

**THOMSON
SEMICONDUCTORS**

TSD.35
ASYMMETRICAL THYRISTOR
THYRISTOR ASYMÉTRIQUE

T-25-17

TENTATIVE DATA

FEATURES

Low loss asymmetrical diffusion structure.
Interdigitated gate structure.
Very low TQ with gate assisted turn-off.
Fully characterised for operation up to 40 kHz.
Directly compatible with 220-415 V a.c. mains.

APPLICATIONS

High frequency, high power choppers and inverters :
Welding, Induction Heating, 400 Hz UPS,
PWM inverters, Ultrasonic generators.

CARACTERISTIQUES GENERALES

Structure de diffusion asymétrique à faibles pertes.
Structure de gâchette amplificatrice.
Très faible TQ avec l'extinction assistée par gâchette.
Caractérisé pour fonctionnement jusqu'à 40 kHz.
Compatible avec tensions secteur 220-415 V.

APPLICATIONS

Hacheurs et onduleurs haute fréquence, forte puissance :
Soudure, Chauffage par induction,
Onduleurs MLI, Générateurs ultrason, Alimentations de secours 400 Hz.

IT(PEAK)@ 20 KHz 40 Amps

VDRM up to 1200 Volts

tq' 5 µs



Case : TO 48
Boitier :

ORDERING INFORMATION
APPELLATION

Type	Voltage		Turn - off	
Code	V _{DRM} (V)	Code	t _{q'} (μs)	Code
TSD	50	035	5	No code
	200	235		
	400	435		
	600	635		
	800	835		
	1000	1035		
	1200	1235		

Example

Type TSD with V_{DRM} = 600 V, and
tq' = 5 µs, order as:

Type	V _{DRM}
TSD	635

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THOMSON SEMICONDUCTORS

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THOMSON
COMPONENTS

BLOCKING STATE CHARACTERISTICS

Repetitive peak reverse voltage (for all voltage classes)	V_{RRM}	10	V	
Max. forward leakage current	I_{DRM}	5	mA	$T_J = 125^\circ\text{C} @ V_{DRM}$
Max. reverse leakage current	I_{RRM}	100	mA	$T_J = 125^\circ\text{C} @ V_{RRM}$

CONDUCTING STATE CHARACTERISTICS

Peak forward current at 20 kHz	$I_{T(PEAK)}$	40	A	$T_J = 125^\circ\text{C}$ $T_{case} = 80^\circ\text{C}$ Half sine Duty cycle 50 Hz
Peak one cycle surge current (non repetitive)	I_{TSM}	400	A	
I^2t (for fusing)	I^2t	800	A^2s	$T_J = 125^\circ\text{C}$ $t_p = 10\text{ ms}$ $V_R = 0$
Max. forward voltage drop	V_{TM}	2.4	V	$T_J = 25^\circ\text{C}$ $I_{TM} = 100\text{ A}$

SWITCHING CHARACTERISTICS

Gate assisted turn-off time (with feedback diode)	t_q Max Typ	5 3	μs	$T_J = 125^\circ\text{C}$ $I_{TM} = 40\text{ A}$ $t_p = 25\text{ }\mu\text{s}$ $dI_R/dt = 10\text{ A}/\mu\text{s}$ $V_R = -1\text{ V}$ $dv/dt = 200\text{ V}/\mu\text{s}$ (Linear to 0.6 V_{DRM}) $V_{GK} = -5\text{ V}$
Typ. turn-off time (with feedback diode)	t_q	7	μs	
Min. critical on-state di/dt - Non repetitive - Repetitive	di/dt	1000 500	$\text{A}/\mu\text{s}$	$T_J = 125^\circ\text{C}$ $I_{TM} = 40\text{ A}$ $t_p = 100\text{ }\mu\text{s}$ $dI_R/dt = 10\text{ A}/\mu\text{s}$ $V_R = 1\text{ V}$ $dv/dt = 200\text{ V}/\mu\text{s}$ (Linear to 0.6 V_{DRM}) Gate open
Min. critical off-state dv/dt	dv/dt	1000	$\text{V}/\mu\text{s}$	Gate supply 20 V/20 Ω $t_r \leq 0.5\text{ }\mu\text{s}$ $T_J = 125^\circ\text{C}$ Linear to 0.6 V_{DRM} $V_{GK} = -5\text{ V}$

