T 178 F

Elektrische Eigenschaften — Electrical properties

Höchstzulässige Werte — Maximum rated values

Periodische Vorwärts- und Rückwärts-Spitzensperrspannung	repetitive peak forward off-state and reverse voltages	$t_{vj} = -40°C \ldots t_{vj\,max}$	V_{DRM}, V_{RRM}		200, 400 600	V V
Vorwärts-Stoßspitzen-sperrspannung	non repetitive peak forward off-state voltage	$t_{vj} = -40°C \ldots t_{vj\,max}$	$V_{DSM} = V_{DRM}$			
Rückwärts-Stoßspitzen-sperrspannung	non repetitive peak reverse voltage	$t_{vj} = +25°C \ldots t_{vj\,max}$	$V_{RSM} = V_{RRM}$		+50	V
Durchlaßstrom-Grenzeffektivwert	RMS on-state current		I_{TRMSM}		300	A
	average on-state current	$t_C = 85°C$	I_{TAVM}		178	A
		$t_C = 79°C$			190	A
Stoßstrom-Grenzwert	surge current	$t_{vj} = 25°C, t_p = 10$ ms	I_{TSM}		2200	A
		$t_{vj} = t_{vj\,max}, t_p = 10$ ms			1900	A
Grenzlastintegral	I^2t-value	$t_{vj} = 25°C, t_p = 10$ ms	I^2t		24,2	kA^2s
		$t_{vj} = t_{vj\,max}, t_p = 10$ ms			18	kA^2s
Kritische Stromsteilheit	critical rate of rise of on-state current	$v_D \leq 67\%\ V_{DRM}, f = 50$ Hz $i_{GM} = 0{,}8$ A, $di_G/dt = 0{,}8$ A/µs	$(di/dt)_{cr}$		300 [1]	A/µs [2]
Kritische Spannungssteilheit	critical rate of rise of off-state voltage	$t_{vj} = t_{vj\,max}, v_D = 67\%\ V_{DRM}$	$(dv/dt)_{cr}$	B: C*: L: M*:	50 50 500 500 500 50 1000 500	V/µs V/µs V/µs V/µs

Charakteristische Werte — Characteristic values

Durchlaßspannung	on-state voltage	$t_{vj} = t_{vj\,max}, i_T = 500$ A	v_T	max.	1,85	V
Schleusenspannung	threshold voltage	$t_{vj} = t_{vj\,max}$	$V_{T(TO)}$		1,02	V
Ersatzwiderstand	slope resistance	$t_{vj} = t_{vj\,max}$	r_T		1,55	mΩ
Zündstrom	gate trigger current	$t_{vj} = 25°C, v_D = 6$ V	I_{GT}	max.	200	mA
Zündspannung	gate trigger voltage	$t_{vj} = 25°C, v_D = 6$ V	V_{GT}	max.	2	V
Nicht zündender Steuerstrom	gate non-trigger current	$t_{vj} = t_{vj\,max}, v_D = 6$ V	I_{GD}	max.	10	mA
Nicht zündende Steuerspannung	gate non-trigger voltage	$t_{vj} = t_{vj\,max}, v_D = 0{,}5\ V_{DRM}$	V_{GD}	max.	0,25	V
Haltestrom	holding current	$t_{vj} = 25°C, v_D = 6$ V, $R_A = 5\ \Omega$	I_H	max.	150	mA
Einraststrom	latching current	$t_{vj} = 25°C, v_D = 6$ V, $R_{GK} \geq 10\ \Omega$ $i_{GM} = 0{,}8$ A, $di_G/dt = 0{,}8$ A/µs, $t_g = 20$ µs	I_L	max.	750	mA
Vorwärts- u. Rückwärts-Sperrstrom	forward off-state and reverse Currents	$t_{vj} = t_{vj\,max}, v_D = V_{DRM}, v_R = V_{RRM}$	i_D, i_R	max.	20	mA
Zündverzug	gate controlled delay time	$t_{vj} = 25°C, i_{GM} = 0{,}8$ A, $di_G/dt = 0{,}8$ A/µs	t_{gd}	max.	1,4	µs
Freiwerdezeit	circuit commutated turn-off time	siehe Techn. Erl./see Techn. Inf.	t_q C*:	max.	12	µs
			D:	max.	15	µs
			E:	max.	20	µs

