

Supersedes January 1997 version, DS4681 - 4.0

DS4681 - 4.1 March 1998

### 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/μs</b>
$dI/dt$	<b>1000A/μs</b>
$t_q$	<b>10.0μs</b>

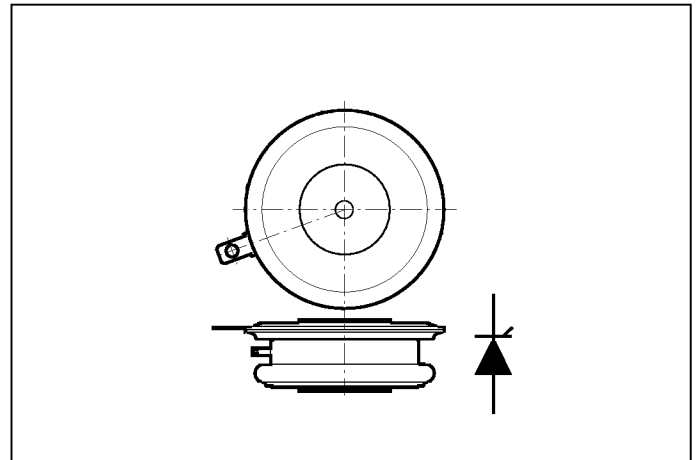
### FEATURES

- 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 outlines 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 <sup>2</sup> s

## 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

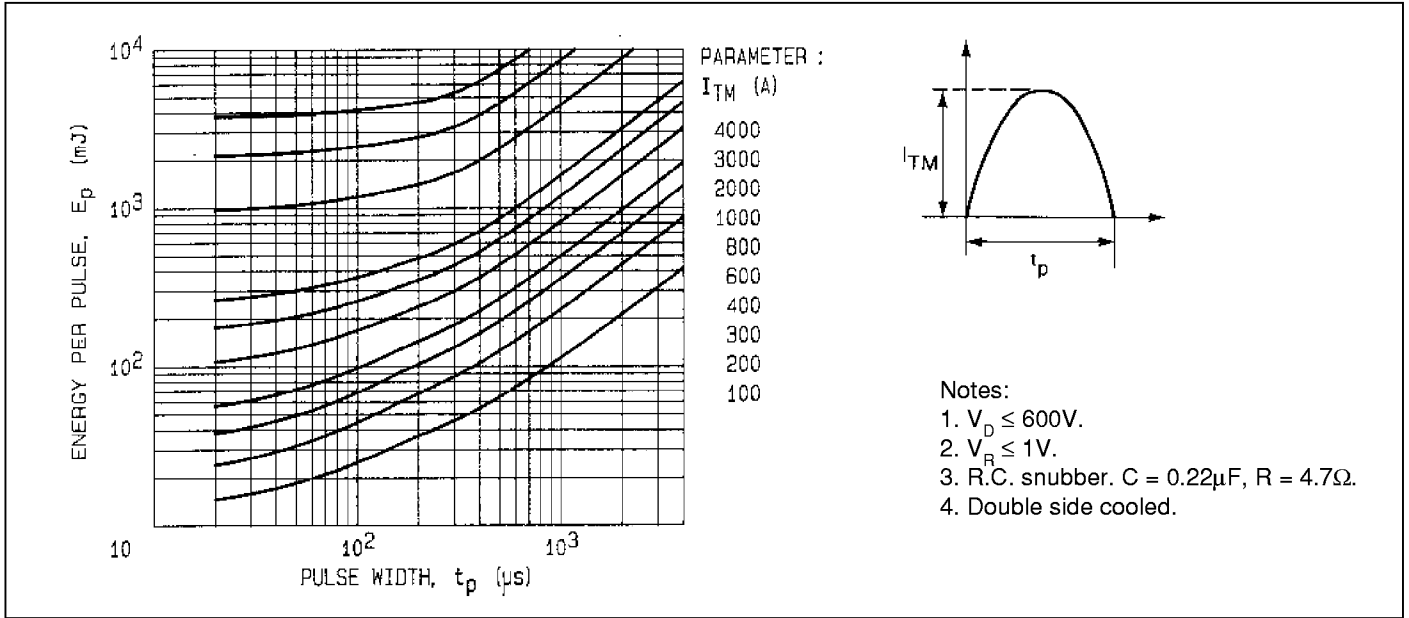


Fig.1 Energy per pulse for sinusoidal pulses.

