

Fast Thyristor

AT195F

Key Parameters

$I_{TAV(M)}$	=	195	A
V_{DRM}/V_{RRM}	=	200 - 1300	V
I_{TSM}	=	6000	A
V_{TO}	=	1.3	V
r_T	=	0.85	mΩ

Properties

- International standard package
- Metal case with ceramic insulator
- Low on-state and switching losses
- High operation reliability
- Optimum power handling capability

MAXIMUM ALLOWABLE RATINGS

Symbols and parameters			Maximum Limits		Unit	
V_{DRM}	Repetitive peak forward voltage		200*	400*	V	
V_{RRM}	Repetitive peak reverse voltage		600	800	V	
			1000	1100	V	
			1200	1300*	V	
I_{TAVM}	Average on-state current	$t_{\text{C}} = 85\text{ }^{\circ}\text{C}$ $t_{\text{C}} = 59\text{ }^{\circ}\text{C}$	195 287		A A	
I_{TRMSM}	RMS on-state current		450		A	
I_{TSM}	Surge current	$t_{\text{vj}} = 45\text{ }^{\circ}\text{C}$, $t_{\text{p}} = 10\text{ ms}$ $t_{\text{vj}} = t_{\text{vj max}}$, $t_{\text{p}} = 10\text{ ms}$	6700 6000		A A	
I^2t	I^2t -value	$t_{\text{vj}} = 45\text{ }^{\circ}\text{C}$, $t_{\text{p}} = 10\text{ ms}$ $t_{\text{vj}} = t_{\text{vj max}}$, $t_{\text{p}} = 10\text{ ms}$	224 180		kA^2s kA^2s	
$(dv/dt)_{\text{cr}}$	Critical rate of rise of off-state voltage	$t_{\text{vj}} = t_{\text{vj max}}$ $V_{\text{D}} = 0.67\text{ }V_{\text{DRM}}$		1)	2)	$\text{V}/\mu\text{s}$ $\text{V}/\mu\text{s}$ $\text{V}/\mu\text{s}$ $\text{V}/\mu\text{s}$
			B:	50	50	
			C*:	400	400	
			L:	400	50	
			M*:	1000	400	
$(di/dt)_{\text{cr}}$	Critical rate of rise of on-state current	non rep. rep., $di_{\text{G}}/dt = 1\text{ A}/\mu\text{s}$ $I_{\text{G}} = 1\text{ A}$, $I_{\text{TM}} = 800\text{ A}$	1000 200		$\text{A}/\mu\text{s}$ $\text{A}/\mu\text{s}$	

CHARACTERISTICS

Symbols and parameters			Value			Unit
			min	typ	max	
V_T	On-state voltage	$t_{vj} = t_{vj \max}, I_T = 800 \text{ A}$			2.05	V
$V_{(TO)}$	Threshold voltage	$t_{vj} = t_{vj \max}$	1.3			V
r_T	Slope resistance	$t_{vj} = t_{vj \max}$	0.85			mΩ
I_{GT}	Gate trigger current	$t_{vj} = 25^\circ\text{C}, v_D = 6 \text{ V}, R_A = 5 \Omega$ $t_{vj} = t_{vj \max}, v_D = 6 \text{ V}, R_A = 5 \Omega$			250 10	mA mA
V_{GT}	Gate trigger voltage	$t_{vj} = 25^\circ\text{C}, v_D = 6 \text{ V}, R_A = 5 \Omega$			2.2	V
I_H	Holding current	$t_{vj} = 25^\circ\text{C}, v_D = 6 \text{ V}, R_A = 5 \Omega$			250	mA
I_L	Latching current	$t_{vj} = 25^\circ\text{C}, v_D = 6 \text{ V}$ $R_{GK} \geq 10 \Omega, I_G = 1 \text{ A}$ $di_G/dt = 1 \text{ A}/\mu\text{s}$ $t_g = 20 \mu\text{s}$			1	A
i_D, i_R	Forward off-state and reverse current	$t_{vj} = t_{vj \max}$ $v_D = V_{DRM}, v_R = V_{RRM}$			50	mA
t_{gd}	Gate controlled delay time	$I_G = 1 \text{ A}, di_G/dt = 1 \text{ A}/\mu\text{s}$			1.2	μs
t_q	Turn-off time	See Techn. Inf.			S: 18 E: 20 F: 25	μs μs μs
Q_s	Stored charge	$t_{vj} = t_{vj \max}, I_{TM} = 300 \text{ A}$ - $di_T/dt = 20 \text{ A}/\mu\text{s}$			90	μAs
C_{null}	Null capacitance	$t_{vj} = 25^\circ\text{C}, f = 10 \text{ kHz}$			4	nF