GATE CHARACTERISTICS

Max. DC trigger current	I_{GT}	200	mA	$T_J = 25^\circ\text{C}$ $V_D = 12\text{ V}$ $R_L = 3\text{ }\Omega$
Max. DC trigger voltage	V_{GT}	2	V	
Min. non trigger voltage	V_{GD}	0.2	V	$T_J = 125^\circ\text{C}$ $V_D = V_{DRM}$ $R_L = 1\text{ k}\Omega$
Peak forward current	I_{FGM}	20	A	$T_p = 10\text{ }\mu\text{s}$
Peak reverse voltage	V_{RGM}	10	V	
Peak power	P_{GM}	60	W	$T_p = 10\text{ }\mu\text{s}$
Average power	$P_{G(AV)}$	2	W	

THERMAL AND MECHANICAL CHARACTERISTICS

Junction operating temperature range	T_J	- 40 to + 125 $^\circ\text{C}$		
Storage temperature range	T_{stg}	- 40 to + 150 $^\circ\text{C}$		
Max. thermal resistance junction to case (DC)	R_{thJC}	1.0	$^\circ\text{C}/\text{W}$	Stud torque Min : 3.5 Nm Max : 3.8 Nm
Max. thermal resistance case to heatsink	R_{thCS}	0.4		

SINUSOIDAL CURRENT PULSE DATA

T-25-17

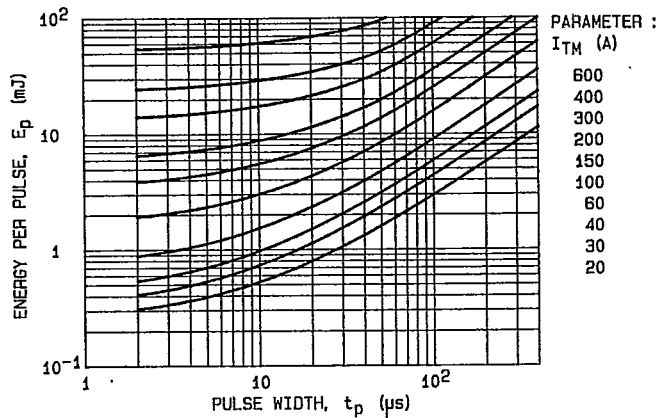
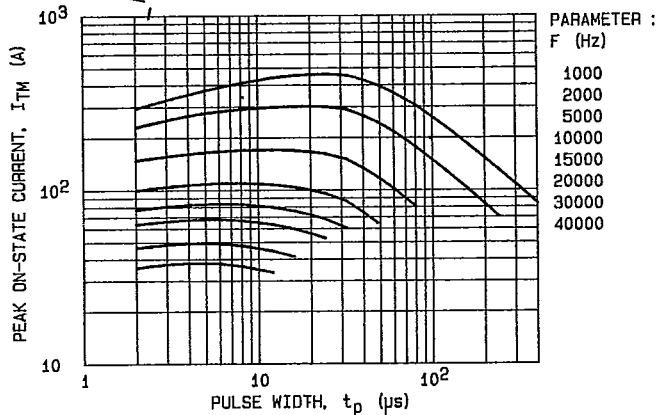
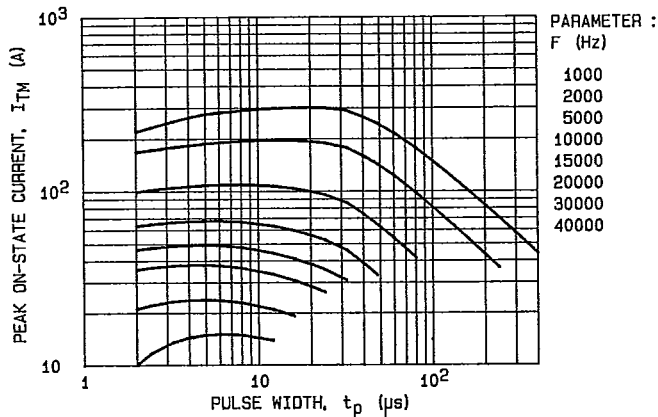
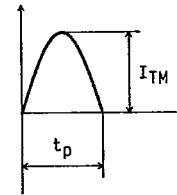


FIG.1 - ENERGY PER PULSE FOR SINUSOIDAL PULSES.

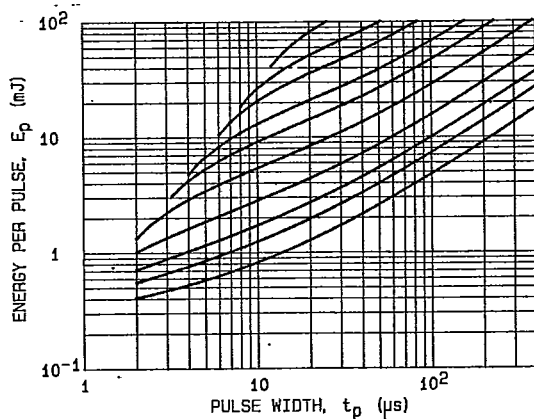
FIG.2 - MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT VERSUS PULSE WIDTH FOR $T_c = 85^\circ\text{C}$.FIG.3 - MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT VERSUS PULSE WIDTH FOR $T_c = 90^\circ\text{C}$.

