

# TF219..B

## FAST SWITCHING THYRISTOR

### APPLICATIONS

- High Power Inverters And Choppers.
- UPS.
- Railway Traction.
- Induction Heating.
- AC Motor Drives.
- Cycloconverters.

### KEY PARAMETERS

$V_{DRM}$	2000V
$I_{T(RMS)}$	190A
$I_{TSM}$	1200A
$dV/dt$	200V/ $\mu$ s
$dI/dt$	500A/ $\mu$ s
$t_q$	40 $\mu$ s

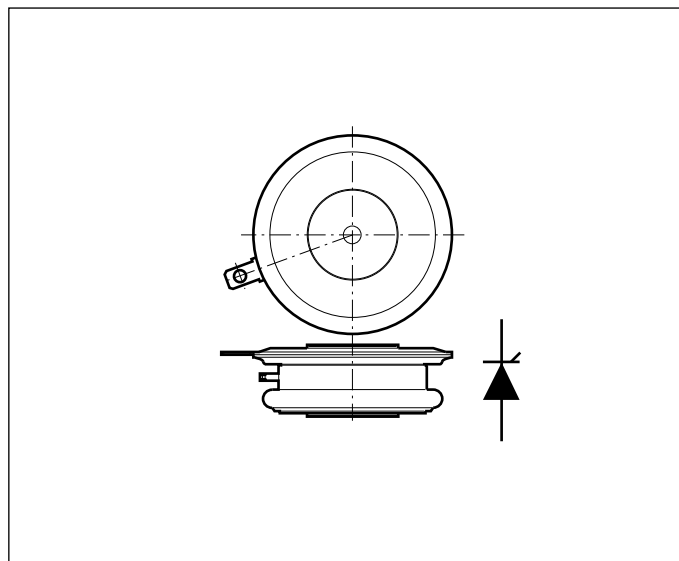
### FEATURES

- Double Side Cooling.
- High Surge Capability.
- High Voltage.

### VOLTAGE RATINGS

Type Number	Repetitive Peak Voltages $V_{DRM}$ $V_{RRM}$	Conditions
TF219 20B	2000	$V_{RSM} = V_{RRM} + 100V$  $I_{DRM} = I_{RRM} = 15mA$  at $V_{RRM}$ or $V_{DRM}$ & $T_{vj}$
TF219 18B	1800	
TF219 16B	1600	
TF219 14B	1400	

Lower voltage grades available.



Outline type code: MU86. Turn to page 12 for further information.

### CURRENT RATINGS

Symbol	Parameter	Conditions	Max.	Units
$I_{T(AV)}$	Mean on-state current	Half sinewave, 50Hz, $T_{case} = 80^{\circ}C$	120	A
$I_{T(RMS)}$	RMS value	Half sinewave, 50Hz, $T_{case} = 80^{\circ}C$	190	A

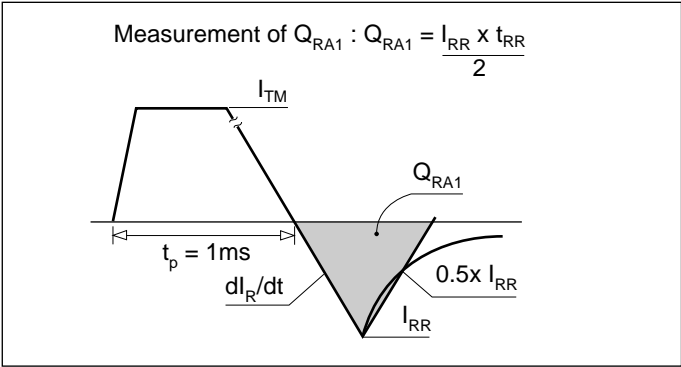
SURGE RATINGS

Symbol	Parameter	Conditions	Max.	Units
$I_{TSM}$	Surge (non-repetitive) on-state current	10ms half sine; $V_R = 0\% V_{RRM}$ ; $T_j = 125^{\circ}C$	1.2	kA
$I^2t$	$I^2t$ for fusing	10ms half sine; $V_R = 0\% V_{RRM}$ ; $T_j = 125^{\circ}C$	7.2	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	-	0.1	°C/W
		Single side cooled	Anode dc	-	0.19	°C/W
			Cathode dc	-	0.24	°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)		-	125	°C
		Reverse (blocking)		-	125	°C
$T_{stg}$	Storage temperature range			-40	150	°C
-	Clamping force			3.3	3.6	kN

