

APPLICATIONS

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

KEY PARAMETERS

V_{DRM}	2000V
$I_{T(RMS)}$	260A
I_{TSM}	4000A
dV/dt	200V/ μ s
dI/dt	500A/ μ s
t_q	50 μ s

FEATURES

- Low Switching Losses At High Frequency.
- Fully Characterised For Operation Up To 20kHz.

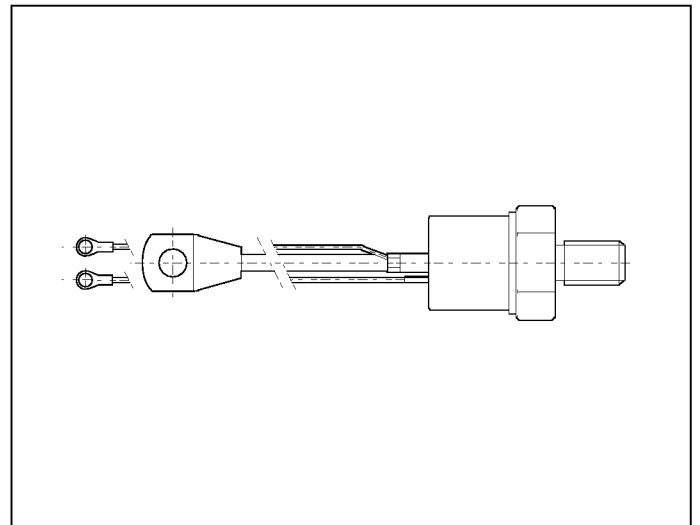
VOLTAGE RATINGS

Type Number	Repetitive Peak Voltages V_{DRM} V_{RRM}	Conditions
DK24 20FC K or M	2000	$V_{RSM} = V_{RRM} + 100V$ $I_{DRM} = I_{RRM} = 25mA$ at V_{RRM} or V_{DRM} & T_{vj}
DK24 18FC K or M	1800	
DK24 16FC K or M	1600	
DK24 14FC K or M	1400	

$C = t_q \text{ code} = 50\mu s.$

For 3/4" 16 UNF thread add K to type number, e.g. DK24 20FCK.

For M16 thread add M to type number, e.g. DK24 14FCM.



Outline type code: TO93 Turn to page 12 for further information.

CURRENT RATINGS

Symbol	Parameter	Conditions	Max.	Units
$I_{T(AV)}$	Mean on-state current	Half wave resistive load, $T_{case} = 80^\circ C$	165	A
$I_{T(RMS)}$	RMS value	$T_{case} = 80^\circ C$	260	A

SURGE RATINGS

Symbol	Parameter	Conditions	Max.	Units
I_{TSM}	Surge (non-repetitive) on-state current	$t_p \geq 10\text{ms}$ half sine; $T_{case} = 125^\circ\text{C}$ $V_R = 0\% V_{RRM} - 1/4$ sine	4.0	kA
I^2t	I^2t for fusing		80.0×10^3	A ² s

THERMAL AND MECHANICAL DATA

Symbol	Parameter	Conditions	Min.	Max.	Units
$R_{th(j-c)}$	Thermal resistance - junction to case	dc	-	0.13	°C/W
$R_{th(c-h)}$	Thermal resistance - case to heatsink	Mounting torque 35.0Nm with mounting compound	-	0.06	°C/W
T_{vj}	Virtual junction temperature	On-state (conducting)	-	125	°C
		Reverse (blocking)	-	125	°C
T_{stg}	Storage temperature range		-40	150	°C
-	Mounting torque		30.0	35.0	Nm

DYNAMIC CHARACTERISTICS

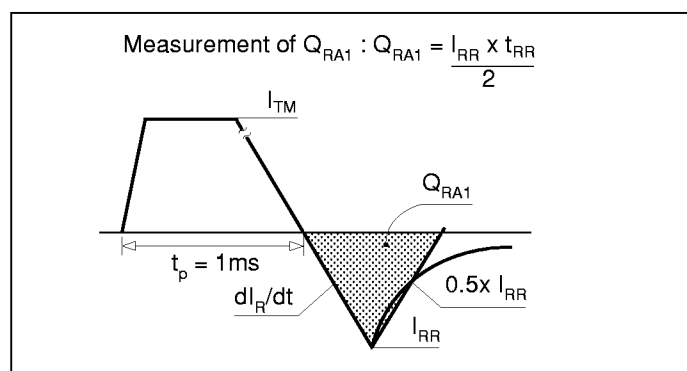
Symbol	Parameter	Conditions		Min.	Max.	Units
V _{TM}	Maximum on-state voltage	At 450A peak, T _{case} = 25°C		-	2.0	V
I _{RRM} /I _{DRM}	Peak reverse and off-state current	At V _{RRM} /V _{DRM} , T _{case} = 125°C		-	25	mA
dV/dt	Maximum linear rate of rise of off-state voltage	Linear to 60% V _{DRM} T _j = 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 _r < 0.5μs, T _j = 125°C	Non-repetitive	-	800	A/μs
V _{T(To)}	Threshold voltage	At T _{vj} = 125°C		-	1.25	V
r _T	On-state slope resistance	At T _{vj} = 125°C		-	1.66	mΩ
t _{gd}	Delay time	T _j = 25°C, I _T = 50A, V _D = 300V, I _G = 1A, dI/dt = 30A/μs, dI _G /dt = 1A/μs		3*	-	μs
t _{(ON)TOT}	Total turn-on time			1.5*	-	μs
I _H	Holding current	T _j = 25°C, I _{TM} = 1A, V _D = 12V		-	70	mA
t _q	Turn-off time	T _j = 125°C, I _T = 200A, V _R = 50V, dV/dt = 200V/μs (Linear to 60% V _{DRM}), dI _R /dt = 30A/μs, Gate open circuit	t _q code: C	-	50	μs

*Typical value.