NOTES :

1. $V_D \leq 600$ Volts.
2. $V_R \leq 1$ Volt.
3. R.C Snubber, $C = 22$ nF,
 $R = 33 \Omega$

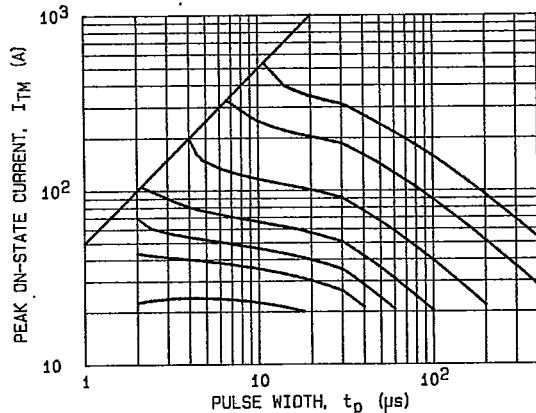
TRAPEZOIDAL CURRENT PULSE DATA

T-25-17



PARAMETER :
 I_{TM} (A)
 600
 400
 300
 200
 150
 100
 60
 40
 30
 20

FIG.4 - ENERGY PER PULSE FOR TRAPEZOIDAL PULSES.



PARAMETER :
 F (Hz)
 1000
 2000
 5000
 10000
 15000
 20000
 30000

$di/dt = 100 \text{ A}/\mu\text{s}$

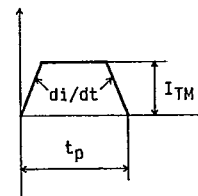
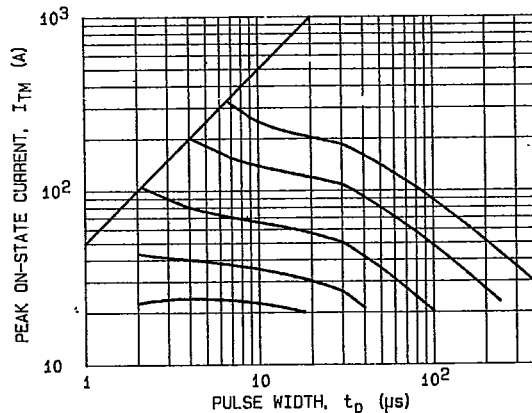


FIG.5 - MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT VERSUS PULSE WIDTH FOR $T_C = 85^\circ\text{C}$.



PARAMETER :
 F (Hz)
 1000
 2000
 5000
 10000
 15000

NOTES :

1. $V_D \leq 600$ Volts.
2. $V_R \leq 1$ Volt.
3. R.C Snubber, $C = 22 \text{ nF}$,
 $R = 33 \Omega$.

FIG.6 - MAXIMUM ALLOWABLE PEAK ON-STATE CURRENT VERSUS PULSE WIDTH FOR $T_C = 80^\circ\text{C}$.

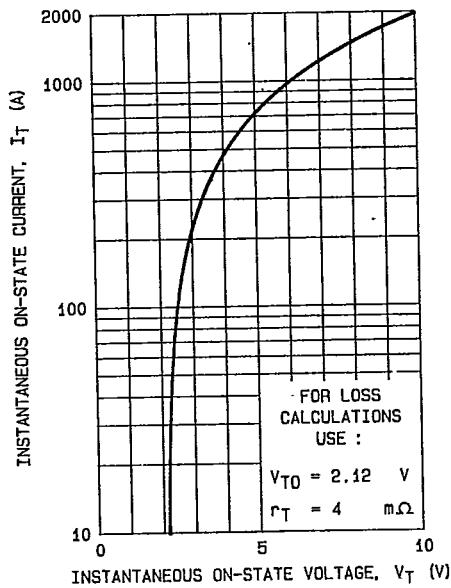


FIG.7 - MAXIMUM ON-STATE CONDUCTION CHARACTERISTIC ($T_J = 125^\circ\text{C}$).

