

TF447..A

FAST SWITCHING THYRISTOR

APPLICATIONS

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

KEY PARAMETERS

V_{DRM}	1200V
$I_{T(RMS)}$	470A
I_{TSM}	5000A
dV/dt	200V/ μ s
dI/dt	500A/ μ s
t_q	20 μ s

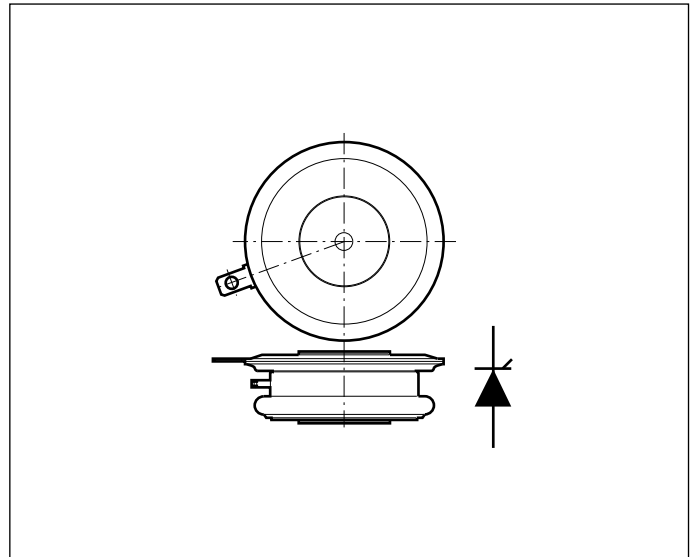
FEATURES

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

VOLTAGE RATINGS

Type Number	Repetitive Peak Voltages V_{DRM} V_{RRM}	Conditions
TF447 12A TF447 10A	1200 1000	$V_{RSM} = V_{RRM} + 100V$ $I_{DRM} = I_{RRM} = 25mA$ at V_{RRM} or V_{DRM} & T_{vj}

Lower voltage grades available.



Outline type code: MU86. See package outlines for further information.

CURRENT RATINGS

Symbol	Parameter	Conditions	Max.	Units
$I_{T(AV)}$	Mean on-state current	Half sinewave, 50Hz, $T_{case} = 80^{\circ}C$	300	A
$I_{T(RMS)}$	RMS value	Half sinewave, 50Hz, $T_{case} = 80^{\circ}C$	470	A

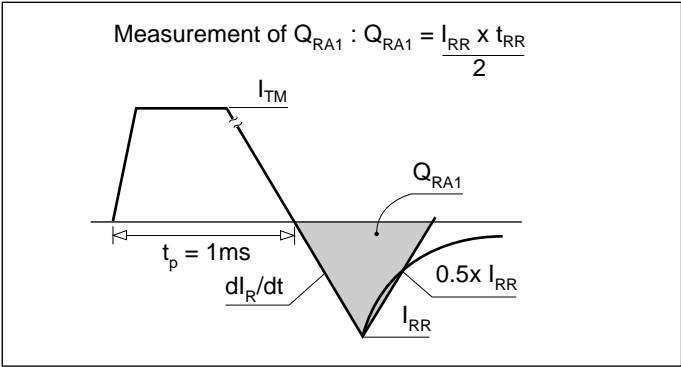
SURGE RATINGS

Symbol	Parameter	Conditions	Max.	Units
I_{TSM}	Surge (non-repetitive) on-state current	$t_p = 10\text{ms half sine;}$ $V_R = 0\% V_{RRM}, T_j = 125^\circ\text{C}$	5.0	kA
I^2t	I^2t for fusing		125×10^3	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	$^\circ\text{C/W}$
		Single side cooled	Anode dc	-	0.133	$^\circ\text{C/W}$
			Cathode dc	-	0.154	$^\circ\text{C/W}$
$R_{th(c-h)}$	Thermal resistance - case to heatsink	Clamping force 5.0kN with mounting compound	Double side	-	0.02	$^\circ\text{C/W}$
			Single side	-	0.04	$^\circ\text{C/W}$
T_{vj}	Virtual junction temperature	On-state (conducting)		-	125	$^\circ\text{C}$
		Reverse (blocking)		-	125	$^\circ\text{C}$
T_{stg}	Storage temperature range			-40	150	$^\circ\text{C}$
-	Clamping force			4.75	5.25	kN

