

Elektrische Eigenschaften

Electrical properties

Höchstzulässige Werte

Maximum rated values

Periodische Vorwärts- und Rückwärts-Sperrspannung	repetitive peak forward off-state and reverse voltages	$t_{vj} = -40^{\circ}\text{C} \dots t_{vj\text{max}}$	$V_{\text{DRM}}, V_{\text{RRM}}$ 1600, 1800 V 2000* v
Vorwärts-Stoßsperrspannung	non repetitive peak forward off-state voltage	$t_{vj} = -40^{\circ}\text{C} \dots t_{vj\text{max}}$	$V_{\text{DSM}} = V_{\text{DRM}}$
Rückwärts-Stoßsperrspannung	non repetitive peak reverse voltage	$t_{vj} = +25^{\circ}\text{C} \dots t_{vj\text{max}}$	$V_{\text{RSM}} = V_{\text{RRM}}$ + 100 v
Durchlaßstrom-Grenzeffektivwert	RMS on-state current	$t_c = 85^{\circ}\text{C}$	I_{TRMSM} 2000 A
Dauergrenzstrom	average on-state current	$t_c = 62^{\circ}\text{C}$	I_{TAVM} 930 A 1274 A
Stoßstrom-Grenzwert	surge current	$t_{vj} = 25^{\circ}\text{C}, t_p = 10\text{ ms}$ $t_{vj} = t_{vj\text{max}}, t_p = 10\text{ ms}$	I_{TSM} 20,5 kA 18 kA
Grenzlastintegral	I ² t-value	$t_{vj} = 25^{\circ}\text{C}, t_p = 10\text{ ms}$ $t_{vj} = t_{vj\text{max}}, t_p = 10\text{ ms}$	I ² t 2100 kA ² s 1 6 2 0 kA ² s
Kritische Stromsteilheit	critical rate of rise of on-state current	$v_D \leq 67\% V_{\text{DRM}}, f = 50\text{ Hz}$ $i_{\text{GM}} = 1,2\text{ A}, di_G/dt = 1,2\text{ Alps}$	(di/dt) _{cr} 250 A/μs
Kritische Spannungssteilheit	critical rate of rise of off-state voltage	$t_{vj} = t_{vj\text{max}}, v_D = 67\% V_{\text{DRM}}$	(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	$t_{vj} = t_{vj\text{max}}, I_T = 3500\text{ A}$	v_T max. 2,7 V
Schleusenspannung	threshold voltage	$t_{vj} = t_{vj\text{max}}$	$V_{T(TO)}$ 1,35 v
Ersatzwiderstand	slope resistance	$t_{vj} = t_{vj\text{max}}$	r_T 0,33 mΩ
Zündstrom	gate trigger current	$t_{vj} = 25^{\circ}\text{C}, v_D = 12\text{ V}$	I_{GT} max. 250 mA
Zündspannung	gate trigger voltage	$t_{vj} = 25^{\circ}\text{C}, v_D = 12\text{ V}$	V_{GT} max. 2,2 v
Nicht zündender Steuerstrom	gate non-trigger current	$t_{vj} = t_{vj\text{max}}, v_D = 12\text{ V}$	I_{GD} max. 10 mA
Nicht zündende Steuerspannung	gate non-trigger voltage	$t_{vj} = t_{vj\text{max}}, v_D = 0,5 V_{\text{DRM}}$	V_{GD} max. 0,25 v
Haltestrom	holding current	$t_{vj} = 25^{\circ}\text{C}, v_D = 12\text{ V}, R_A = 10\ \Omega$	I_H max. 300 mA
Einraststrom	latching current	$t_{vj} = 25^{\circ}\text{C}, v_D = 12\text{ V}, R_{\text{GK}} \geq 10\ \Omega$ $i_{\text{GM}} = 1,2\text{ A}, di_G/dt = 1,2\text{ A}/\mu\text{s}, t_g = 20\text{ ps}$	I_L max. 1,5 A
Vorwärts- u. Rückwärts-Sperrstrom	forward off-state and reverse Currents	$t_{vj} = t_{vj\text{max}}, v_D = V_{\text{DRM}}, v_R = V_{\text{RRM}}$	i_D, i_R max. 200 mA
Zündverzögerung	gate controlled delay time	$t_{vj} = 25^{\circ}\text{C}, i_{\text{GM}} = 1,2\text{ A}, di_G/dt = 1,2\text{ A}/\mu\text{s}$	t_{gd} max. 1,4 μs
Freiwerdezeit	circuit commutated turn-off time	siehe Techn. Erl./see Techn. Inf.	t_q K: max. 40 μs M: max. 50 μs N: max. 60 μs