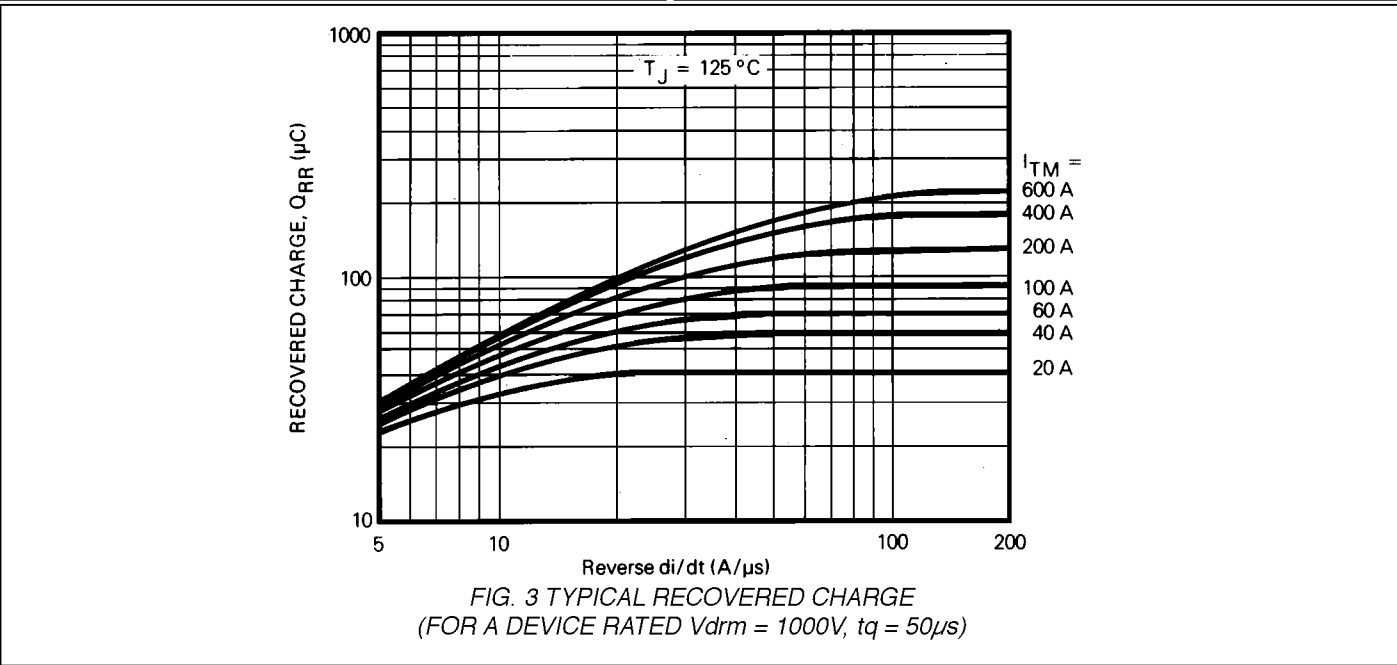
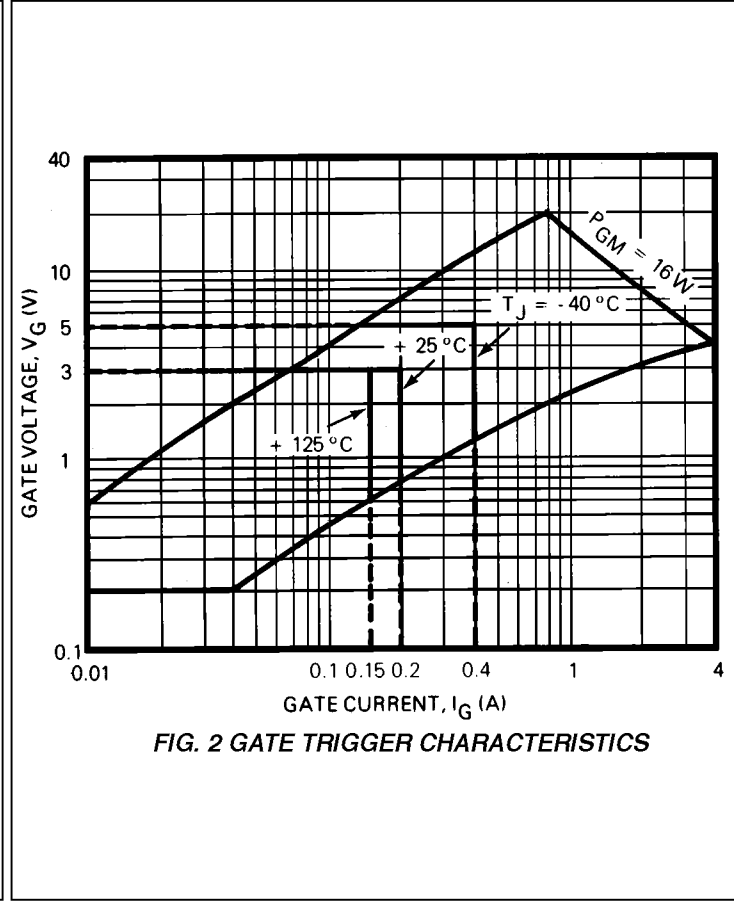
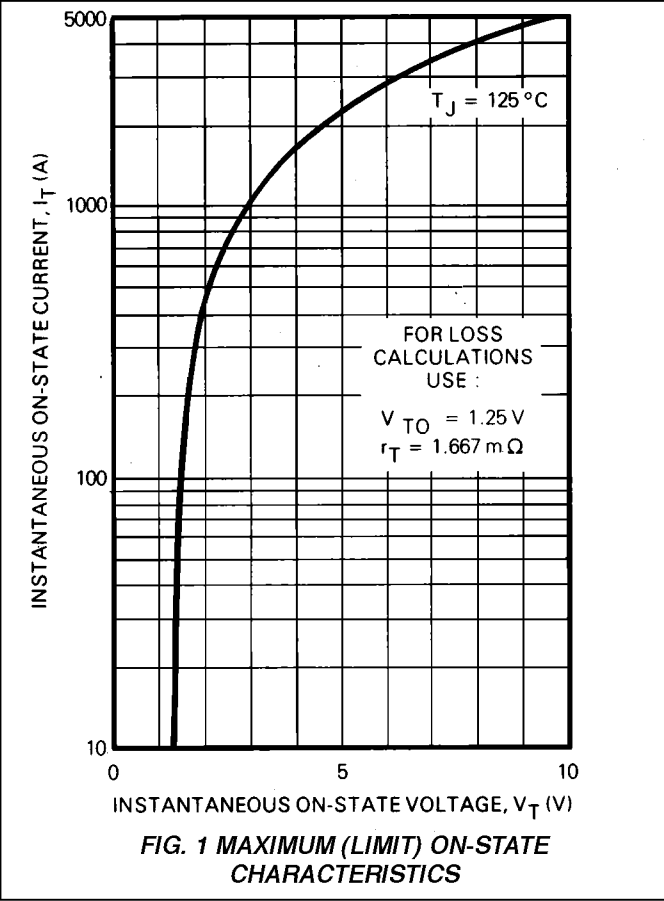
GATE TRIGGER CHARACTERISTICS AND RATINGS

