DK27..FA

Fast Switching Thyristor

Replaces January 2000 version, DS4269-3.0

DS4269-4.0 July 2001

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

KEY PARAMETERS

V_{DRM}	**1200V**
$I_{T(RMS)}$	**290A**
I_{TSM}	**5000A**
dVdt	**200V/μs**
dI/dt	**500A/μs**
t_q	**20μs**

VOLTAGE RATINGS

Type Number	Repetitive Peak Voltages V_{DRM} V_{RRM} V	Conditions
DK27 12FA K or M DK27 10FA K or M	1200 1000	$V_{RSM} = V_{RRM} + 100V$ $I_{DRM} = I_{RRM} = 25mA$ at V_{RRM} or V_{DRM} & T_{vj}

ORDERING INFORMATION

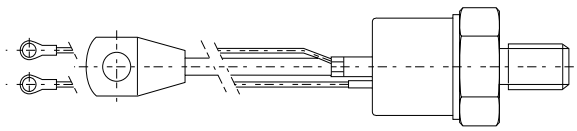
When ordering, select the required part number shown in the Voltage Ratings selection table, then:-

Add K to type number for 3/4" 16 UNF thread, e.g. **DK27 12FAK**

or

Add M to type number for M16 thread, e.g. **DK27 12FAM**.

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



Outline type code: TO93
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	185	A
$I_{T(RMS)}$	RMS value	T_{case} = 80°C	290	A

SURGE RATINGS

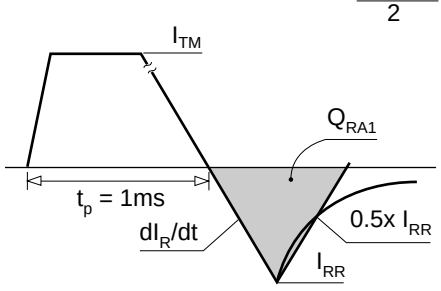
Symbol	Parameter	Conditions	Max.	Units
I_{TSM}	Surge (non-repetitive) on-state current	$t_p \geq$ 10ms half sine; T_{case} = 125°C	5.0	kA
I^2t	I^2t for fusing	V_R = 0% V_{RRM} - 1/4 sine	125.0 x 10^3	A^2s

THERMAL AND MECHANICAL DATA

Symbol	Parameter	Conditions	Min.	Max.	Units
$R_{th(j-c)}$	Thermal resistance - junction to case	dc	-	0.13	°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

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 600A peak, T_{case} = 25°C		-	1.85	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 t_r < 0.5µs, T_j = 125°C	Repetitive 50Hz	-	500	A/µs
			Non-repetitive	-	800	A/µs
$V_{T(TO)}$	Threshold voltage	At T_{vj} = 125°C		-	1.2	V
r_T	On-state slope resistance	At T_{vj} = 125°C		-	1.0	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		1.5*	-	µs
$t_{(ON)TOT}$	Total turn-on time			3*	-	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: 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°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