-hermische Eigenschaften — Thermal properties

Innerer Wärmewiderstand	thermal resistance, junction to case					
für beidseitige Kühlung	for two-sided cooling	$\Theta = 180°$ el, sin	R_{thJC}	max.	0,18	°C/W
		DC		max.	0,16	°C/W
für anodenseitige Kühlung	for anode-sided cooling	$\Theta = 180°$ el, sin	$R_{thJC(A)}$	max.	0,31	°C/W
		DC		max.	0,29	°C/W
für kathodenseitige Kühlung	for cathode-sided cooling	$\Theta = 180°$ el, sin	$R_{thJC(K)}$	max.	0,38	°C/W
		DC		max.	0,36	°C/W
Übergangswärmewiderstand	thermal resistance, case to heatsink	beidseitig/two-sided	R_{thCK}	max.	0,015	°C/W
		einseitig/one-sided		max.	0,03	°C/W
Höchstzul. Sperrschichttemperatur	max. junction temperature		$t_{vj\,max}$		140	°C
Betriebstemperatur	Operating temperature		$t_{c\,op}$		−40 ... + 140	°C
Lagertemperatur	storage temperature		t_{stg}		−40 ... + 140	°C

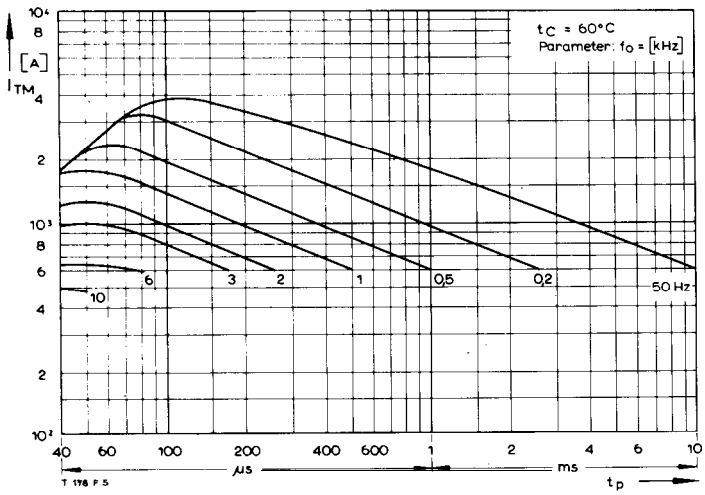
Mechanische Eigenschaften — Mechanical properties

Si-Element mit Druckkontakt	Si-pellet with pressure contact				
Anpreßkraft	Clamping force		F		1,5 ... 2,5 kN
Gewicht	weight		G	typ.	70 g
Kriechstrecke	Creepage distance				17 mm
Feuchteklasse	humidity classification	DIN 40040			C
Schwingfestigkeit	Vibration resistance	f = 50 Hz			50 m/s²
Maßbild	outline	DIN 41814-151A4			Seitelpage 154

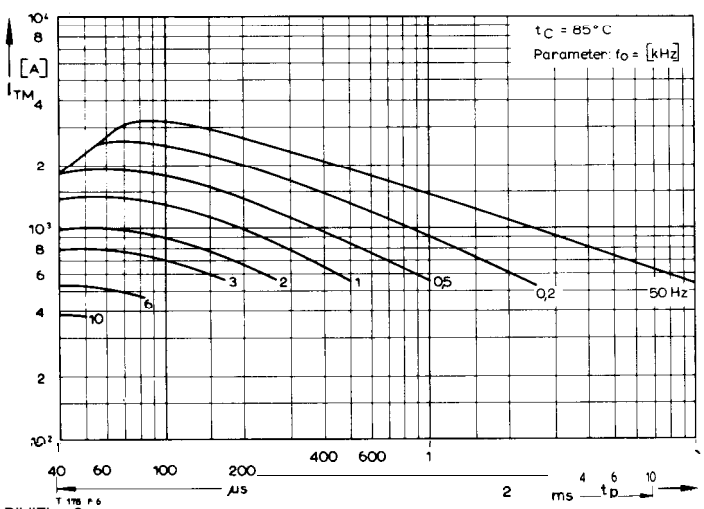
* Für größere Stückzahlen bitte Liefertermin erfragen/Delivery for larger quantities on request