MEASUREMENT OF RECOVERED CHARGE -  $Q_{RA1}$



## DYNAMIC CHARACTERISTICS

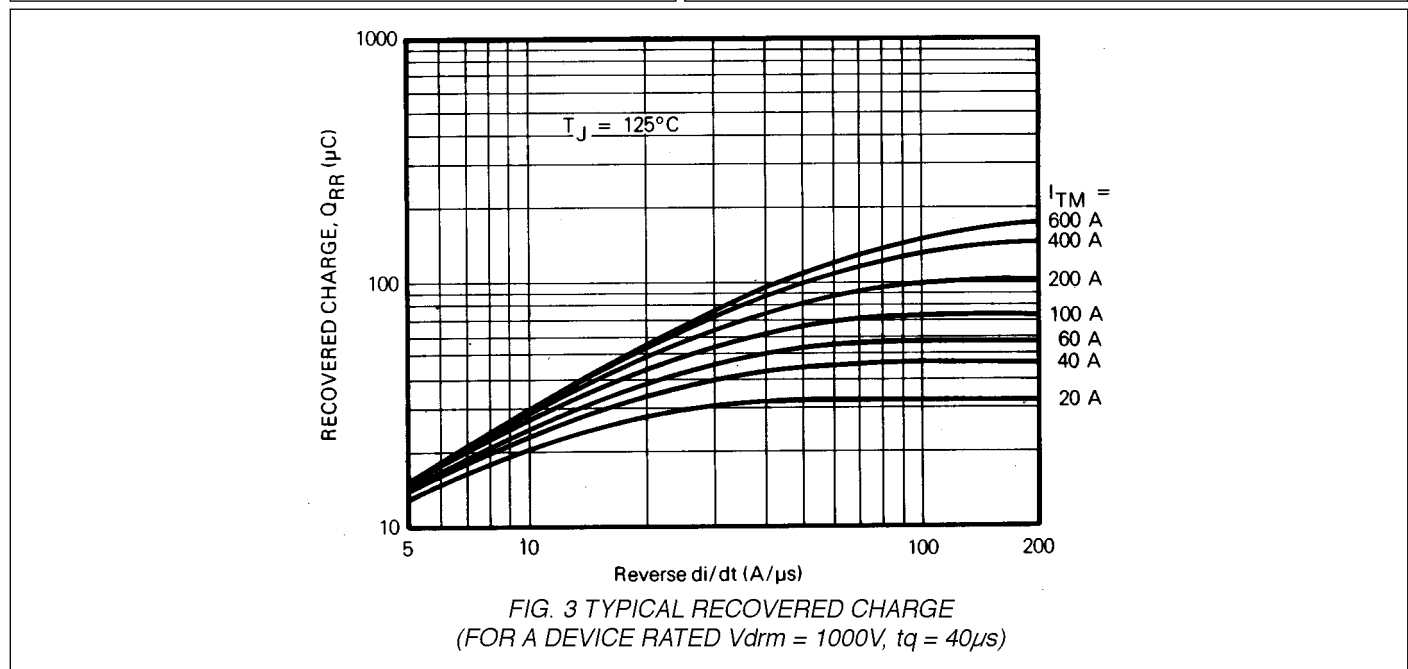
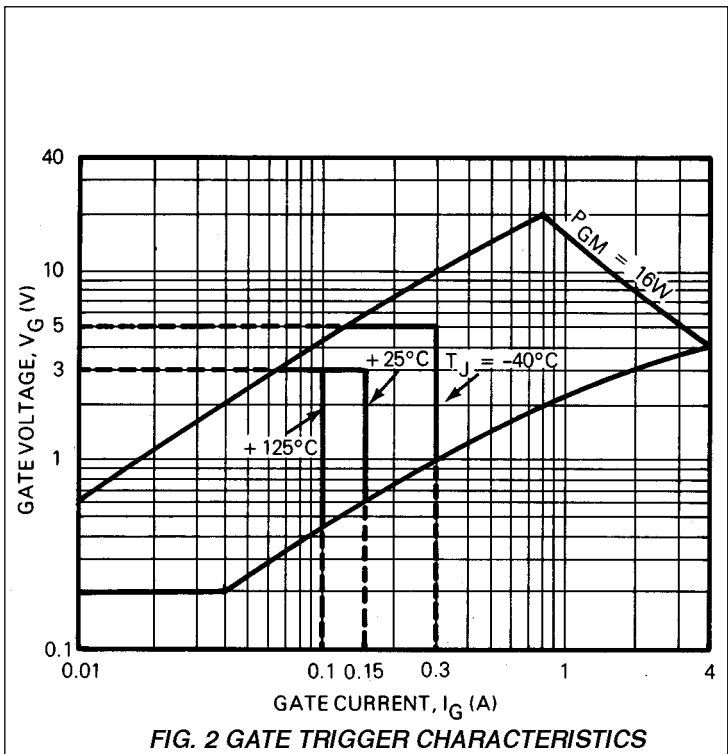
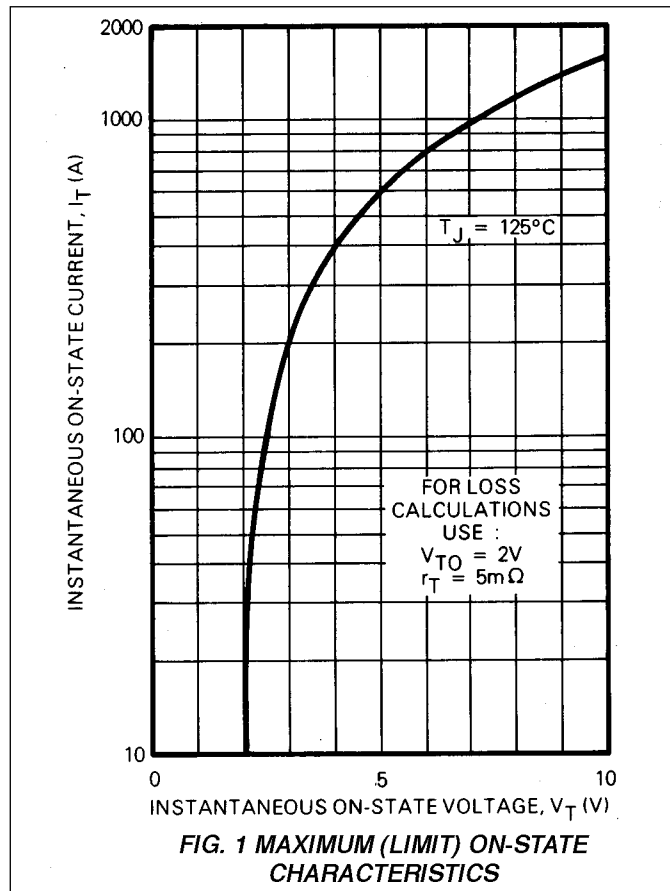
Symbol	Parameter	Conditions		Min.	Max.	Units
V <sub>TM</sub>	Maximum on-state voltage	At 150A peak, T <sub>case</sub> = 25°C		-	2.75	V
I <sub>RRM</sub> /I <sub>DRM</sub>	Peak reverse and off-state current	At V <sub>RRM</sub> /V <sub>DRM</sub> , T <sub>case</sub> = 125°C		-	15	mA
dV/dt	Maximum linear rate of rise of off-state voltage	Linear to 60% V <sub>DRM</sub> T <sub>j</sub> = 125°C, Gate open circuit		-	200	V/μs
dI/dt	Rate of rise of on-state current	Gate source 20V, 20Ω	Repetitive 50Hz	-	500	A/μs
		t <sub>r</sub> ≤ 0.5μs, T <sub>j</sub> = 125°C	Non-repetitive	-	800	A/μs
V <sub>T(TO)</sub>	Threshold voltage	At T <sub>vj</sub> = 125°C		-	2.0	V
r <sub>T</sub>	On-state slope resistance	At T <sub>vj</sub> = 125°C		-	5.0	mΩ
t <sub>gd</sub>	Delay time	T <sub>j</sub> = 25°C, I <sub>T</sub> = 100A, V <sub>D</sub> = 50V, I <sub>G</sub> = 1A, dI/dt = 50A/μs, dI <sub>G</sub> /dt = 1A/μs		-	3*	μs
t <sub>(ON)TOT</sub>	Total turn-on time			-	1.5*	μs
I <sub>H</sub>	Holding current	T <sub>j</sub> = 25°C, I <sub>TM</sub> = 1A, V <sub>D</sub> = 12V		-	60	mA
t <sub>q</sub>	Turn-off time	T <sub>j</sub> = 125°C, I <sub>T</sub> = 100A, V <sub>R</sub> = 50V, dV/dt = 200V/μs (Linear to 60% V <sub>DRM</sub> ), dI <sub>R</sub> /dt = 30A/μs, Gate open circuit	t <sub>q</sub> code: B	-	40	μs

