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}		800, 1000 1100, 1200	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	$t_{vj} = +25°C \ldots t_{vj\,max}$	$V_{RSM} = V_{RRM}$		+ 100	v
Durchlaßstrom-Grenzeffektivwert	RMS on-state current		I_{TRMSM}		2200	A
Dauergrenzstrom	average on-state current	t_C = 85°C	I_{TAVM}		1050	A
		t_C = 66°C			1400	A
Stoßstrom-Grenzwert	surge current	$t_{vj} = 25°C, t_p$ = 10 ms	I_{TSM}		22,5	kA
		$t_{vj} = t_{vj\,max}, t_p$ = 10 ms			20	kA
Grenzlastintegral	Pt-value	$t_{vj} = 25°C, t_p$ = 10 ms	I^2t		2530	kA^2s
		$t_{vj} = t_{vj\,max}, t_p$ = 10 ms			2000	kA^2s
Kritische Stromsteilheit	critical rate of rise of on-state current	$v_D \leq 67\%\ V_{DRM}$, f = 50 Hz	$(di/dt)_{cr}$		400	A/µs
		i_{GM} = 1,2 A, di_G/dt = 1,2 A/µs			[1] [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:	50 50	V/µs
				c*:	500 500	V/µs
				L:	500 50	V/µs
				M*:	1000 500	V/µs

Charakteristische Werte — Characteristic values

Durchlaßspannung	on-state voltage	$t_{vj} = t_{vj\,max}, i_T$ = 4000 A	v_T	max.	2,7	V
Schleusenspannung	threshold voltage	$t_{vj} = t_{vj\,max}$	$V_{T(TO)}$		1,45	v
Ersatzwiderstand	slope resistance	$t_{vj} = t_{vj\,max}$	r_T		0,3	mΩ
Zündstrom	gate trigger current	t_{vj} = 25°C, v_D = 12 V	I_{GT}	max.	300	mA
Zündspannung	gate trigger voltage	t_{vj} = 25°C, v_D = 12 V	V_{GT}	max.	2,2	v
Nicht zündender Steuerstrom	gate non-trigger current	$t_{vj} = t_{vj\,max}, v_D$ = 12 v	I_{GD}	max.	20	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 = 12 V, R_A = 10 Ω	I_H	max.	250	mA
Einraststrom	latching current	t_{vj} = 25°C, v_D = 12 V, $R_{GK} \geq$ 10 Ω	I_L	max.	1	A
		i_{GM} = 1,2 A, di_G/dt = 1,2 A/µs, t_g = 20 µs				
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.	200	mA
Zündverzug	gate controlled delay time	t_{vj} = 25°C, i_{GM} = 1,2 A, di_G/dt = 1,2 A/µs	t_{gd}	max.	1,4	µs
Freiwerdezeit	circuit commutated turn-off time	siehe Techn. Erl./see Techn. Inf.	t_q C*[3]:	max.	12	µs
			D:	max.	15	µs
			E:	max.	20	µs
			F:	max.	25	µs