MEASUREMENT OF RECOVERED CHARGE - Q_{RA1}



DYNAMIC CHARACTERISTICS

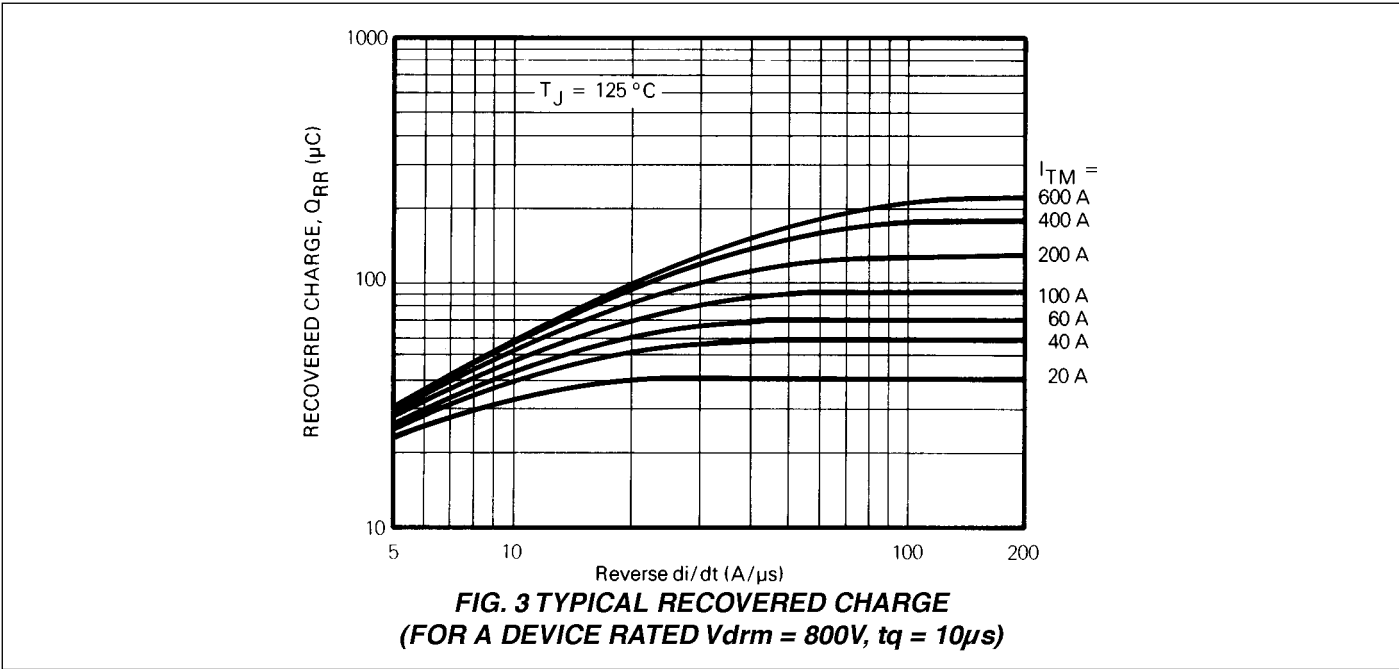
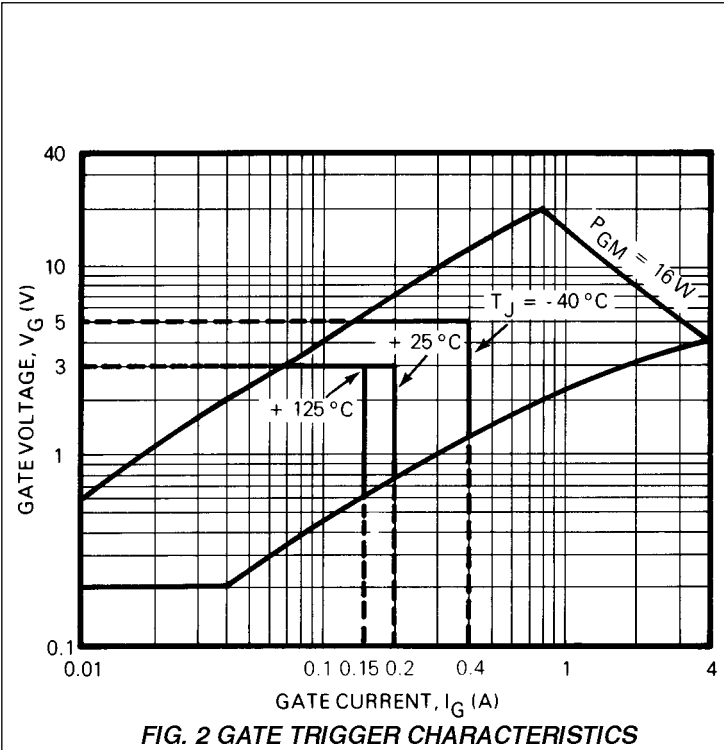
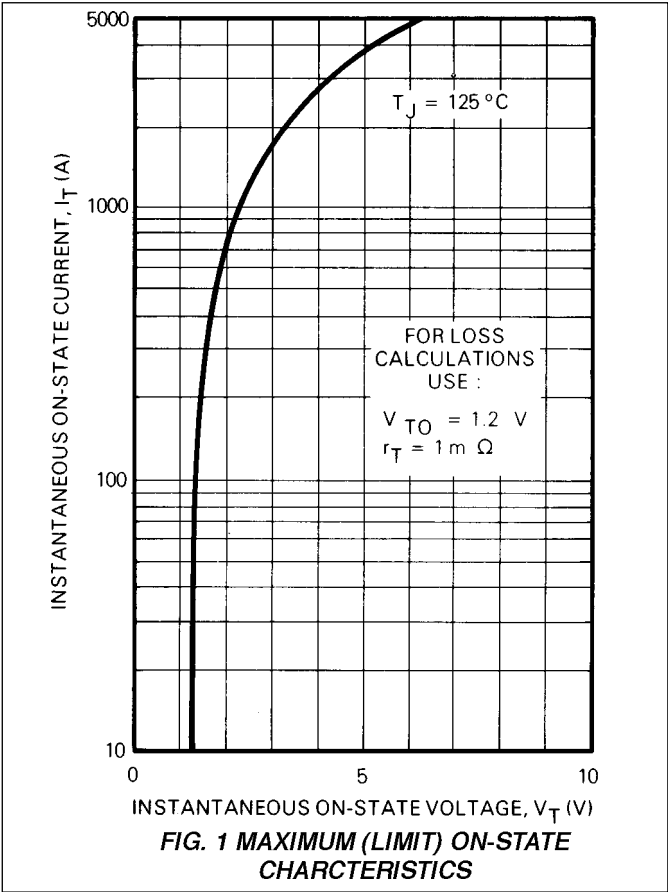
Symbol	Parameter	Conditions		Min.	Max.	Units
V_{TM}	Maximum on-state voltage	At 600A peak, $T_{case} = 25^{\circ}C$		-	1.85	V
I_{RRM}/I_{DRM}	Peak reverse and off-state current	At V_{RRM}/V_{DRM} , $T_{case} = 125^{\circ}C$		-	25	mA
dV/dt	Maximum linear rate of rise of off-state voltage	Linear to 60% V_{DRM} , $T_j = 125^{\circ}C$, Gate open circuit		-	200	V/ μs
dI/dt	Rate of rise of on-state current	Gate source 20V, 20 Ω	Repetitive 50Hz	-	500	A/ μs
		$t_r \leq 0.5\mu s$, $T_j = 125^{\circ}C$	Non-repetitive	-	800	A/ μs
$V_{T(TO)}$	Threshold voltage	At $T_{vj} = 125^{\circ}C$		-	1.2	V
r_T	On-state slope resistance	At $T_{vj} = 125^{\circ}C$		-	1.0	m Ω
t_{gd}	Delay time	$T_j = 25^{\circ}C$, $I_T = 100A$, $V_D = 50V$, $I_G = 1A$, $dI/dt = 50A/\mu s$, $dI_G/dt = 1A/\mu s$		-	1.5	μs
$t_{(ON)TOT}$	Total turn-on time			-	3	μs
I_H	Holding current	$T_j = 25^{\circ}C$, $I_{TM} = 1A$, $V_D = 12V$		-	70*	mA
t_q	Turn-off time	$T_j = 125^{\circ}C$, $I_T = 200A$, $V_R = 50V$, $dV/dt = 200V/\mu s$ (Linear to 60% V_{DRM}), $dI_R/dt = 30A/\mu s$, Gate open circuit	t_q code: A	-	20	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