\*Typical value.

## GATE TRIGGER CHARACTERISTICS AND RATINGS

Symbol	Parameter	Conditions	Typ.	Max.	Units
$V_{GT}$	Gate trigger voltage	$V_{DRM} = 12V$ , $T_{case} = 25^{\circ}C$ , $R_L = 6\Omega$	-	3.0	V
$I_{GT}$	Gate trigger current	$V_{DRM} = 12V$ , $T_{case} = 25^{\circ}C$ , $R_L = 6\Omega$	-	200	mA
$V_{GD}$	Gate non-trigger voltage	At $V_{DRM}$ , $T_{case} = 125^{\circ}C$ , $R_L = 1k\Omega$	-	0.2	V
$V_{RGM}$	Peak reverse gate voltage		-	5.0	V
$I_{FGM}$	Peak forward gate current	Anode positive with respect to cathode	-	4	A
$P_{GM}$	Peak gate power		-	16	W
$P_{G(AV)}$	Mean gate power		-	3	W

## CURVES



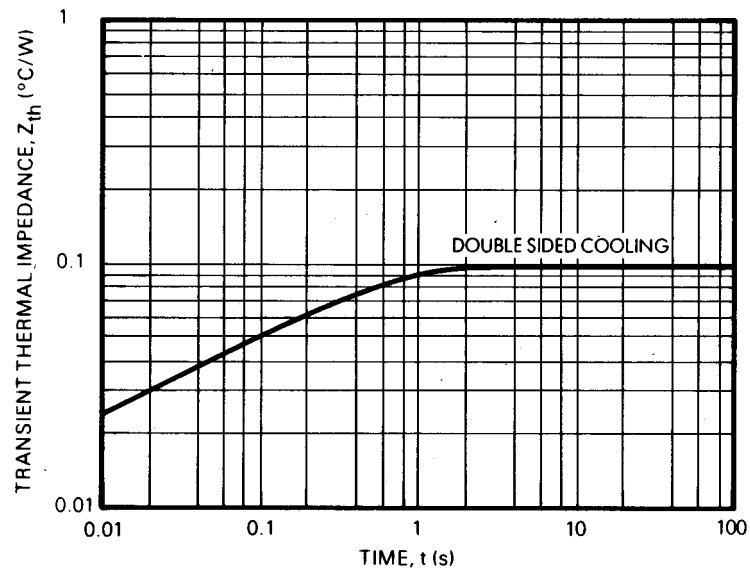
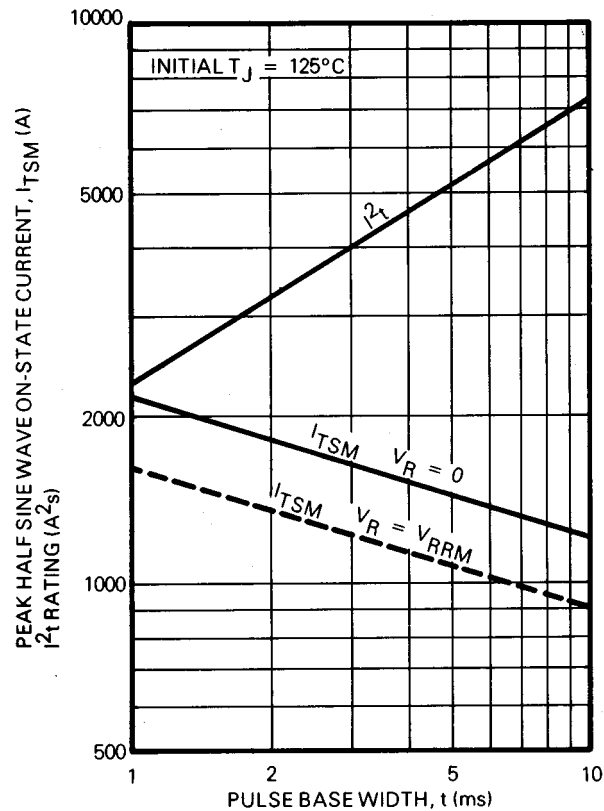


