DK13..FW

Fast Switching Thyristor

Replaces July 2001 version, DS4267-4.0

DS4267-4.1 July 2002

FEATURES

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

APPLICATIONS

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

VOLTAGE RATINGS

Type Number	Repetitive Peak Voltages V_{DRM} V_{RRM} V	Conditions
DK13 08FW K or M DK13 06FW K or M	800 600	$V_{RSM} = V_{RRM} + 100V$ $I_{DRM} = I_{RRM} = 15mA$ at V_{RRM} or V_{DRM} & T_{vj}

ORDERING INFORMATION

When ordering, select the required part number shown in the Voltage Ratings selection table, then:-

Add K to type number for 1/2" 20 UNF thread, e.g. **DK13 06FWK**

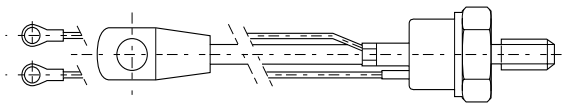
or

Add M to type number for M12 thread, e.g. **DK13 06FM**.

Note: Please use the complete part number when ordering and quote this number in any future correspondance relating to your order.

KEY PARAMETERS

V_{DRM}	**800V**
$I_{T(RMS)}$	**110A**
I_{TSM}	**1200A**
dVdt	**200V/μs**
dI/dt	**200A/μs**
t_q	**10μs**



Outline type code: TO94
See Package Details for further information.

Fig. 1 Package outline

CURRENT RATINGS

Symbol	Parameter	Conditions	Max.	Units
$I_{T(AV)}$	Mean on-state current	Half wave resistive load, T_{case} = 80°C	70	A
$I_{T(RMS)}$	RMS value	T_{case} = 80°C	110	A

SURGE RATINGS

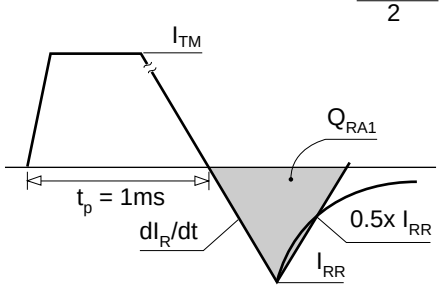
Symbol	Parameter	Conditions	Max.	Units
I_{TSM}	Surge (non-repetitive) on-state current	t_p = 10ms half sine; T_{case} = 125°C	1.2	kA
I^2t	I^2t for fusing	V_R = 0% V_{RRM} - 1/4 sine	7.2×10^3	A^2s

THERMAL AND MECHANICAL DATA

Symbol	Parameter	Conditions	Min.	Max.	Units
$R_{th(j-c)}$	Thermal resistance - junction to case	dc	-	0.24	°C/W
$R_{th(c-h)}$	Thermal resistance - case to heatsink	Mounting torque 15.0Nm with mounting compound	-	0.08	°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		12.0	15.0	Nm

MEASUREMENT OF RECOVERED CHARGE - Q_{RA1}

Measurement of Q_{RA1} : $Q_{RA1} = \frac{I_{RR} \times t_{RR}}{2}$



DYNAMIC CHARACTERISTICS

Symbol	Parameter	Conditions		Min.	Max.	Units
V_{TM}	Maximum on-state voltage	At 300A peak, T_{case} = 25°C		-	2.35	V
I_{RRM}/I_{DRM}	Peak reverse and off-state current	At V_{RRM}/V_{DRM}, T_{case} = 125°C		-	15	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		-	1.65	V
r_T	On-state slope resistance	At T_{vj} = 125°C		-	3.5	mΩ
t_{gd}	Delay time	T_j = 25˚C, I_T = 50A, V_D = 300V, I_G = 1A, dI/dt =50A/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		60*	-	mA
t_q	Turn-off time	T_j = 125˚C, I_T = 100A, V_R = 50V, dV/dt = 200V/µs (Linear to 60% V_{DRM}), dI_R/dt = 30A/µs, Gate open circuit	t_q code: W	-	10	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°C, R_L = 6Ω	-	3.0	V
I_{GT}	Gate trigger current	V_{DRM} = 12V, T_{case} = 25°C, R_L = 6Ω	-	200	mA
V_{GD}	Gate non-trigger voltage	At V_{DRM} T_{case} = 125°C, R_L = 1kΩ	-	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