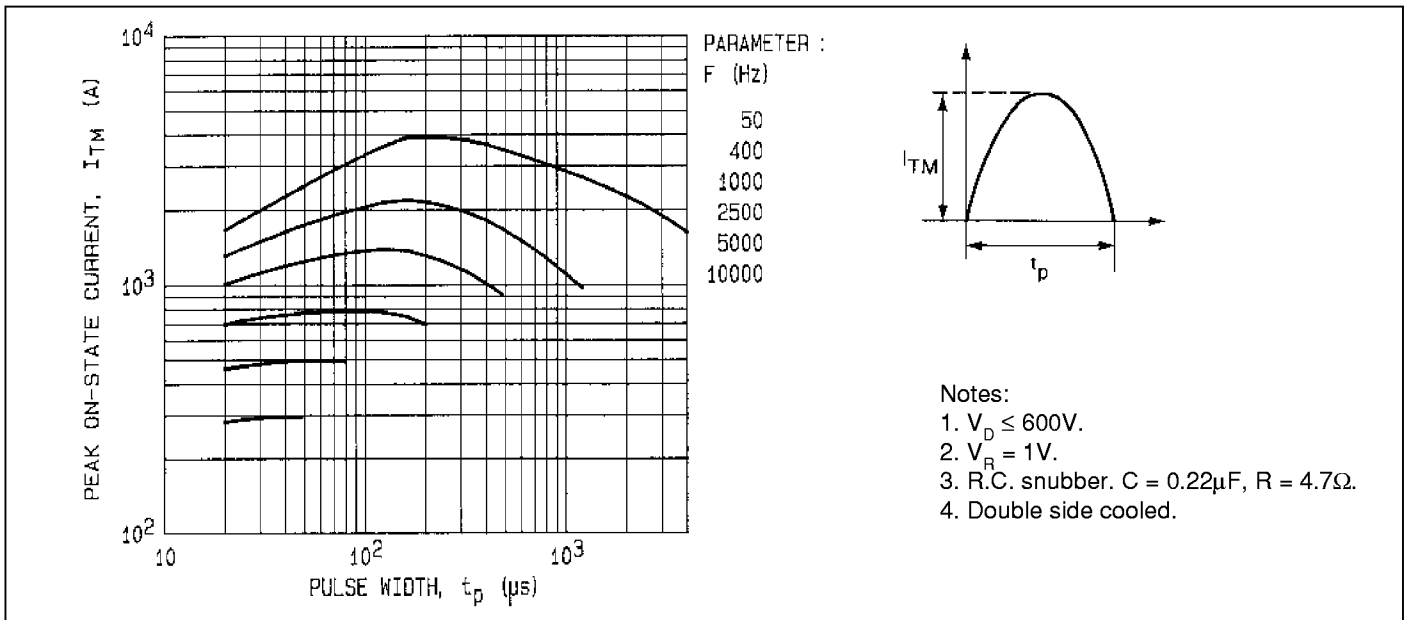


Fig.2 Maximum allowable peak on-state current vs pulse width for  $T_{case} = 65^\circ C$ .

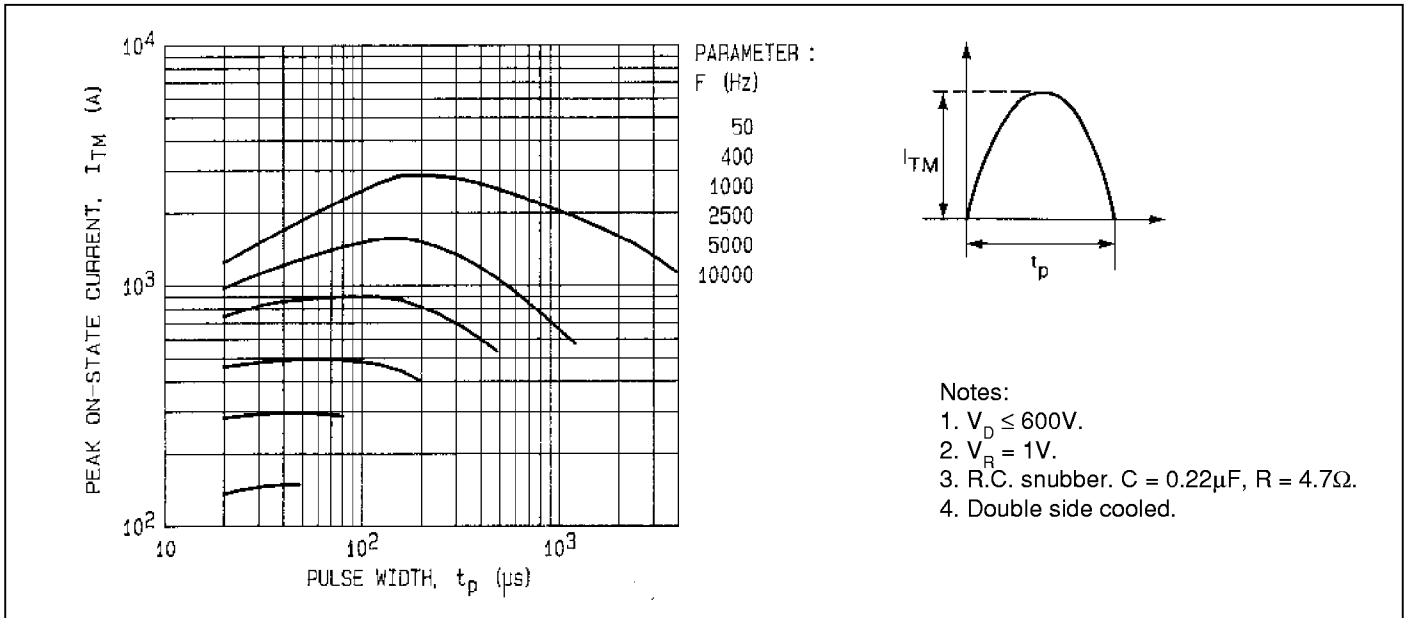


Fig.3 Maximum allowable peak on-state current vs pulse width for  $T_{case} = 90^\circ C$ .

