Fast Thyristor
AT510S

Key Parameters

$I_{TAV(M)}$	=	510	A
V_{DRM}/V_{RRM}	=	600 - 1200	V
I_{TSM}	=	8400	A
V_{T0}	=	1.3	V
r_T	=	0.65	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} V_{RRM}	Repetitive peak forward voltage Repetitive peak reverse voltage		600 1000 1200		800 1100	V V V
I_{TAVM}	Average on-state current	t_C = 85 °C t_C = 22 °C	510 960			A A
I_{TRMSM}	RMS on-state current		1500			A
I_{TSM}	Surge current	t_{vj} = 45 °C, t_P = 10 ms t_{vj} = $t_{vj\ max}$, t_P = 10 ms	9500 8400			A A
I^2t	I^2t-value	t_{vj} = 45 °C, t_P = 10 ms t_{vj} = $t_{vj\ max}$, t_P = 10 ms	451 353			kA^2s kA^2s
$(dv/dt)_{cr}$	Critical rate of rise of off-state voltage	t_{vj} = $t_{vj\ max}$ V_D = 0.67 V_{DRM}		1)	2)	
			B:	50	50	V/µs
			C*:	400	400	V/µs
			L:	400	50	V/µs
			M*:	1000	400	V/µs
$(di/dt)_{cr}$	Critical rate of rise of on-state current	non rep. rep., di_G/dt = 1 A/µs I_{TM} = 2.5 kA I_G = 1 A	1500 500			A/µs A/µs

CHARACTERISTICS

Symbols and parameters			Value			Unit
			min	typ	max	
v_T	On-state voltage	$t_{vj} = t_{vj\ max}$, I_T = 2500 A			3.05	V
$V_{(TO)}$	Threshold voltage	$t_{vj} = t_{vj\ max}$		1.3		V
r_T	Slope resistance	$t_{vj} = t_{vj\ max}$		0.65		mΩ
I_{GT}	Gate trigger current	t_{vj} = 25 °C, v_D = 6 V, R_A = 5 Ω $t_{vj} = t_{vj\ max}$, v_D = 6 V, R_A = 5 Ω			250 10	mA mA
V_{GT}	Gate trigger voltage	t_{vj} = 25 °C, v_D = 6 V, R_A = 5 Ω			2.2	V
I_H	Holding current	t_{vj} = 25 °C, v_D = 6 V, R_A = 5 Ω			250	mA
I_L	Latching current	t_{vj} = 25 °C, v_D = 6 V R_{GK} ≥ 10 Ω, I_G = 1 A di_G/dt = 1 A/µs t_g = 20 µs			1.5	A
i_D, i_R	Forward off-state and reverse currents	$t_{vj} = t_{vj\ max}$ $v_D = V_{DRM}$, $v_R = V_{RRM}$			100	mA
t_{gd}	Gate controlled delay time	I_G = 1 A, di_G/dt = 1 A/µs			1.2	µs
t_q	Turn-off time	See Techn. Inf.			C*: 12 D: 15 S: 18 E: 20	µs µs µs µs
Q_s	Stored charge	$t_{vj} = t_{vj\ max}$, I_{TM} = 800 A $-di_T/dt$ = 20 A/µs			80	µAs
C_{null}	Null capacitance	t_{vj} = 25 °C, f = 10 kHz			8.5	nF

THERMAL PARAMETERS

Symbols and parameters			Value	Unit
$R_{th(j-c)}$	Thermal resistance, junction to case	Two-sided cooling, θ = 180° el, sin Two-sided cooling, DC Anode-sided cooling, θ = 180° el, sin Anode-sided cooling, DC Cathode-sided cooling, θ = 180° el, sin Cathode-sided cooling, DC	0.038 0.036 0.0675 0.065 0.082 0.08	°C/W
$R_{th(c-h)}$	Thermal resistance, case to heatsink		0.01	°C/W
$t_{vj\ max}$	Maximum junction temperature		+125	°C
$t_{vj\ op}$	Operating temperature range		-40 ... +125	°C
t_{stg}	Storage temperature range		-40 ... +150	°C