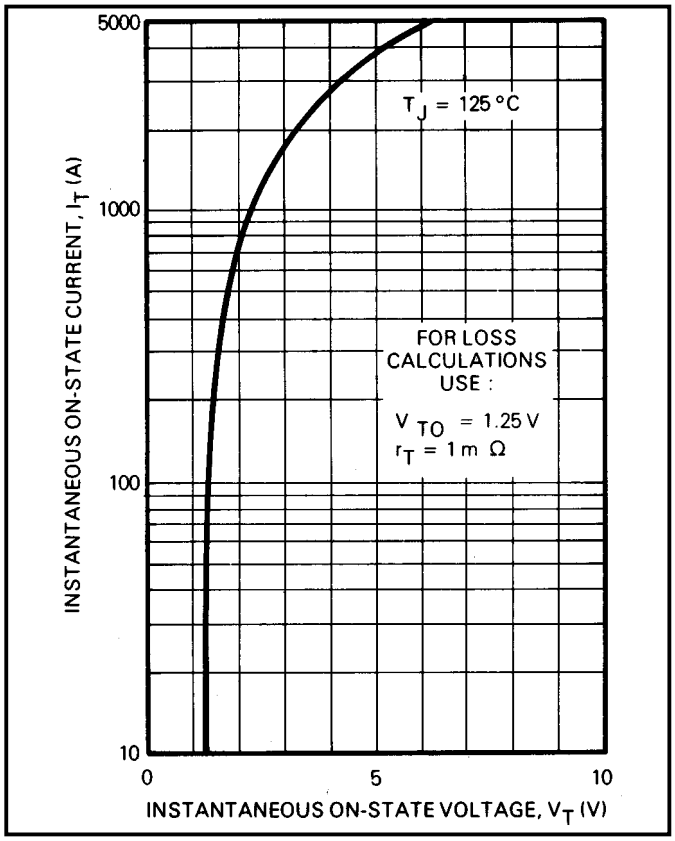


Fig.2 Maximum (limit) on-state characteristics

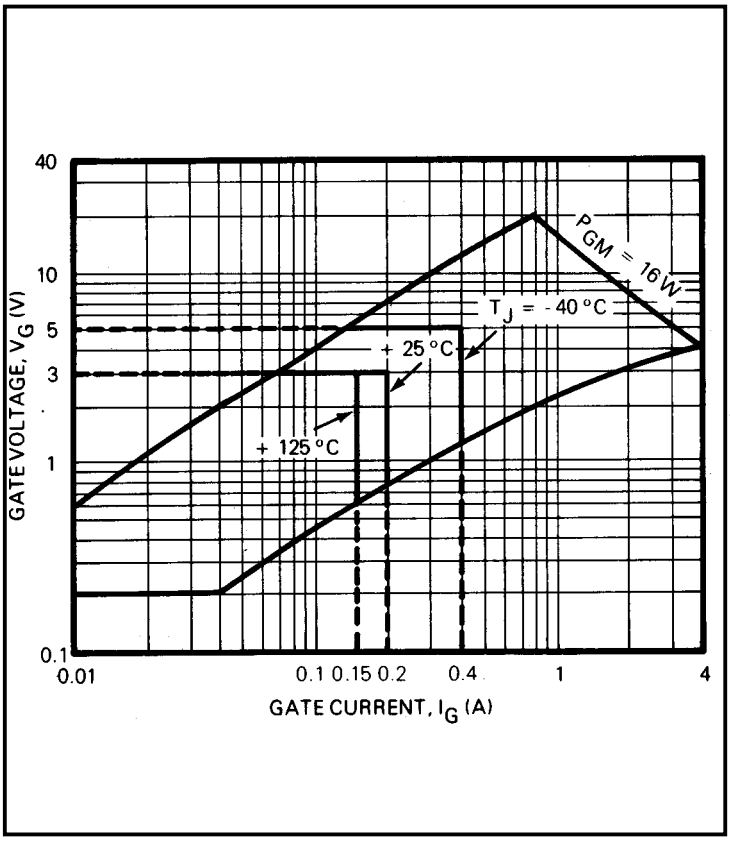


Fig.3 Gate characteristics

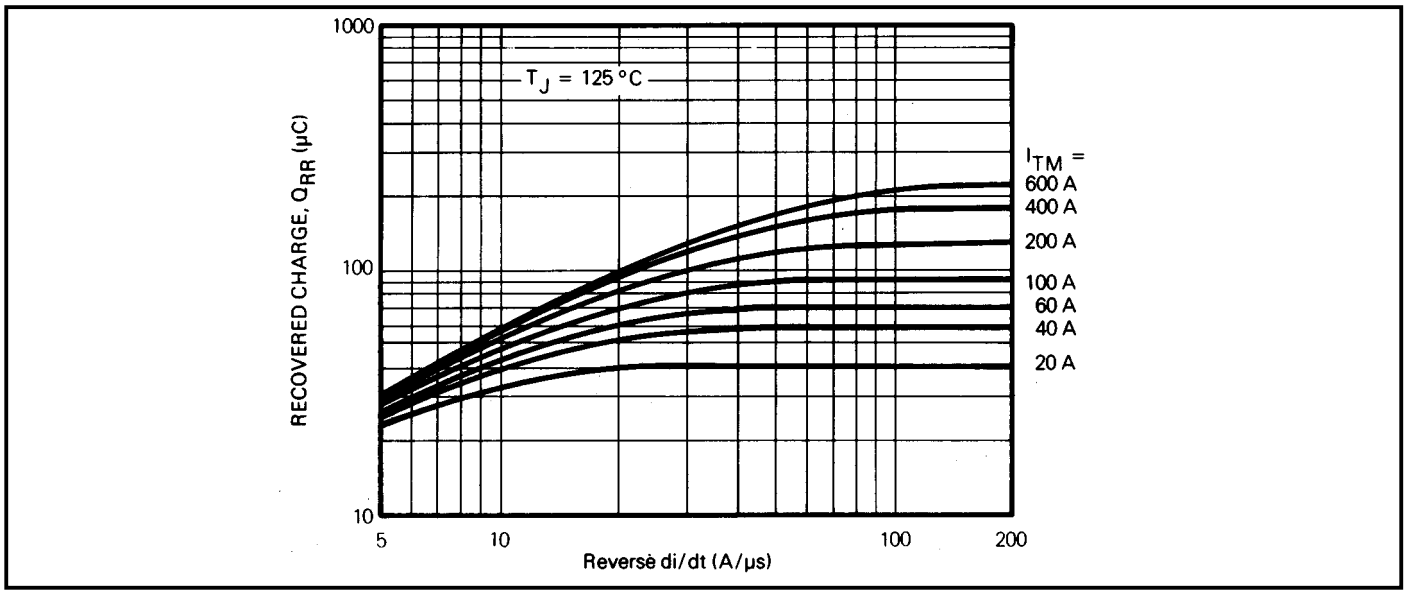


Fig.4 Typical recovered charge (for a device rated V_{DRM} = 800V, t_q = 20µs)