FIG. 4 TRANSIENT THERMAL IMPEDANCE

FIG. 5 NON-REPETITIVE SUB-CYCLE SURGE  
ON-STATE CURRENT AND  $I^2t$  RATING

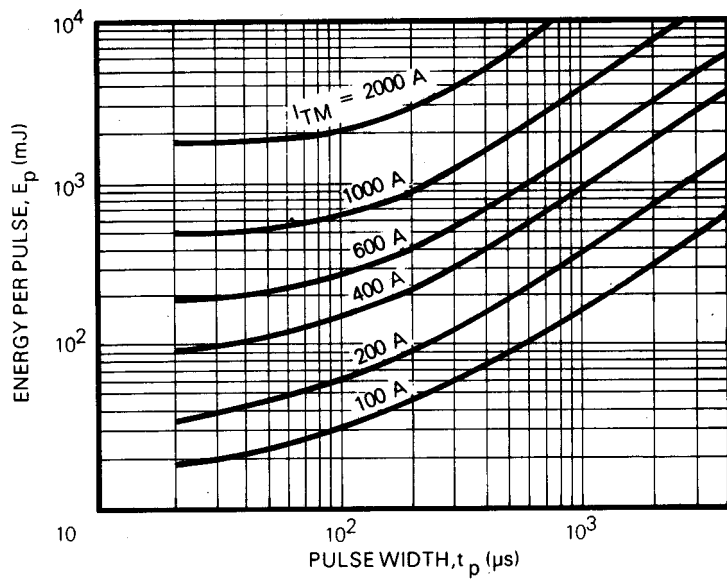
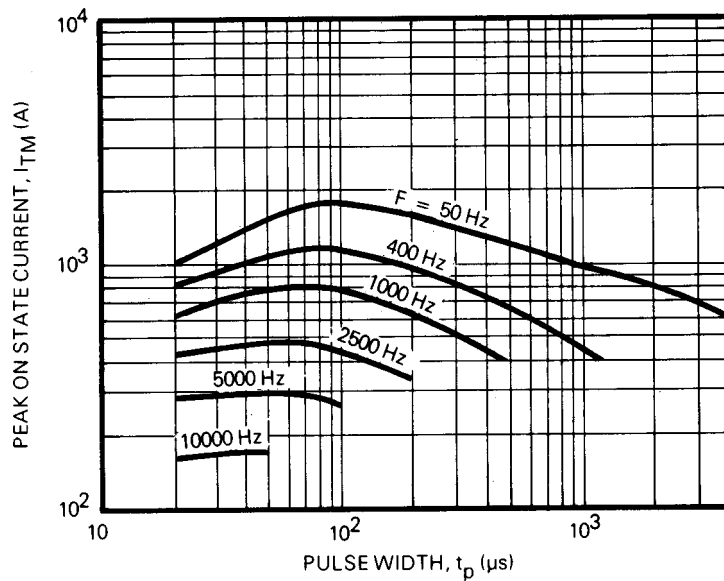
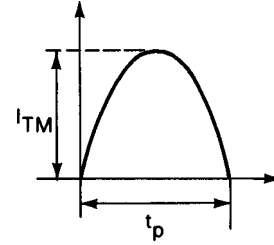


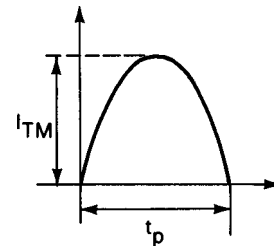
FIG. 6 ENERGY PER PULSE FOR SINUSOIDAL PULSES

**NOTES:**

1.  $V_D \leq 600V$ .
2.  $V_R \leq 10V$ .
3. R.C Snubber,  $C = 0.22\mu F$ ,  $R = 4.7\Omega$

FIG. 7 MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT  
vs PULSE WIDTH FOR  $T_c = 65^\circ C$ **NOTES:**

1.  $V_D \leq 600V$ .
2.  $V_R \leq 10V$ .
3. R.C Snubber,  $C = 0.22\mu F$ ,  $R = 4.7\Omega$