MECHANICAL PARAMETERS

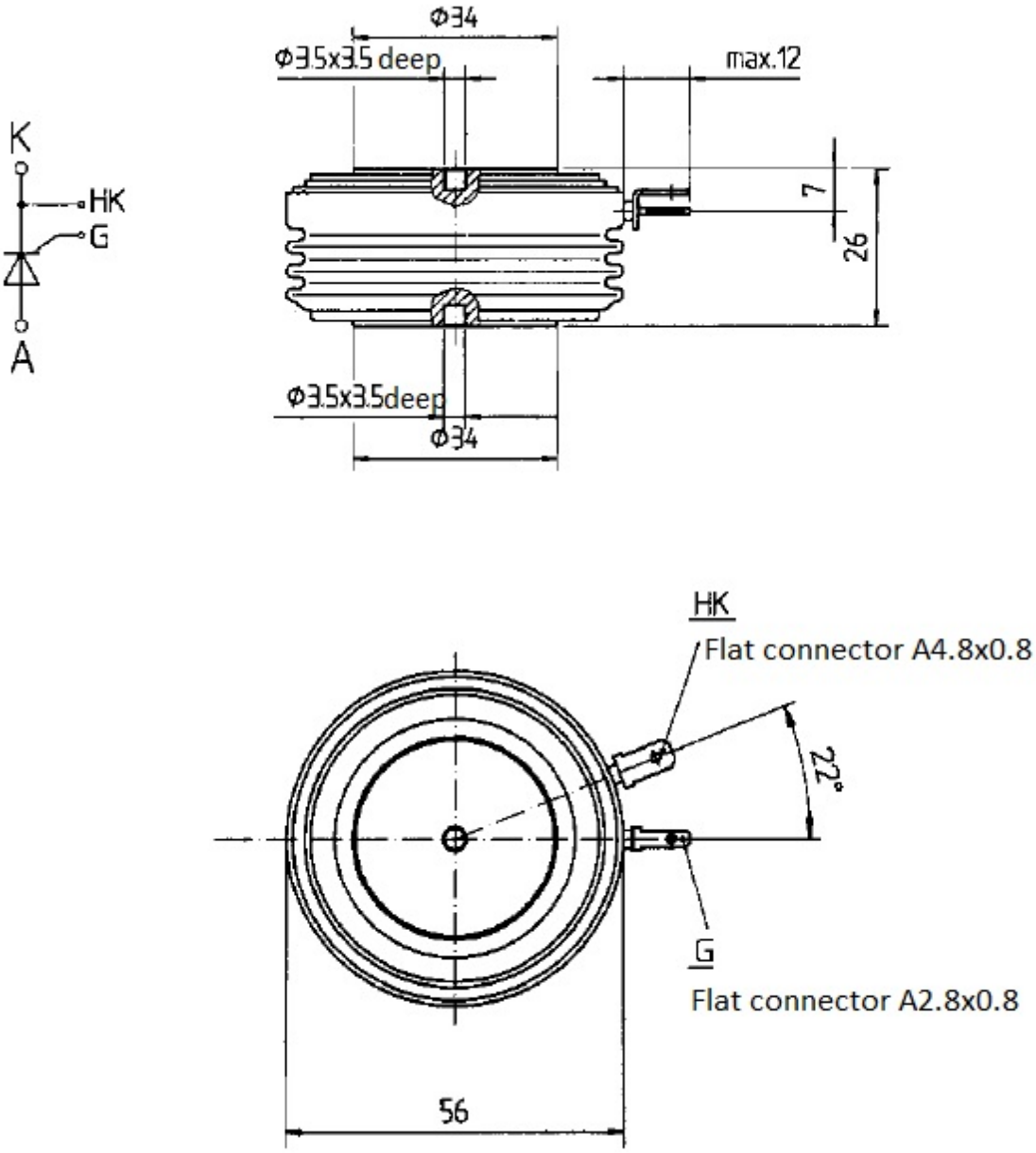
Symbols and parameters			Value	Unit
F	Clamping force		12 – 15	kN
W	Weight		270	g
D	Creepage distance		25	mm