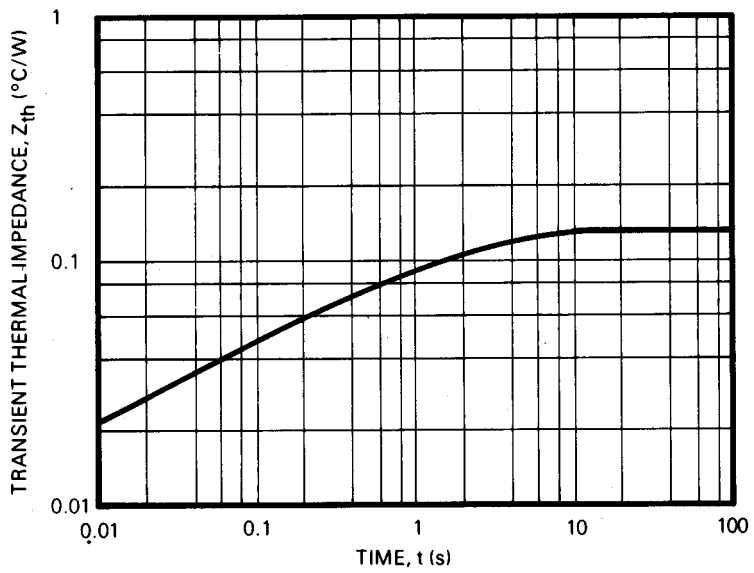


Fig.5 Transient thermal impedance - junction to case

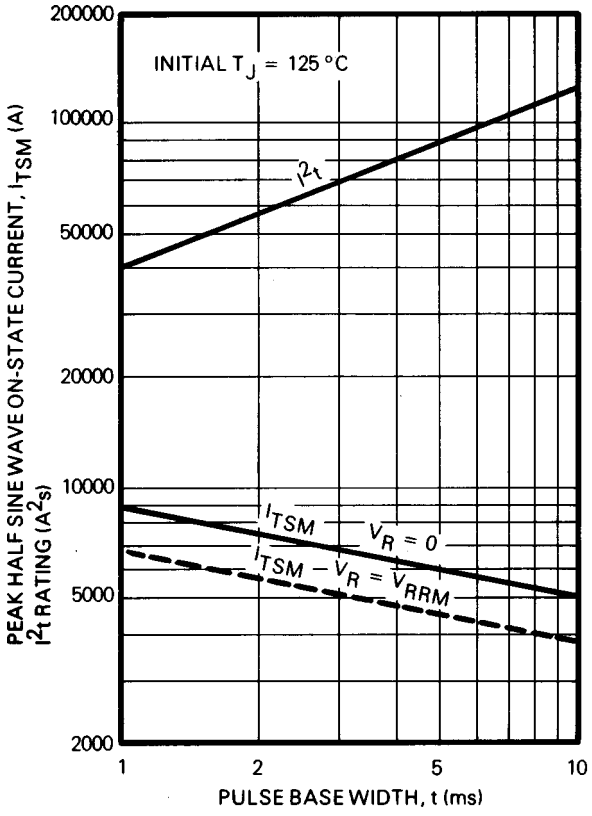
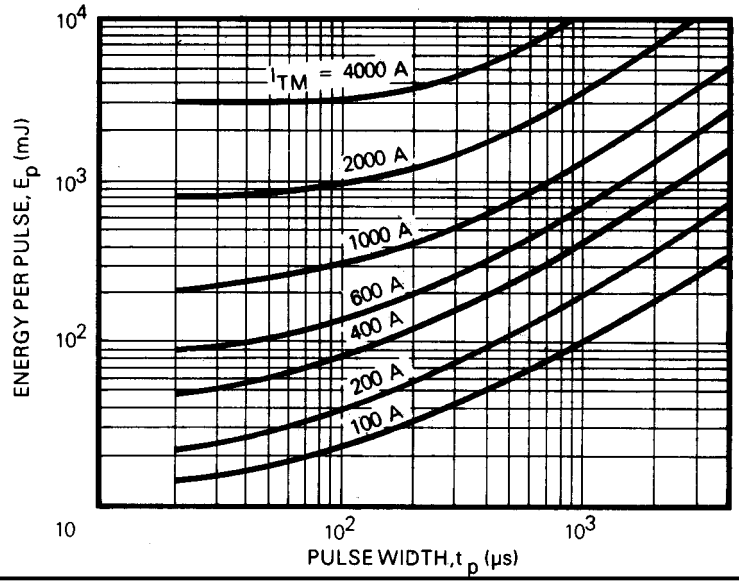


Fig.6 Non-repetitive sub-cycle surge on-state current and I^2t rating



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

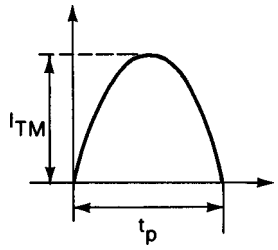
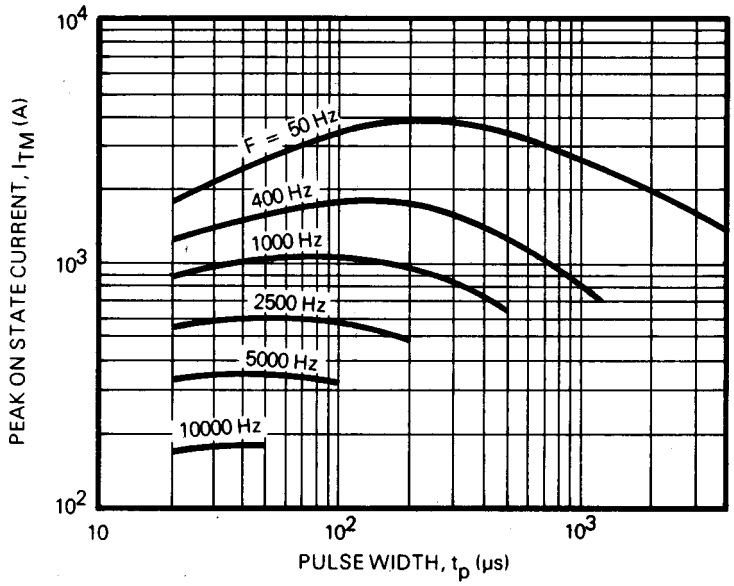