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		-	3.0	W

MEASUREMENT OF RECOVERED CHARGE - Q_{RA1}



CURVES



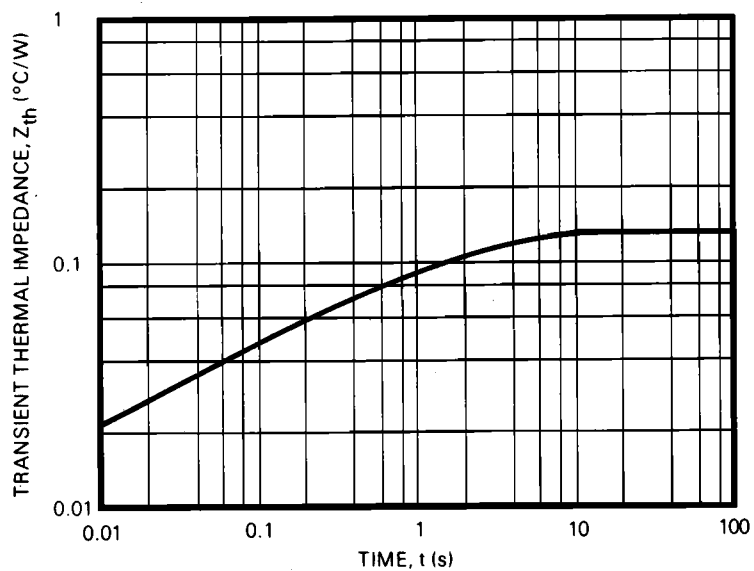
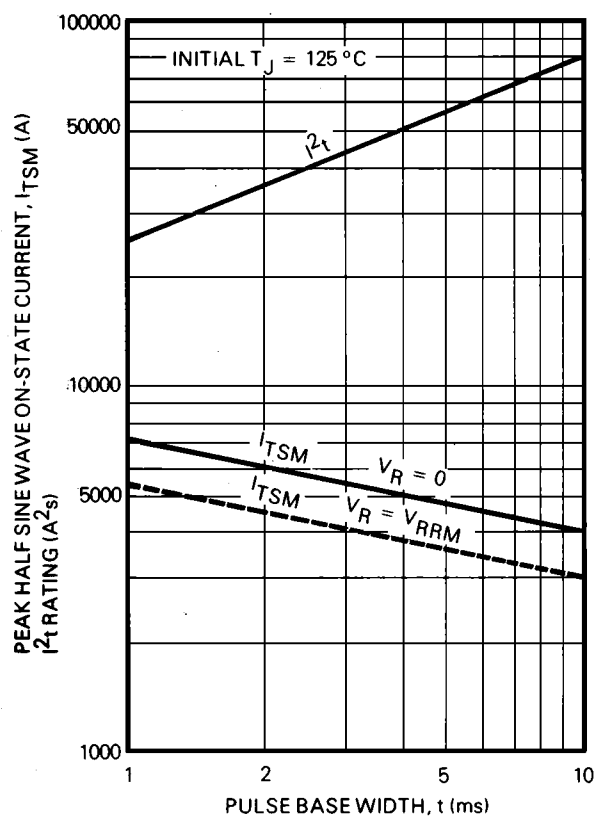
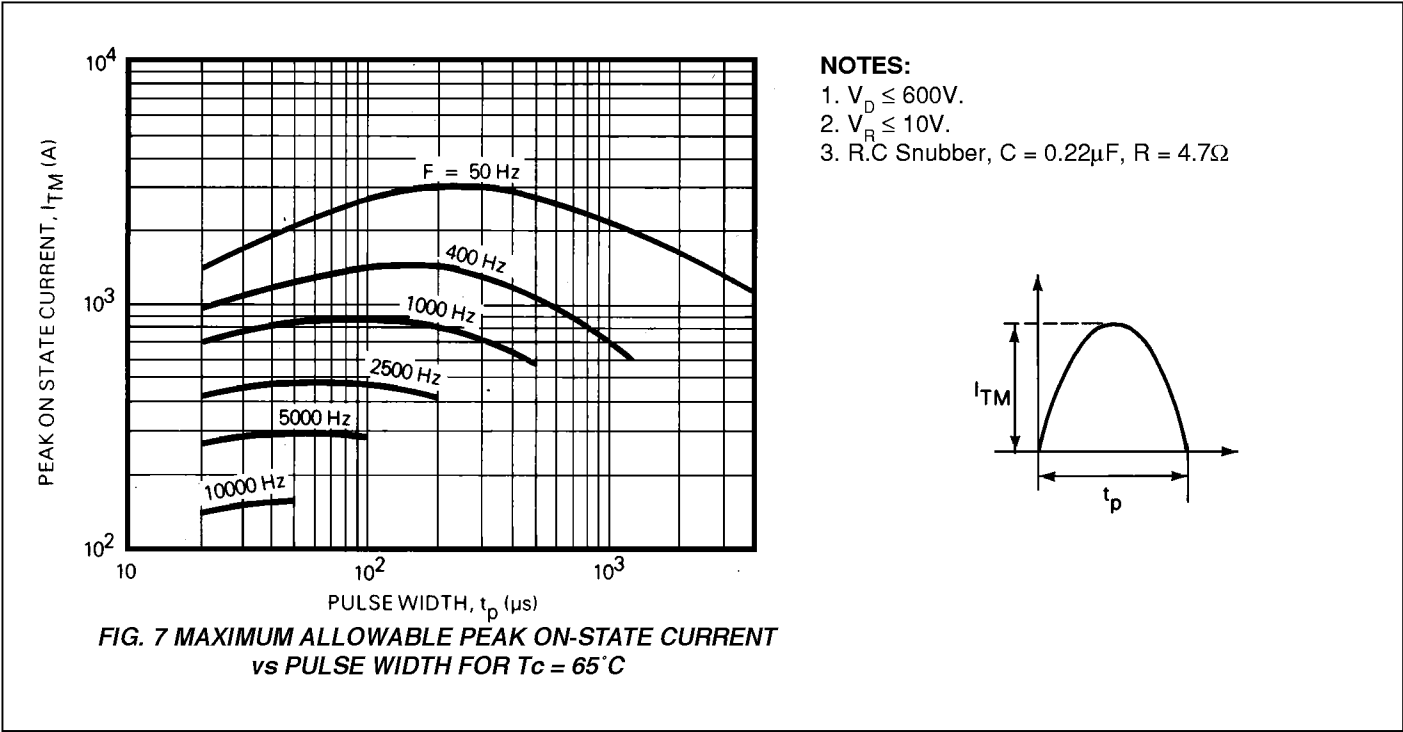
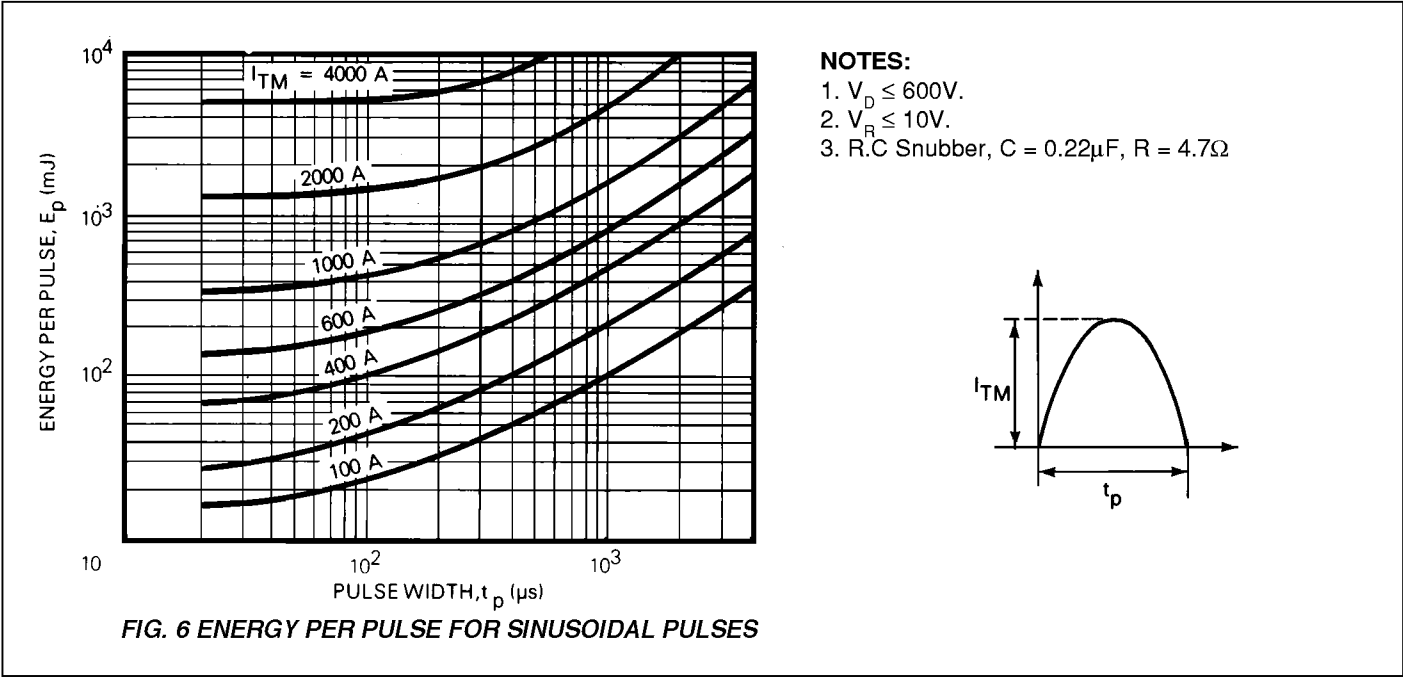