Thermische Eigenschaften

thermal properties

Innerer Wärmewiderstand für beidseitige Kühlung	thermal resistance, junction to case for two-sided cooling	$\Theta = 180^{\circ}\text{ el, sin}$ DC	R_{thJC} max. 0,021 °C/W max. 0,02 °C/W
für anodenseitige Kühlung	for anode-sided cooling	$\Theta = 160^{\circ}\text{ el, sin}$ DC	$R_{\text{thJC(A)}}$ max. 0,036 °C/W max. 0,035 °C/W
für kathodenseitige Kühlung	for cathode-sided cooling	$\Theta = 180^{\circ}\text{ el, sin}$ DC	$R_{\text{thJC(K)}}$ max. 0,048 °C/W max. 0,047 °C/W
Übergangswärmewiderstand	thermal resistance, case to heatsink	beidseitig/two-sided einseitig/one-sided	R_{thCK} max. 0,004 °C/W max. 0,008 °C/W
Höchstzul. Sperrschichttemperatur	max. junction temperature		$t_{vj\text{max}}$ 125 °C
Betriebstemperatur	Operating temperature		t_{op} -40 ... + 125 °C
Lagertemperatur	storage temperature		t_{stg} -40 ... + 150 °C

Mechanische Eigenschaften

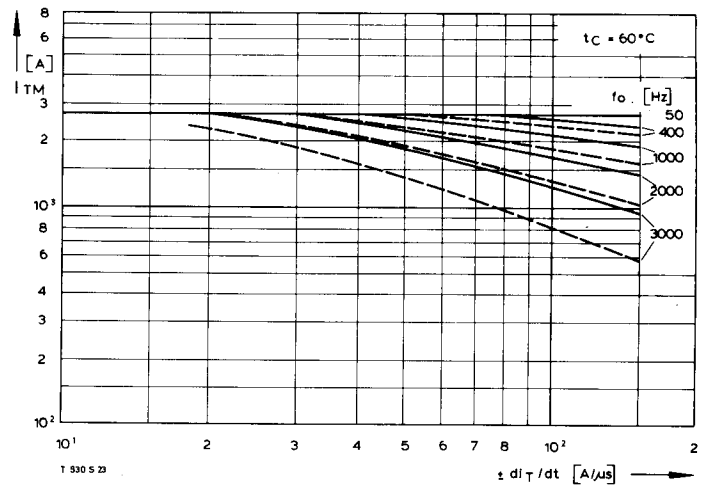
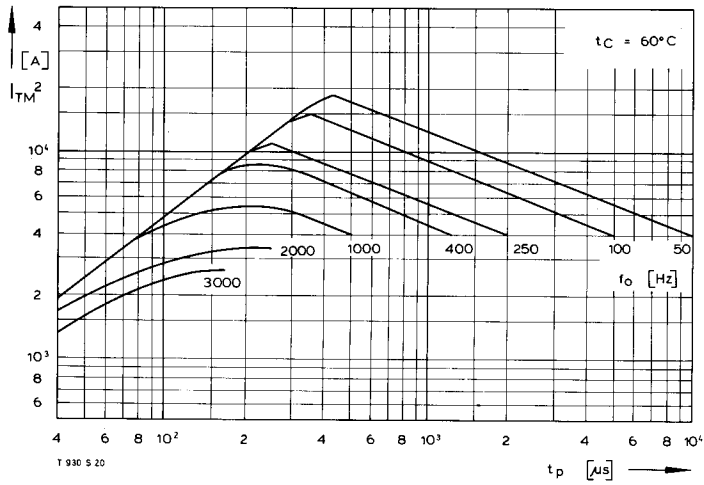
Mechanical properties

Si-Element mit Druckkontakt	Si-pellet with pressure contact		F 16 ... 32 kN
Anpreßkraft	Clamping force		G typ. 600 g
Gewicht	weight		30 mm
Kriechstrecke	Creepage distance		C
Feuchteklasse	humidity classification	DIN 40040	50 m/s ²
Schwingfestigkeit	Vibration resistance	f = 50 Hz	Seite/page 155
Maßbild	outline	DIN 41814-155B4	