Fig.7 Energy per pulse for sinusoidal pulses



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

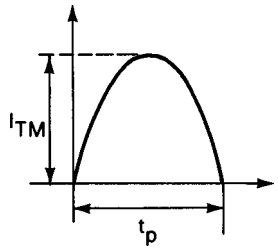
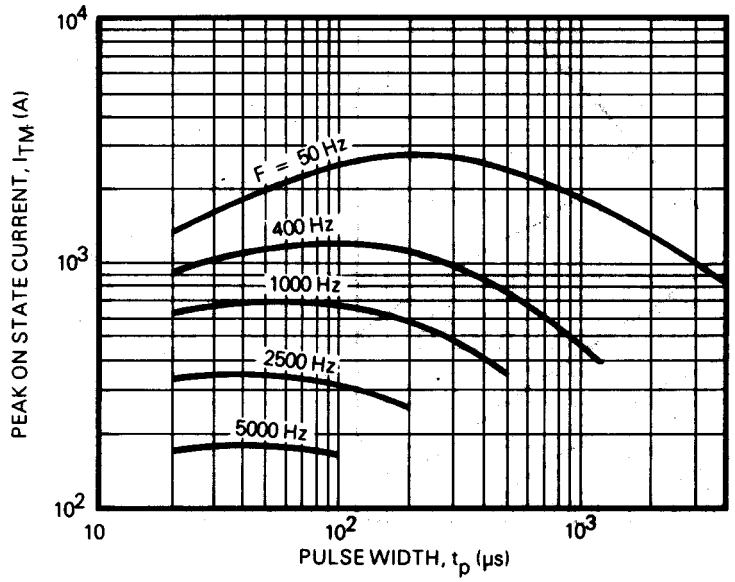


Fig.8 Maximum allowable peak on-state current vs pulse width for T_{case} = 65˚C



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

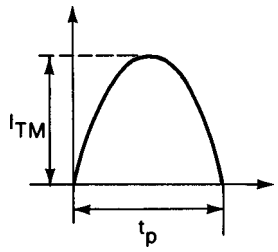
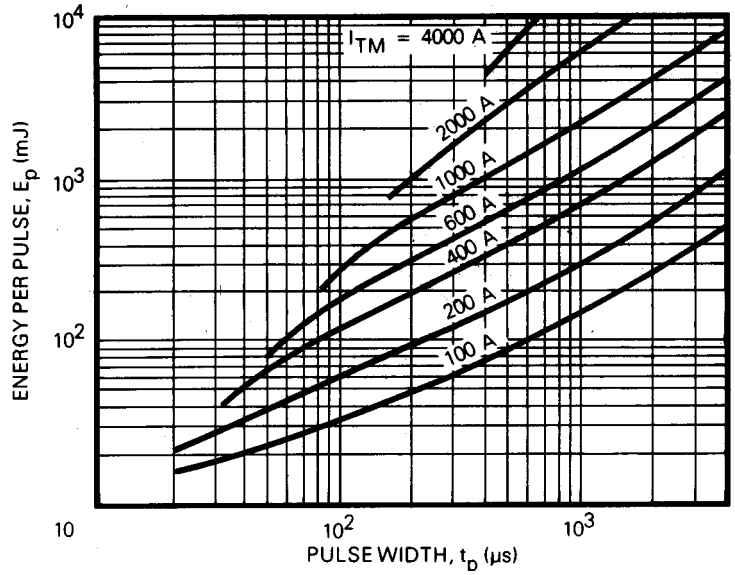