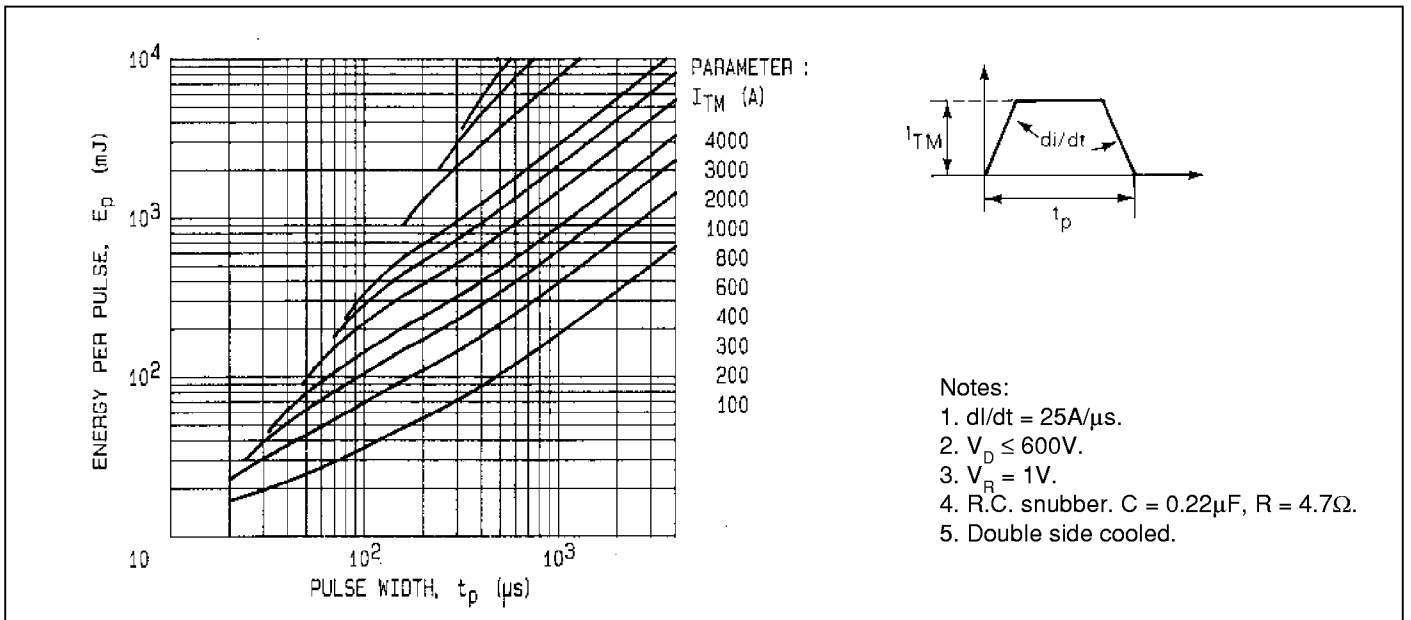


Fig.4 Energy per pulse for trapezoidal pulses

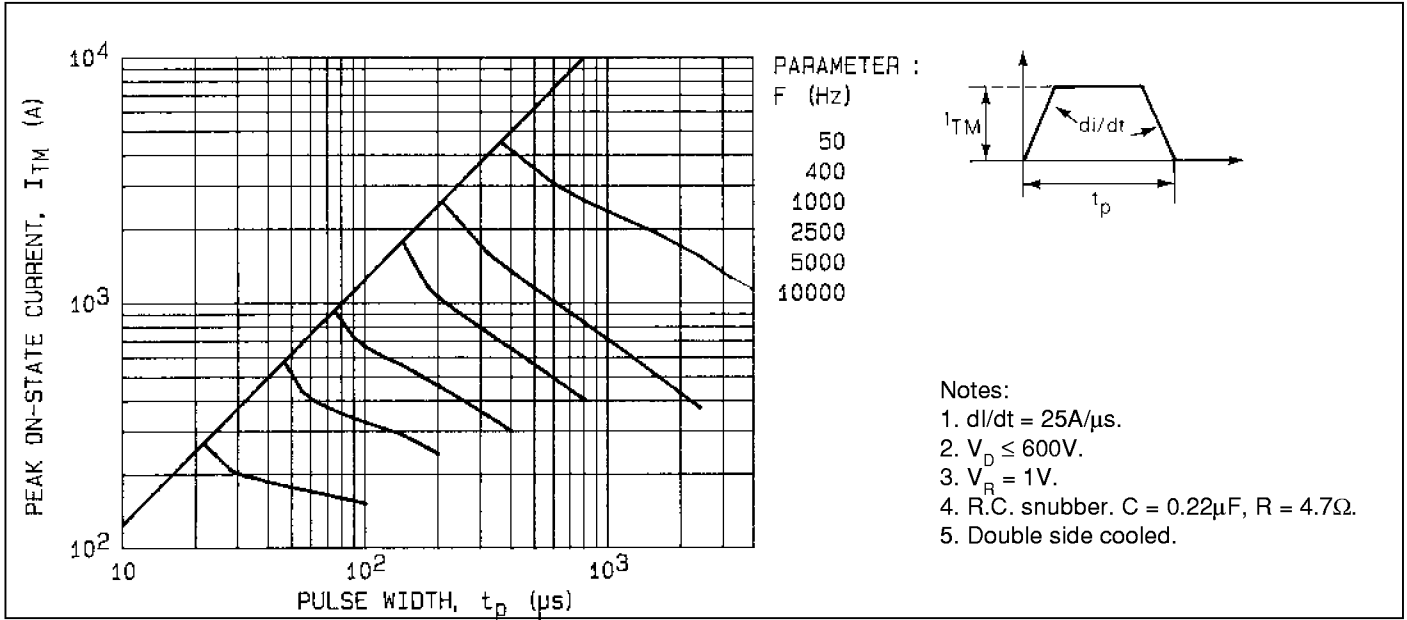


Fig.5 Maximum allowable peak on-state current vs pulse width for  $T_{case} = 65^\circ C$ .