CURVES

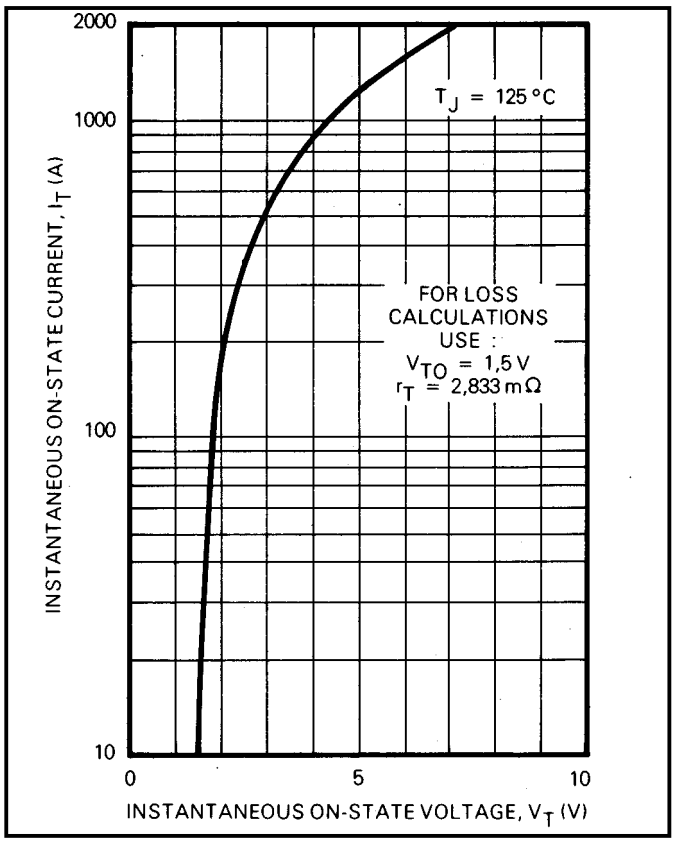


Fig.2 Maximum (limit) on-state characteristics

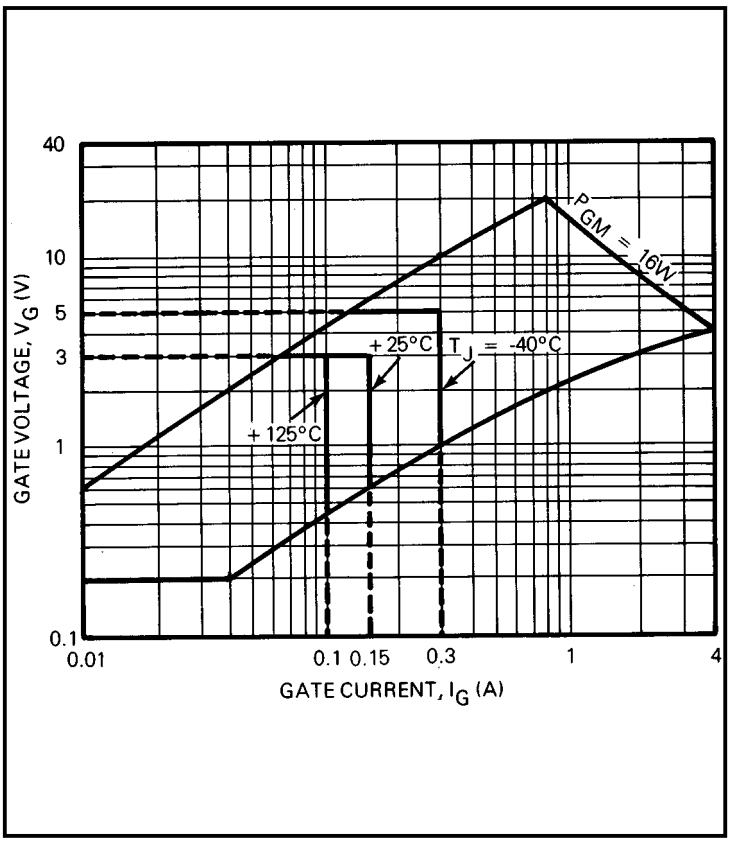


Fig.3 Gate characteristics

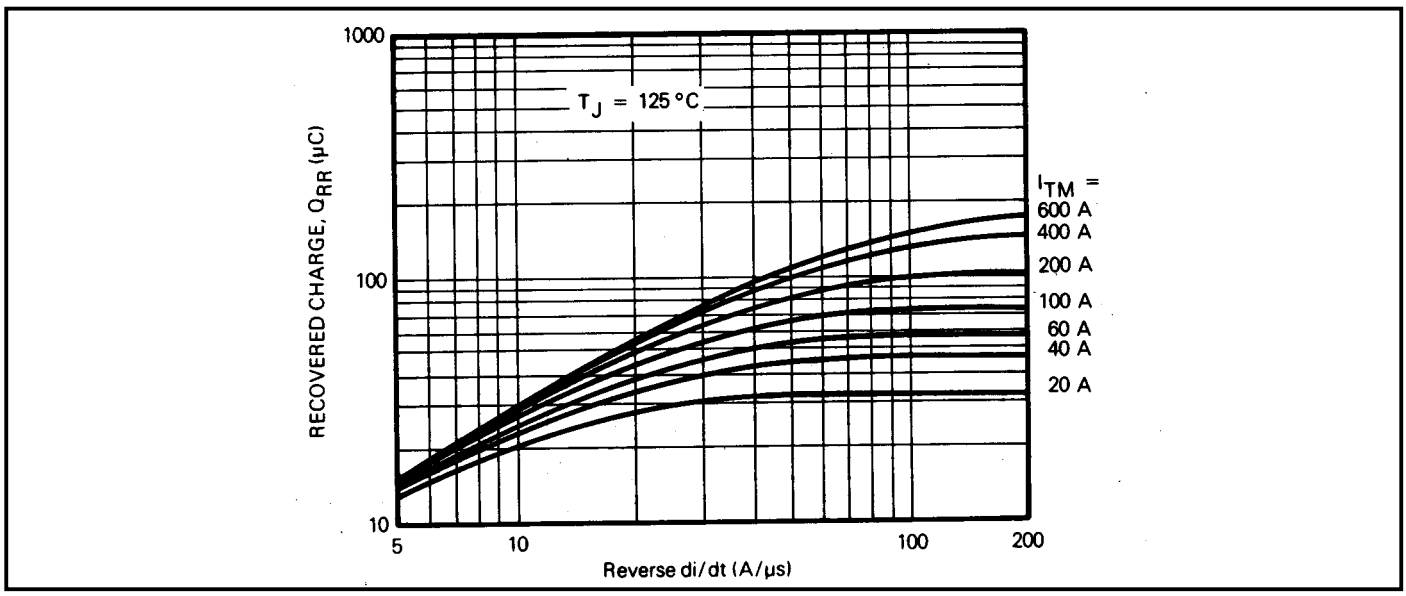


Fig.4 Typical recovered charge (for a device rated V_{DRM} = 600V, t_q = 10µs)