1) Werte nach DIN IEC 747-6 (ohne vorausgehende Kommutierung)/Values to DIN IEC 747-6 (without prior commutation)
2) Unmittelbar nach der Freiwerdezeit, vgl. Meßbedingungen für t_q/Immediately after circuit commutated turn-off time, see Parameters t_q

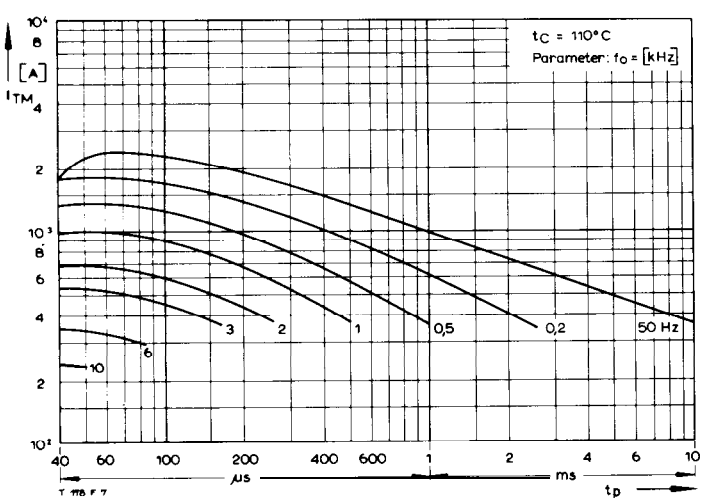
Dauergrenzstrom



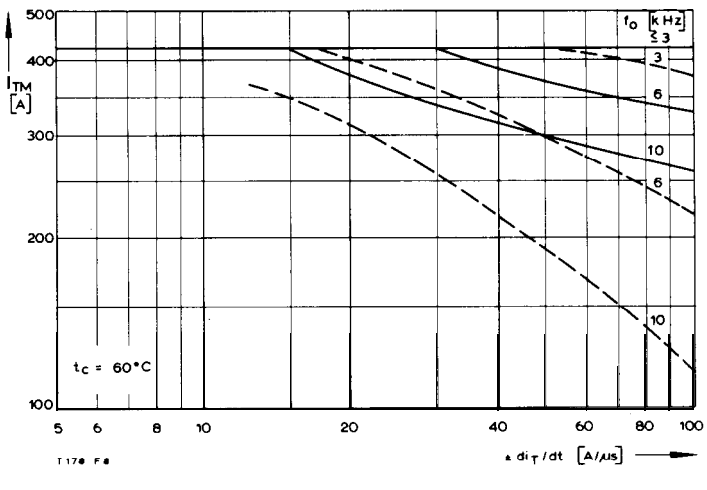
Bild/Fig. 1



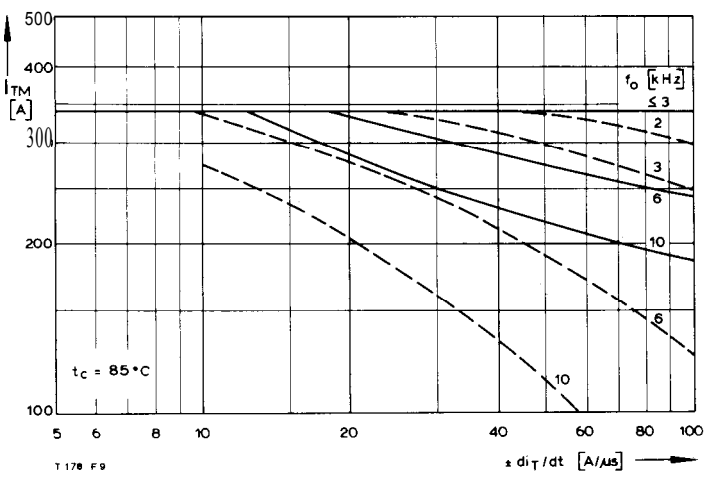
BildlFig. 2



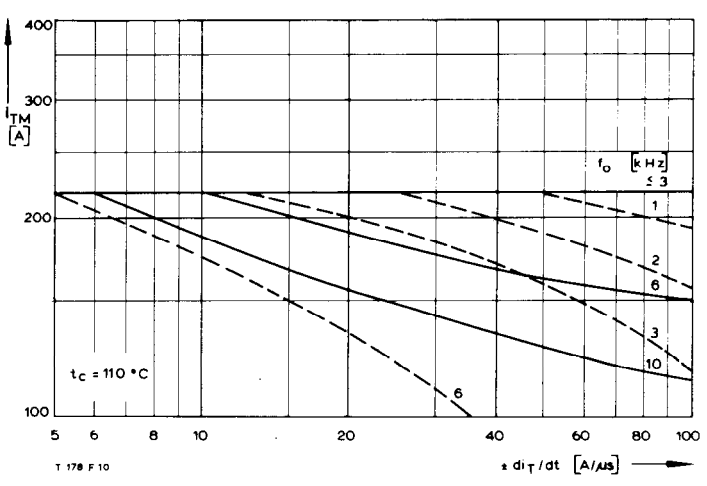