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

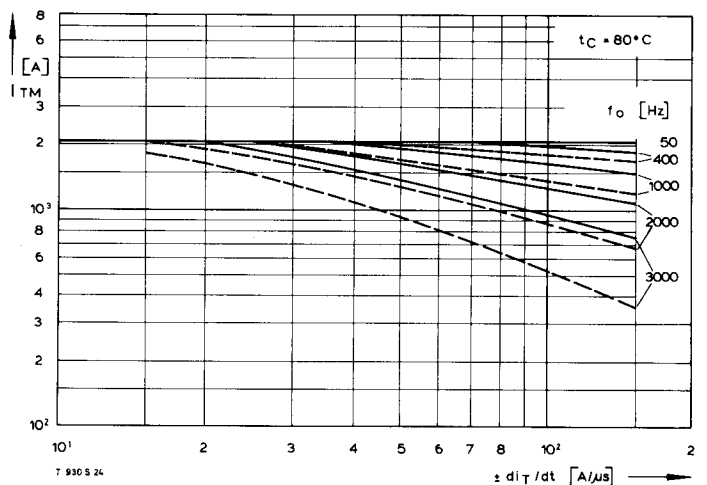
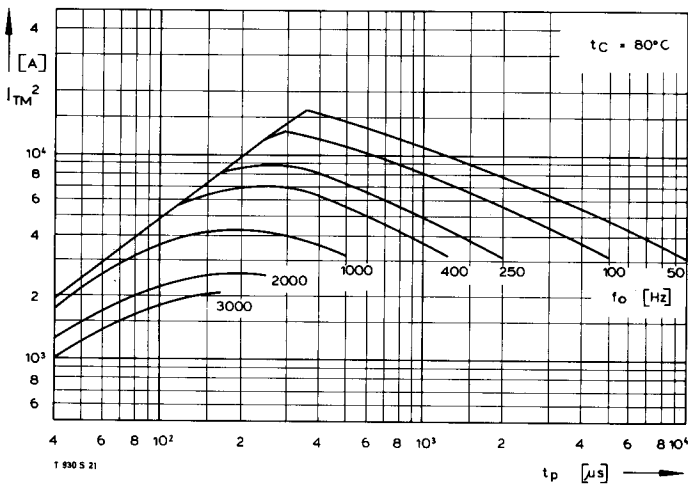
1) Werte nach DIN IEC 747-6 (ohne vorausgehende Kommutierung)/Values to DIN IEC 747-6 (without prior commutation)

2) Unmittelbar nach der Freiwerdezeit, vgl. Meßbedingungen für t_q /Immediately after circuit commutated turn-off time, see Parameters t_q



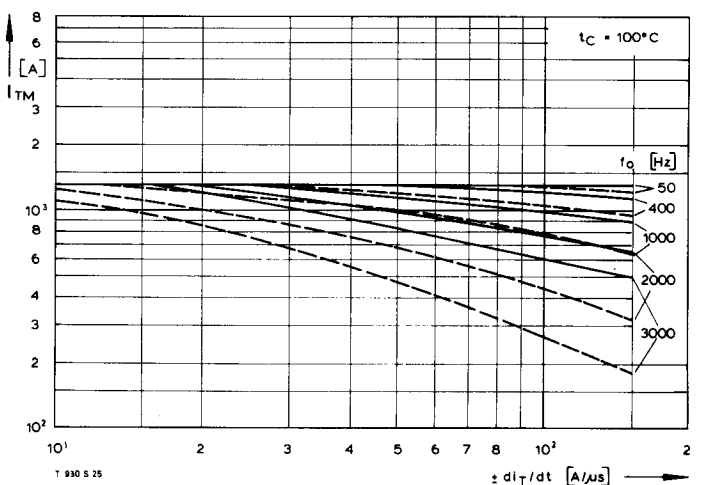
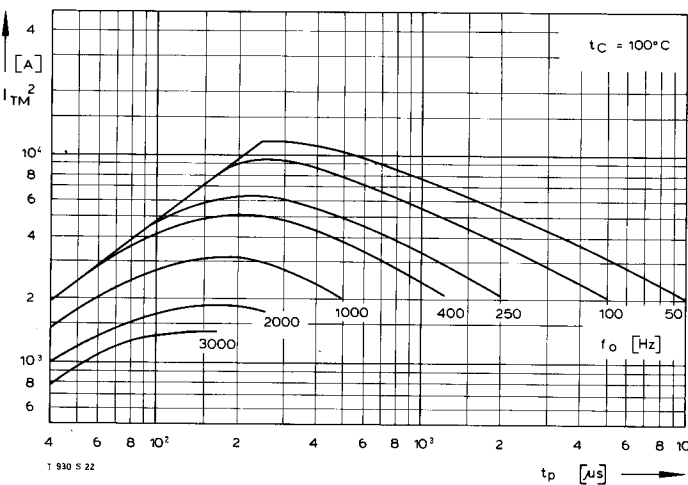
Bild/Fig. 1