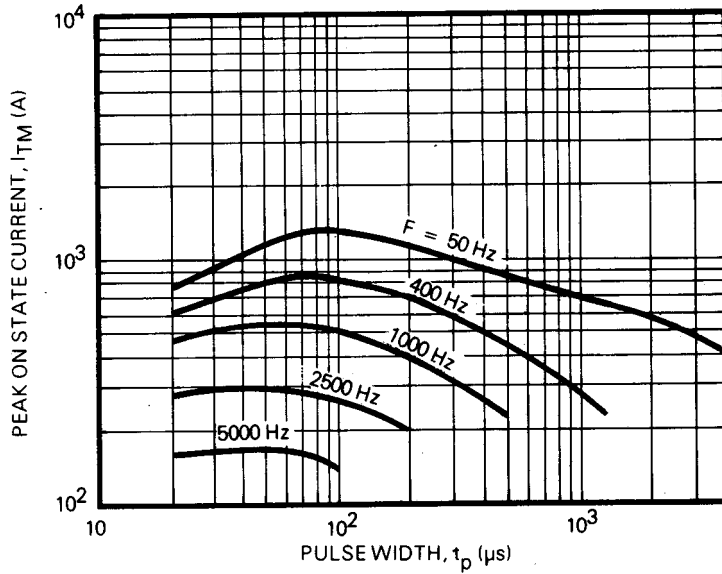


FIG. 8 MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT vs PULSE WIDTH FOR  $T_c = 90^\circ\text{C}$

**NOTES:**

1.  $V_D \leq 600\text{V}$ .
2.  $V_R \leq 10\text{V}$ .
3. R.C Snubber,  $C = 0.22\mu\text{F}$ ,  $R = 4.7\Omega$

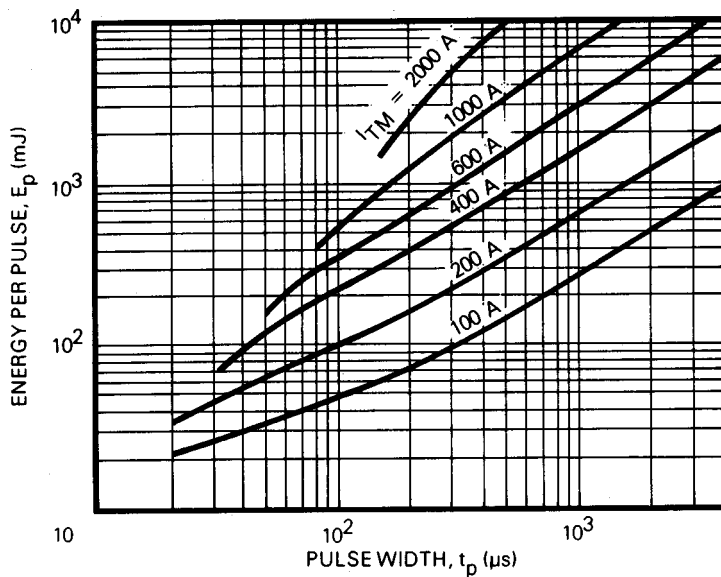
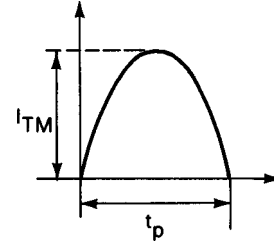
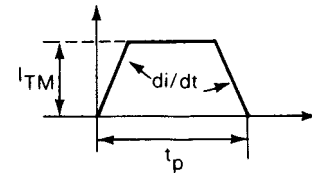


FIG. 9 ENERGY PER PULSE FOR TRAPEZOIDAL PULSES

**NOTES:**

1.  $di/dt = 25\text{A}/\mu\text{s}$
2.  $V_D \leq 600\text{V}$ .
3.  $V_R \leq 10\text{V}$ .
4. R.C Snubber,  $C = 0.22\mu\text{F}$ ,  $R = 4.7\Omega$



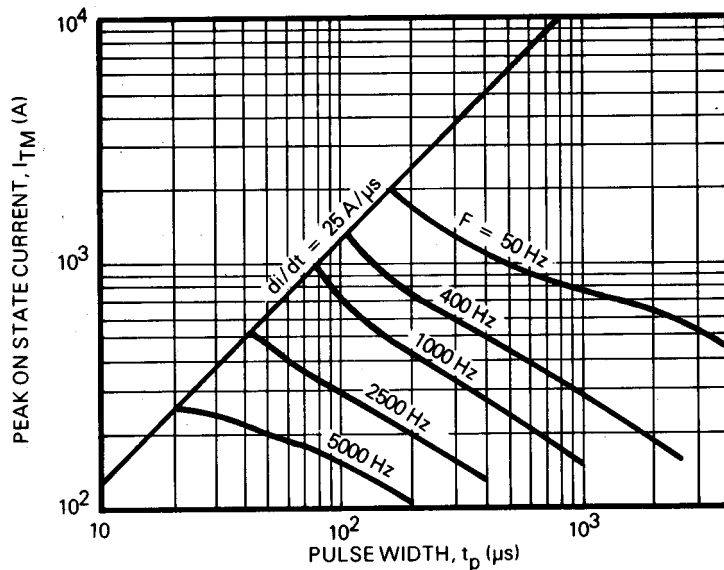


FIG. 10 MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT  
vs PULSE WIDTH FOR  $T_c = 65^\circ\text{C}$