THERMAL PARAMETERS

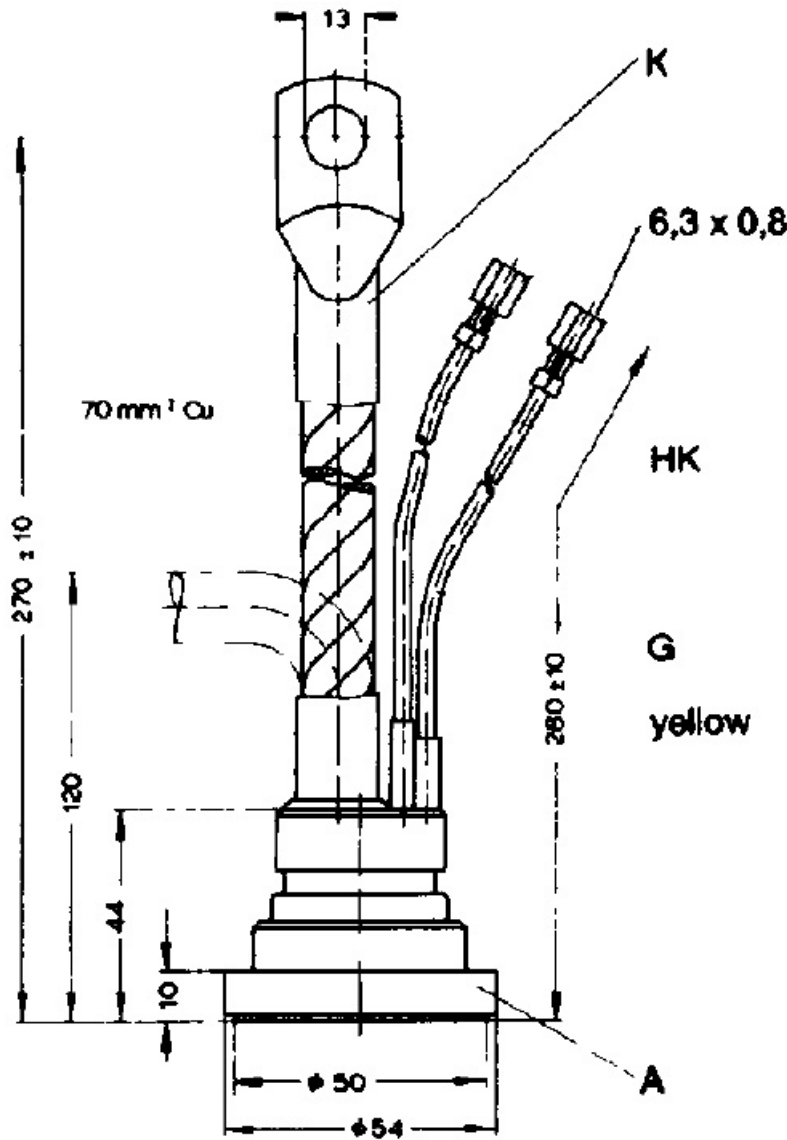
Symbols and parameters			Value	Unit
$R_{th(j-c)}$	Thermal resistance, junction to case	$\theta = 180^\circ \text{ el, sin DC}$	0.12 0.116	$^\circ\text{C}/\text{W}$
$t_{vj \max}$	Maximum junction temperature		+125	$^\circ\text{C}$
$t_{vj \text{ op}}$	Operating temperature range		-40 ... +125	$^\circ\text{C}$
t_{stg}	Storage temperature range		-40 ... +150	$^\circ\text{C}$

MECHANICAL PARAMETERS

Symbols and parameters			Value	Unit
F	Clamping force		5.5	kN
W	Weight		630	g
D	Creepage distance		14	mm

* - Delivery for larger quantities on request
1) - Values to DIN 41787 (without prior commutation)
2) - Immediately after turn-off time