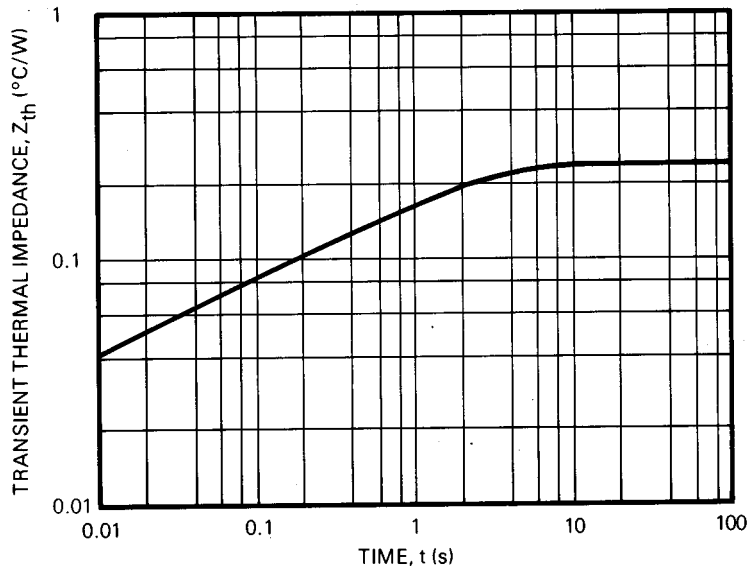


Fig.5 Transient thermal impedance - junction to case

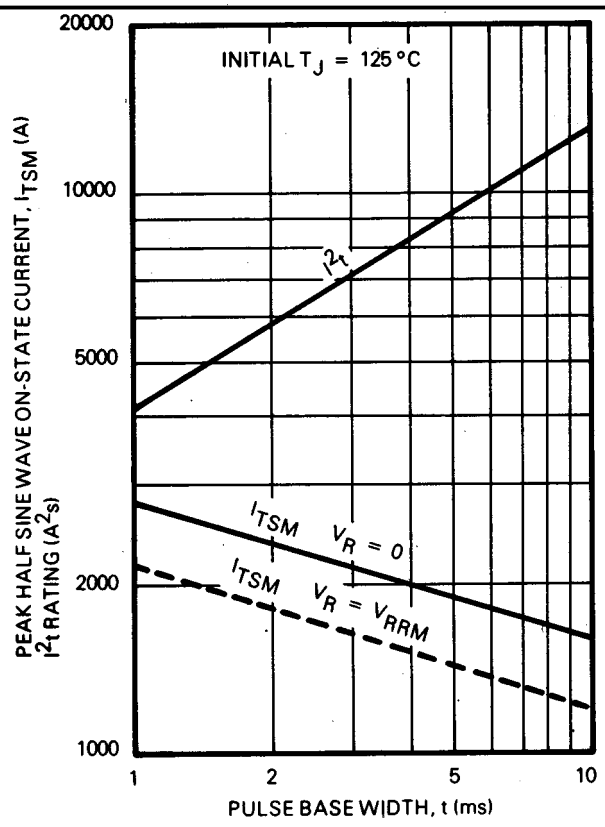
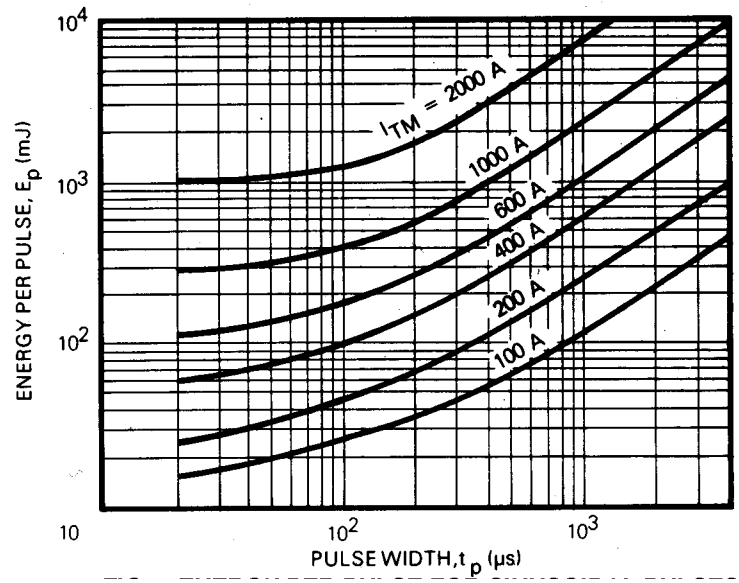


Fig.6 Non-repetitive sub-cycle surge on-state current and I^2t rating



NOTES:
1. $V_D \leq 600V$.
2. $V_R \leq 10V$.
3. R.C Snubber, C = 0.22µF, R = 4.7Ω