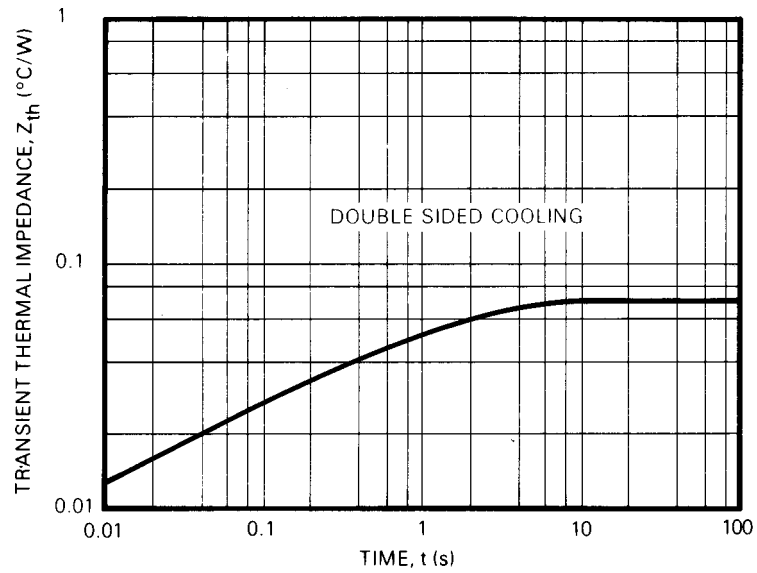


FIG. 4 TRANSIENT THERMAL IMPEDANCE - JUNCTION TO CASE

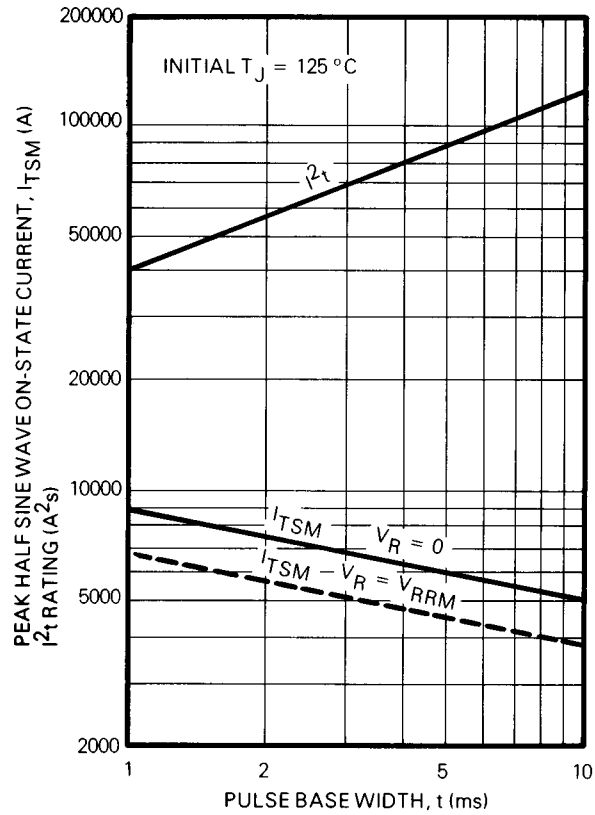


FIG. 5 NON-REPETITIVE SUB-CYCLE SURGE ON-STATE CURRENT AND I^2t RATING

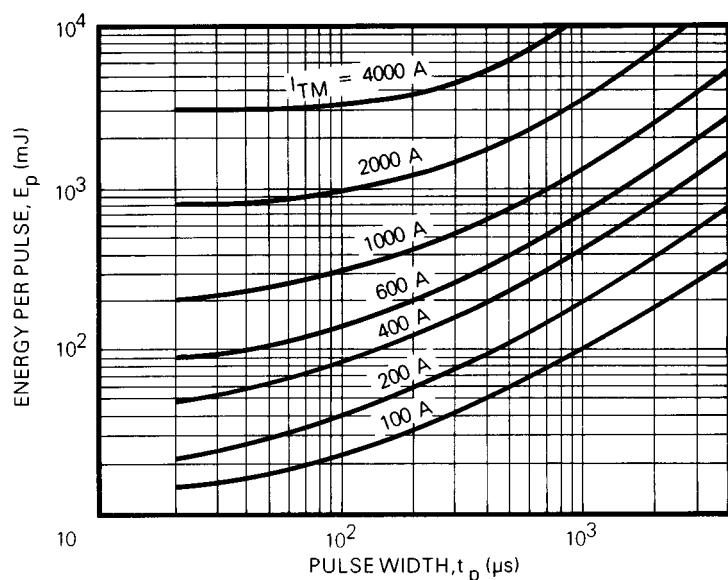


FIG. 6 ENERGY PER PULSE FOR SINUSOIDAL PULSES

NOTES:

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

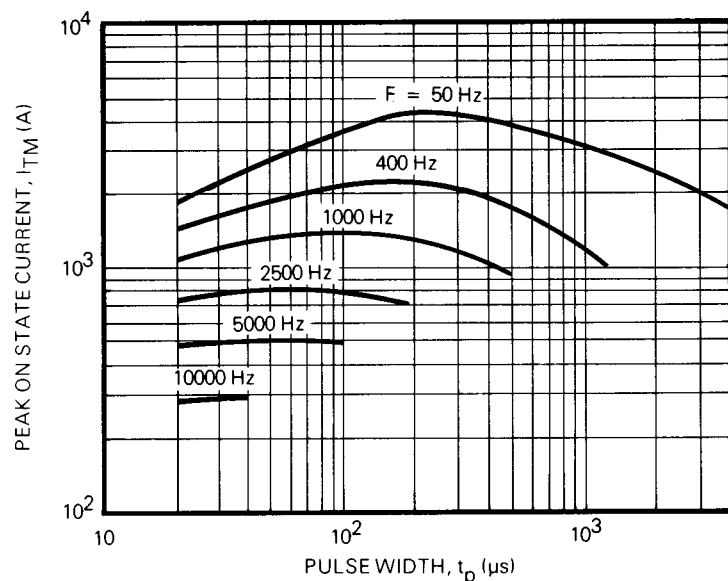
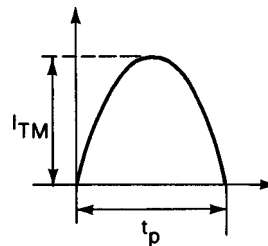
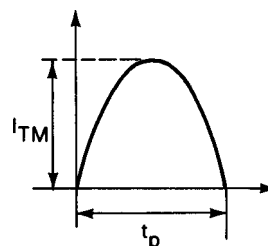