DIMENSIONS



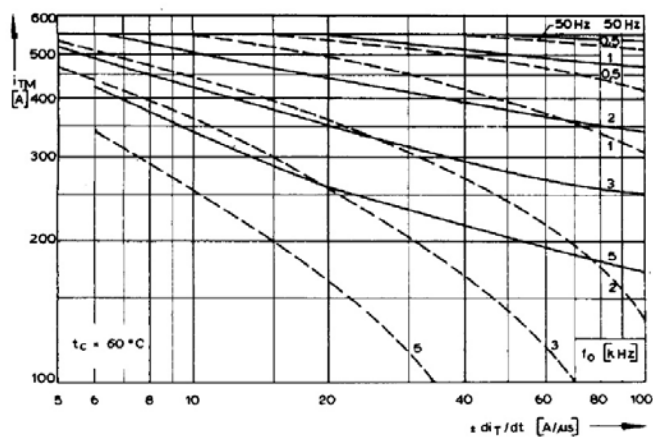


Fig. 1

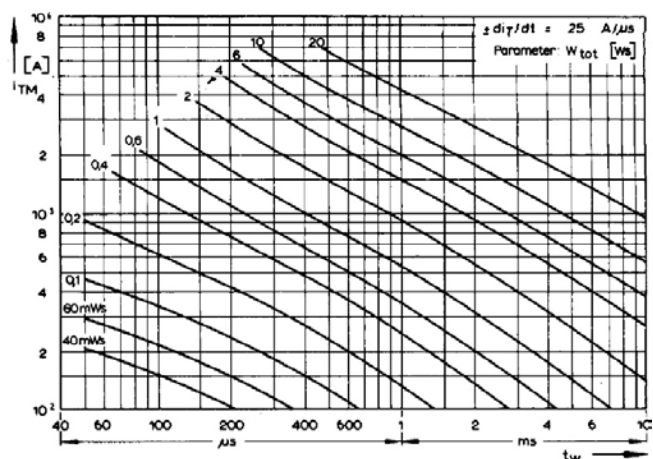


Fig. 4

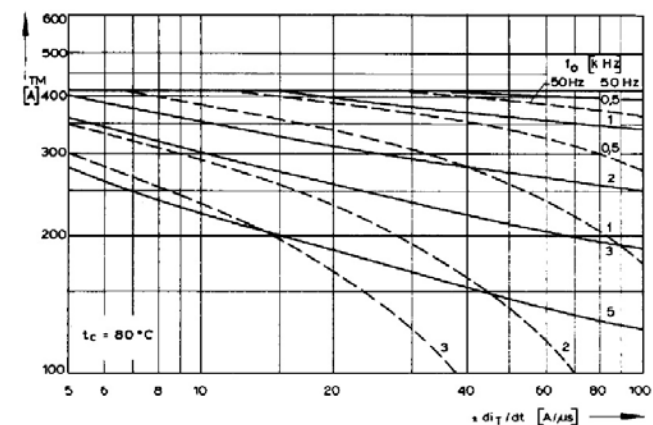


Fig. 2

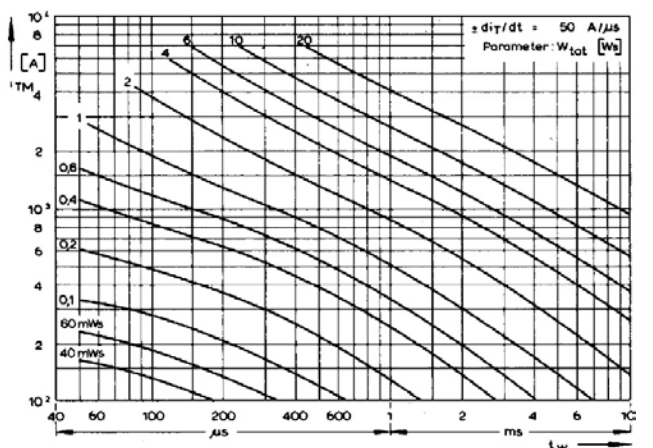


Fig. 5

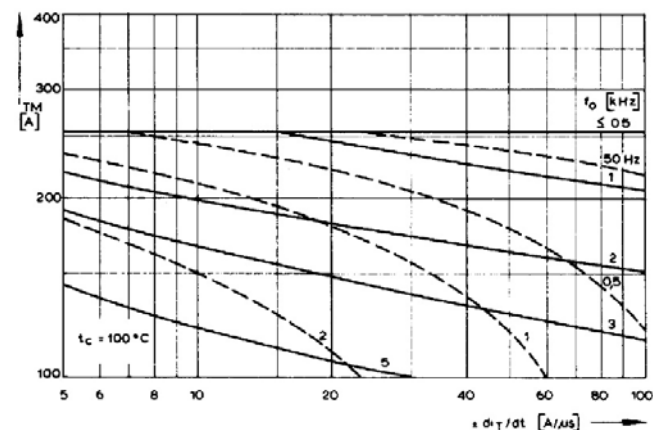


Fig. 3

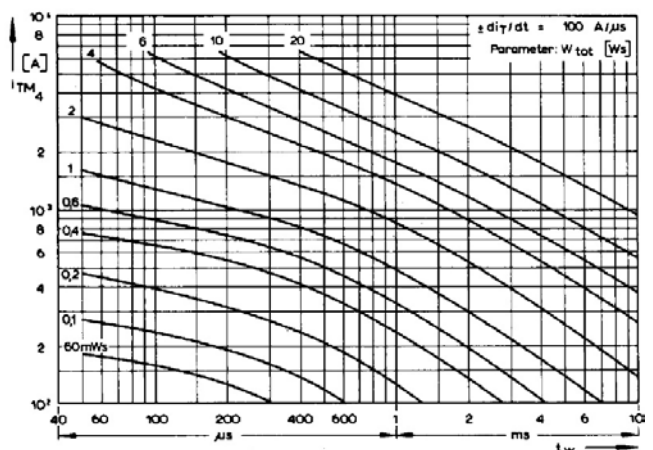


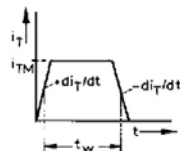
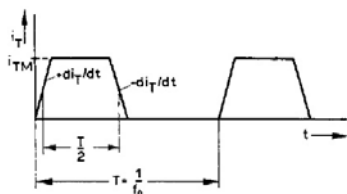
Fig. 6

Pulse generator:
 $i_G = 1 \text{ A}$, $t_a = 1 \text{ μs}$

RC-network:
 $R [\Omega] \geq 0.02 v_{DM} [\text{V}]$
 $C \leq 0.33 \text{ μF}$
 $dv_R/dt \leq 600 \text{ V/μs}$