Bild/Fig. 3



Bild/Fig. 4



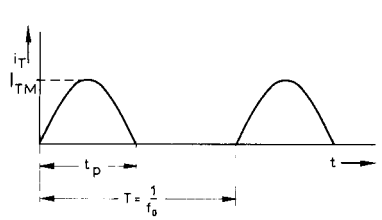
Bild/Fig. 5



BildlFig. 6

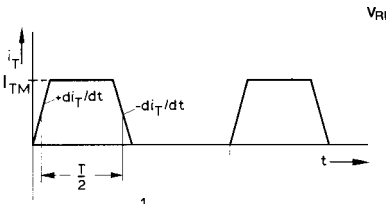
Bild/Fig. 1, 2, 3
Steuergenerator/pulse generator:
i_G = 0.8 A, di_G/dt = 0,8 A/µs

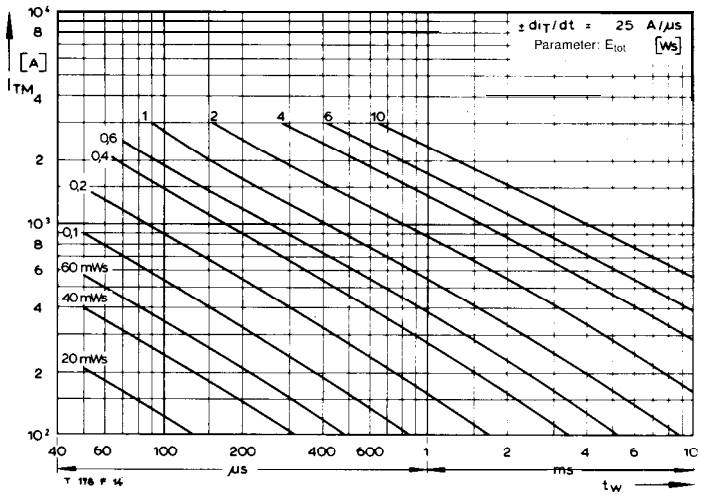
RC-Glied/RC-network:
R [Ω] ≥ 0,02 v_{DM} [V]
C ≤ 0,22 µF
v_{DM} ≤ 0,67 V_{DRM}



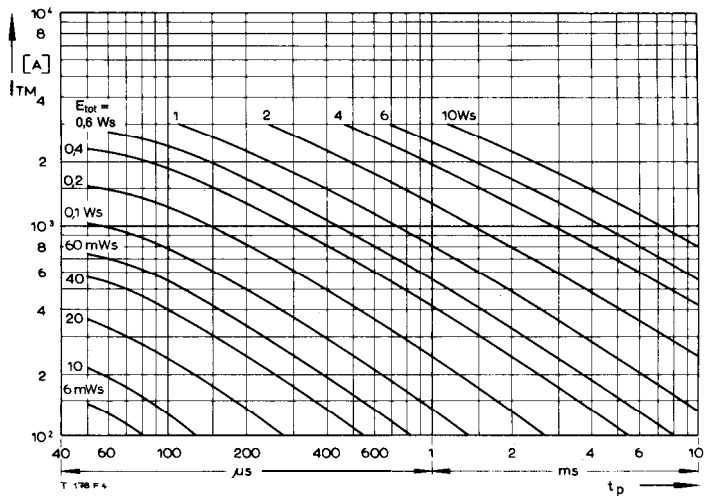
BildlFig. 4, 5, 6
Steuergenerator/pulse generator:
i_G = 0,8 A, di_G/dt = 0,8 A/µs