FIG. 7 MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT vs PULSE WIDTH FOR $T_c = 65^\circ C$

NOTES:

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



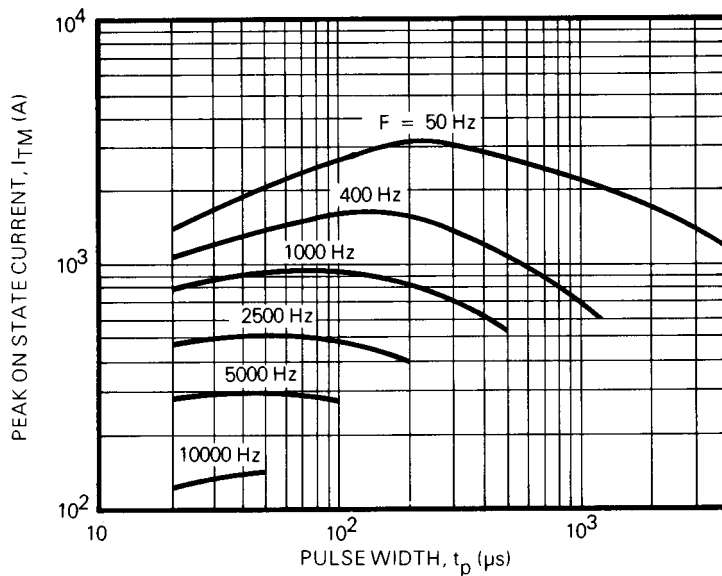


FIG. 8 MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT vs PULSE WIDTH FOR $T_c = 90^\circ C$

NOTES:

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

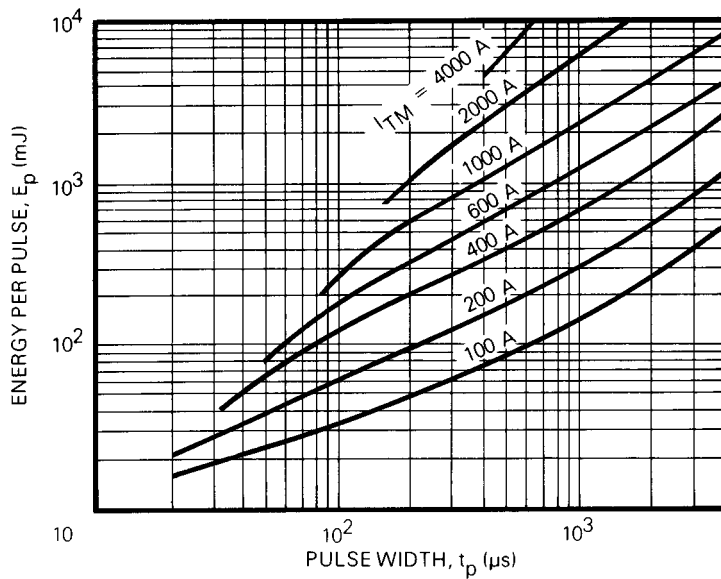
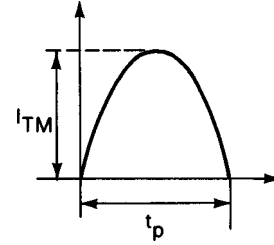
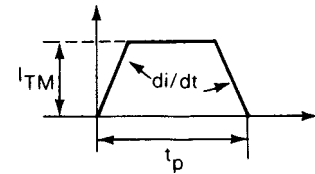


FIG. 9 ENERGY PER PULSE FOR TRAPEZOIDAL PULSES

NOTES:

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



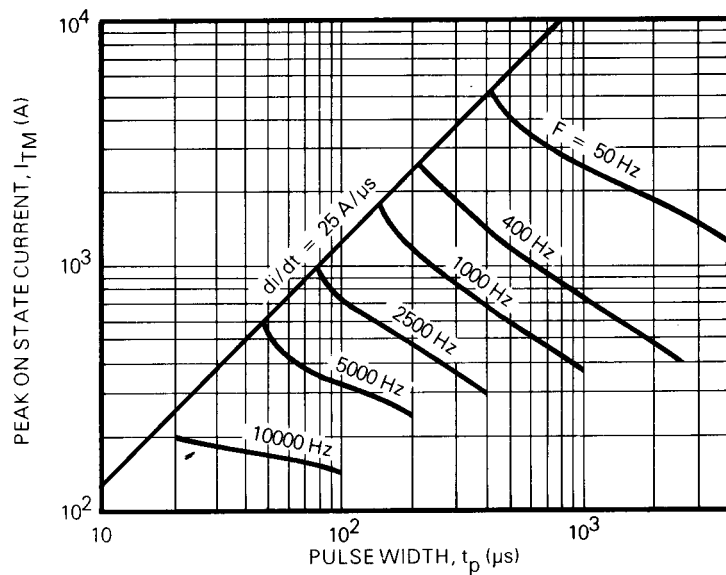


FIG. 10 MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT
vs PULSE WIDTH FOR $T_c = 65^\circ\text{C}$