Pulse generator:
 $i_G = 1 \text{ A}$, $t_a = 1 \text{ μs}$

RC-network:
 $R [\Omega] \geq 0.02 v_{DM} [\text{V}]$
 $C \leq 0.33 \text{ μF}$



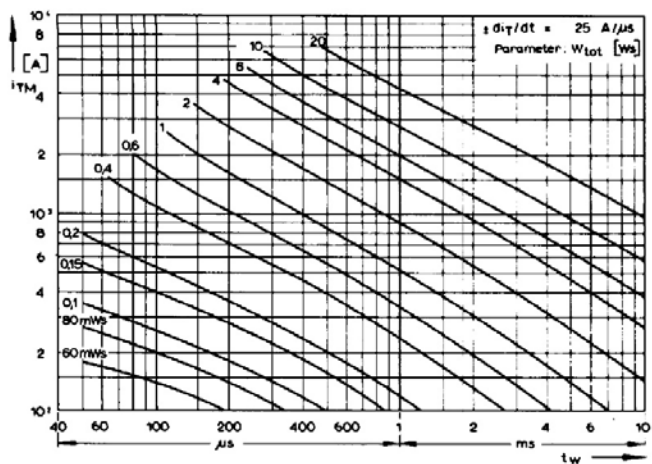


Fig. 7

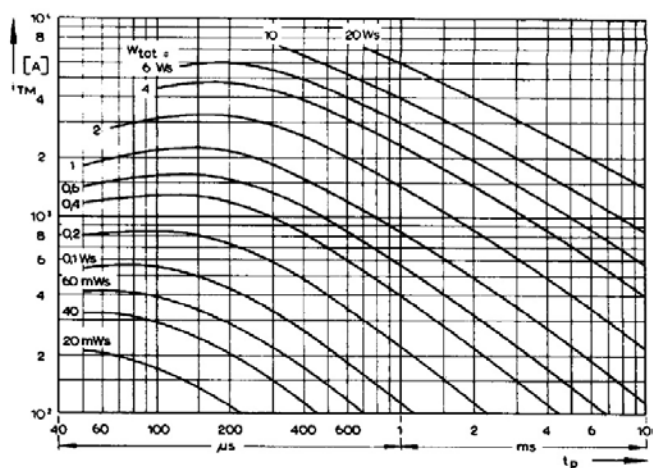


Fig. 10

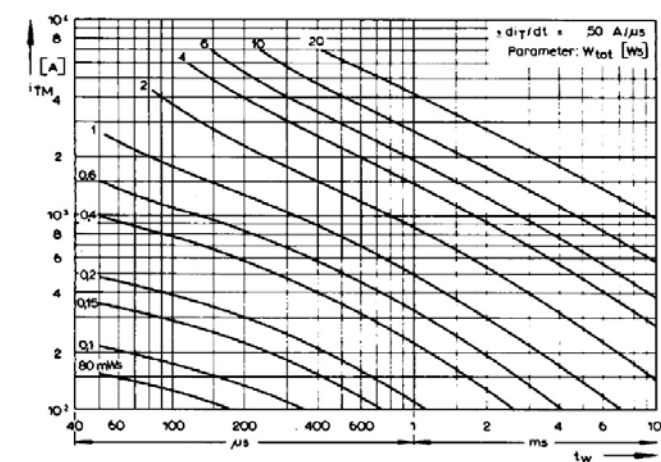


Fig. 8

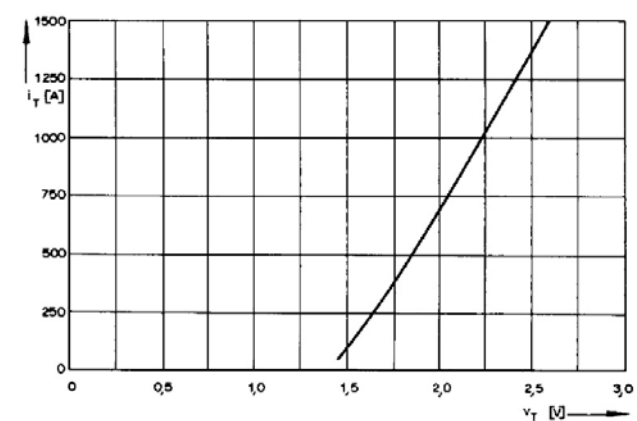


Fig. 11