Bild/Fig. 4



Bild/Fig. 2

Bild/Fig. 5



Bild/Fig. 3

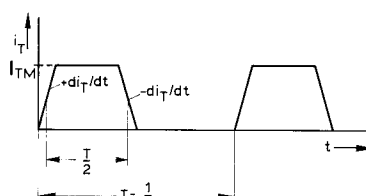
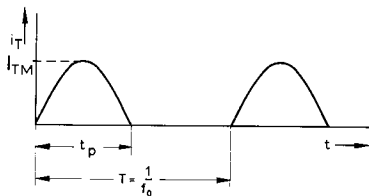
Bild/Fig. 6

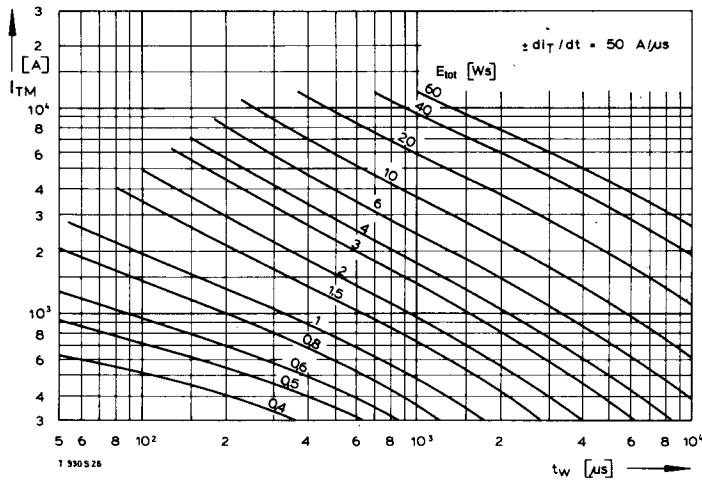
Bild/Fig. 1, 2, 3
 Steuergenerator/pulse generator:
 $i_G = 1,2 \text{ A}$, $di_G/dt = 1,2 \text{ A}/\mu\text{s}$

RC-Glied/RC-network:
 $R [\Omega] \geq 0,02 V_{DM} [V]$
 $C \leq 0,33 \mu\text{F}$
 $V_{DM} \leq 0,67 V_{DRM}$

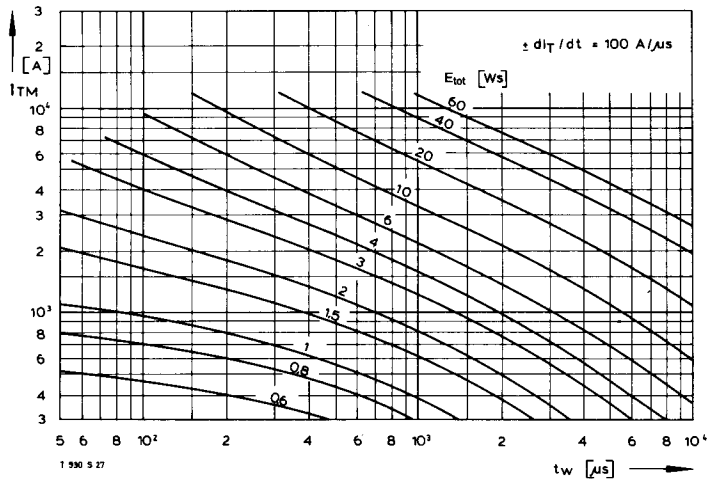
Bild/Fig. 4, 5, 6
 Steuergenerator/pulse generator:
 $i_G = 1,2 \text{ A}$, $di_G/dt = 1,2 \text{ A}/\mu\text{s}$