Thermische Eigenschaften — Thermal properties

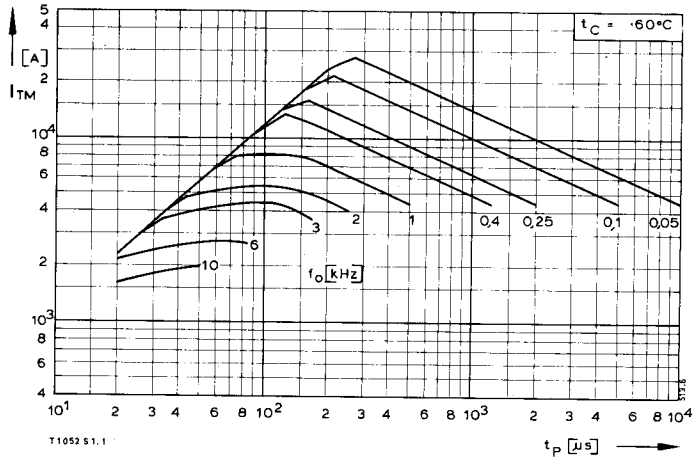
Innerer Wärmewiderstand	thermal resistance, junction to case				
für beidseitige Kühlung	for two-sided cooling	Θ = 180° el, sin	R_{thJC}	max.	0,018 °C/W
		DC		max.	0,017 °C/W
für anodenseitige Kühlung	for anode-sided cooling	Θ = 180° el, sin	$R_{thJC(A)}$	max.	0,031 °C/W
		DC		max.	0,030 °C/W
für kathodenseitige Kühlung	for cathode-sided cooling	Θ = 180° el, sin	$R_{thJC(K)}$	max.	0,041 °C/W
		DC		max.	0,040 °C/W
Übergangswärmewiderstand	thermal resistance, case to heatsink	beidseitig/two-sided	R_{thCK}	max.	0,004 °C/W
		einseitig/one-sided		max.	0,008 °C/W
Höchstzul. Sperrschichttemperatur	max. junction temperature		$t_{vj\,max}$		125°C
Betriebstemperatur	Operating temperature		$t_{c\,op}$		−40 ... + 125°C
Lagertemperatur	storage temperature		t_{stg}		−40 ... + 150°C

Mechanische Eigenschaften — Mechanical properties

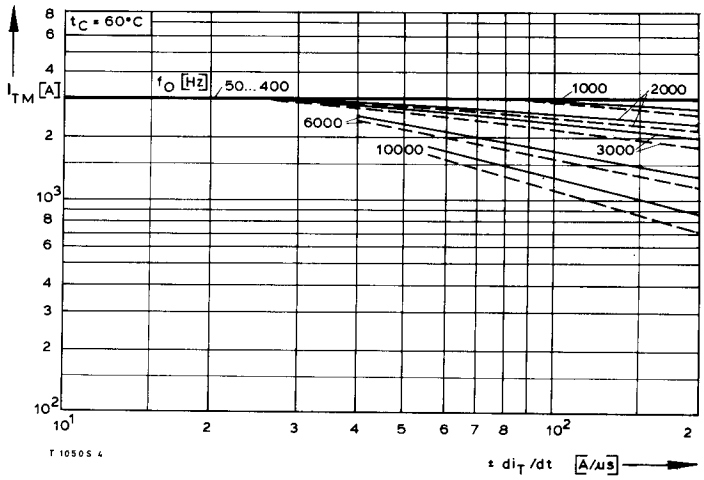
Si-Element mit Druckkontakt	Si-pellet with pressure contact				
Anpreßkraft	Clamping force		F		16 ... 32 kN
Gewicht	weight		G	typ.	600 g
Kriechstrecke	Creepage distance				30 mm
Feuchteklasse	humidity classification	DIN 40040			C
Schwingfestigkeit	Vibration resistance	f = 50 Hz			50 m/s²
Maßbild	outline	DIN 41814-15584 •			Seite/page 155

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

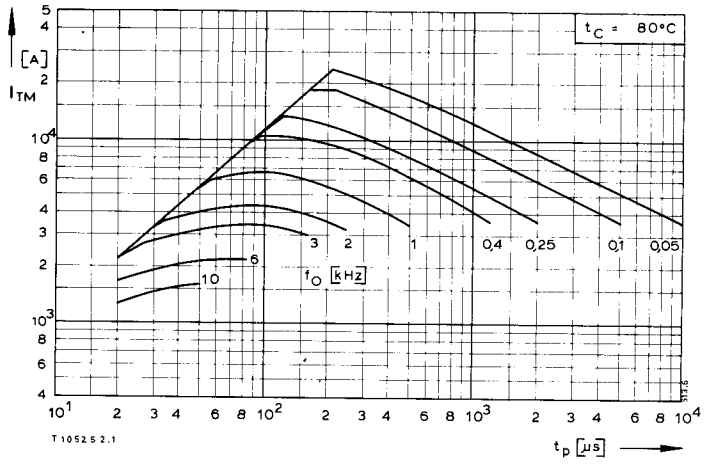
1) Werte nach DIN IEC 747-6 (ohne vorausgehende Kommutierung)/Values to DIN IEC 747-6 (without prior commutation)
2) Unmittelbar nach der Freiwerdezeit, vgl. Meßbedingungen für t_q/Immediately after circuit commutated turn-off time, see Parameters t_q
3) nur in Verbindung mit $(dv/dt)_{cr}$ = B oder L/only in connection with $(dv/dt)_{cr}$ = B or L