***** - Delivery for larger quantities on request

1) - Values to DIN 41787 (without prior commutation)

2) - Immediately after turn-off time

DIMENSIONS



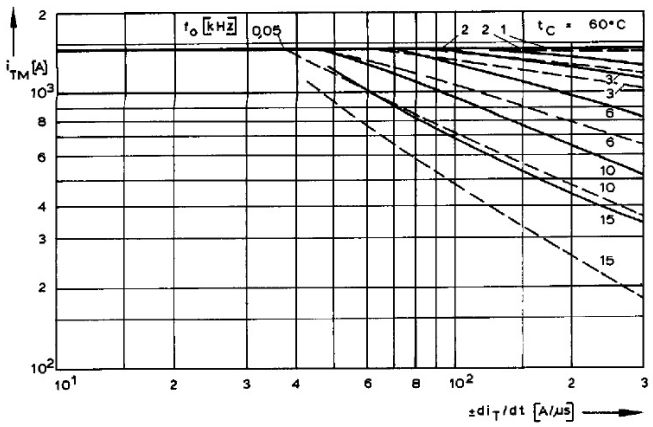


Fig. 1

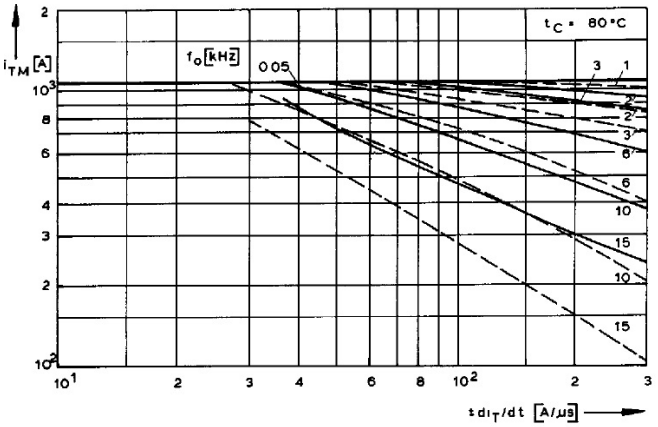


Fig. 2

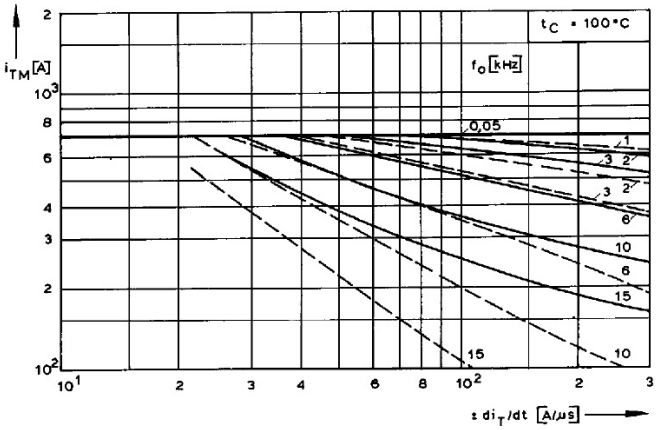
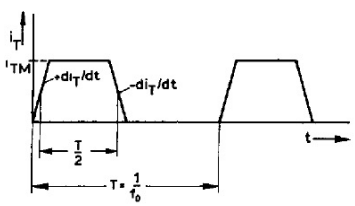