Fig.9 Maximum allowable peak on-state current vs pulse width for T_{case} = 90˚C



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

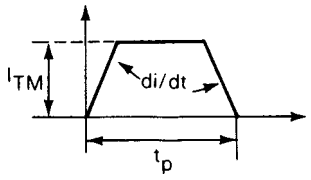


Fig.10 Energy per pulse for trapezoidal pulses

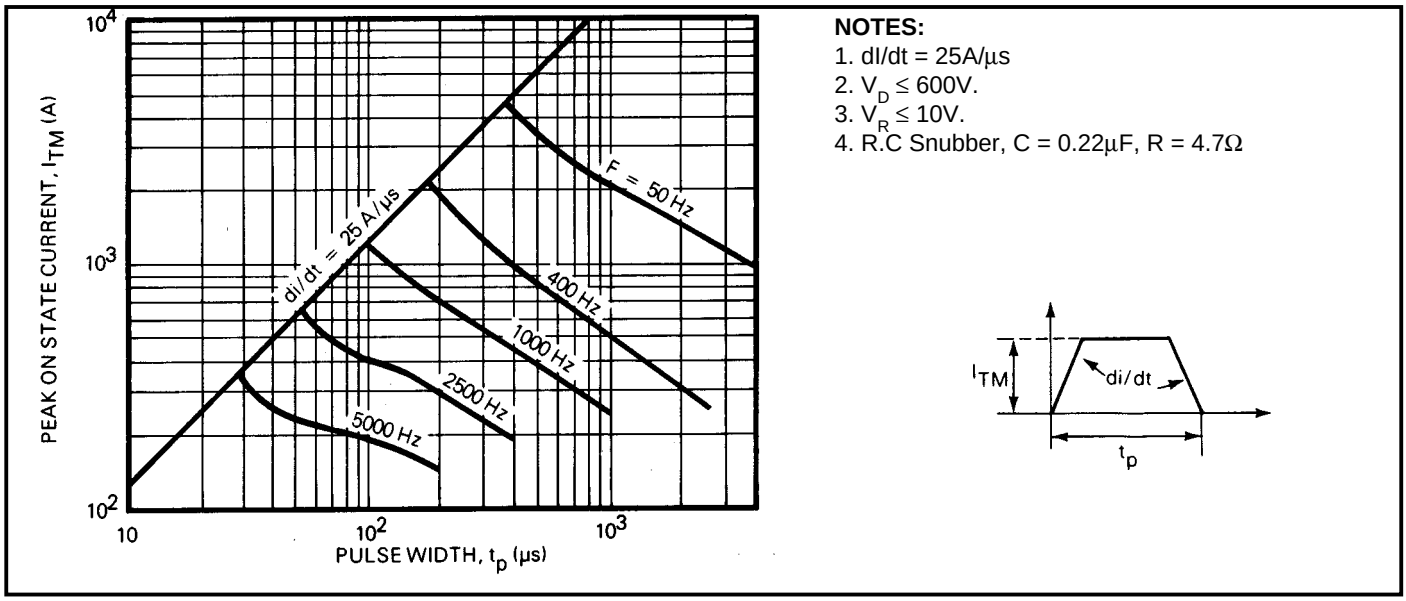


Fig.11 Maximum allowable peak on-state current vs pulse width for T_{case} = 65˚C

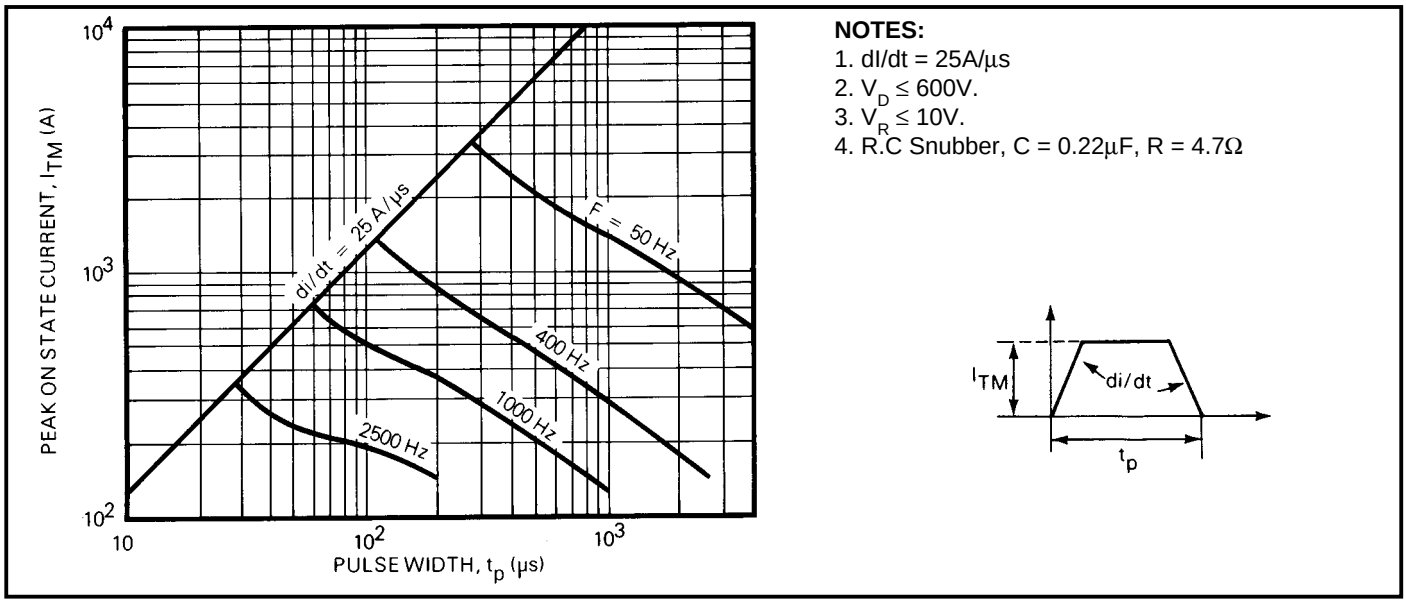
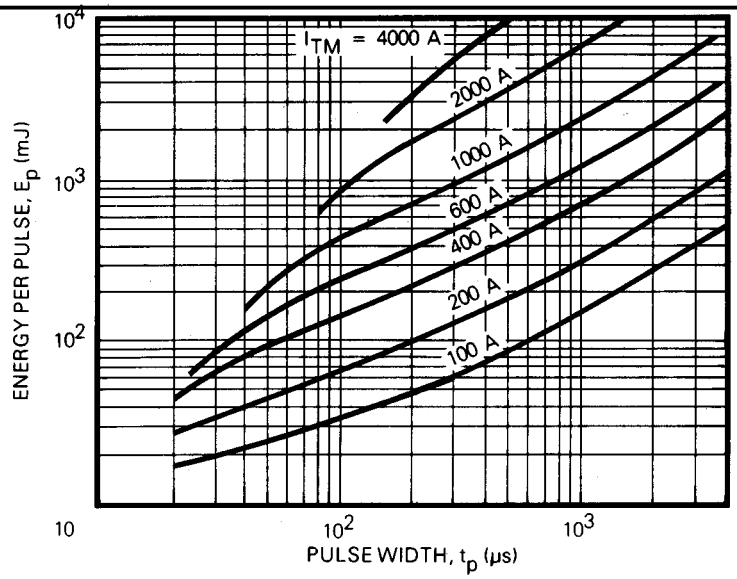