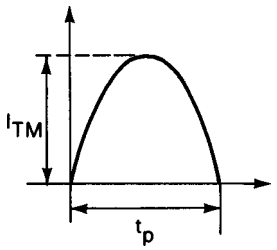
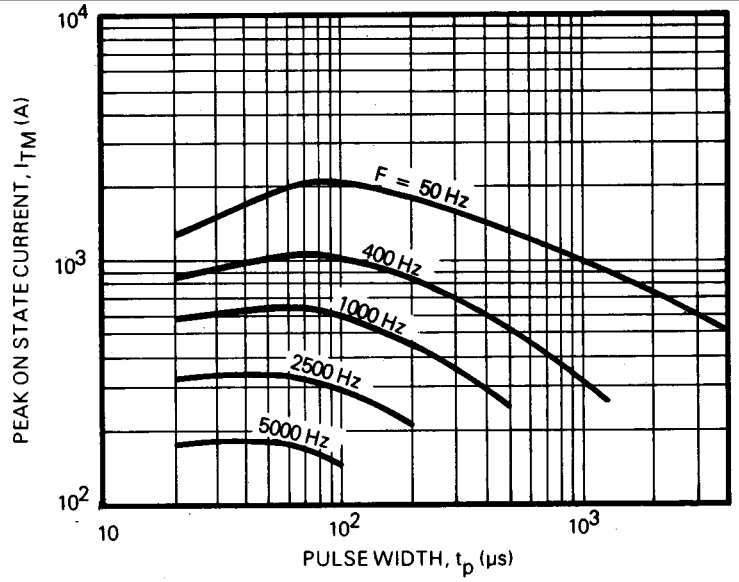


Fig.7 Energy per pulse for sinusoidal pulses



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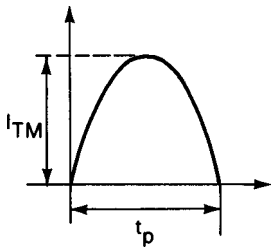
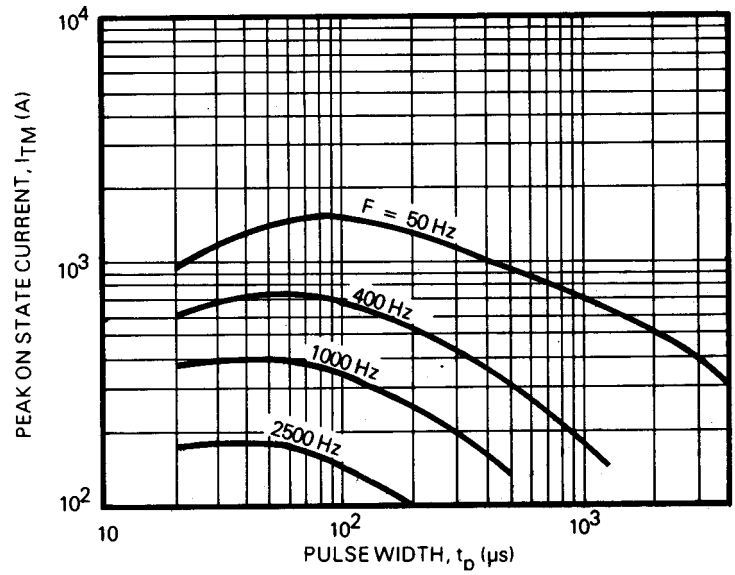


Fig.8 Maximum allowable peak on-state current vs pulse width for T_{case} = 65˚C



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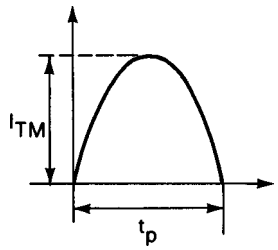
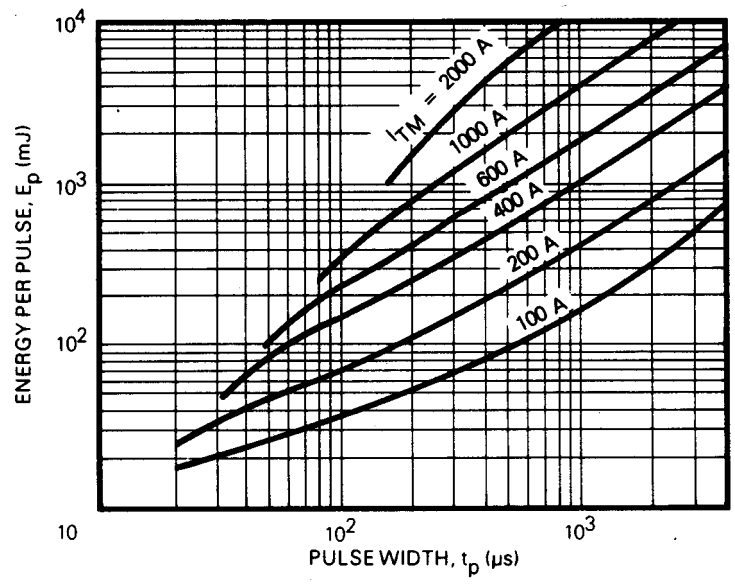


Fig.9 Maximum allowable peak on-state current vs pulse width for T_{case} = 90˚C



NOTES:
1. dI/dt = 25A/µs
2. $V_D \leq 600V$.
3. $V_R \leq 10V$.
4. R.C Snubber, C = 0.22µF, R = 4.7Ω