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, $C = 0.22\mu\text{F}$, $R = 4.7\Omega$

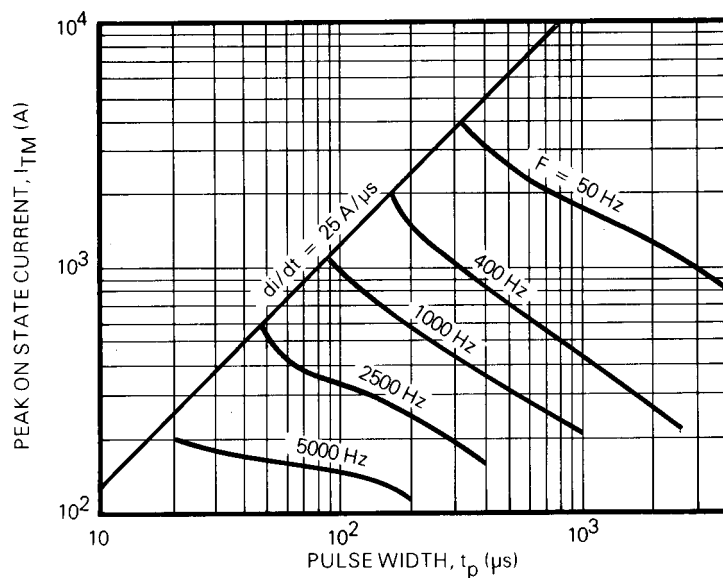
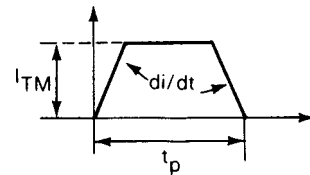
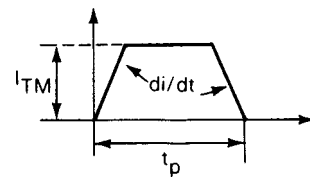


FIG. 11 MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT
vs PULSE WIDTH FOR $T_c = 90^\circ\text{C}$

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, $C = 0.22\mu\text{F}$, $R = 4.7\Omega$



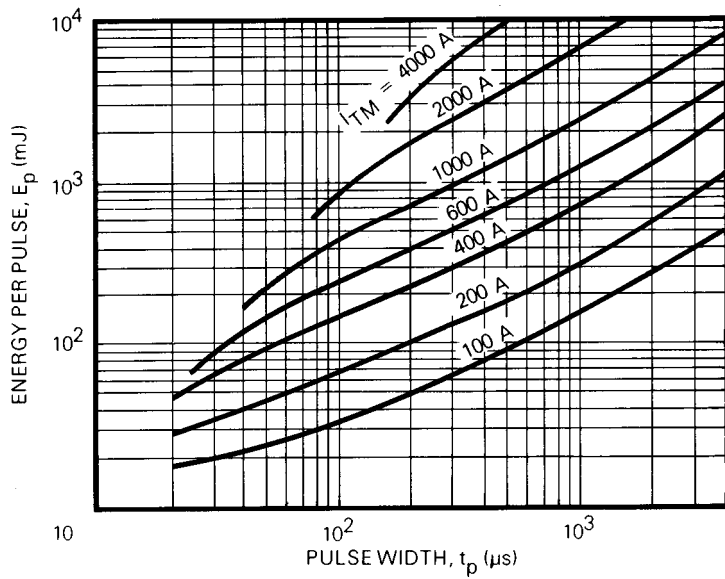


FIG. 12 ENERGY PER PULSE FOR TRAPEZOIDAL PULSES

NOTES:

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

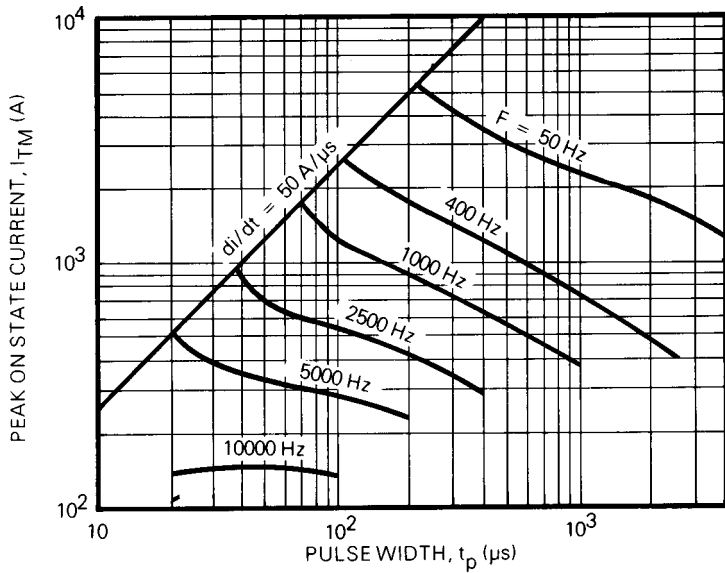
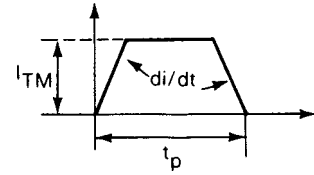
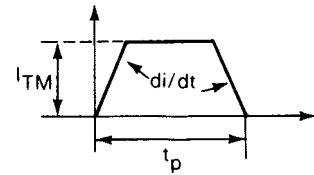