Fig. 3

Pulse generator:
i_G = 1 A, t_a = 1 µs

RC-network:
R [Ω] ≥ 0.02 v_{DM} [V]
C ≤ 0.33 µF
dv_R/dt ≤ 600 V/µs



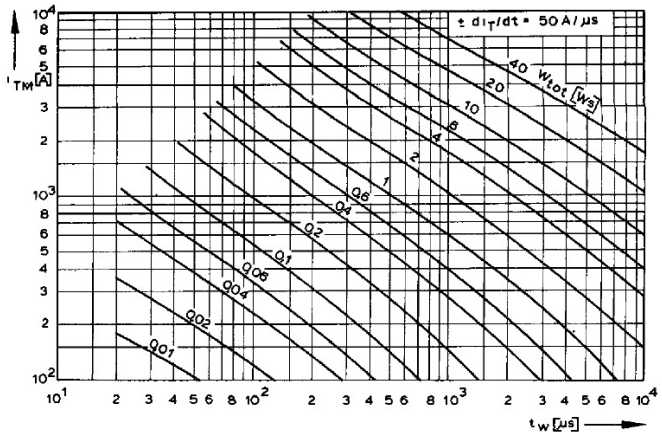


Fig. 4

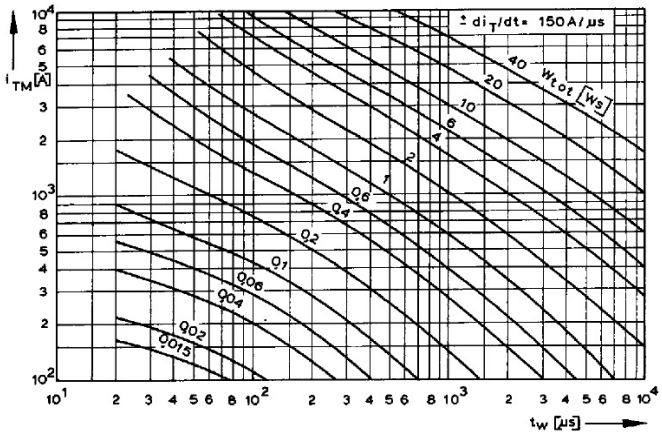


Fig. 5

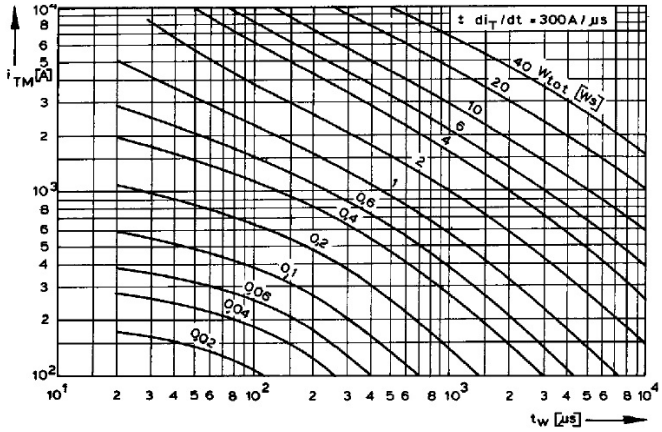


Fig. 6

Pulse generator:
i_G = 1 A, t_a = 1 µs

RC-network:
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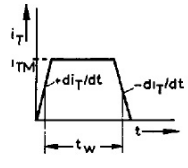