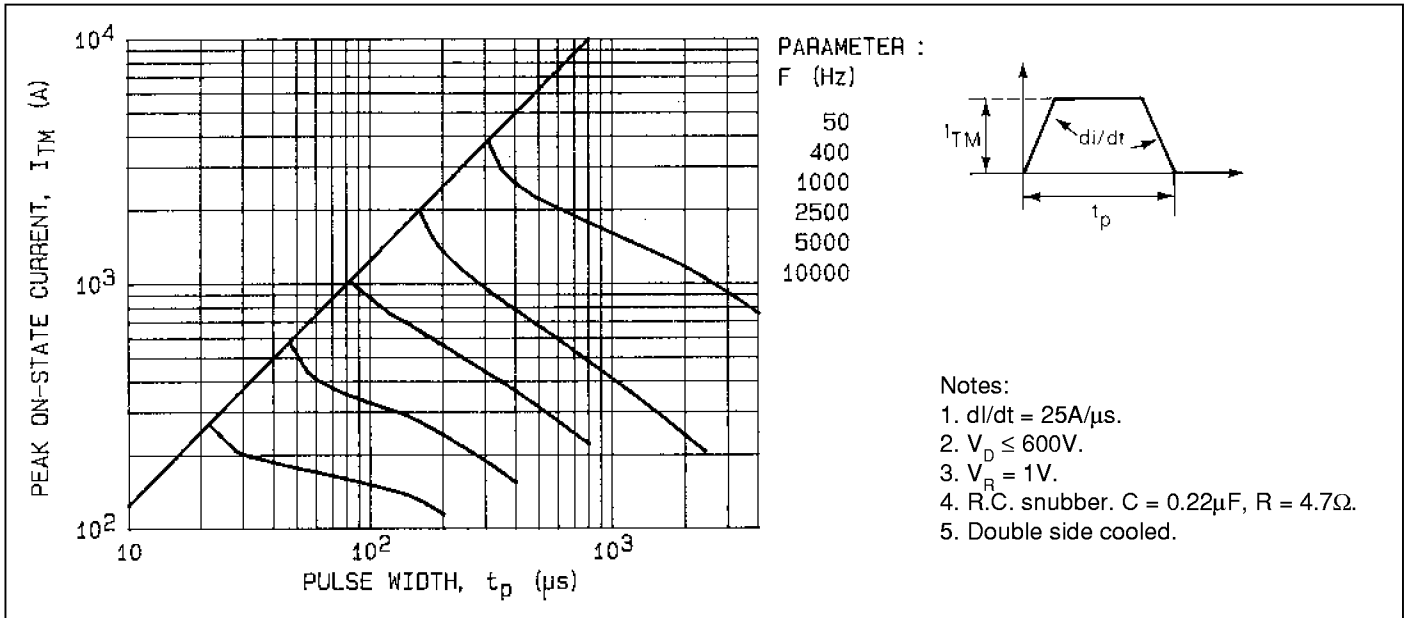


Fig.6 Maximum allowable peak on-state current vs pulse width for  $T_{case} = 90^\circ C$ .

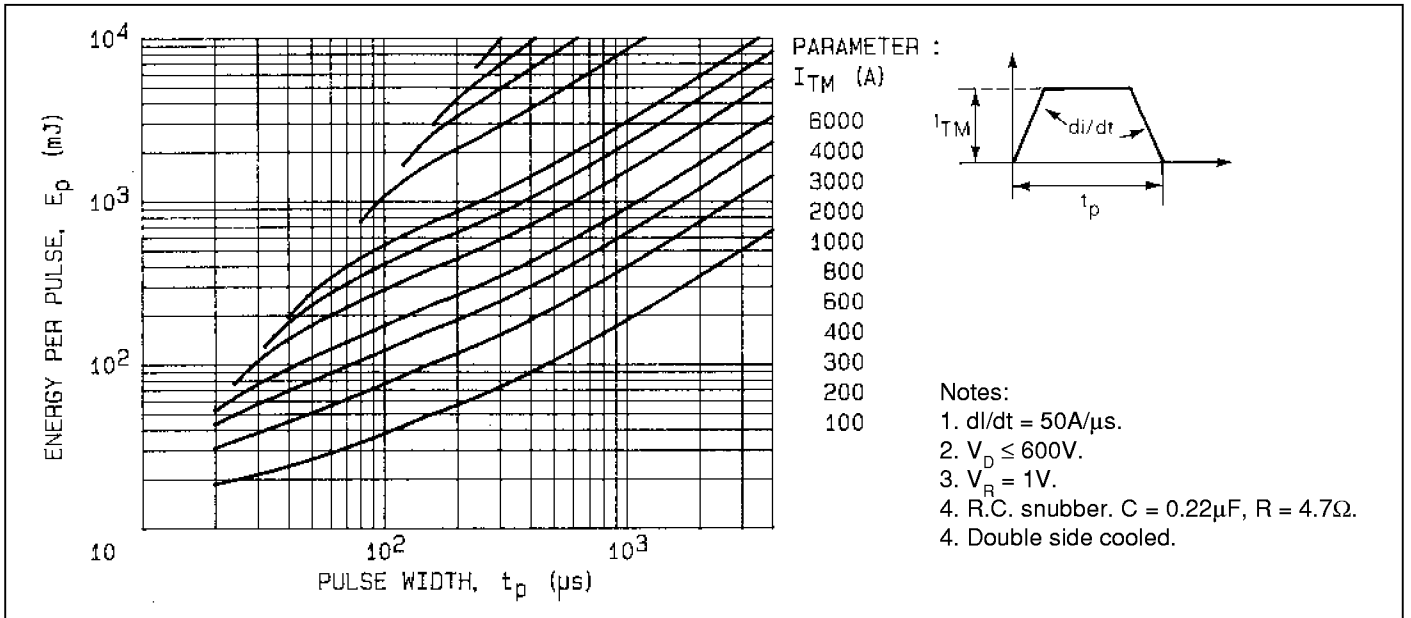


Fig.7 Energy per pulse for trapezoidal pulses.