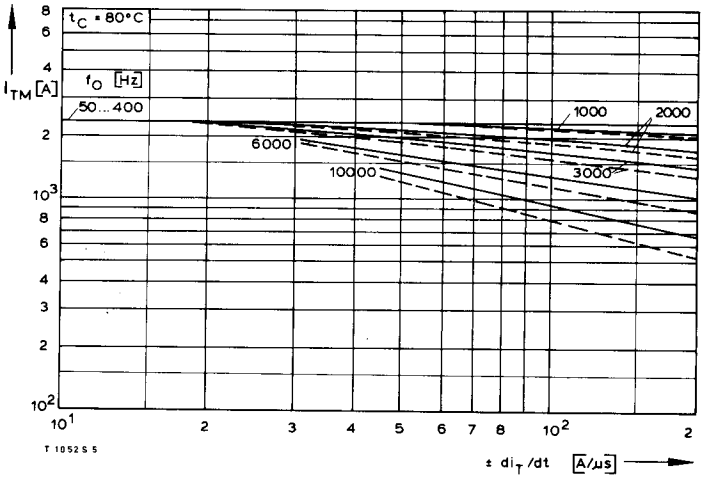
Bild/Fig. 1



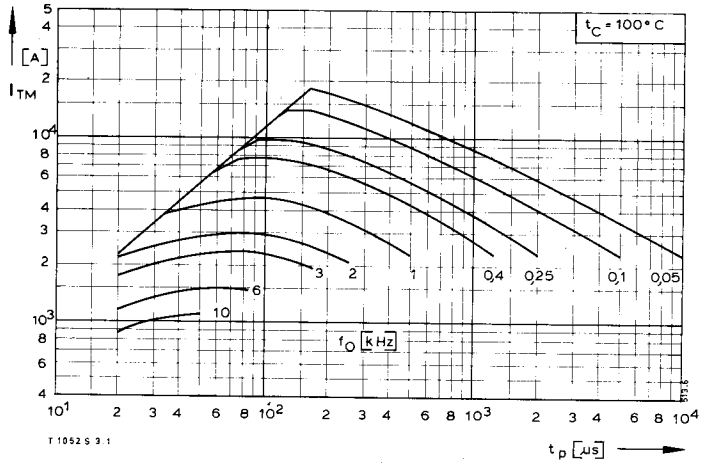
Bild/Fig. 4



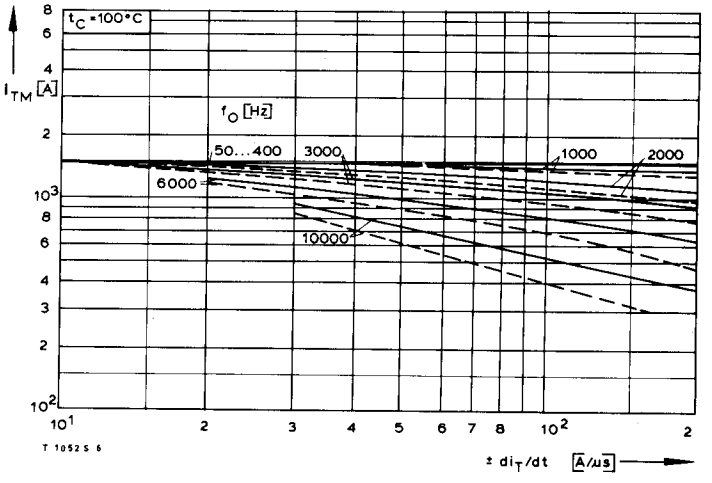
Bild/Fig. 2



Bild/Fig. 5



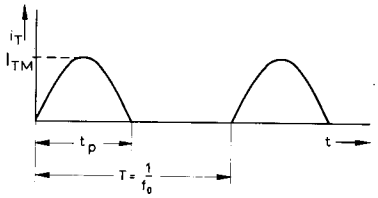
Bild/Fig. 3



Bild/Fig. 6

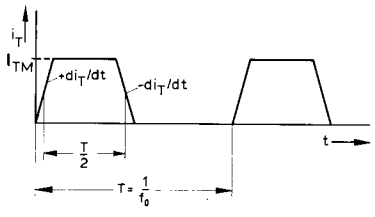
Bild/Fig. 1, 2, 3
Steuergenerator/pulse generator:
i_G = 1,2 A, di_G/dt = 1,2 A/µs