RC-Glied/RC-network:
R [Ω] ≥ 0,02 v_{DM} [V]
C ≤ 0,33 µF
VDM ≤ 0,67 V_{DRM}
dv_R/dt ≤ 400 V/µs
v_{RM} ≤ 0,67 V_{RRM}

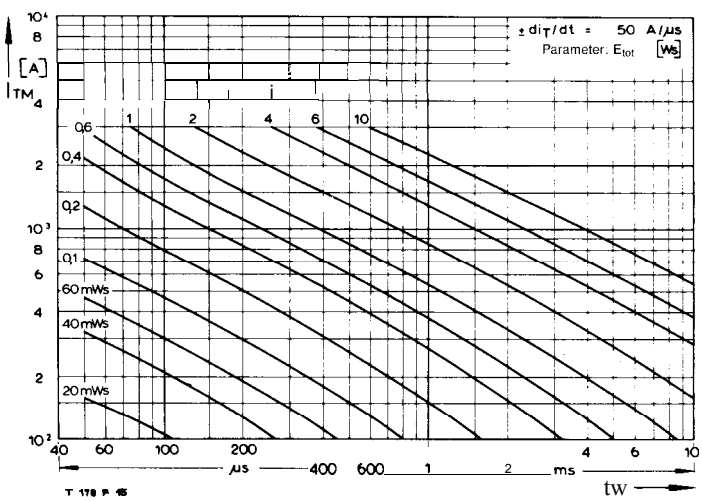




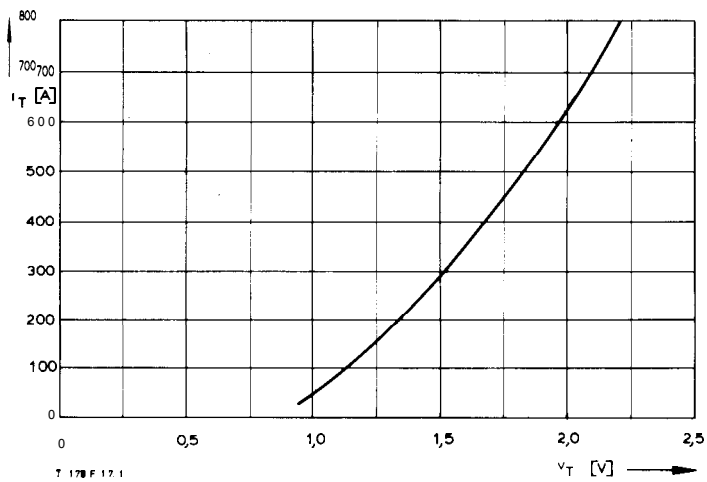
Bild/Fig. 10



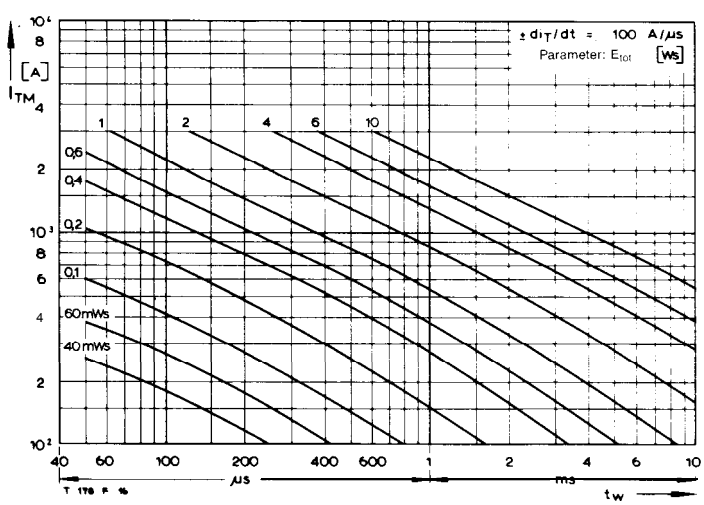
Bild/Fig. 13



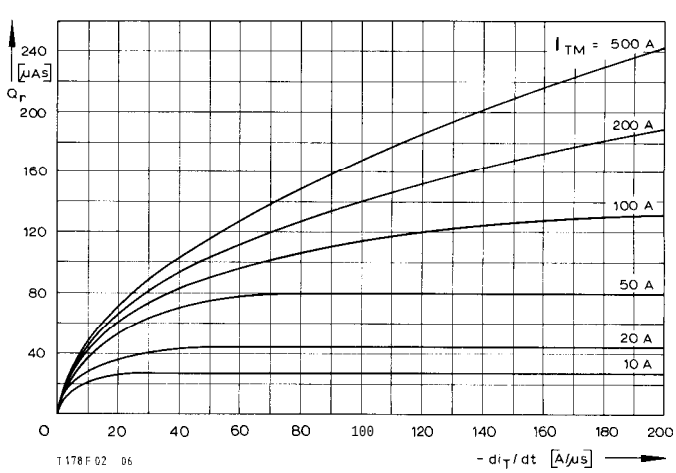
Bild/Fig. 11



Bild/Fig. 14



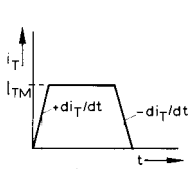
Bild/Fig. 12



Bild/Fig. 15