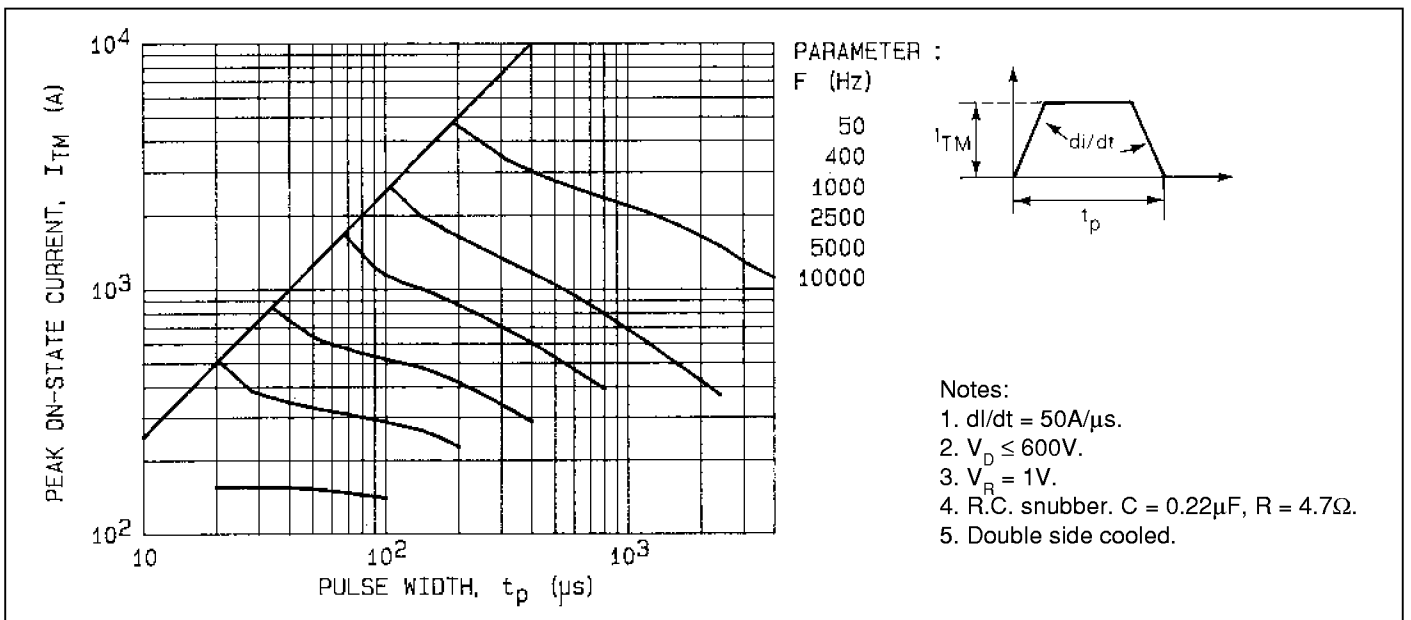


Fig.6 Maximum allowable peak on-state current vs pulse width for  $T_{case} = 90^\circ C$ .

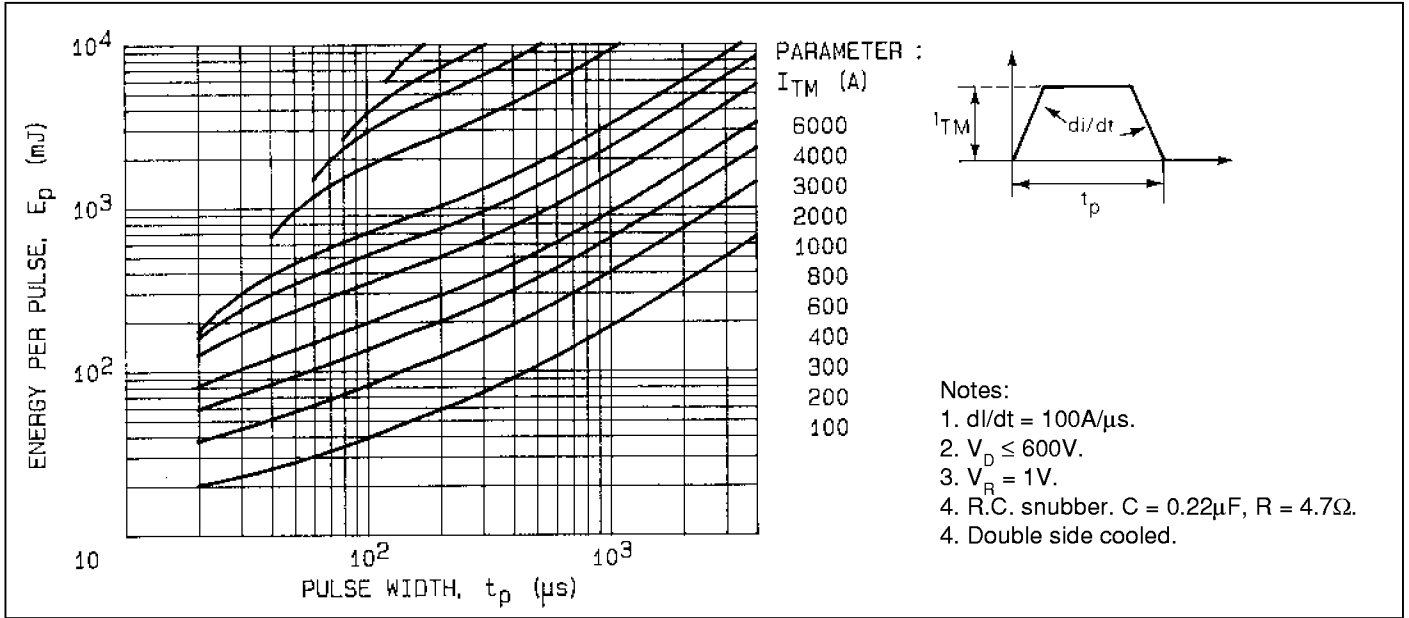


Fig.10 Energy per pulse for trapezoidal pulses.