FIG. 4 TRANSIENT THERMAL IMPEDANCE - JUNCTION TO CASE

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



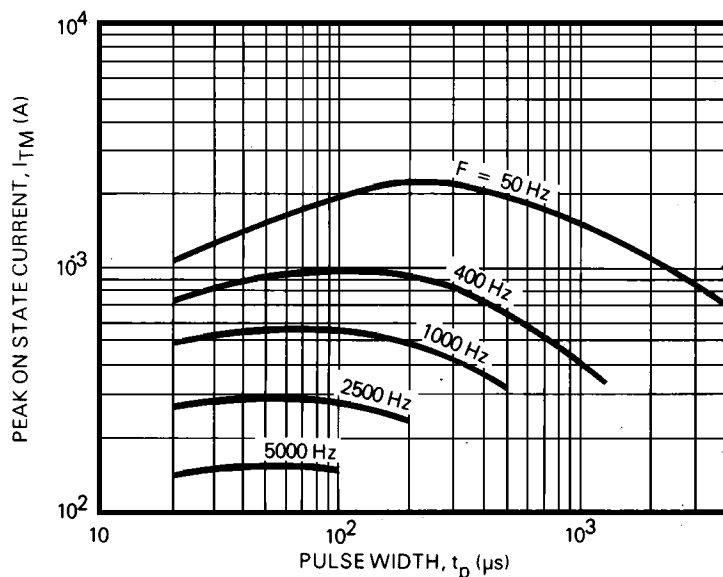


FIG. 8 MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT vs PULSE WIDTH FOR $T_c = 90^\circ\text{C}$

NOTES:

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

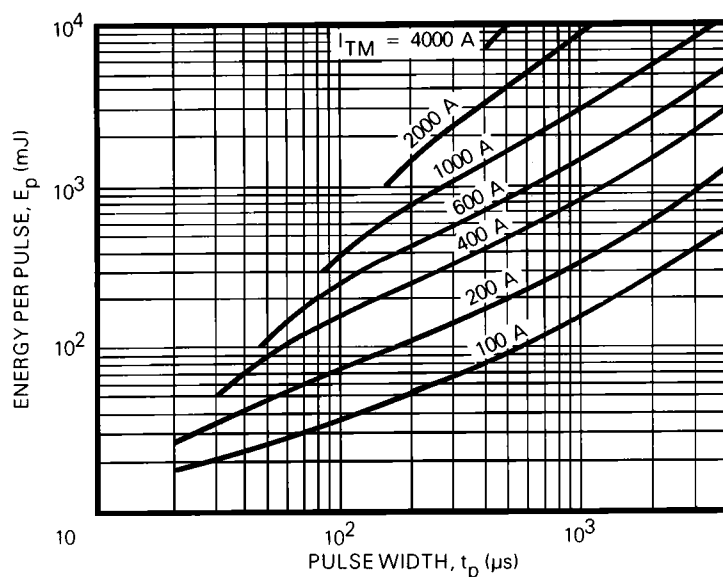
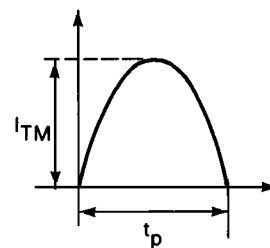
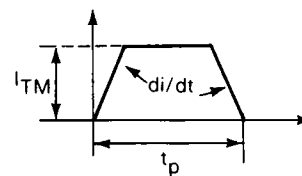
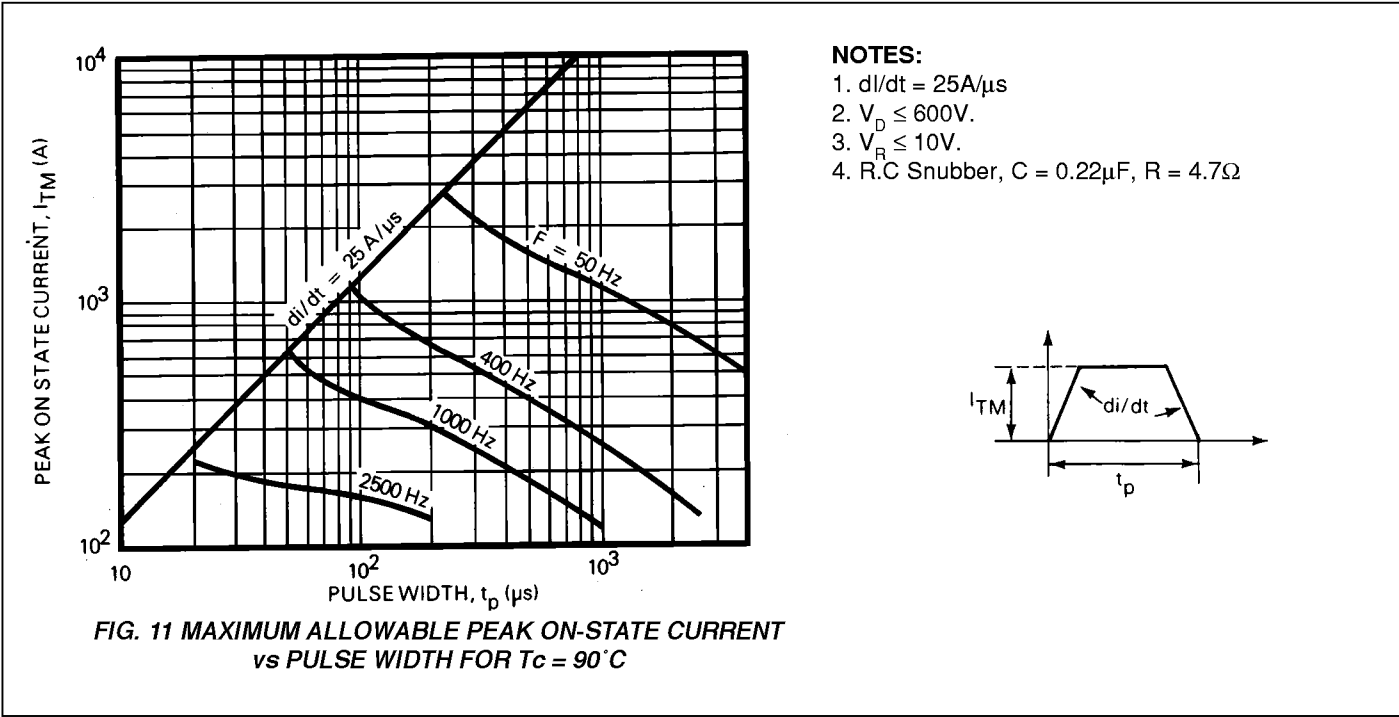
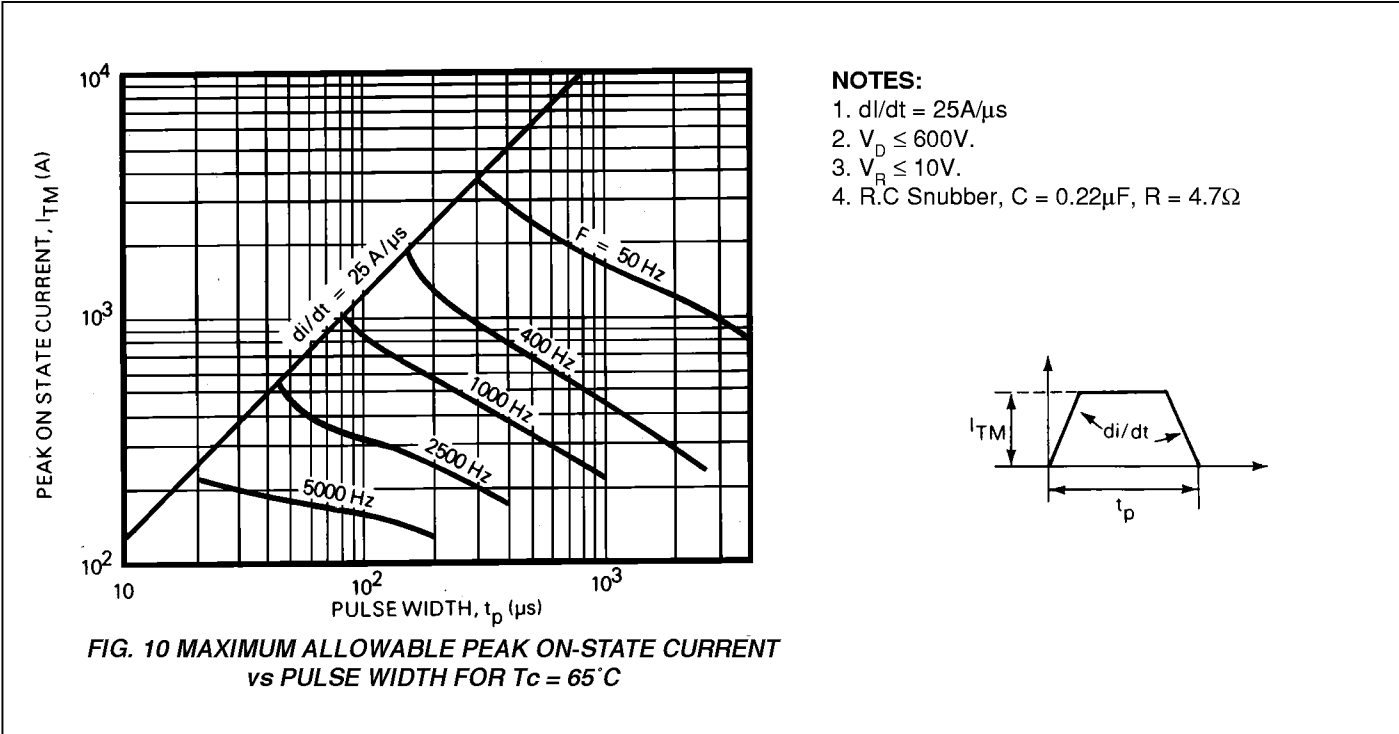