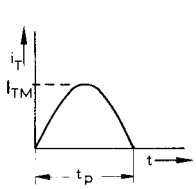
Bild/Fig. 10, 11, 12
Steuergenerator/pulse generator:
I_G = 0,8 A, di_G/dt = 0,8 A/µs

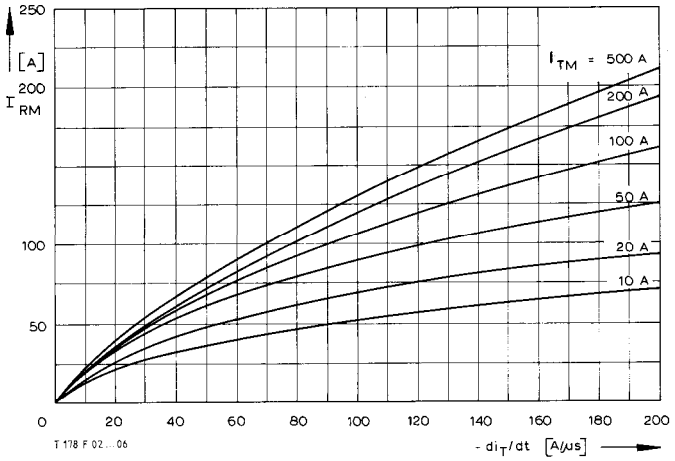
RC-Glied/RC-network:
R [Ω] ≥ 0,02 v_{DM} [V]
C ≤ 0.33 µF
$v_{DM} \leq 0{,}67\ V_{DRM}$
$dv_R/dt \leq 400$ V/µs
$v_{RM} \leq 0{,}67\ V_{RRM}$



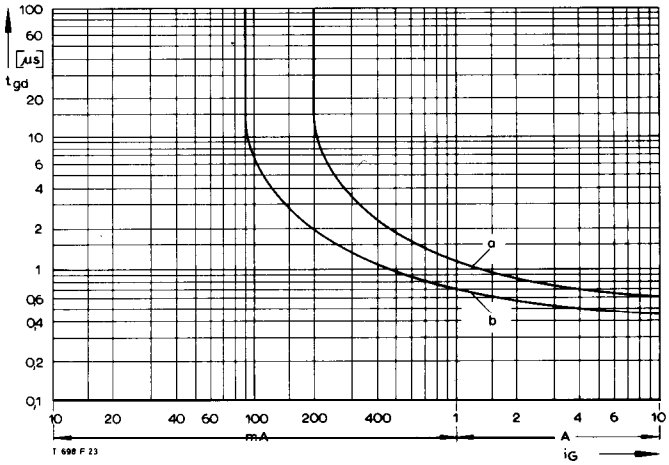
(zu Bild/to Fig. 13)
Steuergenerator/pulse generator:
I_G = 0,8 A, di_G/dt = 0,8 A/µs