**NOTES:**

1.  $di/dt = 25 \text{ A}/\mu\text{s}$
2.  $V_D \leq 600 \text{ V}$ .
3.  $V_R \leq 10 \text{ V}$ .
4. R.C Snubber,  $C = 0.22 \mu\text{F}$ ,  $R = 4.7 \Omega$

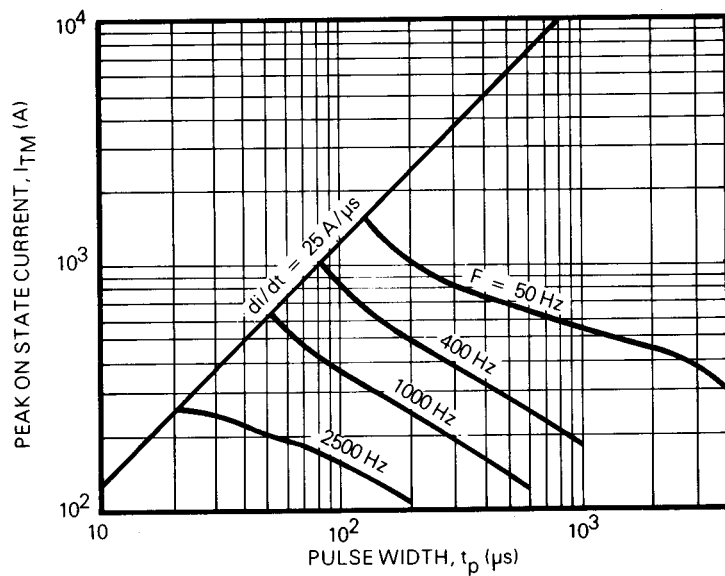
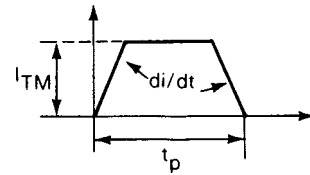
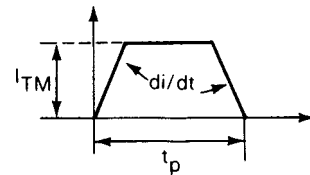


FIG. 11 MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT  
vs PULSE WIDTH FOR  $T_c = 90^\circ\text{C}$

**NOTES:**

1.  $di/dt = 25 \text{ A}/\mu\text{s}$
2.  $V_D \leq 600 \text{ V}$ .
3.  $V_R \leq 10 \text{ V}$ .
4. R.C Snubber,  $C = 0.22 \mu\text{F}$ ,  $R = 4.7 \Omega$





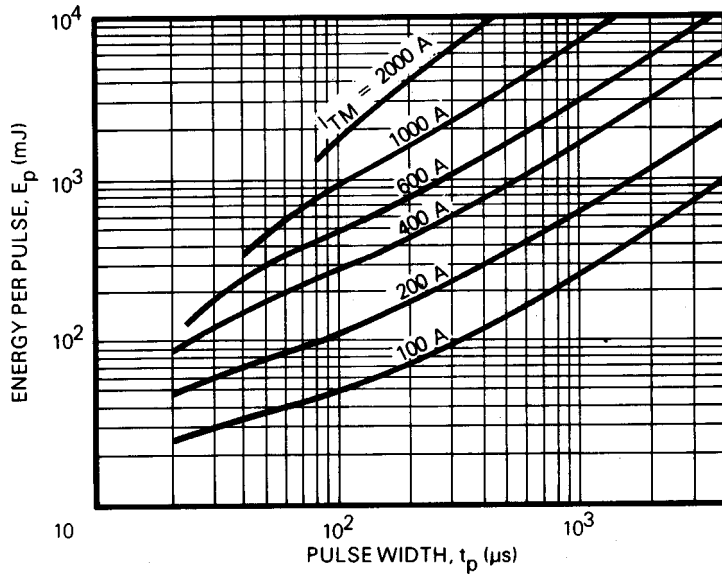


FIG. 12 ENERGY PER PULSE FOR TRAPEZOIDAL PULSES

**NOTES:**

1.  $di/dt = 50 A/\mu s$
2.  $V_D \leq 600V$ .
3.  $V_R \leq 10V$ .
4. R.C Snubber,  $C = 0.22\mu F$ ,  $R = 4.7\Omega$

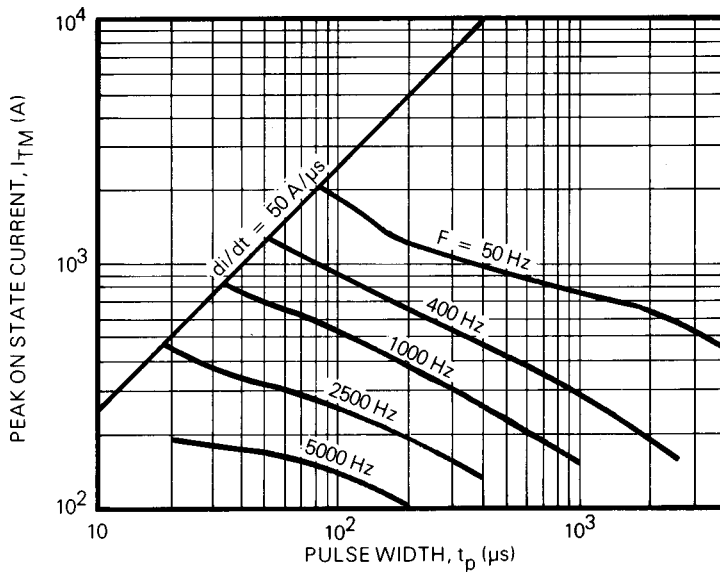
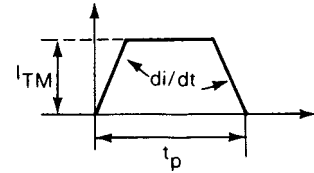
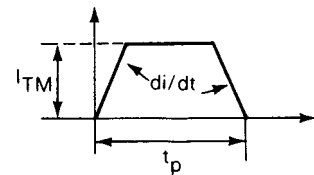