RC-Glied/RC-network:
 $R [\Omega] \geq 0,02 V_{DM} [V]$
 $C \leq 0,47 \mu\text{F}$
 $V_{DM} \leq 0,67 V_{DRM}$
 $dV_R/dt \leq 600 \text{ V}/\mu\text{s}$
 $V_{RM} \leq 0,67 V_{RRM}$

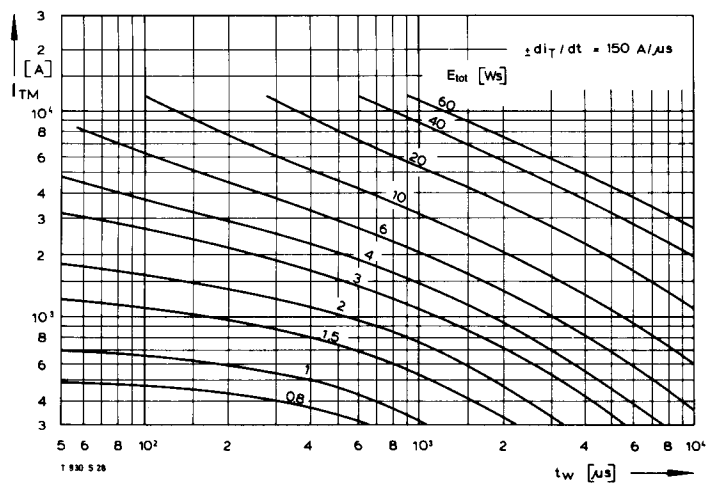




Bild/Fig. 10



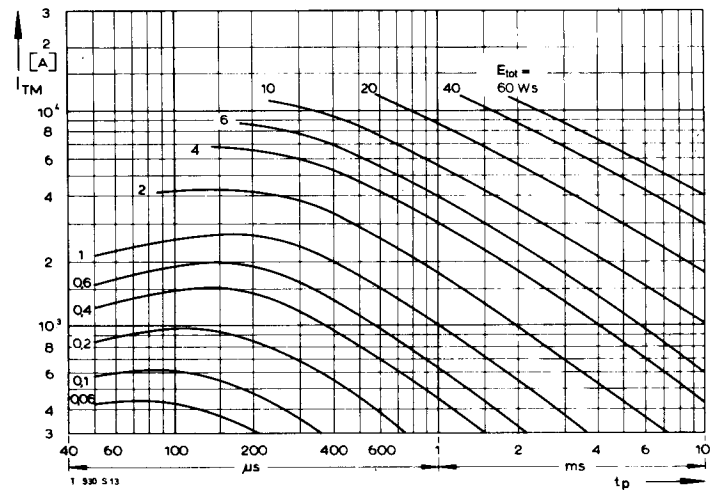
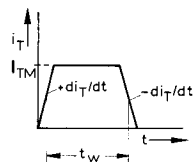
Bild/Fig. 11



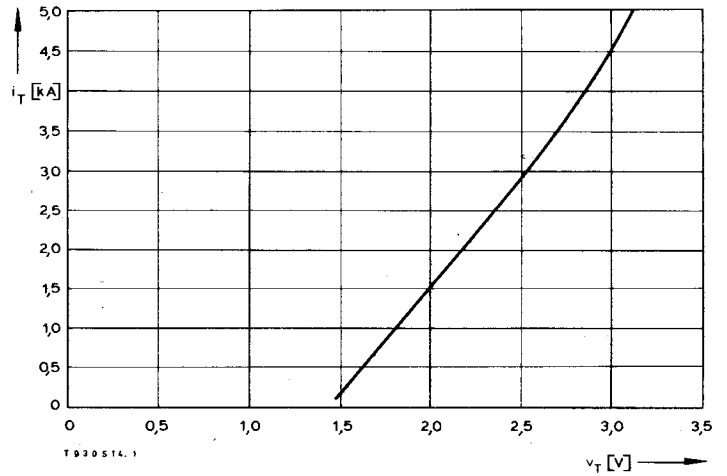
Bild/Fig. 12

Bild/Fig. 10, 11, 12
Steuer-generator/pulse generator:
 $I_G = 1,2 \text{ A}$, $di_G/dt = 1,2 \text{ A}/\mu\text{s}$