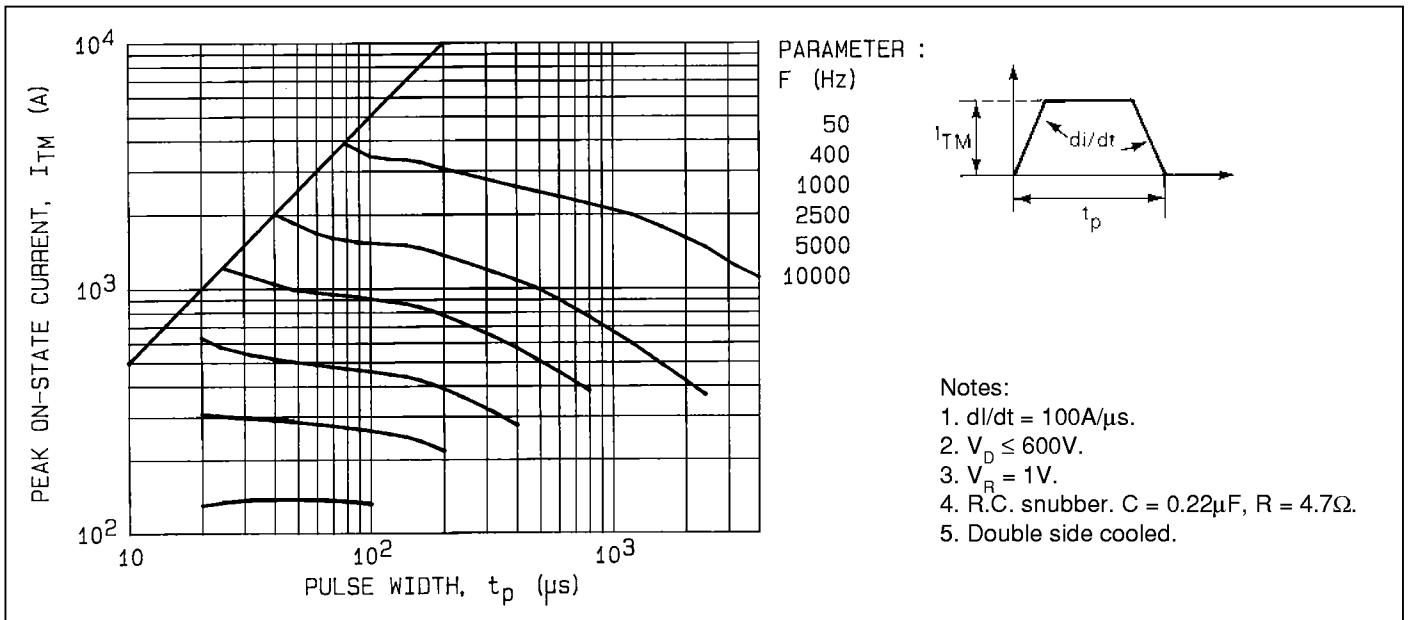


Fig.11 Maximum allowable peak on-state current vs pulse width for  $T_{case} = 65^\circ C$ .

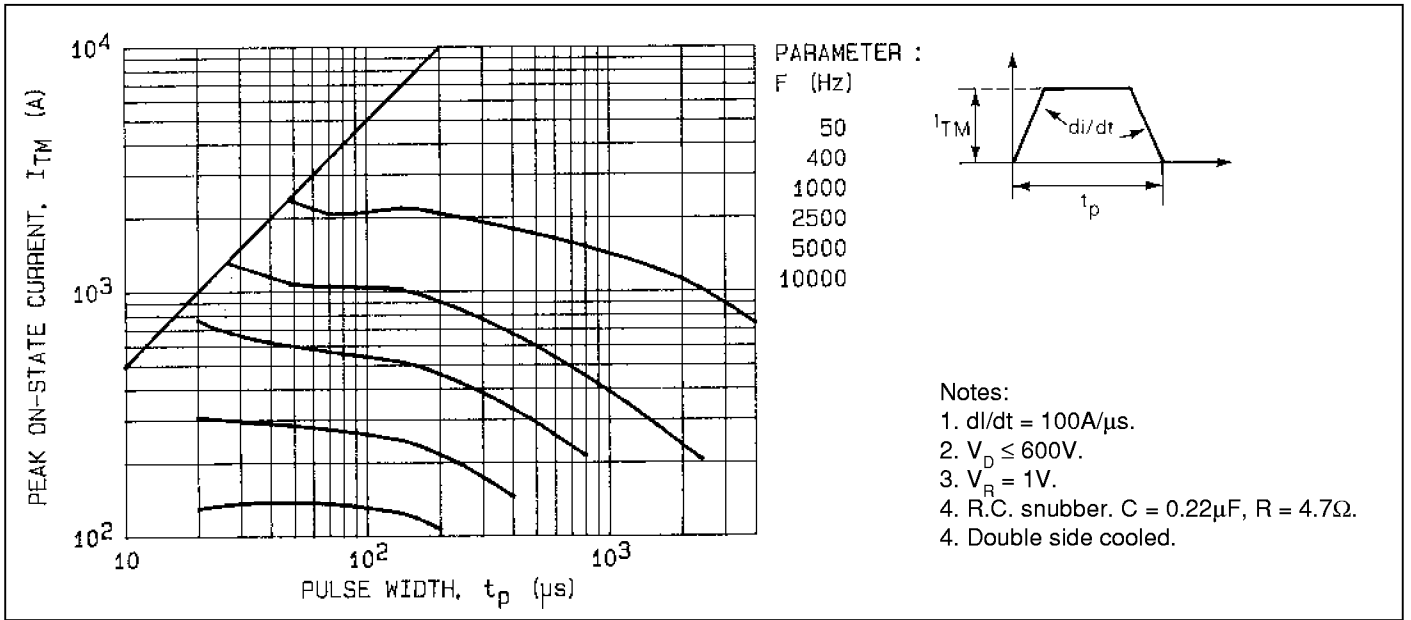


Fig.12 Maximum allowable peak on-state current vs pulse width for  $T_{case} = 90^\circ C$ .

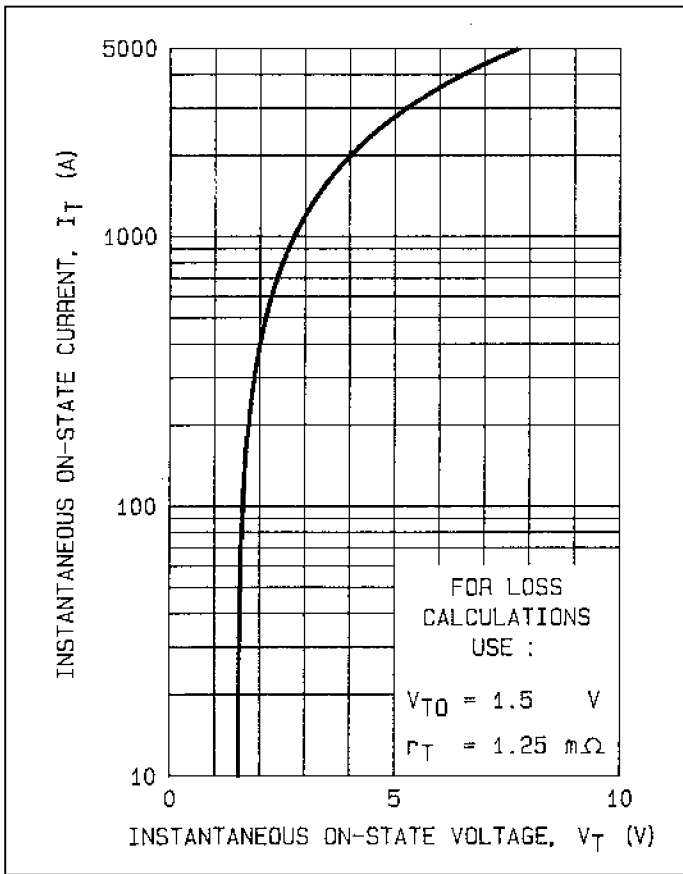


Fig.13 Maximum on-state conduction characteristic ( $T_j = 125^\circ C$ )