FIG. 13 MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT vs PULSE WIDTH FOR  $T_c = 65^\circ C$

**NOTES:**

1.  $di/dt = 50 A/\mu s$
2.  $V_D \leq 600V$ .
3.  $V_R \leq 10V$ .
4. R.C Snubber,  $C = 0.22\mu F$ ,  $R = 4.7\Omega$



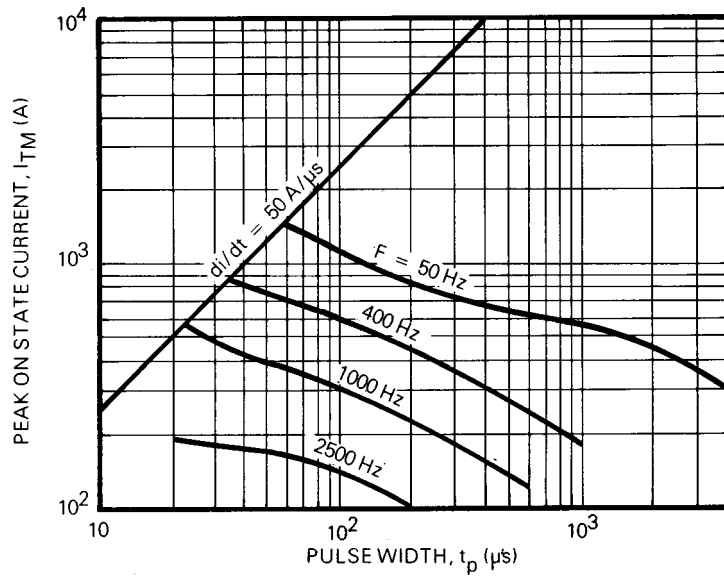


FIG. 14 MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT vs PULSE WIDTH FOR  $T_c = 90^\circ\text{C}$

**NOTES:**

1.  $di/dt = 50 \text{ A}/\mu\text{s}$
2.  $V_D \leq 600 \text{ V}$ .
3.  $V_R \leq 10 \text{ V}$ .
4. R.C Snubber,  $C = 0.22 \mu\text{F}$ ,  $R = 4.7 \Omega$

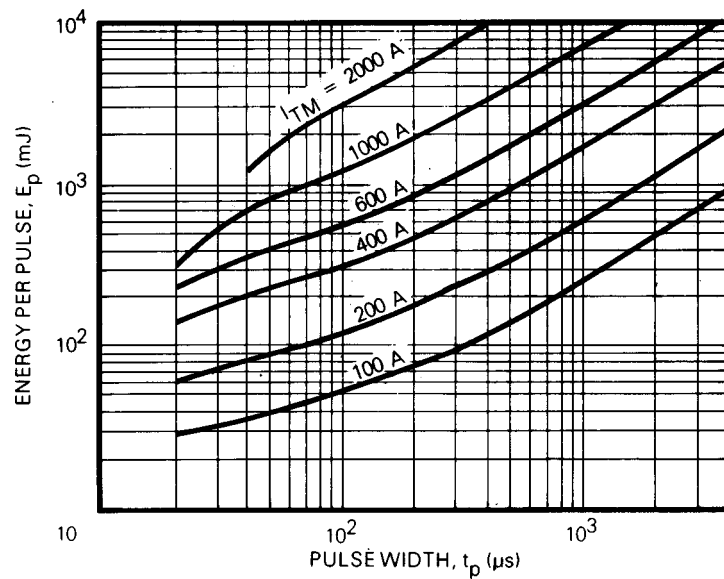
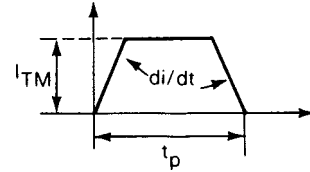
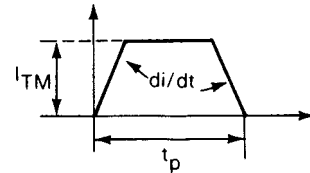


FIG. 15 ENERGY PER PULSE FOR TRAPEZOIDAL PULSES

**NOTES:**

1.  $di/dt = 100 \text{ A}/\mu\text{s}$
2.  $V_D \leq 600 \text{ V}$ .
3.  $V_R \leq 10 \text{ V}$ .
4. R.C Snubber,  $C = 0.22 \mu\text{F}$ ,  $R = 4.7 \Omega$