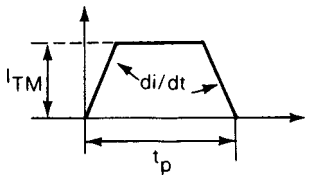
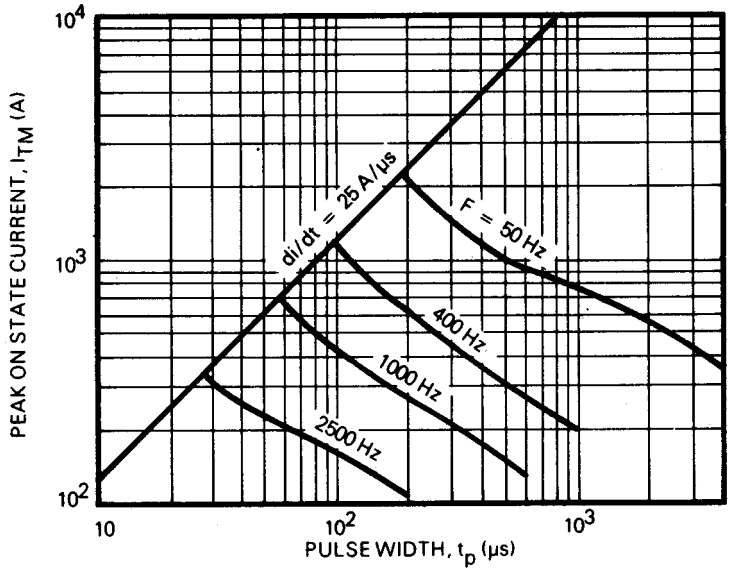


Fig.10 Energy per pulse for trapezoidal pulses



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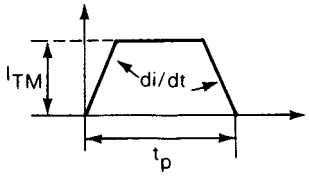
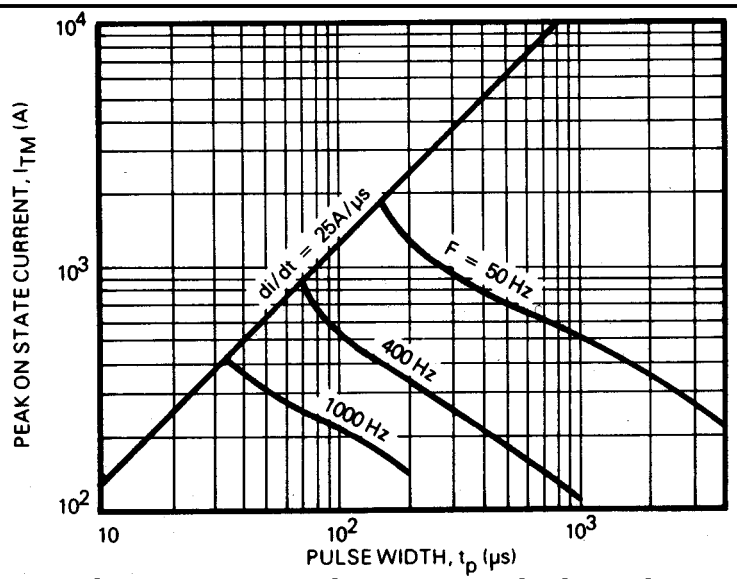


Fig.11 Maximum allowable peak on-state current vs pulse width for T_{case} = 65˚C



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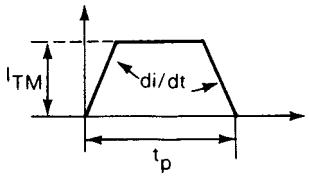


Fig.12 Maximum allowable peak on-state current vs pulse width for T_{case} = 90˚C