FIG. 9 ENERGY PER PULSE FOR TRAPEZOIDAL PULSES

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





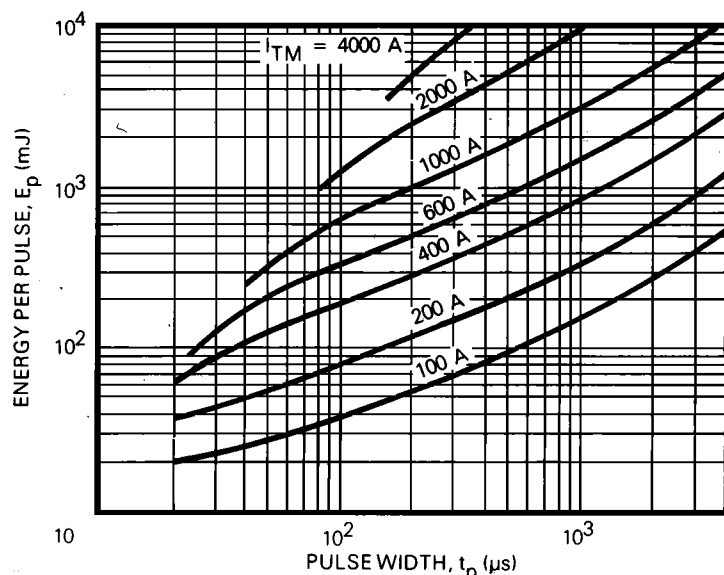
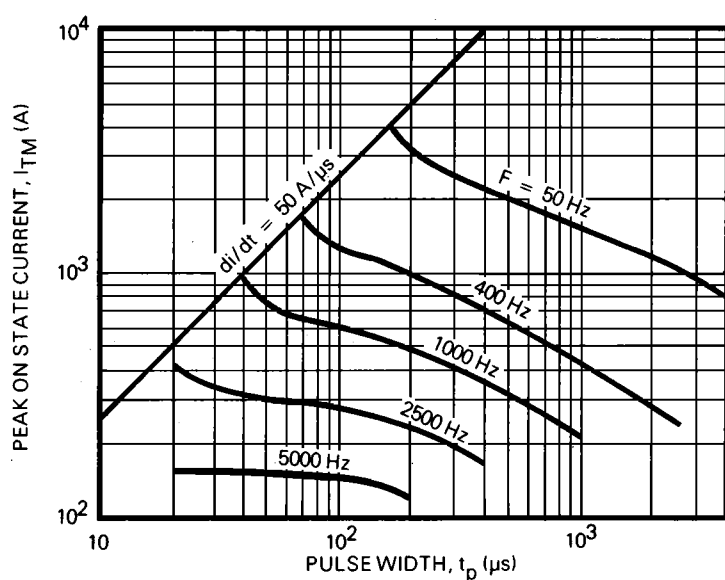
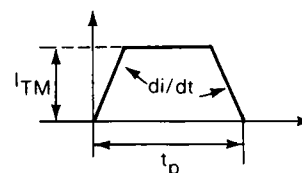