FIG. 13 MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT vs PULSE WIDTH FOR $T_c = 65^\circ C$

NOTES:

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



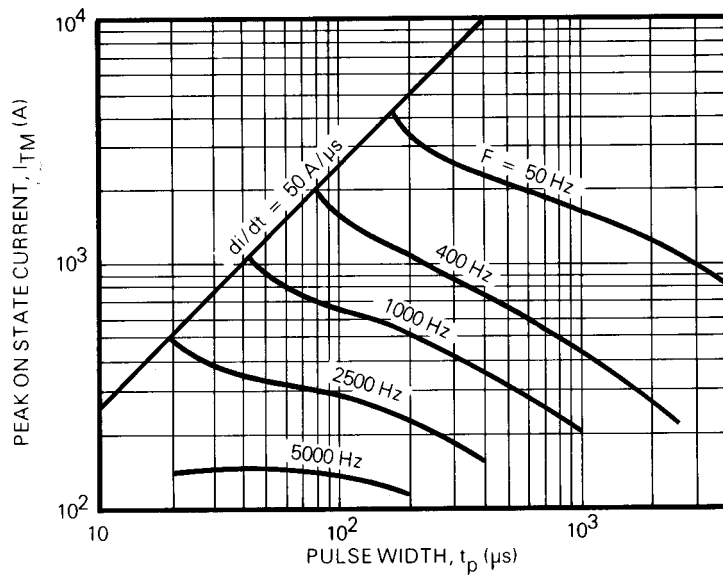


FIG. 14 MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT vs PULSE WIDTH FOR $T_c = 90^\circ\text{C}$

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, $C = 0.22\mu\text{F}$, $R = 4.7\Omega$

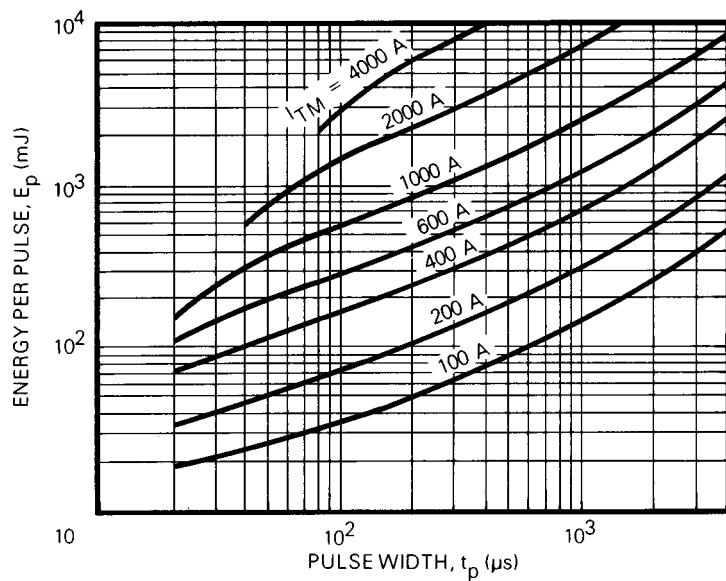
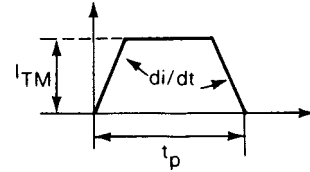
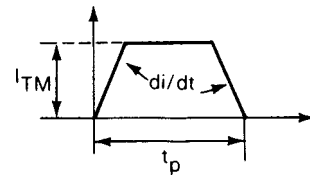
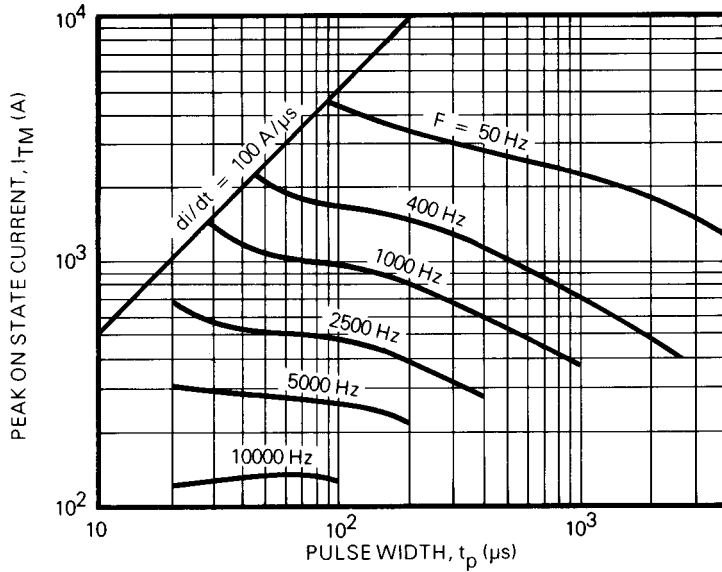