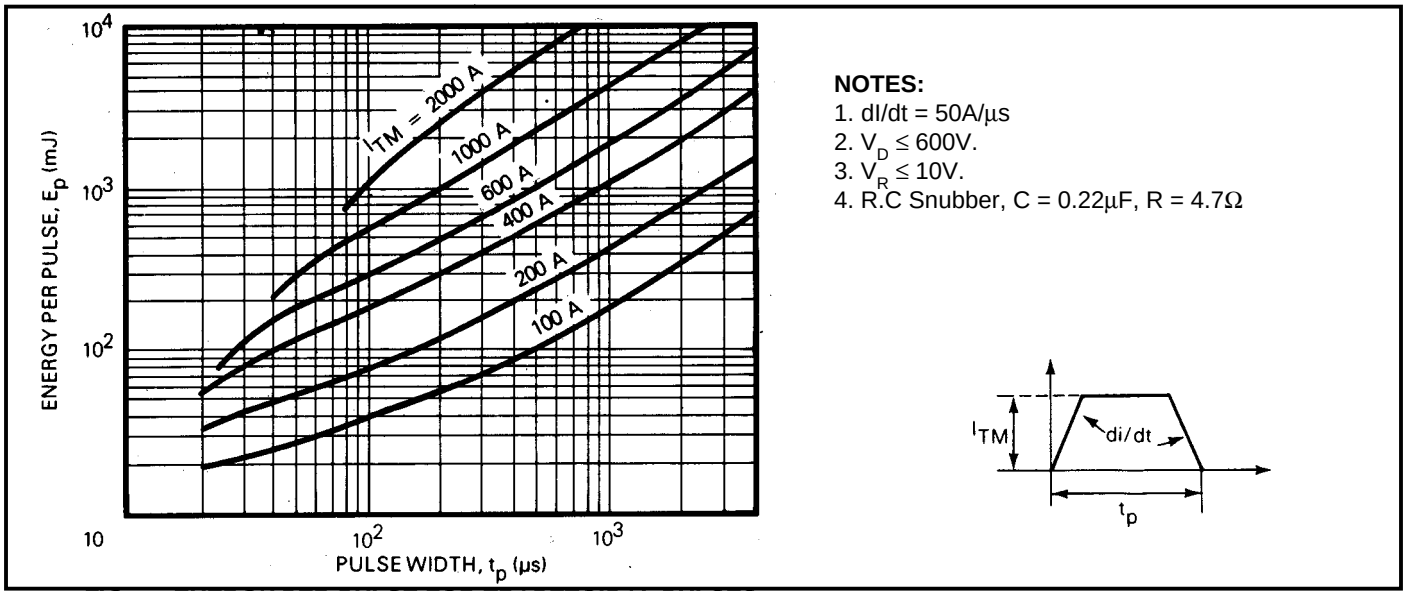


Fig.13 Energy per pulse for trapezoidal pulses

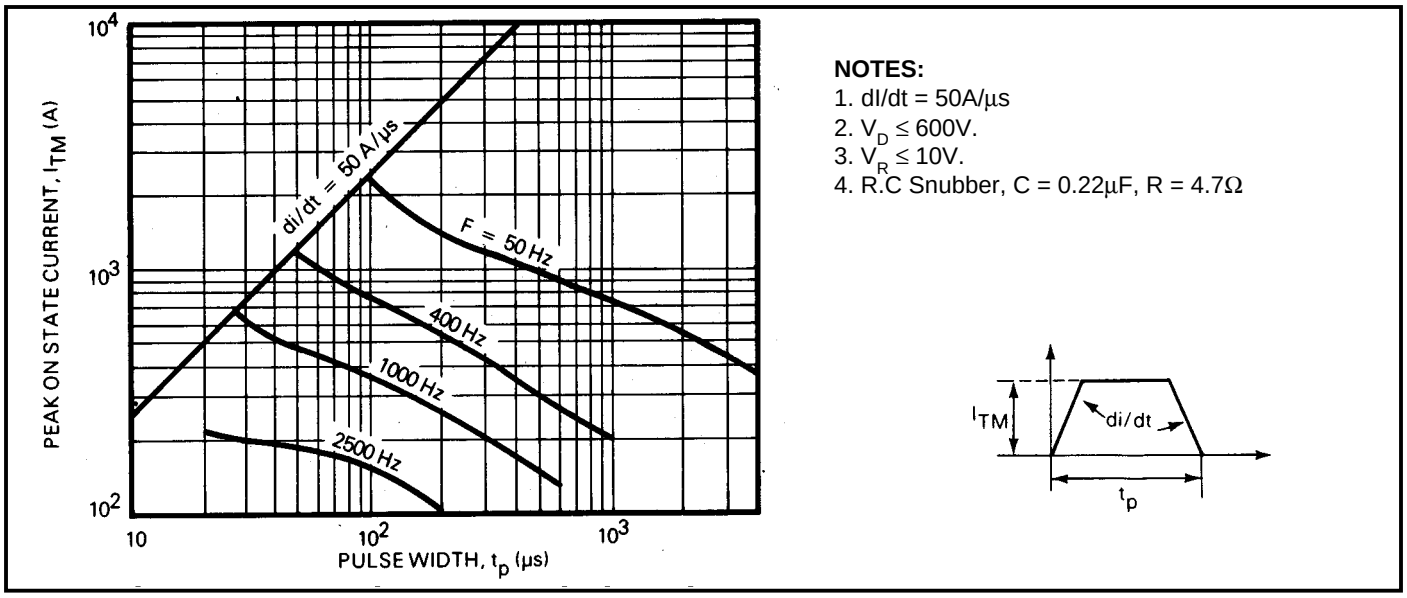


Fig.14 Maximum allowable peak on-state current vs pulse width for T_{case} = 65˚C

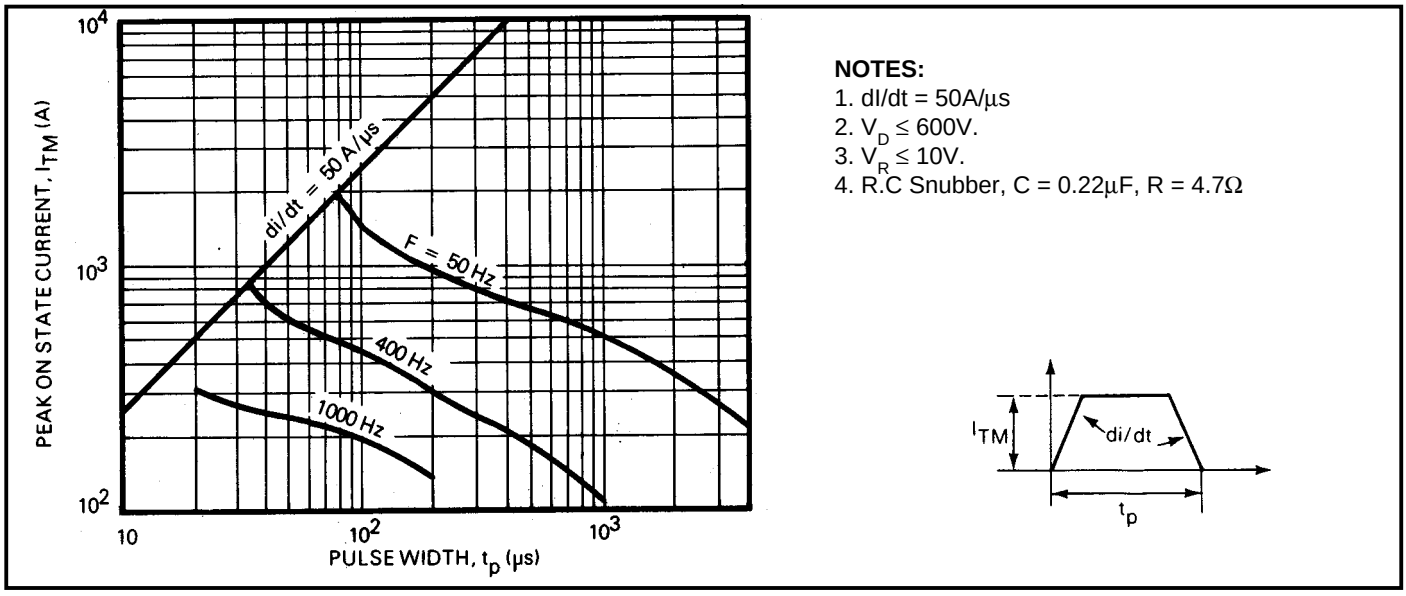


Fig.15 Maximum allowable peak on-state current vs pulse width for T_{case} = 65°C