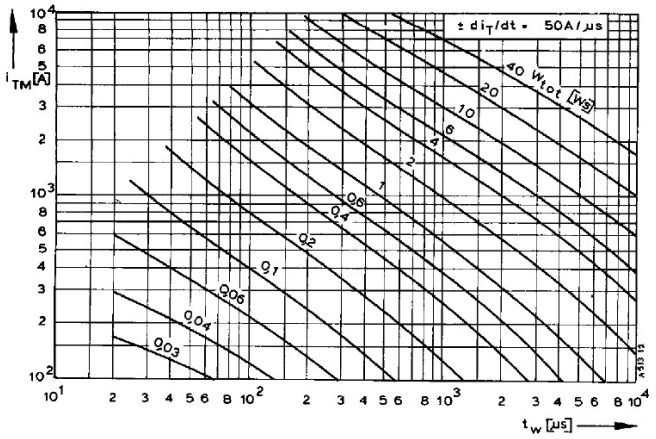

Fig. 7

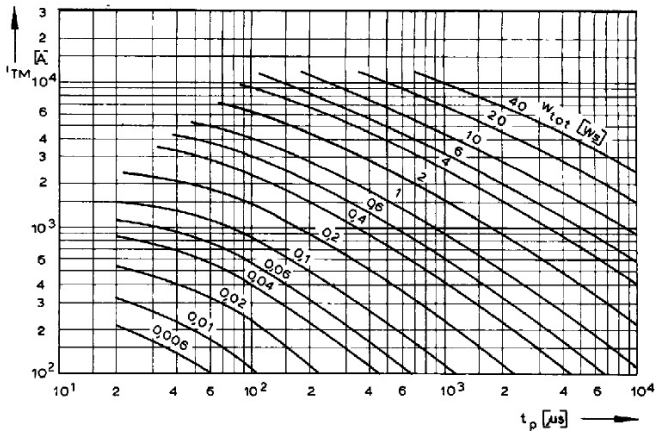

Fig. 10

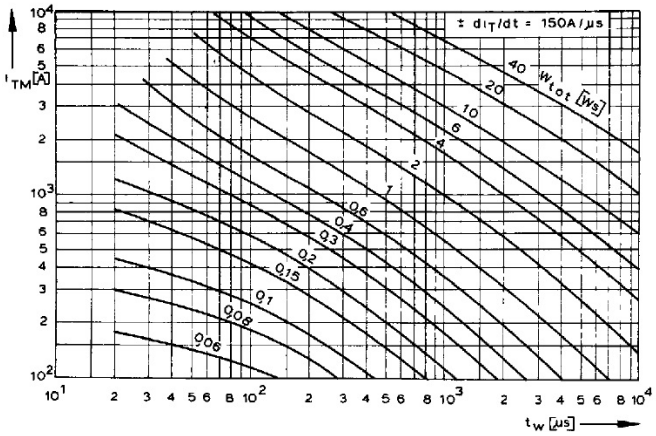

Fig. 8

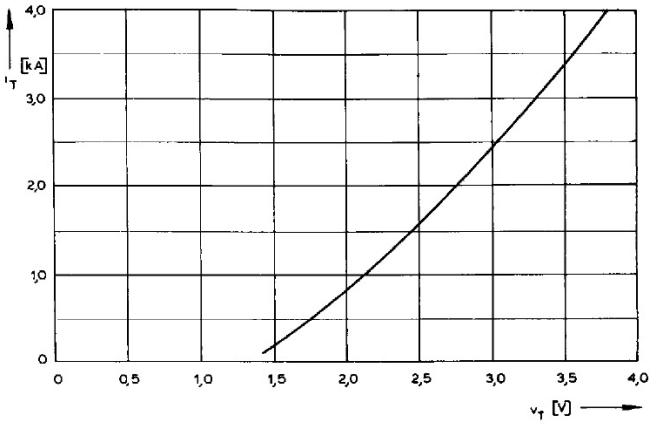

Fig. 11

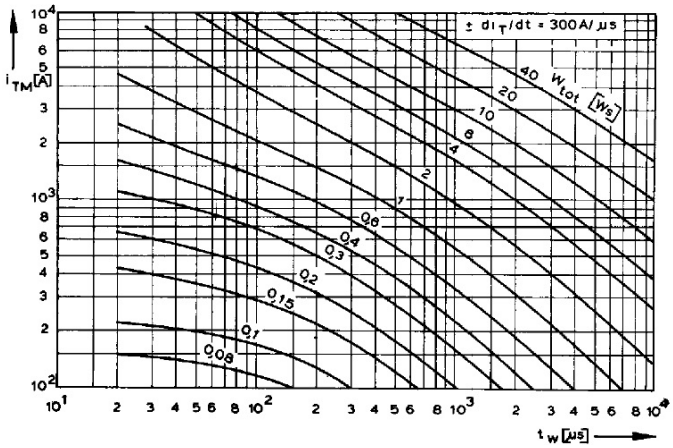

Fig. 9

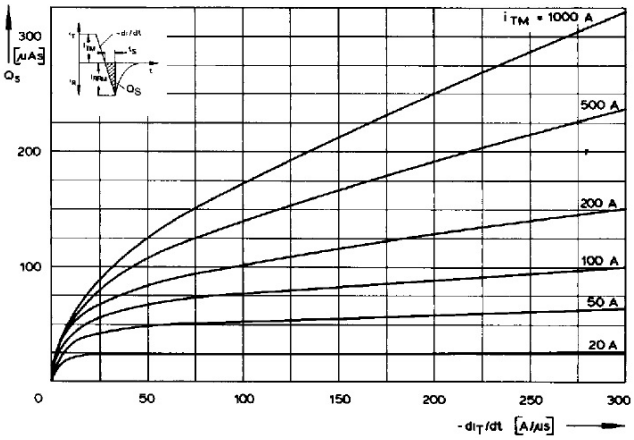

Fig. 12

Pulse generator:
i_G = 1 A, t_a = 1 µs

RC-network:
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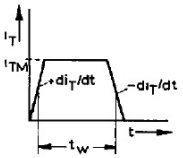
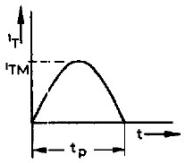
C ≤ 0.33 µF
dv_R/dt ≤ 600 V/µs

Fig. 10
Pulse generator:
i_G = 1 A, t_a = 1 µs

RC-network:
R [Ω] ≥ 0.02 v_{DM} [V]
C ≤ 0.22 µF





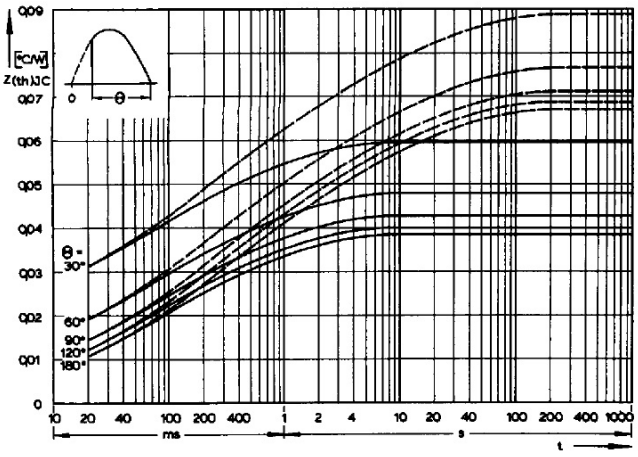


Fig. 13
Transient thermal impedance, junction to case, $Z_{(th)JC}$
- - Anode sided cooling
— Two-sided cooling

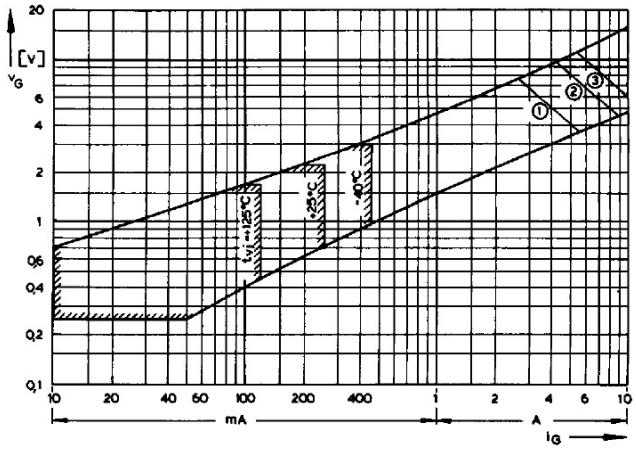


Fig. 15
Gate characteristic and peak gate power dissipation at $v_D \geq 6$ V
Parameter: Pulse duration t_g [ms]: a - 10; b - 1; c - 0.5
Maximum allowable peak gate power [W]: a - 20; b - 40; c - 60

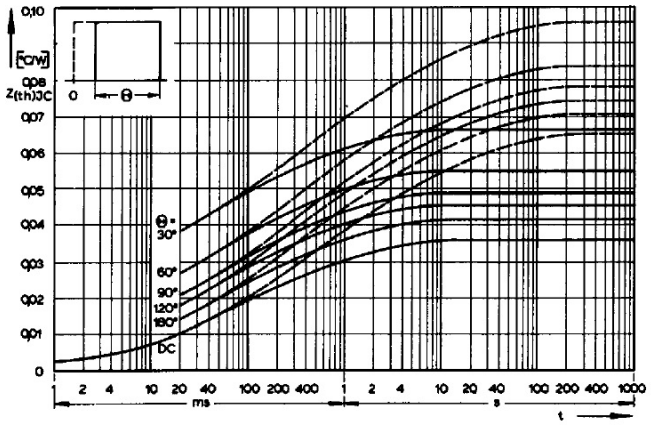


Fig. 14
Transient thermal impedance, junction to case, $Z_{(th)JC}$
- - Anode sided cooling
— Two-sided cooling