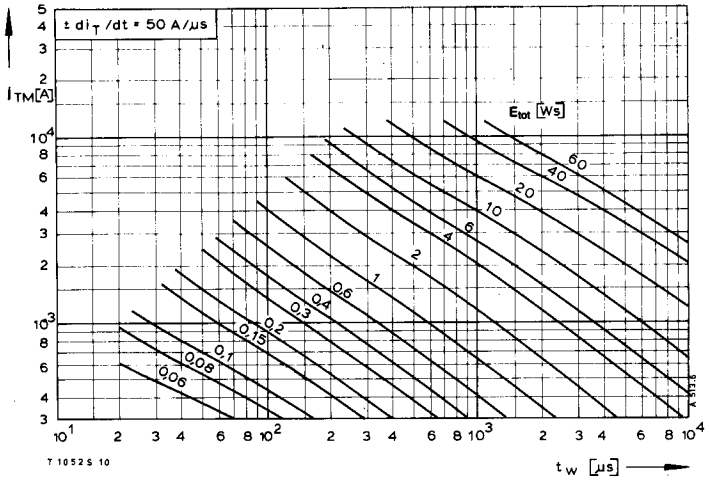
RC-Glied/RC-network:
R [Ω] ≥ 0,02 v_{DM} [V]
C ≤ 0,33 µF
v_{DM} ≤ 0,67 V_{DRM}



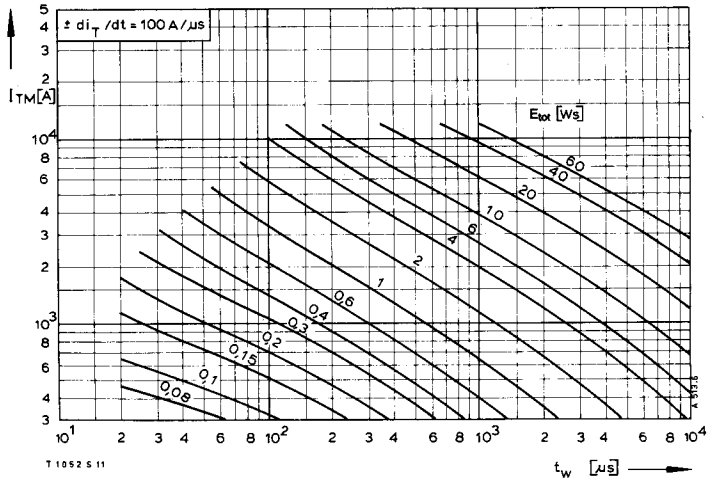
Bild/Fig. 4, 5, 6
Steuergenerator/pulse generator:
i_G = 1,2 A, di_G/dt = 1,2 A/µs

RC-Glied/RC-network:
R [Ω] ≥ 0,02 v_{DM} [V]
C ≤ 0,47 µF
v_{DM} ≤ 0,67 V_{DRM}
dv_R/dt ≤ 600 V/µs
v_{RM} ≤ 0,67 V_{RRM}