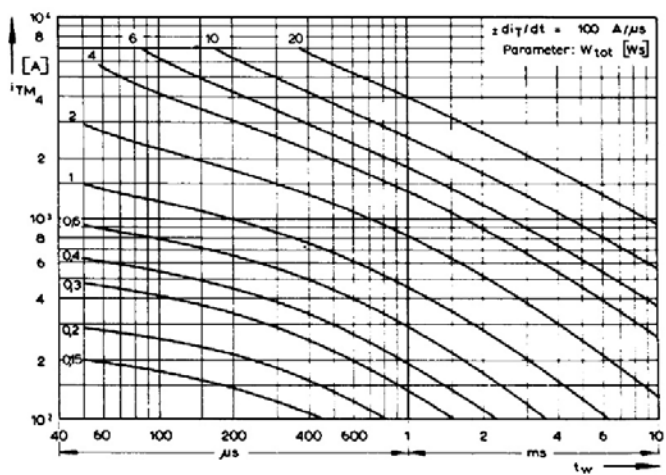


Fig. 9

Pulse generator:
 $i_G = 1 \text{ A}$, $t_a = 1 \mu\text{s}$

RC-network:
 $R [\Omega] \geq 0.02 V_{DM} [V]$
 $C \leq 0.33 \mu\text{F}$
 $dv_R/dt \leq 600 \text{ V}/\mu\text{s}$

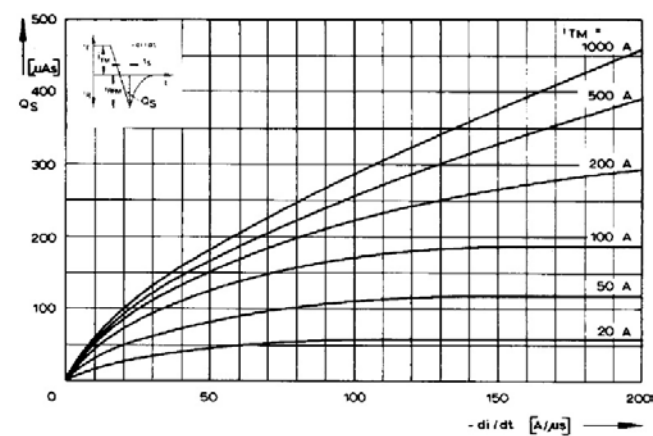
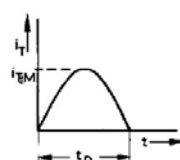
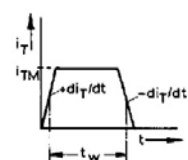