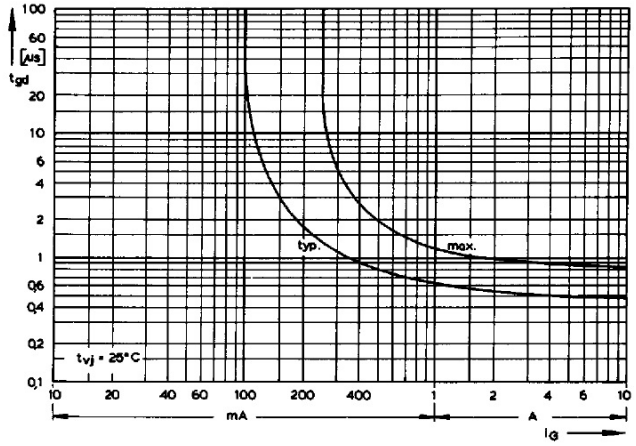


Fig. 16
Gate controlled delay time t_{gd}

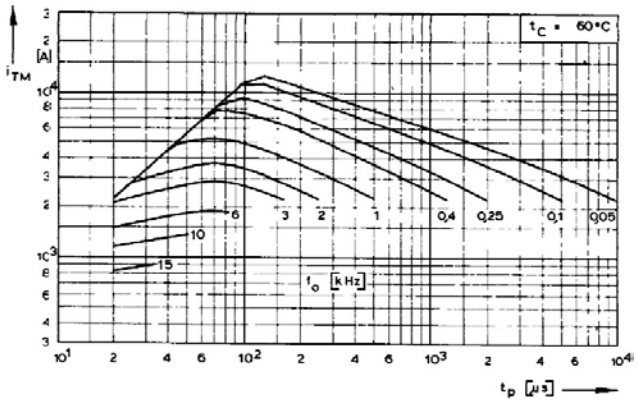


Fig. 17

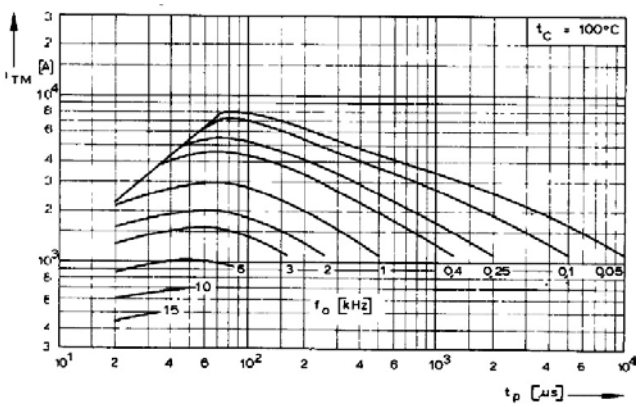


Fig. 19

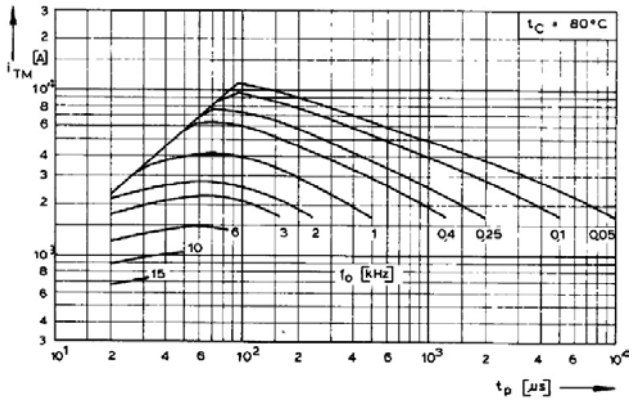


Fig. 18

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C ≤ 0.22 µF
dv_R/dt ≤ 600 V/µs