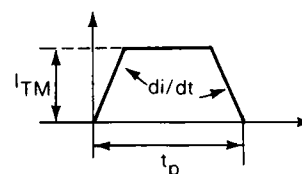
FIG. 12 ENERGY PER PULSE FOR TRAPEZOIDAL PULSES

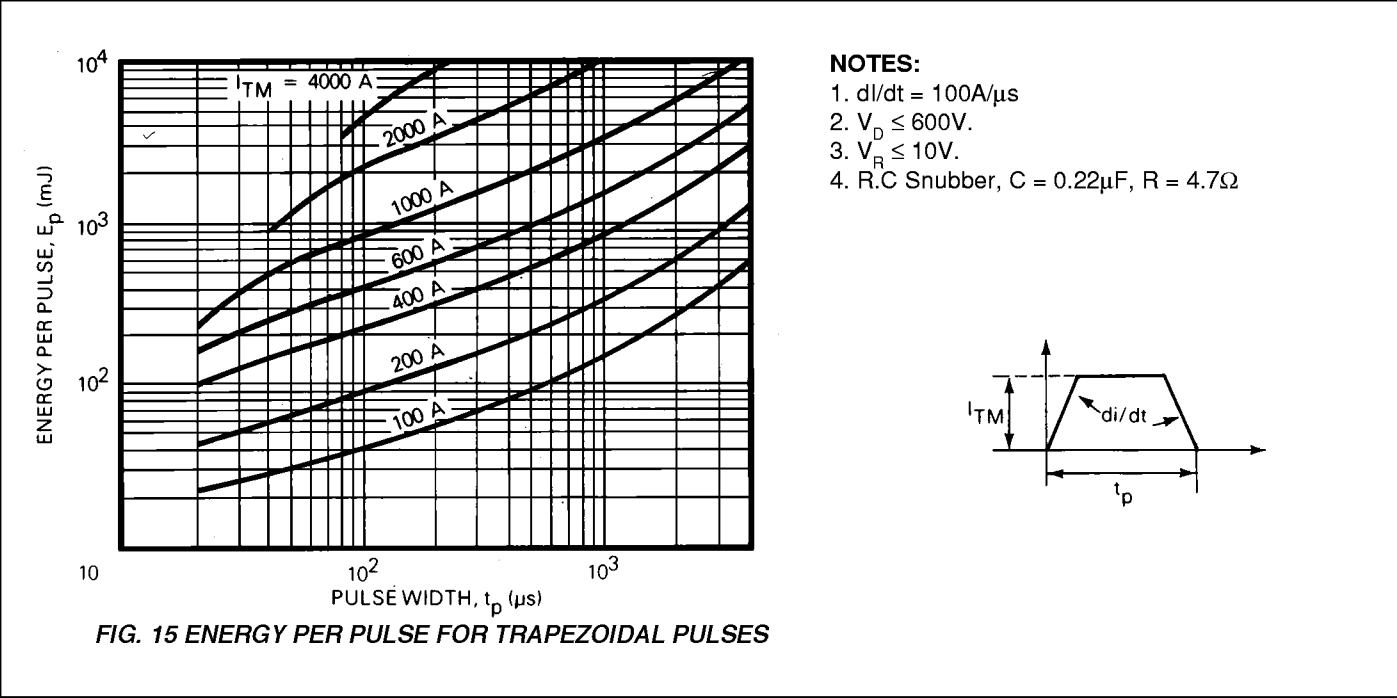
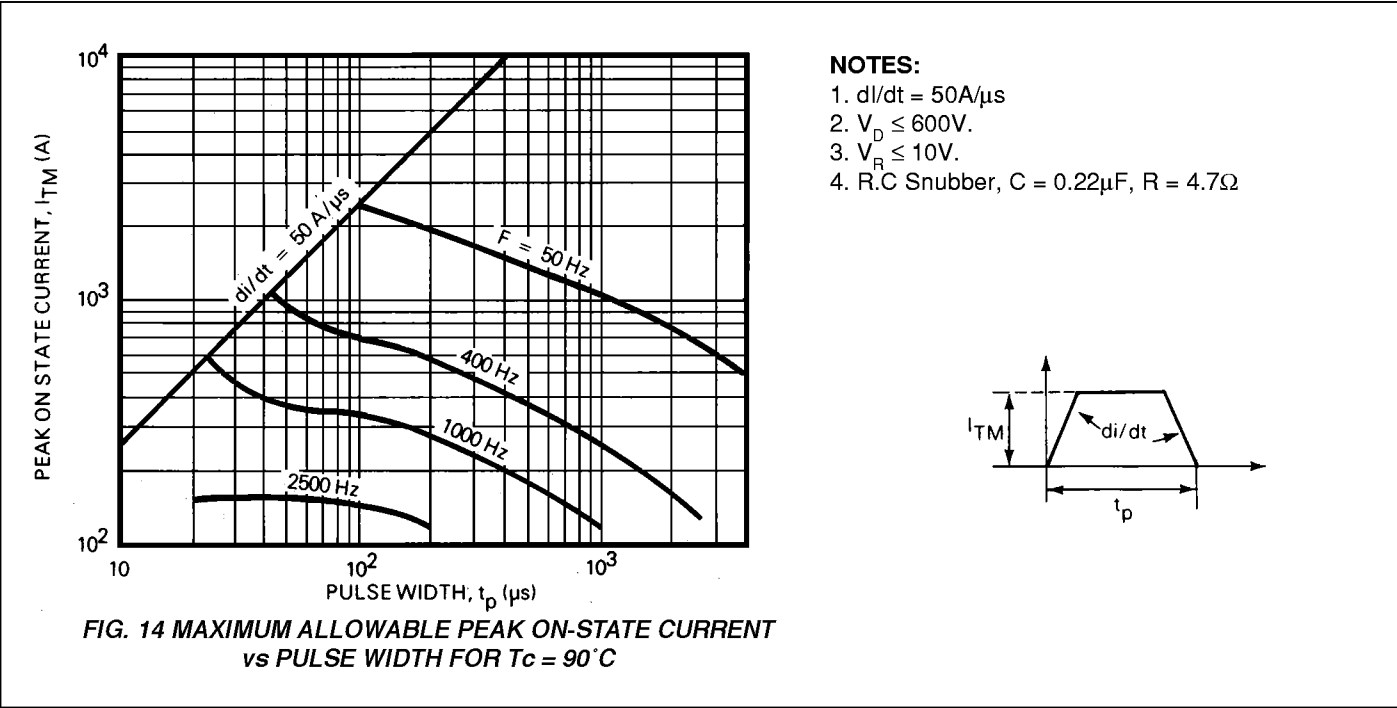
NOTES:

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, $C = 0.22\mu F$, $R = 4.7\Omega$





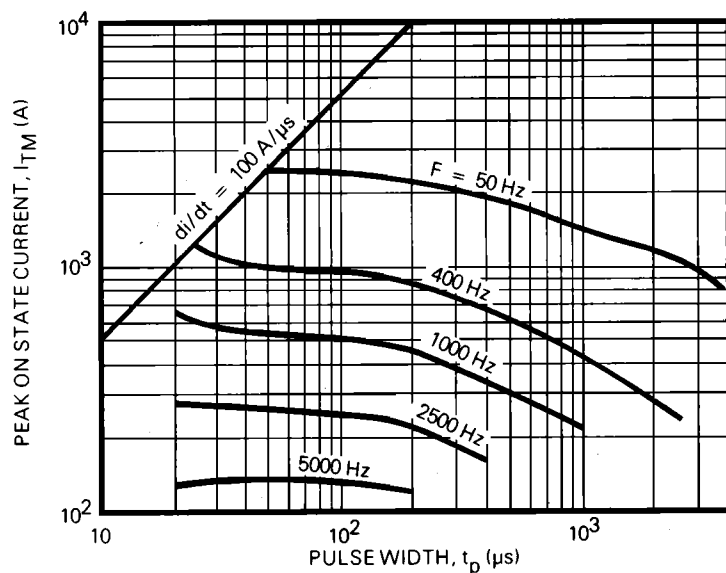


FIG. 16 MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT
vs PULSE WIDTH FOR $T_c = 65^\circ\text{C}$

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

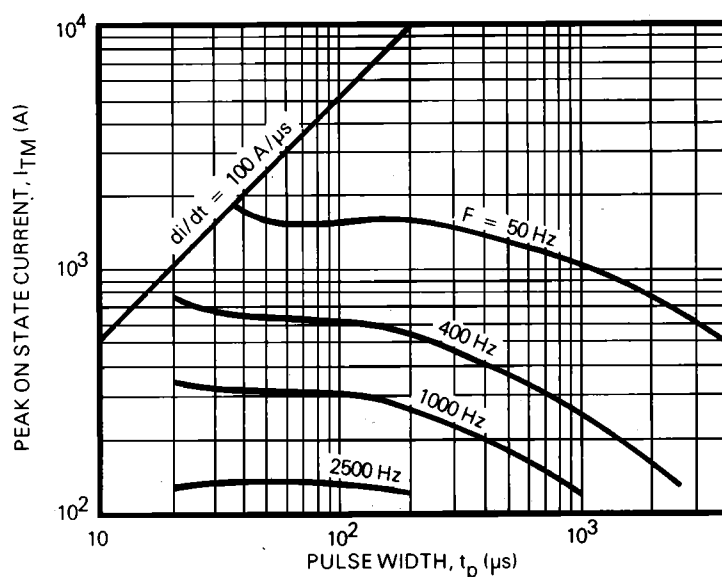
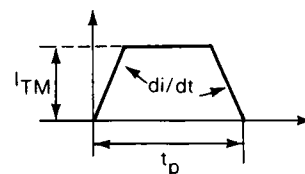
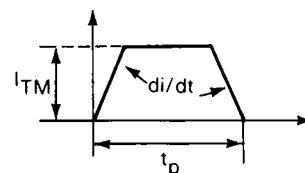