Fig.12 Maximum allowable peak on-state current vs pulse width for T_{case} = 90˚C



NOTES:
1. dI/dt = 50A/µs
2. $V_D \leq 600V$.
3. $V_R \leq 10V$.
4. R.C Snubber, C = 0.22µF, R = 4.7Ω

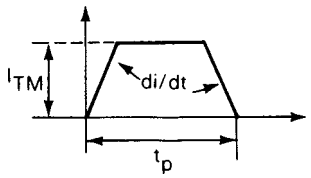
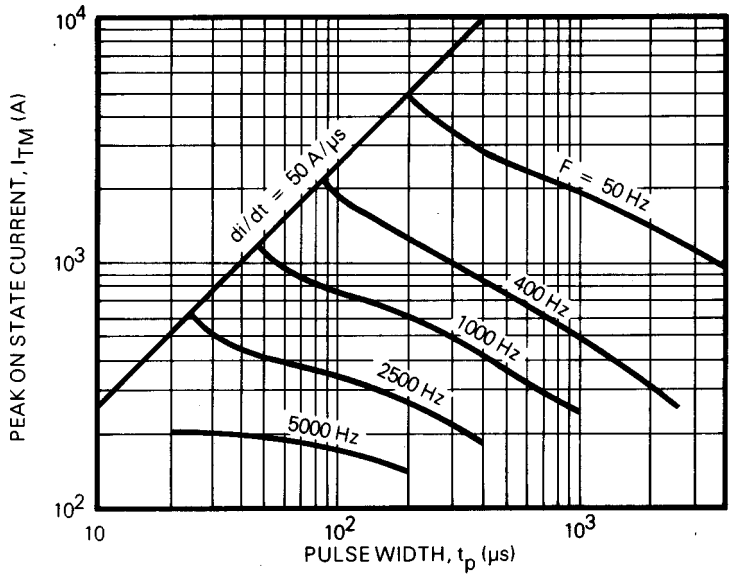


Fig.13 Energy per pulse for trapezoidal pulses



NOTES:
1. dI/dt = 50A/µs
2. $V_D \leq 600V$.
3. $V_R \leq 10V$.
4. R.C Snubber, C = 0.22µF, R = 4.7Ω

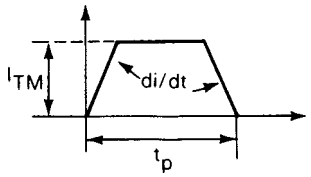
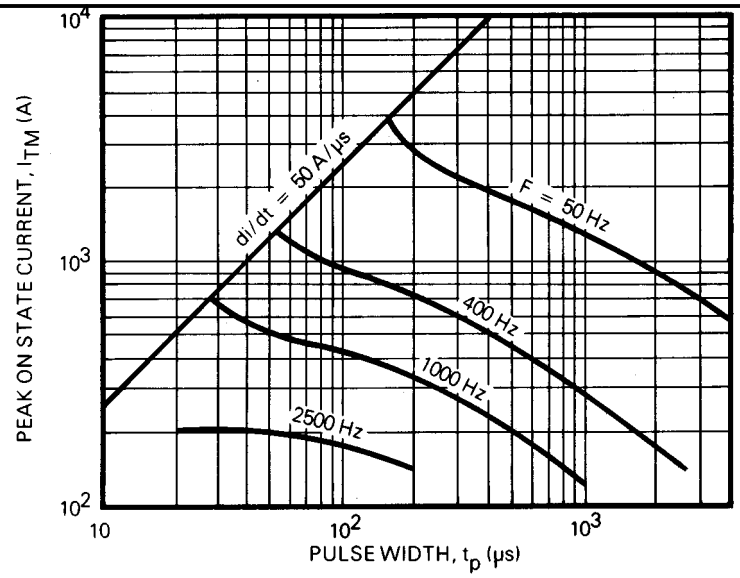


Fig.14 Maximum allowable peak on-state current vs pulse width for T_{case} = 65˚C



NOTES:
1. dI/dt = 50A/µs
2. $V_D \leq 600V$.
3. $V_R \leq 10V$.
4. R.C Snubber, C = 0.22µF, R = 4.7Ω

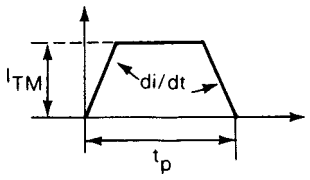
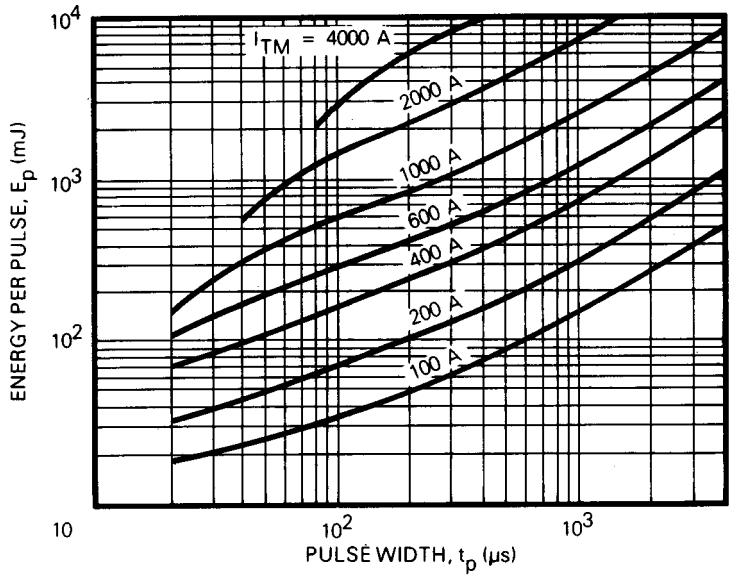