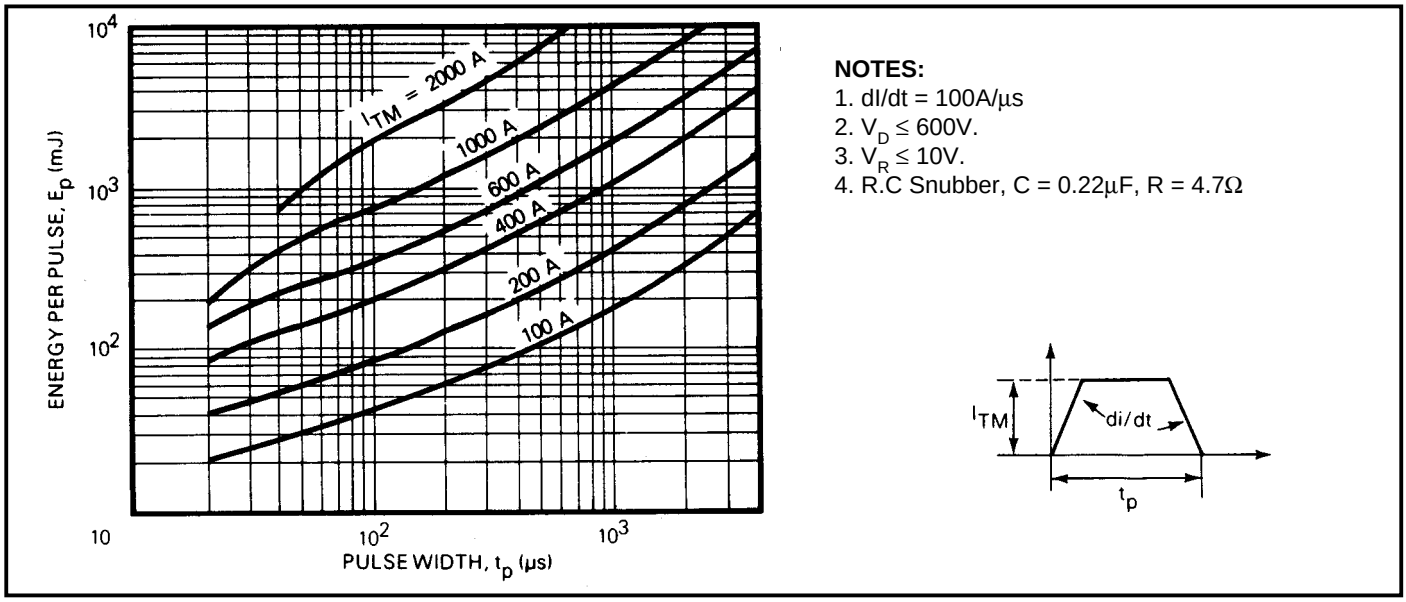


Fig.16 Energy per pulse for trapezoidal pulses

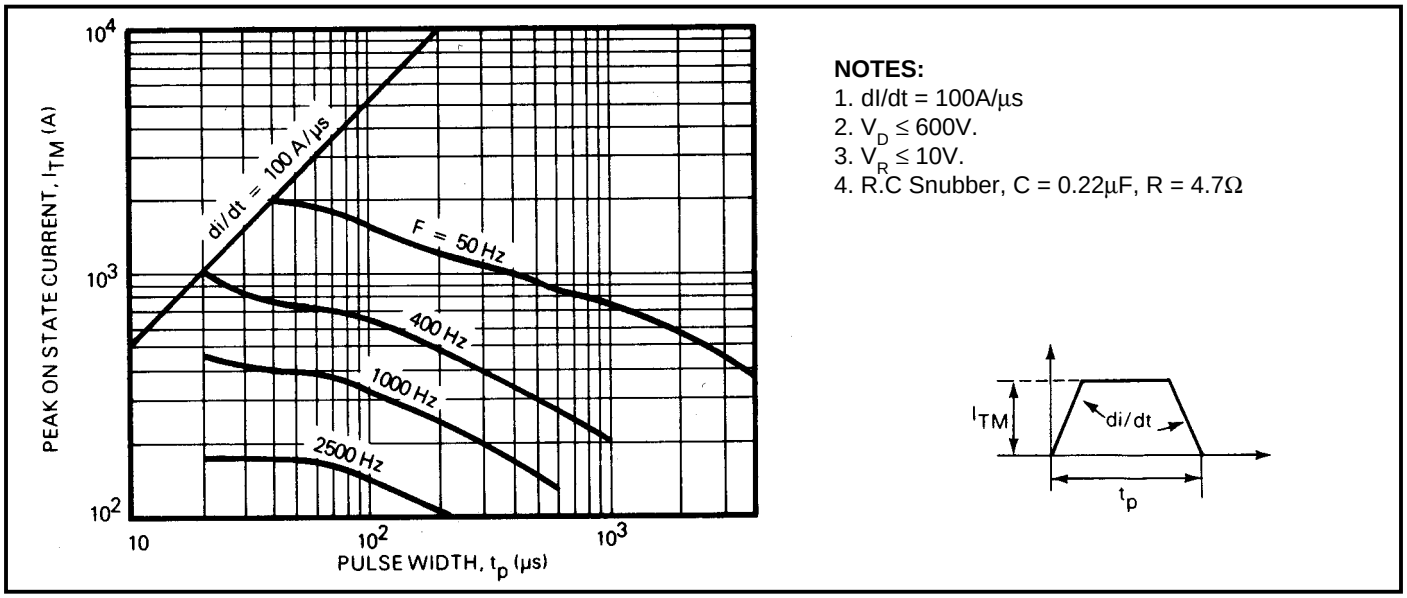


Fig.17 Maximum allowable peak on-state current vs pulse width for T_{case} = 65˚C