FIG. 17 MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT
vs PULSE WIDTH FOR $T_c = 90^\circ\text{C}$

NOTES:

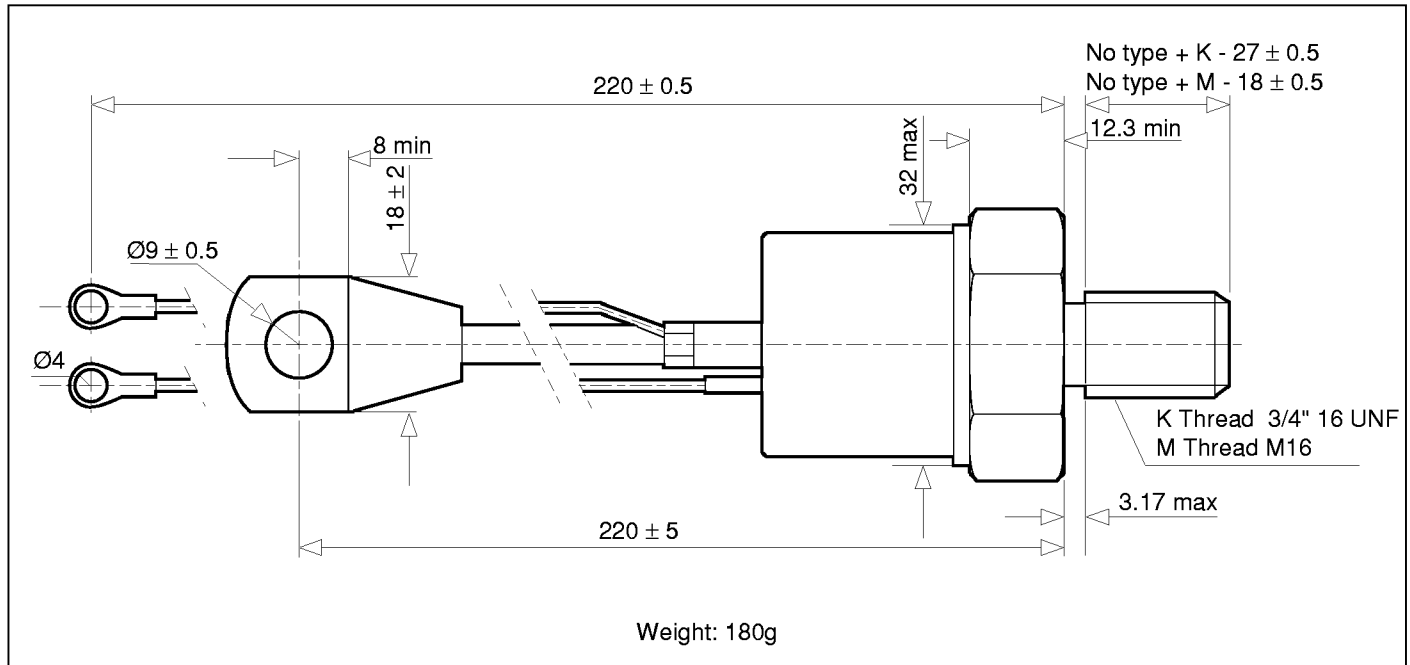
1. $di/dt = 100 \text{ A}/\mu\text{s}$
2. $V_D \leq 600 \text{ V}$.
3. $V_R \leq 10 \text{ V}$.
4. R.C Snubber, $C = 0.22 \mu\text{F}$, $R = 4.7 \Omega$



DK24..FC

PACKAGE DETAILS - TO93

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



HEADQUARTERS OPERATIONS
MITEL SEMICONDUCTOR
Cheney Manor, Swindon,
Wiltshire SN2 2QW, United Kingdom.
Tel: (01793) 518000
Fax: (01793) 518411

MITEL SEMICONDUCTOR
1500 Green Hills Road,
Scotts Valley, California 95066-4922
United States of America.
Tel (408) 438 2900
Fax: (408) 438 5576/6231

Internet: <http://www.gpsemi.com>

POWER PRODUCT CUSTOMER SERVICE CENTRES

- **FRANCE, BENELUX & SPAIN** Les Ulis Cedex Tel: (1) 69 18 90 00 Fax : (1) 64 46 54 50
- **GERMANY** Munich Tel: (089) 419508-20 Fax : (089) 419508-55
- **NORTH AMERICA** Dedham, USA Tel: (781) 251 0126 Fax: (781) 251 0106
- **UK** Lincoln Tel: (01522) 500500 Fax : (01522) 510550

These are supported by Agents and Distributors in major countries world-wide.

© Mitel Corporation 1998 Publication No. DS4268-2 Issue No. 2.3 March 1998

TECHNICAL DOCUMENTATION – NOT FOR RESALE. PRINTED IN UNITED KINGDOM

This publication is issued to provide information only which (unless agreed by the Company in writing) may not be used, applied or reproduced for any purpose nor form part of any order or contract nor to be regarded as a representation relating to the products or services concerned. No warranty or guarantee express or implied is made regarding the capability, performance or suitability of any product or service. The Company reserves the right to alter without prior notice the specification, design or price of any product or service. Information concerning possible methods of use is provided as a guide only and does not constitute any guarantee that such methods of use will be satisfactory in a specific piece of equipment. It is the user's responsibility to fully determine the performance and suitability of any equipment using such information and to ensure that any publication or data used is up to date and has not been superseded. These products are not suitable for use in any medical products whose failure to perform may result in significant injury or death to the user. All products and materials are sold and services provided subject to the Company's conditions of sale, which are available on request.

All brand names and product names used in this publication are trademarks, registered trademarks or trade names of their respective owners.