Fig. 12

Pulse generator:
 $i_G = 1 \text{ A}$, $t_a = 1 \mu\text{s}$

RC-network:
 $R [\Omega] \geq 0.02 V_{DM} [V]$
 $C \leq 0.22 \mu\text{F}$



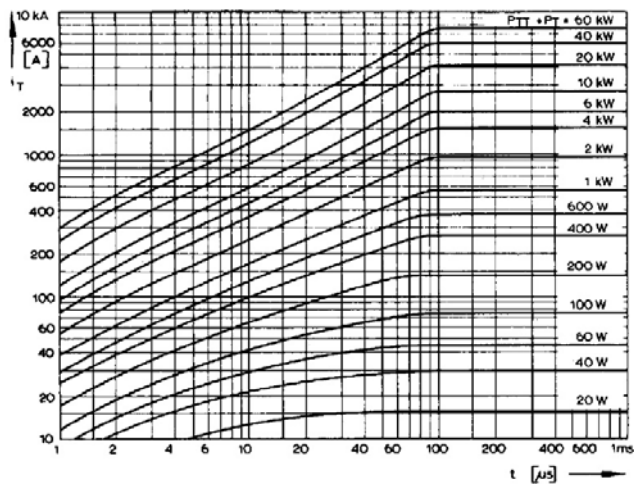


Fig. 13
Diagram for the determination of the sum of the turn-on and forward on-state power loss ($P_{TT} + P_T$)

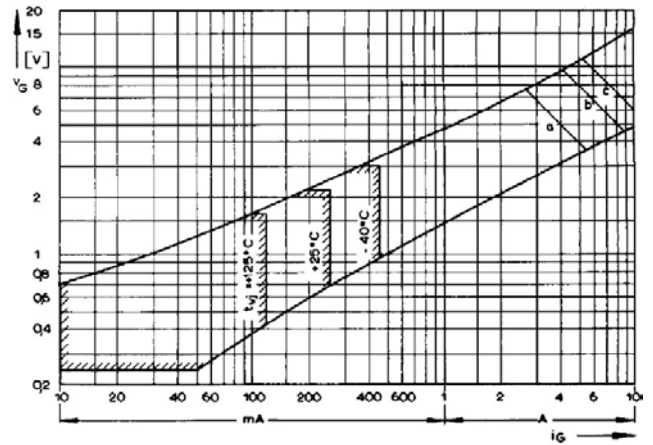


Fig. 15
Gate characteristic and peak gate power dissipation at $v_D \geq 6$ V
Parameter: Pulse duration t_g [ms]: a - 10; b - 1; c - 0.5
Maximum allowable peak gate power [W]: a - 20; b - 40; c - 60

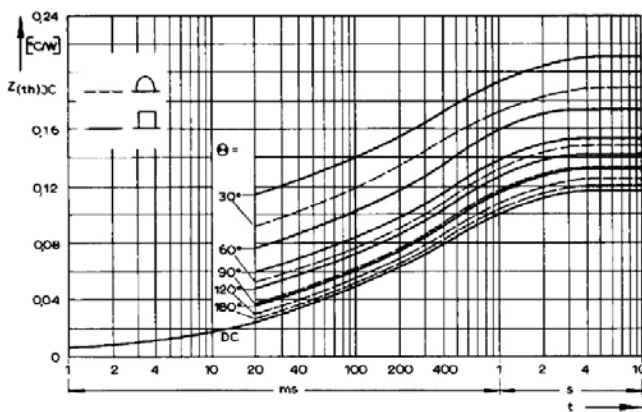


Fig. 14
Transient thermal impedance, junction to case $Z_{(th)JC}$ at sinusoidal and trapezoidal current waveform