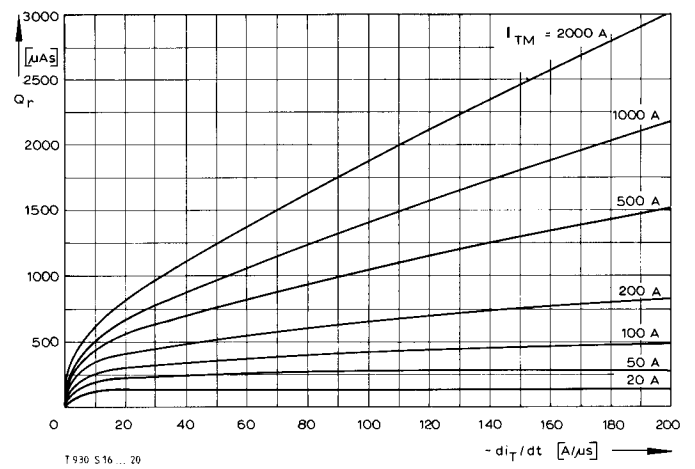
RC-Glied/RC-network:
 $R [\Omega] \geq 0,02 v_{DM} [V]$
 $C \leq 0,47 \mu\text{F}$
 $v_{DM} \leq 0,67 V_{DRM}$
 $dv_R/dt \leq 700 \text{ V}/\mu\text{s}$
 $v_{RM} \leq 0,67 V_{RRM}$



Bild/Fig. 13



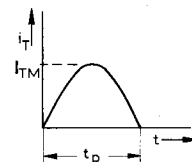
Bild/Fig. 14

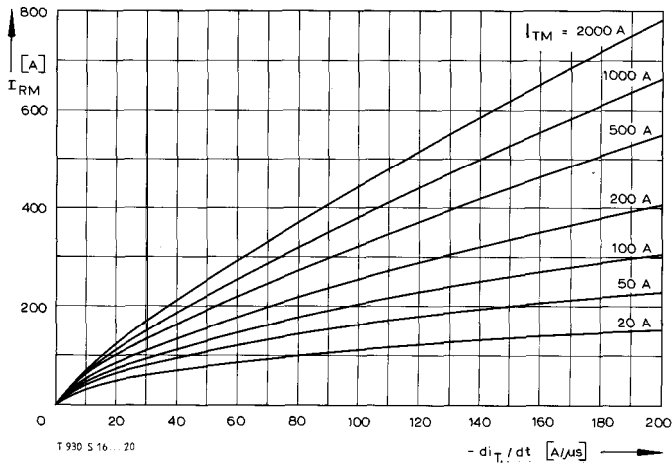


Bild/Fig. 15

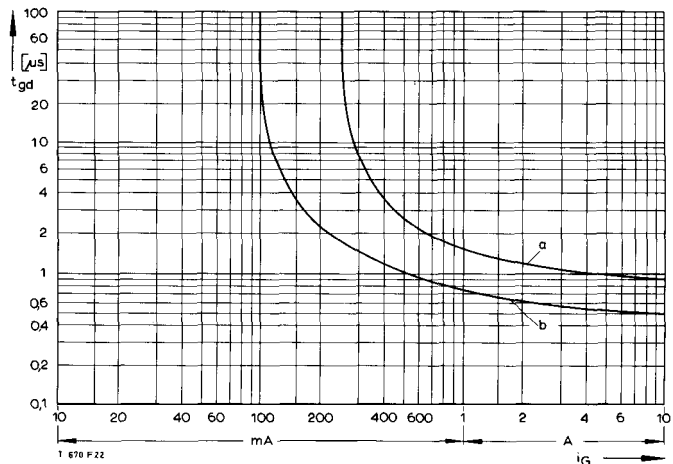
(zu Bild/to Fig. 13)
Steuer-generator/pulse generator:
 $I_G = 1,2 \text{ A}$, $di_G/dt = 1,2 \text{ A}/\mu\text{s}$

RC-Glied/RC-network:
 $R [\Omega] \geq 0,02 v_{DM} [V]$
 $C \leq 0,33 \mu\text{F}$