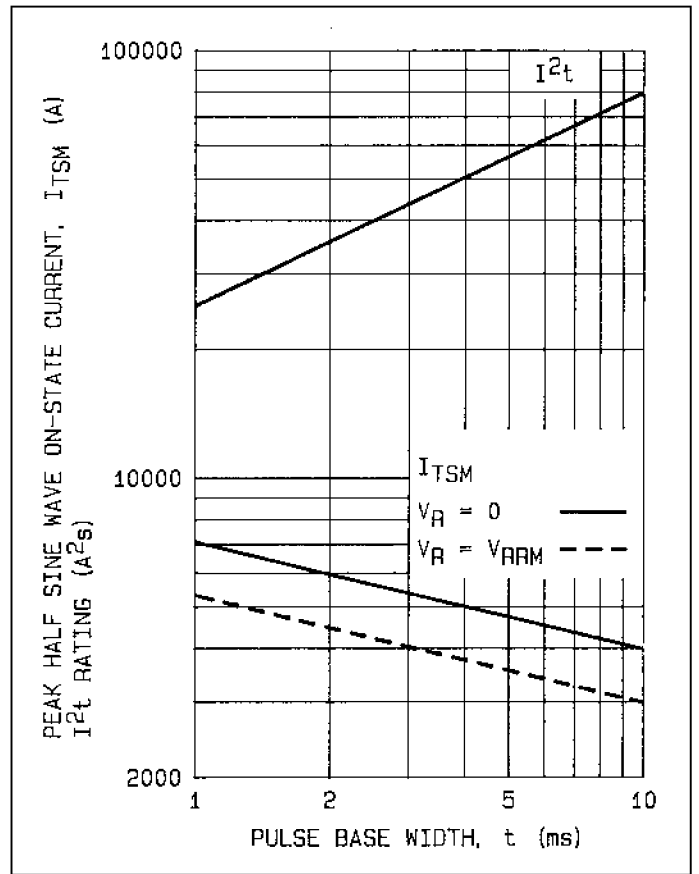


Fig.14 Non-repetitive sub-cycle surge on-state current and  $I^2t$  rating. (Initial  $T_j = 125^\circ C$ )