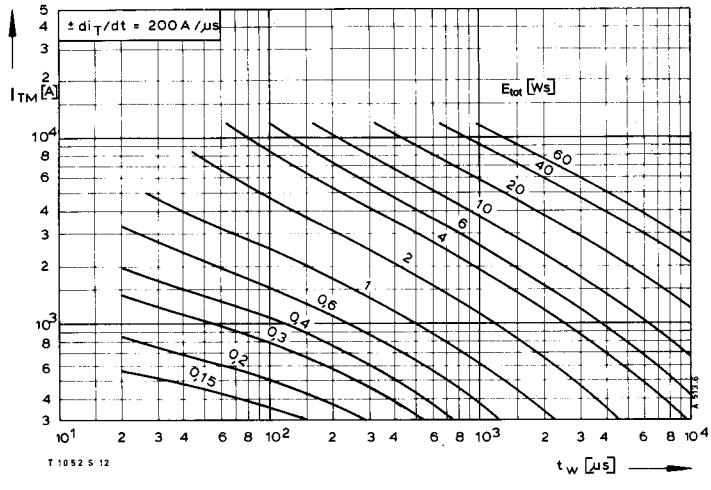




Bild/Fig. 10



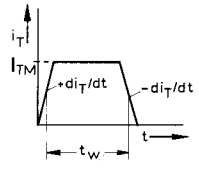
Bild/Fig. 11

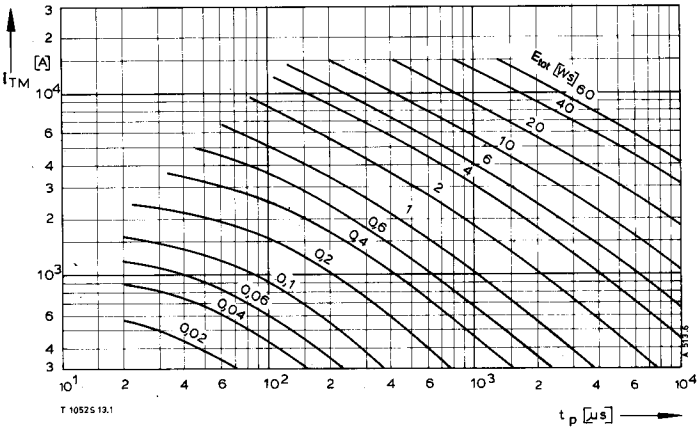


Bild/Fig. 12

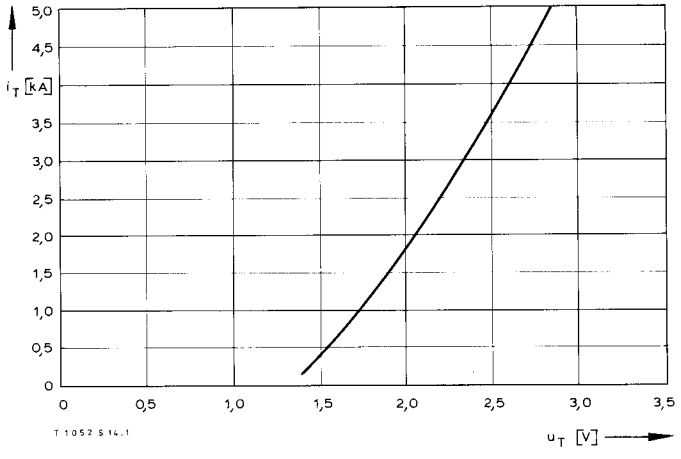
Bild/Fig. 10, 11, 12
Steuergenerator/pulse generator:
i_G = 1,2 A, di_G/dt = 1,2 A/µs

RC-Glied/RC-network:
R [Ω] ≥ 0,02 v_{DM} [V]
C ≤ 0,47 µF
v_{DM} ≤ 0,67 V_{DRM}
dv_R/dt ≤ 600 V/µs
v_{RM} ≤ 0,67 V_{RRM}