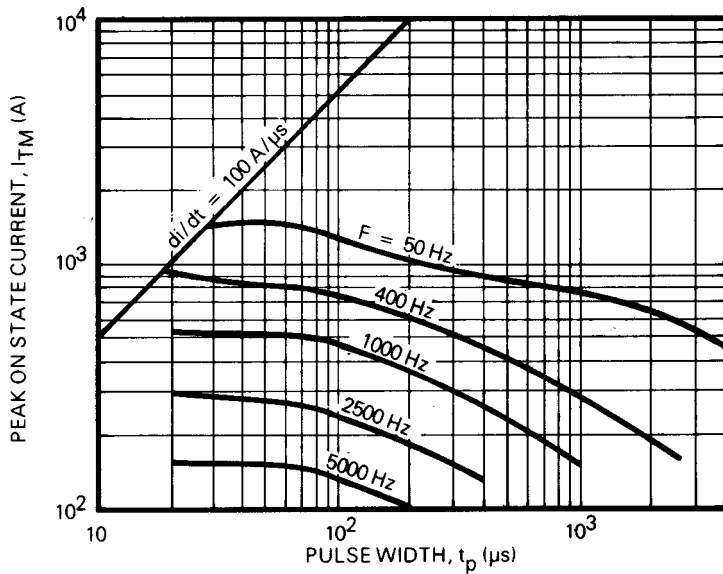


FIG. 16 MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT  
vs PULSE WIDTH FOR  $T_c = 65^\circ\text{C}$

**NOTES:**

1.  $di/dt = 100$  A/ $\mu$ s
2.  $V_D \leq 600$  V.
3.  $V_R \leq 10$  V.
4. R.C Snubber,  $C = 0.22$   $\mu$ F,  $R = 4.7$   $\Omega$

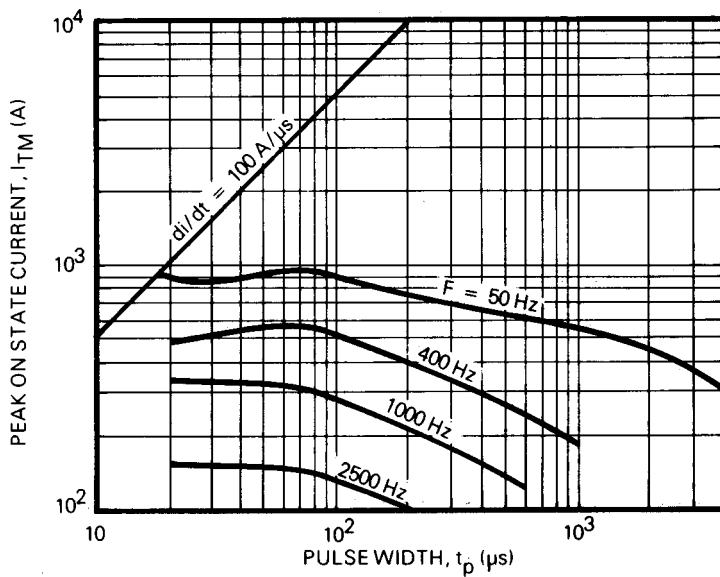
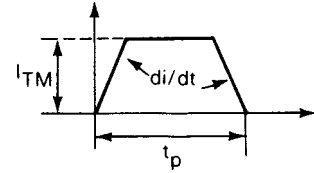
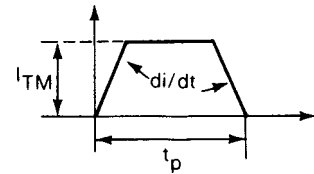


FIG. 17 MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT  
vs PULSE WIDTH FOR  $T_c = 90^\circ\text{C}$

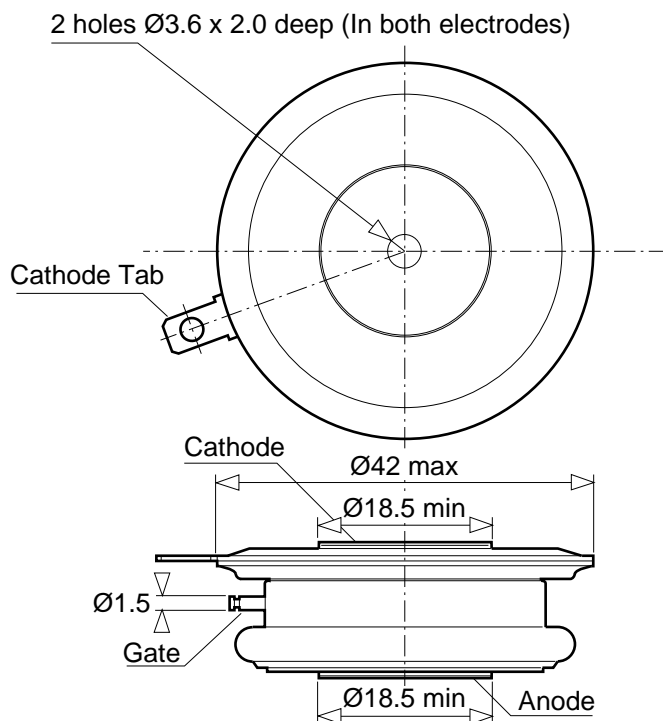
**NOTES:**

1.  $di/dt = 100$  A/ $\mu$ s
2.  $V_D \leq 600$  V.
3.  $V_R \leq 10$  V.
4. R.C Snubber,  $C = 0.22$   $\mu$ F,  $R = 4.7$   $\Omega$



## PACKAGE DETAILS - MU86

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



Weight: 50g



### HEADQUARTERS OPERATIONS

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