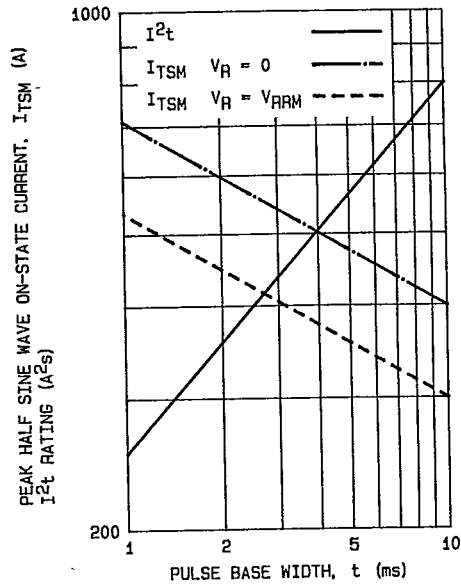


FIG.8 - NON REPETITIVE SUB-CYCLE SURGE ON-STATE CURRENT AND I^2t RATING (INITIAL $T_J = 125^\circ\text{C}$).

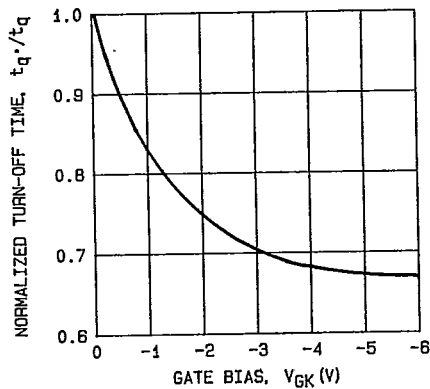


FIG.9 - TYPICAL VARIATION OF EFFECTIVE TURN-OFF TIME t_{q^*} WITH NEGATIVE GATE BIAS.

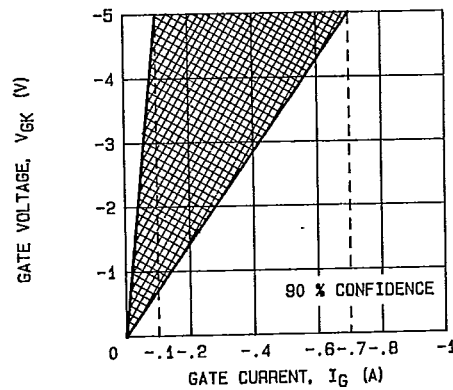


FIG.10 - REVERSE GATE CHARACTERISTICS.

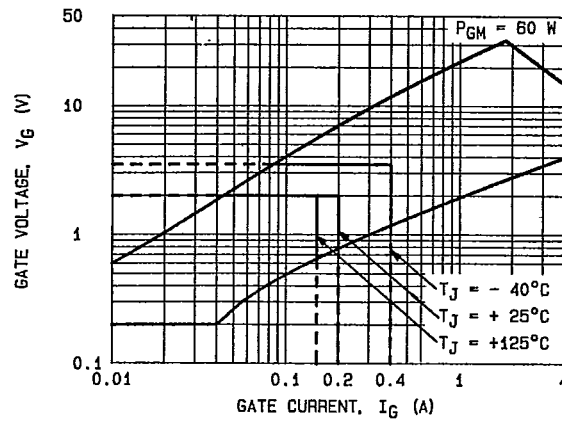


FIG.11 - GATE TRIGGER CHARACTERISTICS.

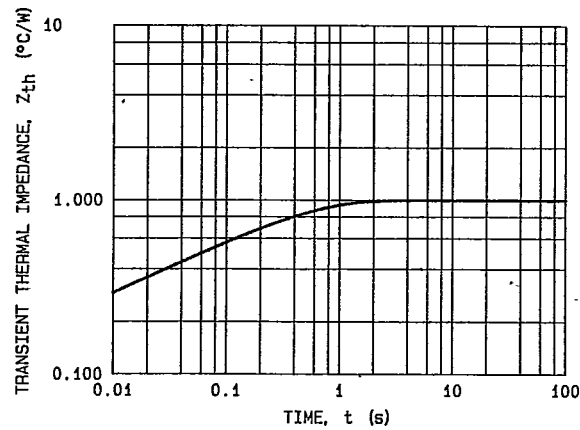
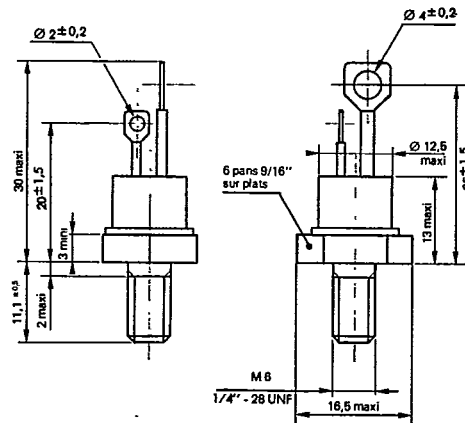


FIG.12 - TRANSIENT THERMAL IMPEDANCE JUNCTION TO CASE.



TO 48 CASE OUTLINE