Fig.15 Maximum allowable peak on-state current vs pulse width for T_{case} = 65°C



NOTES:
1. dI/dt = 100A/µs
2. $V_D \leq 600V$.
3. $V_R \leq 10V$.
4. R.C Snubber, C = 0.22µF, R = 4.7Ω

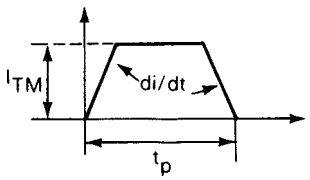


Fig.16 Energy per pulse for trapezoidal pulses

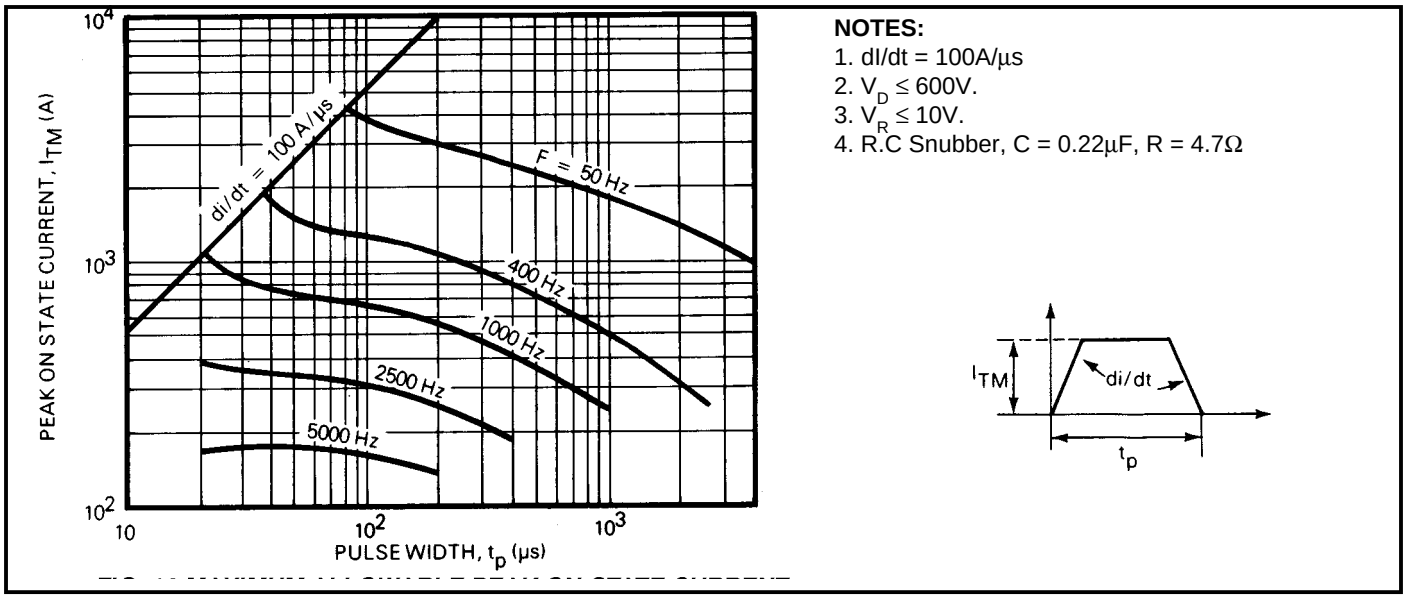


Fig.17 Maximum allowable peak on-state current vs pulse width for T_{case} = 65˚C