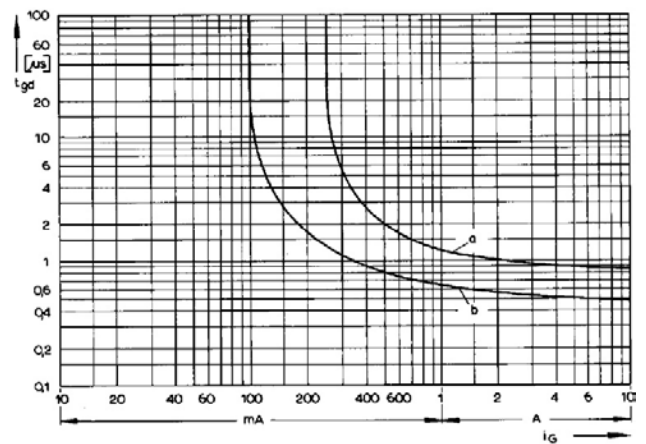


Fig. 16
Gate controlled delay time t_{gd} to DIN 41787 at $t_{vj} = 25^\circ\text{C}$, $t_a = 1 \mu\text{s}$
a - Limiting characteristic
b - Typical characteristic

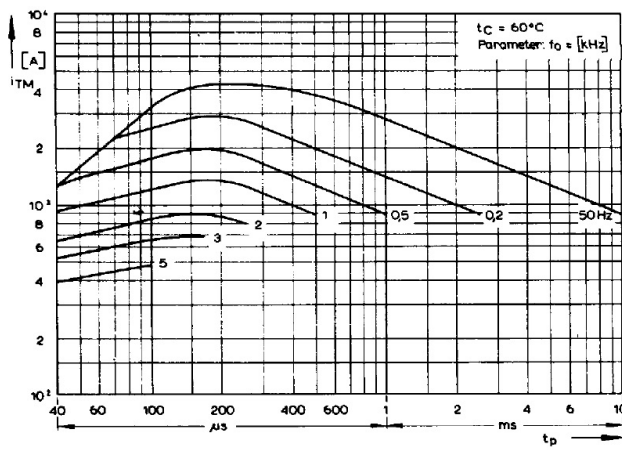


Fig. 17

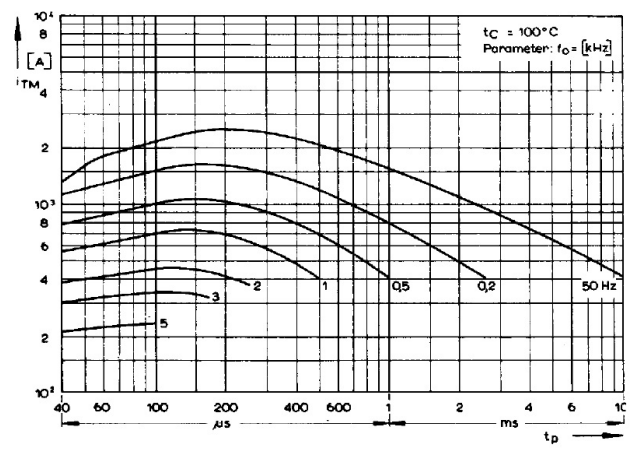


Fig. 19

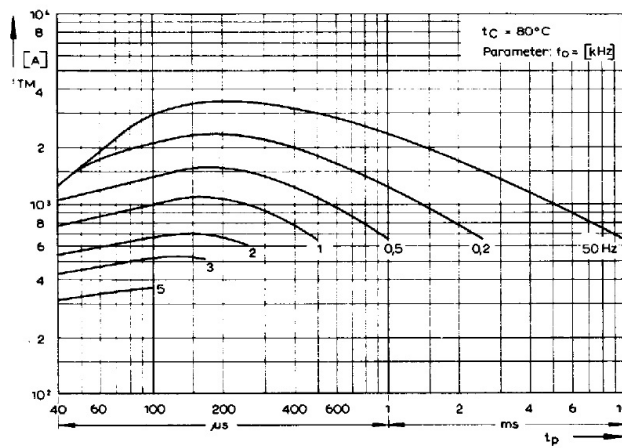


Fig. 18

Pulse generator:
 $i_G = 1 \text{ A}$, $t_a = 1 \mu\text{s}$

RC-network:
 $R [\Omega] \geq 0.02 v_{DM} [\text{V}]$
 $C \leq 0.22 \mu\text{F}$
 $dv_R/dt \leq 600 \text{ V}/\mu\text{s}$