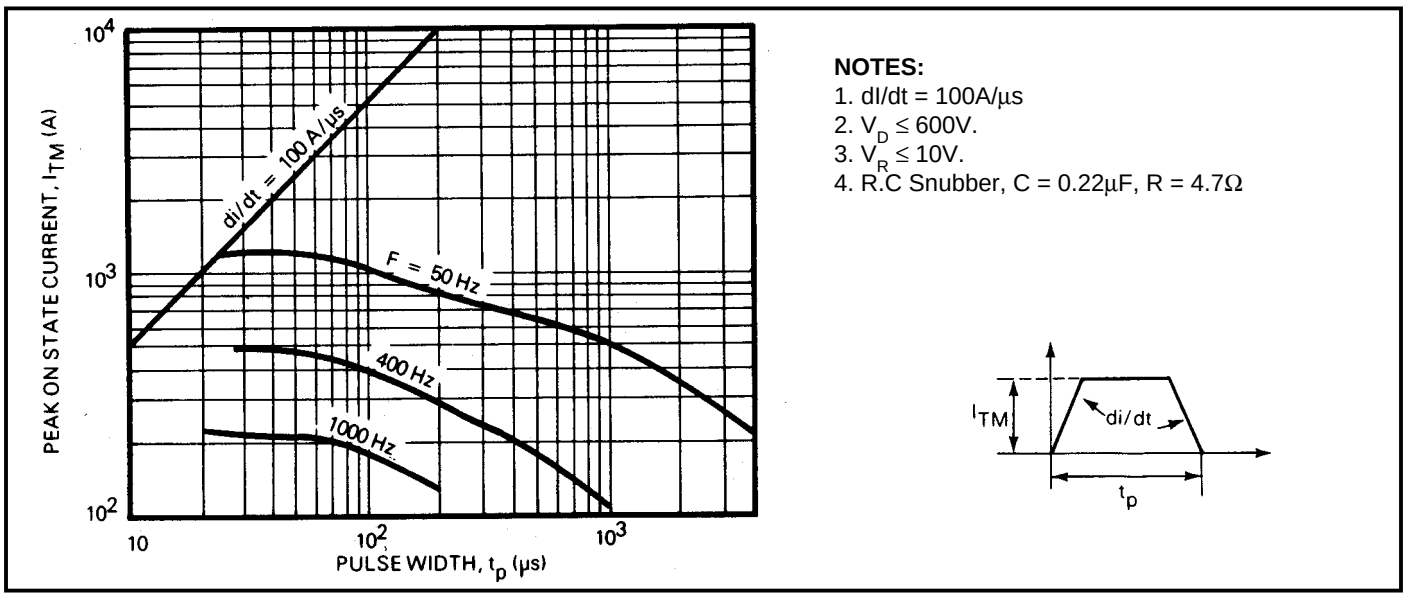
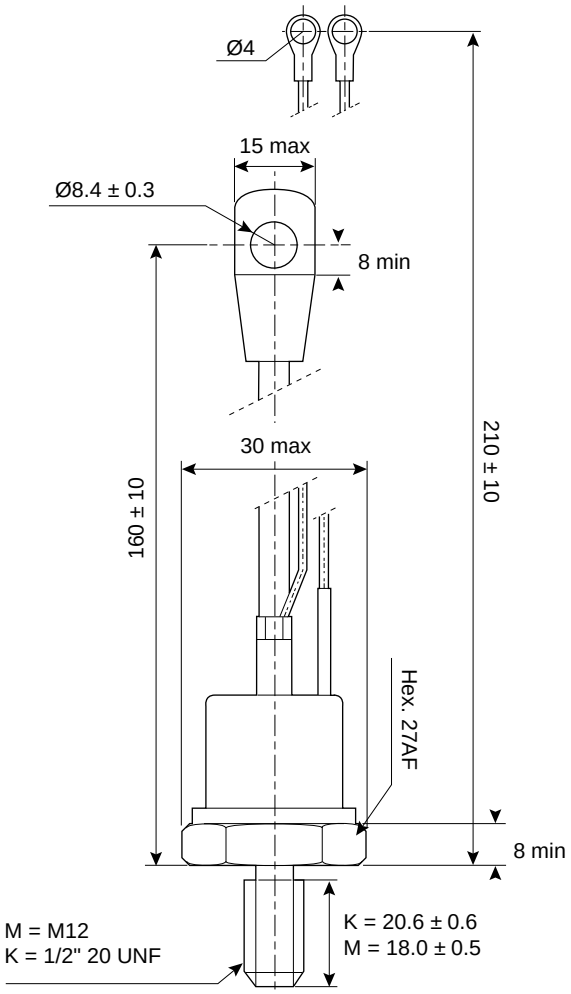


Fig.18 Maximum allowable peak on-state current vs pulse width for T_{case} = 90˚C

PACKAGE DETAILS

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



Nominal weight: 120g
Mounting torque: 15Nm ±10%
Gate lead colour: White
Cathode lead colour: Red

Package outine type code: TO94