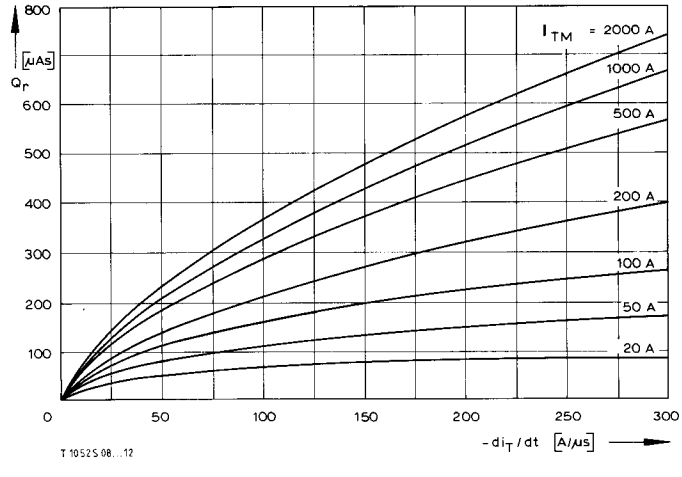




Bild/Fig. 13



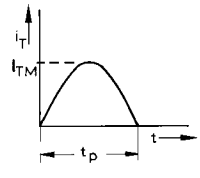
Bild/Fig. 14

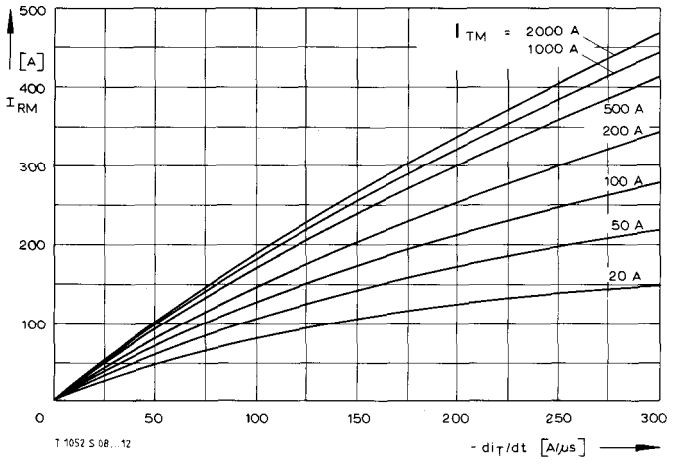


Bild/Fig. 15

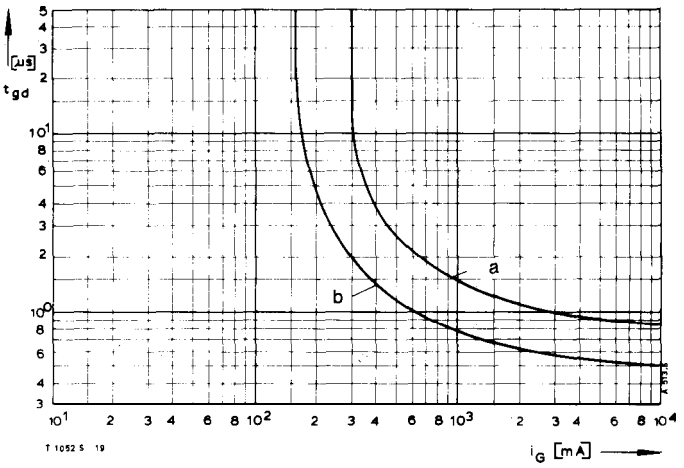
(zu Bild/to Fig. 13)
Steuergenerator/pulse generator:
i_G = 1,2 A, di_G/dt = 1,2 A/µs