FIG. 15 ENERGY PER PULSE FOR TRAPEZOIDAL PULSES

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, $C = 0.22\mu\text{F}$, $R = 4.7\Omega$

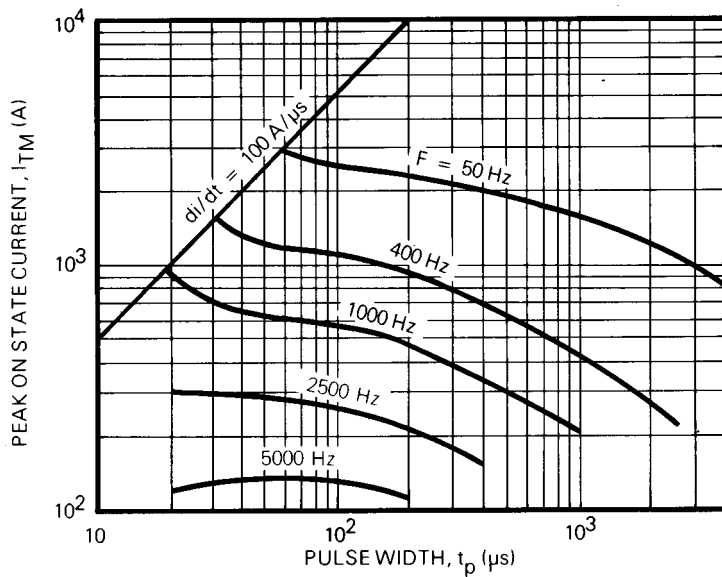
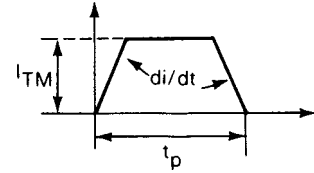




**FIG 16 MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT
vs PULSE WIDTH FOR $T_c = 65^\circ\text{C}$**

NOTES:

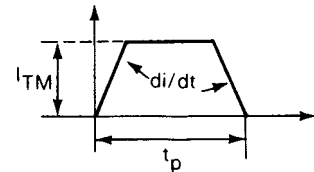
1. $di/dt = 100 \text{ A}/\mu\text{s}$
2. $V_D \leq 600 \text{ V}$.
3. $V_R \leq 10 \text{ V}$.
4. R.C Snubber, $C = 0.22 \mu\text{F}$, $R = 4.7 \Omega$



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

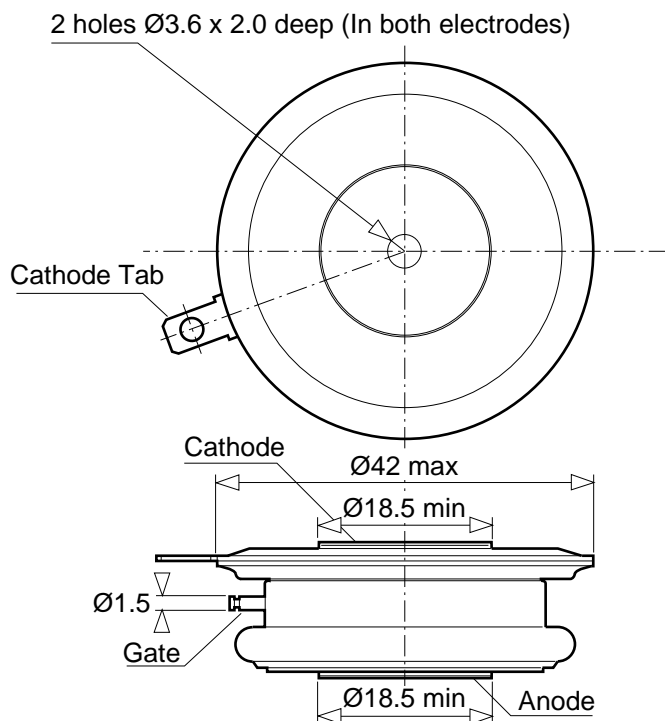
NOTES:

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, $C = 0.22 \mu\text{F}$, $R = 4.7 \Omega$



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



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