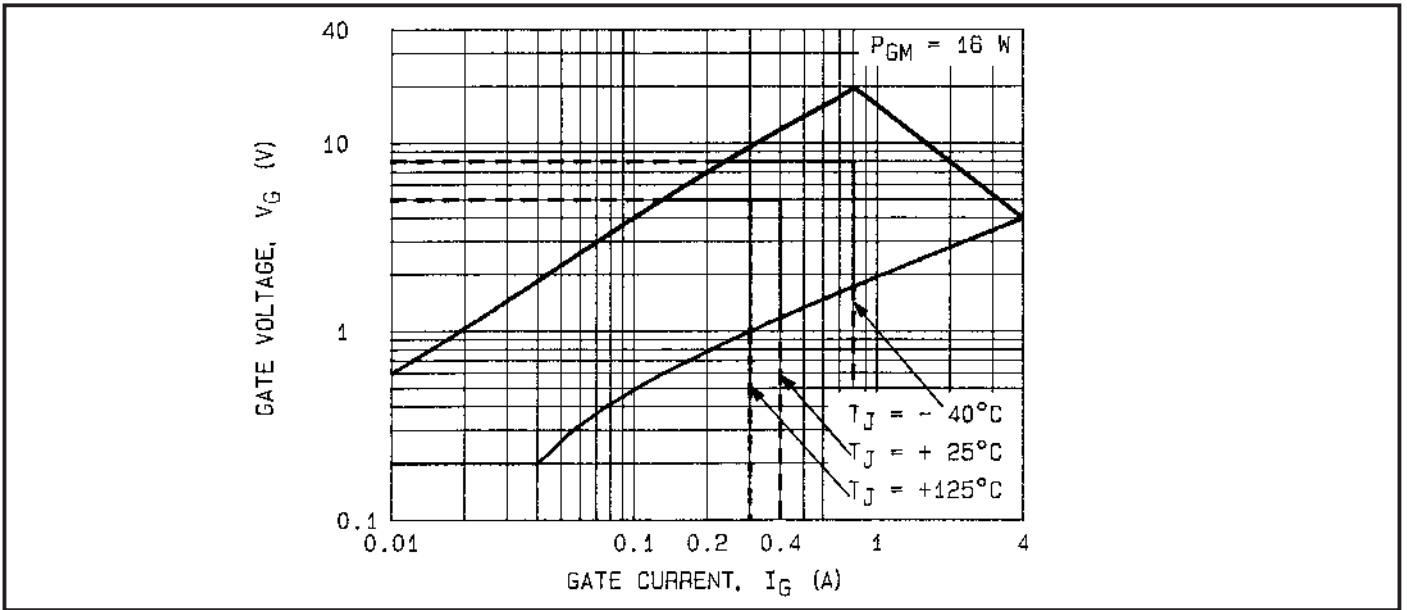


Fig.15 Gate trigger characteristics

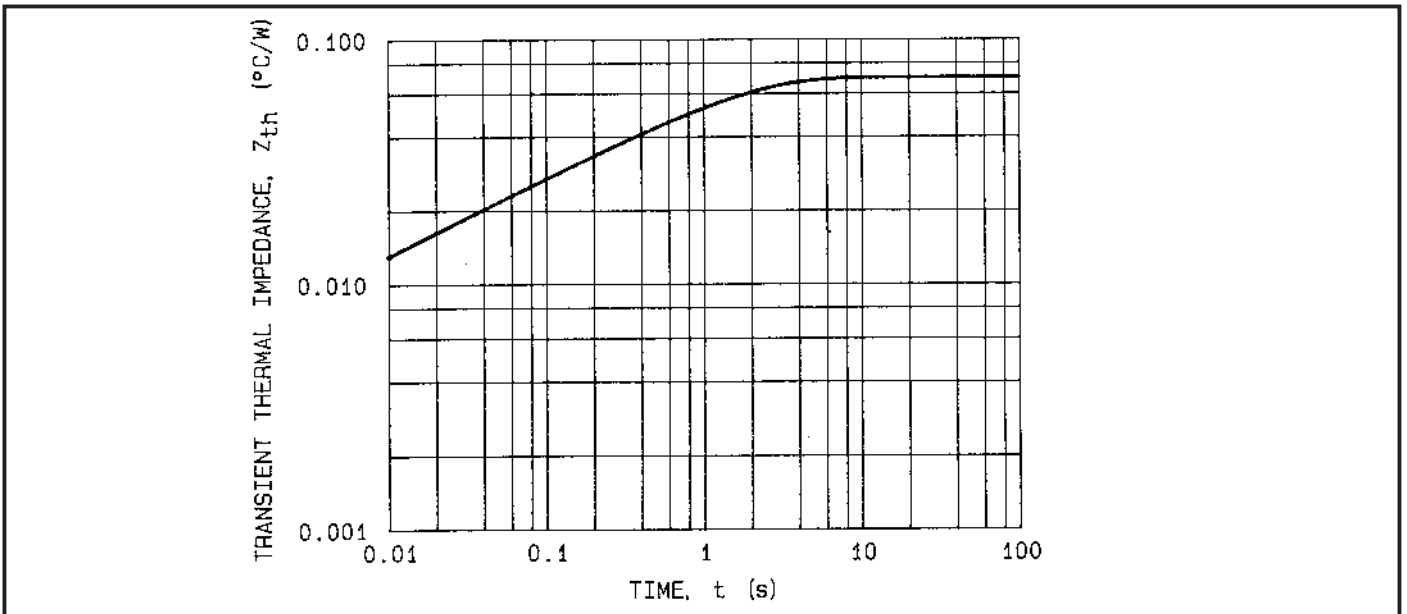
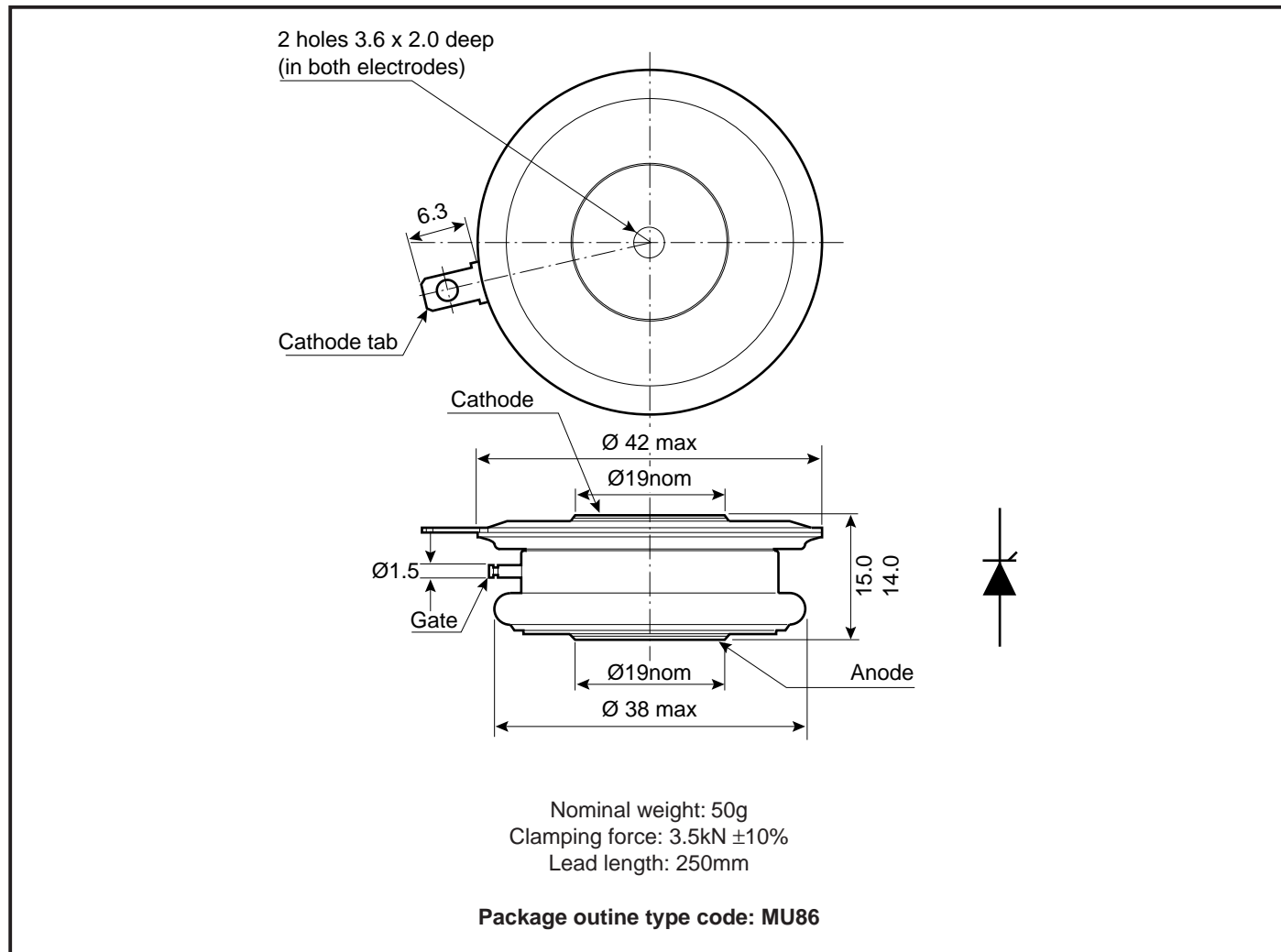


Fig.16 Transient thermal impedance - junction to case (double side cooled)

## PACKAGE DETAILS

For further package information, please contact your local Customer Service Centre. All dimensions in mm, unless stated otherwise. DO NOT SCALE.



## ASSOCIATED PUBLICATIONS

Title	Application Note Number
Calculating the junction temperature or power semiconductors	AN4506
Gate triggering and the use of gate characteristics	AN4840
Recommendations for clamping power semiconductors	AN4839
The effect of temperature on thyristor performance	AN4870
Thyristor and diode measurement with a multi-meter	AN4853
Turn-on performance of thyristors in parallel	AN4999
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.
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