RC-Glied/RC-network:
R [Ω] ≥ 0,02 v_{DM} [V]
C ≤ 0,33 µF

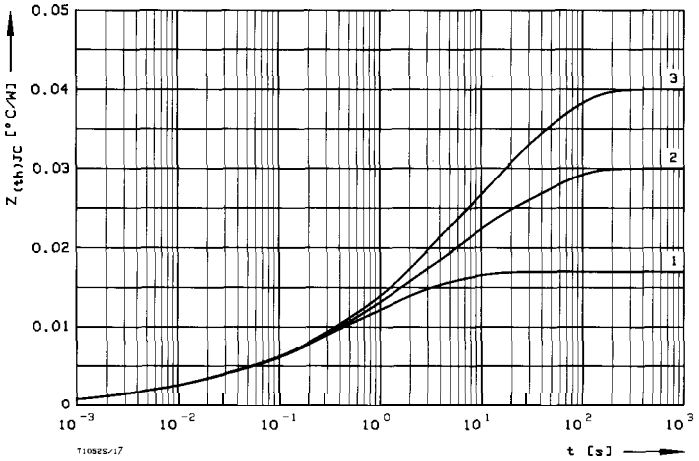




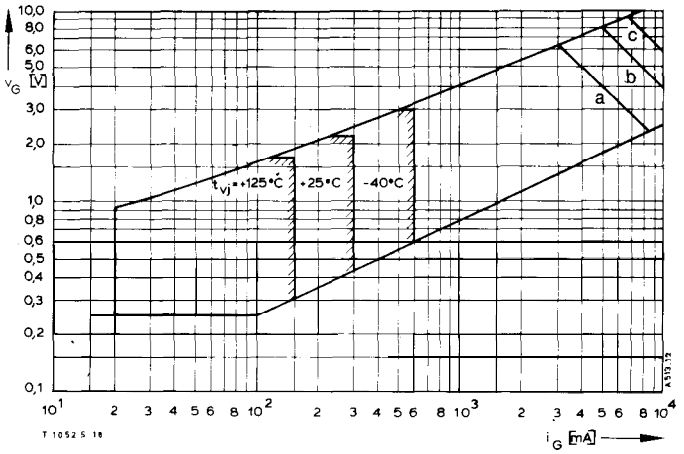
BildIFig. 16
Rückstromspitze $I_{RM} = f(-di/dt), t_{vj} = t_{vj\,(max)}, v_R = 0{,}5\ V_{RRM}, v_{RM} = 0{,}8\ V_{RRM}$
Peak reverse recovery current $I_{RM} = f(-di/dt), t_{vj} = t_{vj\,(max)}, v_R = 0.5\ V_{RRM}, v_{RM} = 0.8\ V_{RRM}$
Parameter: Durchlaßstrom/On-state current I_{TM}



BildIFig. 18
ZündverzuglGate 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/Fig. 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 Kühlunganode side cooling
3 Kathodenseitige Kühlunglcathode side cooling



Bild/Fig. 19
Steuercharakteristik mit ZündbereichenlGate Characteristic with triggering areas
$v_G = f(i_G), V_D = 12$ V

Parameter:		a	b	c
Steuerimpulsdauer/Trigger pulse duration t_g	[ms]	10	1	0,5
Höchstzulässige Spitzensteuerverlustleistung/ Max. rated peak aate power dissioation P_{GM}	[W]	20	40	60

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

Kühlung cooling	Pos. n	1	2	3	4	5	6	7
beidseitig	R_{thn} [°C/W]	0,00114	0,00224	0,00487	0,00549	0,00326		
two-sided	τ_n [s]	0,0014	0,015	0,17	1,05	5,1		
anodenseitig	R_{thn} [°C/W]	0,00106	0,00239	0,004	0,00625	0,0086	0,0077	
anode-sided	τ_n [s]	0,0013	0,015	0,16	0,9	5,8	44	
kathodenseitig	R_{thn} [°C/W]	0,00106	0,00245	0,00499	0,0096	0,0107	0,0112	
cathode-sided	τ_n [s]	0.0013	0.015	0.19	1.7	10.2	53.5	

Analytische Funktion/analytical function:

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