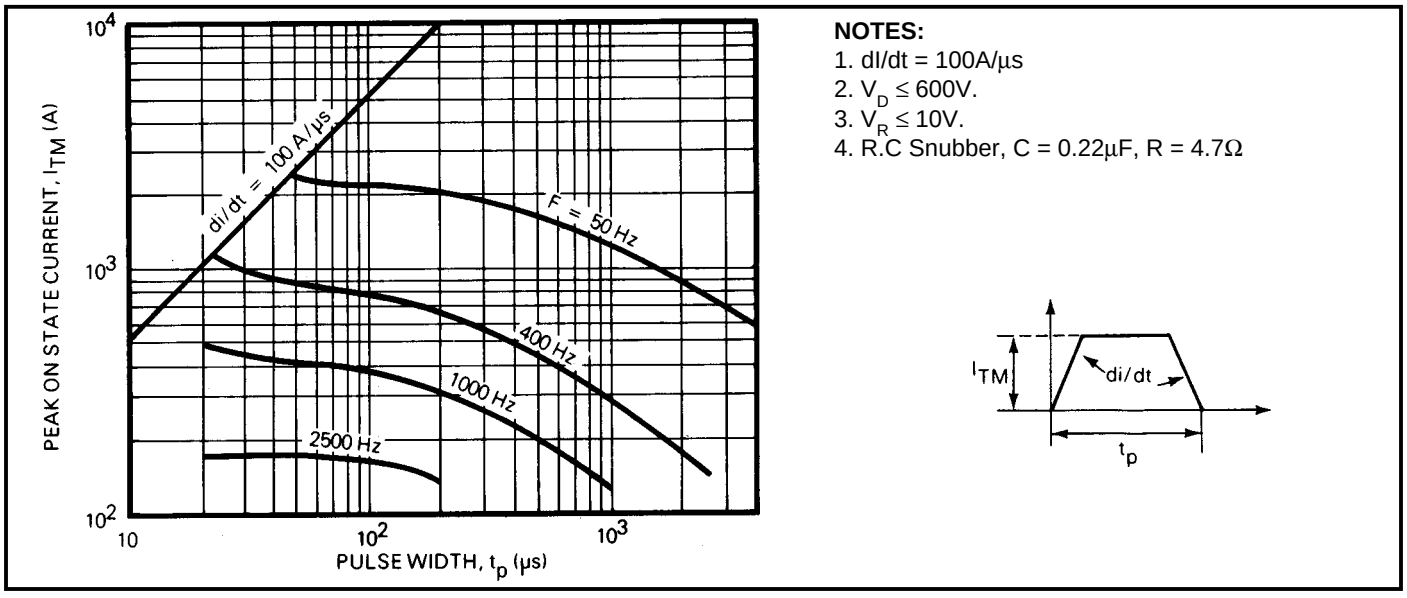
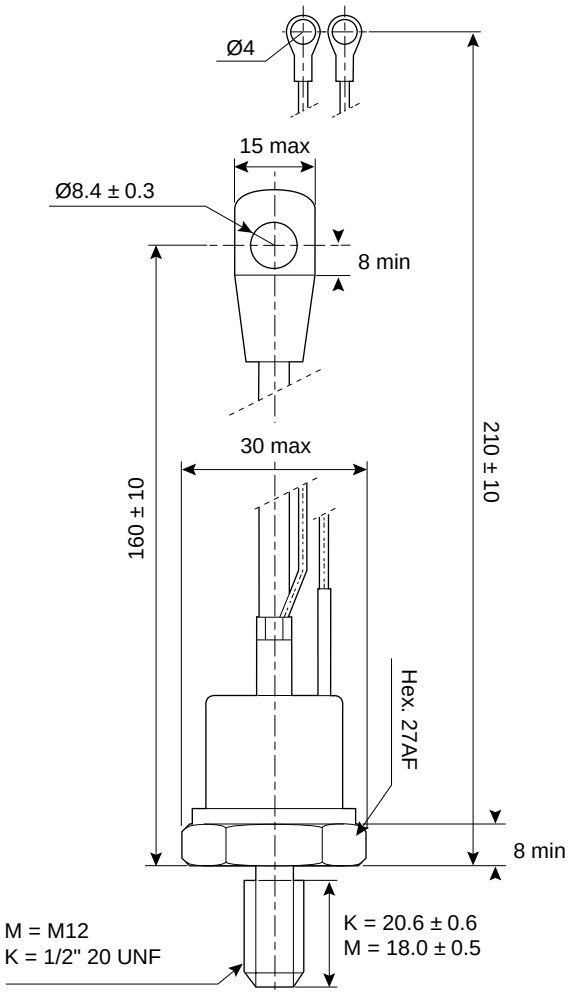


Fig.18 Maximum allowable peak on-state current vs pulse width for T_{case} = 90˚C

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

POWER ASSEMBLY CAPABILITY

The Power Assembly group was set up to provide a support service for those customers requiring more than the basic semiconductor, and has developed a flexible range of heatsink and clamping systems in line with advances in device voltages and current capability of our semiconductors.

We offer an extensive range of air and liquid cooled assemblies covering the full range of circuit designs in general use today. The Assembly group continues to offer high quality engineering support dedicated to designing new units to satisfy the growing needs of our customers.

Using the latest CAD methods our team of design and applications engineers aim to provide the Power Assembly Complete Solution (PACs).

DEVICE CLAMPS

Disc devices require the correct clamping force to ensure their safe operation. The PACS range includes a varied selection of pre-loaded clamps to suit all of our manufactured devices. Types available include cube clamps for single side cooling of 'T' 23mm and 'E' 30mm discs, and bar clamps right up to 83kN for our 'Z' 100mm thyristors and diodes.

Clamps are available for single or double side cooling, with high insulation versions for high voltage assemblies.

Please refer to our application note on device clamping, AN4839

HEATSINKS

The Power Assembly group has its own proprietary range of extruded aluminium heatsinks. They have been designed to optimise the performance of Dynex semiconductors. Data with respect to air natural, forced air and liquid cooling (with flow rates) is available on request.

For further information on device clamps, heatsinks and assemblies, please contact your nearest sales representative or customer service office.

DYNEX SEMICONDUCTOR

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Target Information: This is the most tentative form of information and represents a very preliminary specification. No actual design work on the product has been started.

Preliminary Information: The product is in design and development. The datasheet represents the product as it is understood but details may change.

Advance Information: The product design is complete and final characterisation for volume production is well in hand.

No Annotation: The product parameters are fixed and the product is available to datasheet specification.

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