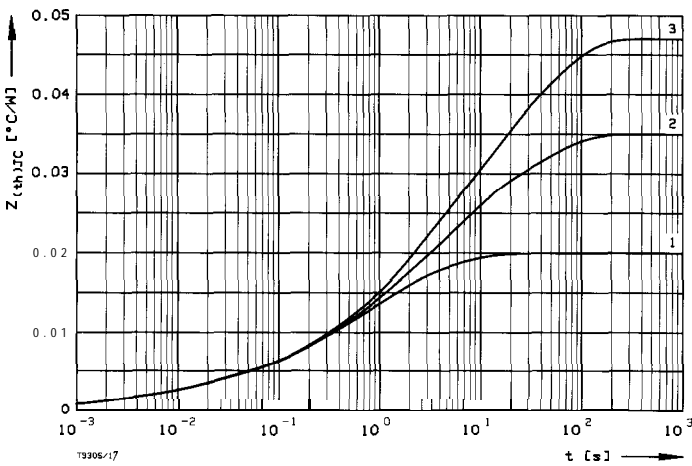




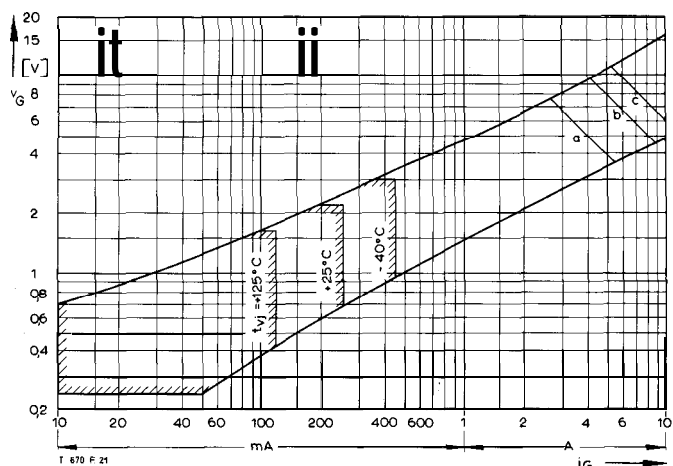
BildFig. 16
Rückstromspitze $I_{RM} = f(-di/dt)$, $t_{vj} = t_{vj(max)}$, $V_R = 0,5 V_{RRM}$, $V_{RM} = 0,8 V_{RRM}$
Peak reverse recovery current $I_{RM} = f(-di/dt)$, $t_{vj} = t_{vj(max)}$, $V_R = 0,5 V_{RRM}$, $V_{RM} = 0,6 V_{RRM}$
Parameter: Durchlaßstrom/On-state current I_{TM}



BildFig. 16
ZündverzugsGate controlled delay time $t_{gd} = f(I_{GM})$, $t_{vj} = 25^\circ\text{C}$, $di_G/dt = i_{GM}/1 \text{ ps}$
a – Maximaler Verlauf/Limiting Characteristic
b – Typischer Verlauf/Typical Characteristic



BildFig. 17
Transient innerer Wärmewiderstand $Z_{thJC} = f(t)$, DC
Transient thermal impedance $Z_{thJC} = f(t)$, DC
1 Beidseitige Kühlung/two-sided cooling
2 Anodenseitige Kühlung/anode side cooling
3 Kathodenseitige Kühlung/cathode side cooling



Bild/fig. 19
Steuercharakteristik mit Zündbereichen/Gate Characteristic with triggering areas
 $V_G = f(I_G)$, $V_D = 12 \text{ V}$

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 two-sided	R_{thn} [°C/W]	0,00114	0,00224	0,00487	0,00749	0,00426		
	τ_n [s]	0,0014	0,015	0,17	1,05	5,1		
anodenseitig anode-sided	R_{thn} [°C/W]	0,00106	0,00239	0,004	0,00725	0,0116	0,0087	
	τ_n [s]	0,0013	0,015	0,16	0,9	5,8	44	
kathodenseitig cathode-sided	R_{thn} [°C/W]	0,00106	0,00245	0,00499	0,0116	0,0127	0,0142	
	τ_n [s]	0,0013	0,015	0,19	1,7	10,2	53,5	

Analytische Funktionsanalytical function:

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