RC-Glied/RC-network:
R [Ω] ≥ 0,02 v_{DM} [V]
C ≤ 0.22 µF

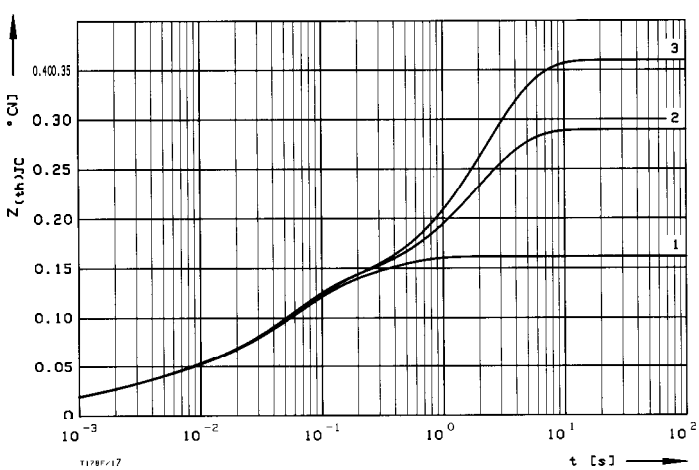




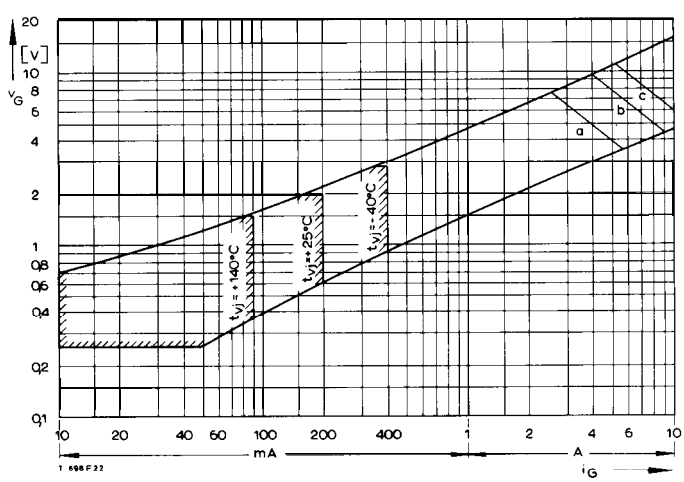
Bild/Fig. 16
Rückstromspitze $I_{RM} = f(-di/dt), t_{vj} = t_{vj\,(max)}, v_R = 0{,}5\ V_{RRM}, v_{RM} = 0{,}8\ V_{RRM}$
Peak reverse recovery current $I_{RM} = f(-di/dt), t_{vj} = t_{vj\,(max)}, v_R = 0.5\ V_{RRM}, v_{RM} = 0.8\ V_{RRM}$
Parameter: Durchlaßstrom/On-state current I_{TM}



Bild/Fig. 18
Zündverzug/Gate controlled delay time $t_{gd} = f(i_{GM}), t_{vj} = 25°C, di_G/dt = i_{GM}/1\,\mu s$
a – Maximaler Verlauf/Limiting Characteristic
b – Typischer Verlauf/Typical Characteristic



BIld/Flg. 17
transienter innerer Wärmewiderstand $Z_{(th)JC} = f(t)$, DC
Transient thermal impedance $Z_{(th)JC} = f(t)$, DC
1 Beidseitige Kühlung/two-sided cooling
2 Anodenseitige Kühlung/anode side cooling
3 Kathodenseitige Kühlunglcathode side cooling



BildiFig 19
Steuercharakteristik mit ZündberelchenlGate Characteristic with trlggering areas
$v_G = f(i_G), V_D = 6$ V

Parameter:		a	b	c
Steuerimpulsdauer/Trigger pulse duration t_g	[ms]	10	1	0.5
Höchstzulässige Spitzensteuerverlustleistung/ Max. rated peak gate power dissipation P_{GM}	[W]	20	40	60

Analytische Elemente des transienten Wärmewiderstandes Z_{thJC} für DC
Analytical elements of transient thermal impedance Z_{thJC} for DC

Kühlung cooling	Pos. n	1	2	3	4	5	6	7
beidseitig	R_{thn} [°C/W]	0,01143	0,01849	0,0122	0,07982	0,03967		
two-sided	τ_n [s]	0,00051	0,00237	0,00979	0,05366	0,28857		
anodenseitig	R_{thn} [°C/W]	0,01143	0,00532	0,02149	0,0924	0,15935		
anode-sided	τ_n [s]	0,00051	0,0011	0,00414	0,05174	1,95143		
kathodenseitig	R_{thn} [°C/W]	0,01143	0,00532	0,02149	0,08815	0,23361		
cathode-sided	τ_n [s]	0,00051	0,0011	0,00414	0,05015	2,30535		

Analytische Funktion/analytical function:

$$Z_{thJC} = \sum_{n=1}^{n_{max}} R_{thn}\,(1 - EXP\ (-t/\tau_n))$$