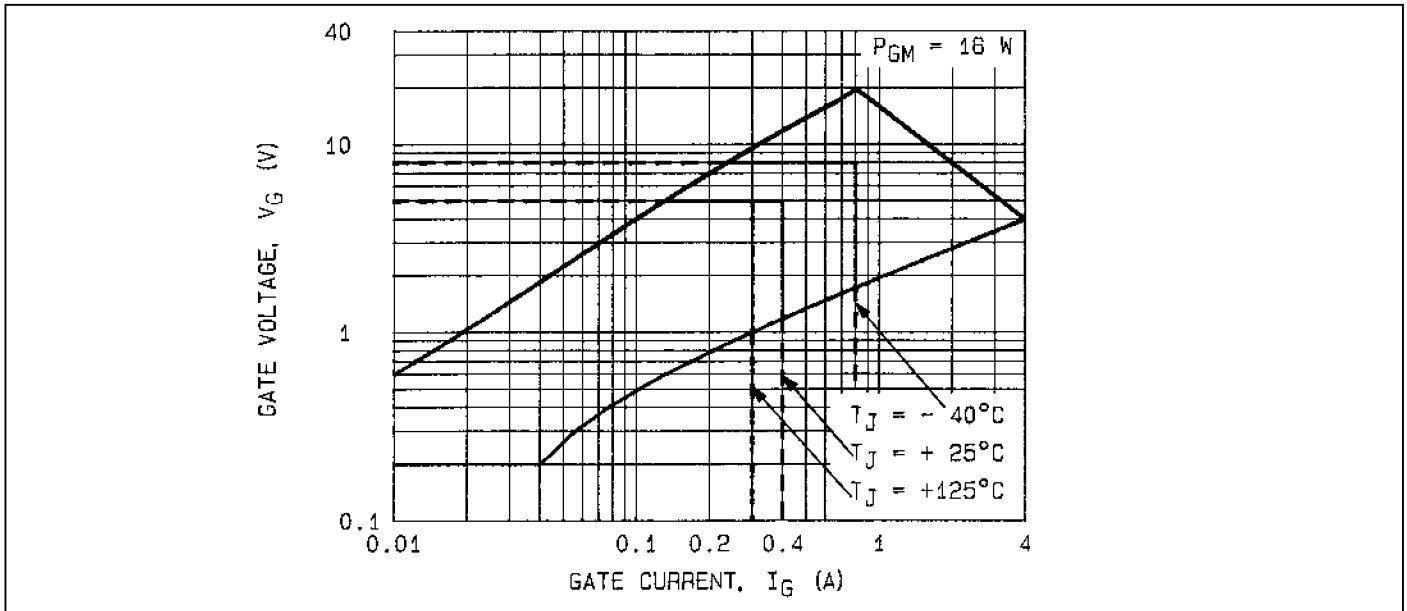


Fig.15 Gate trigger characteristics

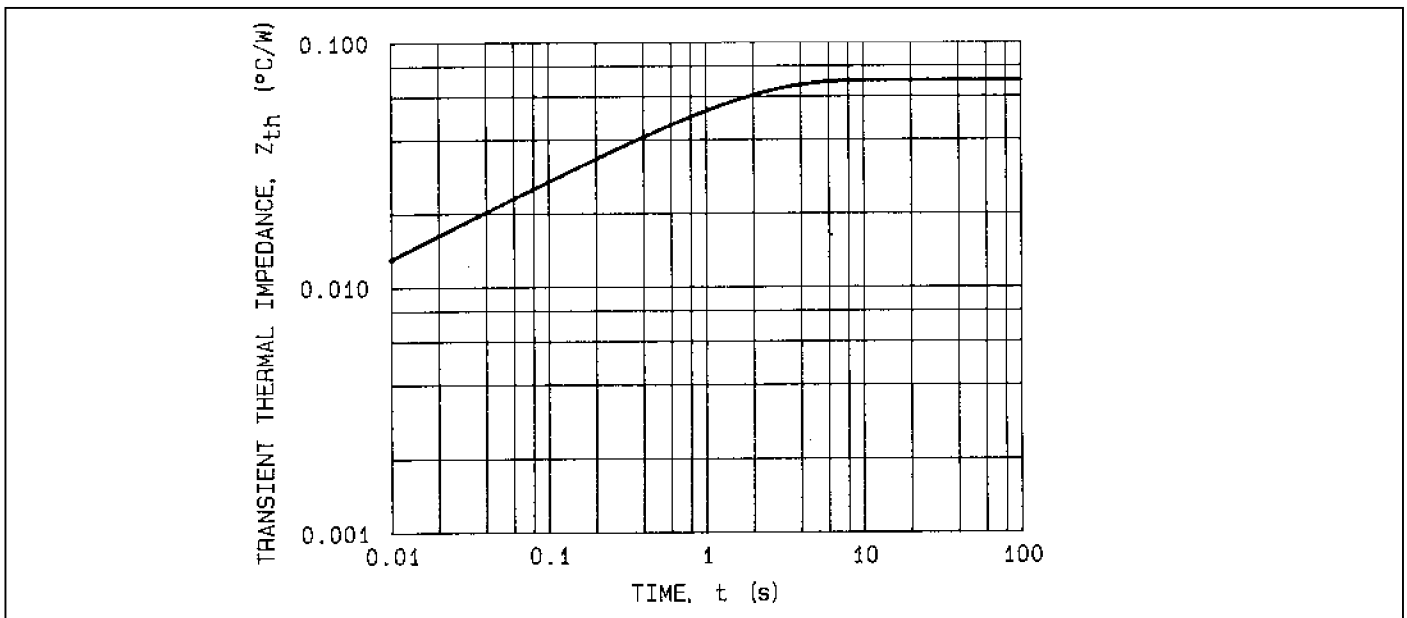
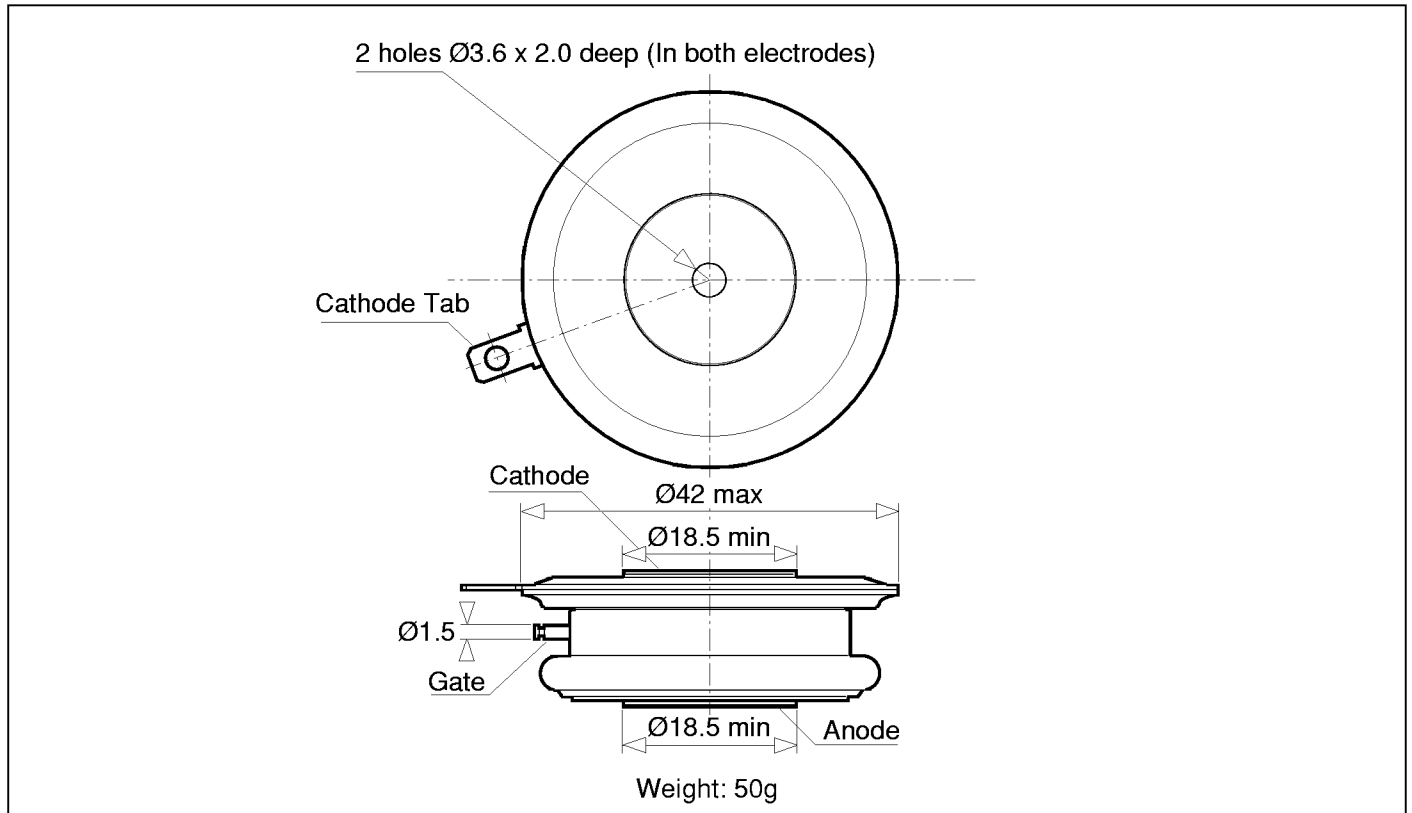


Fig.16 Transient thermal impedance - junction to case (double side cooled)

**PACKAGE DETAILS - MU86**

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



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