

Elektrische Eigenschaften Electrical properties

Höchstzulässige Werte Maximum rated values

Periodische Vorwärts-Spitzenspannung	repetitive peak forward off-state voltage	$t_{vj} = -40^{\circ}\text{C} \dots t_{vj\text{max}}$	$V_{\text{DRM}}$	2500, 2800	V
Vorwärts-Stoßspitzenspannung	non repetitive peak forward off-state voltage	$t_{vj} = -40^{\circ}\text{C} \dots t_{vj\text{max}}$	$V_{\text{DSM}} = V_{\text{DRM}}$		
Periodische Rückwärts-Spitzenspannung	repetitive peak reverse voltage	$t_{vj} = -40^{\circ}\text{C} \dots t_{vj\text{max}}$	$V_{\text{RRM}}$	20	v
Periodische Rückwärts-Spitzenspannung nach der Kommutierung	repetitive peak reverse voltage after commutation	$t_{vj} = -40^{\circ}\text{C} \dots t_{vj\text{max}}, t_p = 1 \text{ ps}$	$V_{\text{RRM(C)}}$	25	V
Durchlaßstrom-Grenzeffektivwert	RMS on-state current	$t_c = 85^{\circ}\text{C}$	$I_{\text{TRMSM}}$	2200	A
Dauergrenzstrom	average on-state current	$t_c = 51^{\circ}\text{C}$	$I_{\text{TAVM}}$	900	A
				1400	A
Stoßstrom-Grenzwert	surge current	$t_{vj} = 25^{\circ}\text{C}, t_p = 10 \text{ ms}$	$I_{\text{TSM}}$	19	kA
		$t_{vj} = t_{vj\text{max}}, t_p = 10 \text{ ms}$		16	kA
Grenzlastintegral	$\int i^2 dt$ -value	$t_{vj} = 25^{\circ}\text{C}, t_p = 10 \text{ ms}$	$\int i^2 dt$	1800	kA <sup>2</sup> s
		$t_{vj} = t_{vj\text{max}}, t_p = 10 \text{ ms}$		1280	kA <sup>2</sup> s
Kritische Stromsteilheit	critical rate of rise of on-state current	$v_D \leq 67\% V_{\text{DRM}}, f_o = 50 \text{ Hz}$	$(di/dt)_{\text{cr}}$	250	A/ $\mu\text{s}$
		$v_L = 10 \text{ V}, I_{\text{GM}} = 4 \text{ A}, di_G/dt = 8 \text{ Alps}$			
Kritische Spannungssteilheit	critical rate of rise of off-state voltage	$t_{vj} = t_{vj\text{max}}, v_D = 67\% V_{\text{DRM}}$	$(dv/dt)_{\text{cr}}$	1000	V/ $\mu\text{s}$
		5. Kennbuchstabe/5th letter F			

Charakteristische Werte Characteristic values

Durchlaßspannung	on-state voltage	$t_{vj} = t_{vj\text{max}}, I_T = 4200 \text{ A}$	$V_T$	max.	2,75 V
Schleusenspannung	threshold voltage	$t_{vj} = t_{vj\text{max}}$	$V_{T(\text{TO})}$		1,46 V
Ersatzwiderstand	slope resistance	$t_{vj} = t_{vj\text{max}}$	$r_T$		0,295 m $\Omega$
Zündstrom	gate trigger current	$t_{vj} = 25^{\circ}\text{C}, v_D = 12 \text{ V}$	$I_{\text{GT}}$	max.	300 mA
Zündspannung	gate trigger voltage	$t_{vj} = 25^{\circ}\text{C}, v_D = 12 \text{ V}$	$V_{\text{GT}}$	max.	2,5 V
Nicht zündender Steuerstrom	gate non-trigger current	$t_{vj} = t_{vj\text{max}}, v_D = 12 \text{ V}$	$I_{\text{GD}}$	max.	40 mA
Nicht zündende Steuerspannung	gate non-trigger voltage	$t_{vj} = t_{vj\text{max}}, v_D = 0,5 V_{\text{DRM}}$	$V_{\text{GD}}$	max.	0,3 v
Haltestrom	holding current	$t_{vj} = 25^{\circ}\text{C}, v_D = 12 \text{ V}, R_{\text{GK}} = 4,7 \Omega$	$I_{\text{H}}$	max.	400 mA
Einraststrom	latching current	$t_{vj} = 25^{\circ}\text{C}, v_D = 12 \text{ V}, R_{\text{GK}} \geq 10 \Omega$	$I_{\text{L}}$	max.	2 A
		$I_{\text{GM}} = 4 \text{ A}, di_G/dt = 8 \text{ A}/\mu\text{s}, t_G = 20 \text{ ps}$			
Vorwärts- u. Rückwärts-Sperrstrom	forward off-state and reverse Currents	$t_{vj} = t_{vj\text{max}}, v_D = V_{\text{DRM}}, v_R = V_{\text{RRM}}$	$i_D$	max.	200 mA
			$i_R$	max.	1000 mA
Zündverzögerung	gate controlled delay time	$t_{vj} = 25^{\circ}\text{C}, I_{\text{GM}} = 4 \text{ A}, di_G/dt = 8 \text{ A}/\mu\text{s}$	$t_{\text{gd}}$	max.	1,5 $\mu\text{s}$
Freiwerdzeit	circuit commutated turn-off time	siehe Techn. Erl./see Techn. Inf.	$t, P:$	max.	55 $\mu\text{s}^1)$

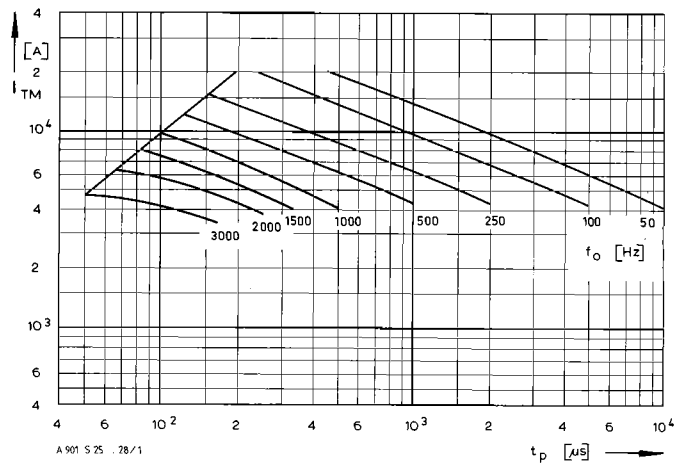
Thermische Eigenschaften Thermal properties

Innerer Wärmewiderstand für beidseitige Kühlung	thermal resistance, junction to case for two-sided cooling	$\Theta = 180^{\circ}\text{el, sin}$ DC	$R_{\text{thJC}}$	max.	0,0212 $^{\circ}\text{C}/\text{W}$
				max.	0,0200 $^{\circ}\text{C}/\text{W}$
Übergangswärmewiderstand	thermal resistance, case to heatsink	beidseitig/two-sided einseitig/one-sided	$R_{\text{thCK}}$	max.	0,005 $^{\circ}\text{C}/\text{W}$
				max.	0,010 $^{\circ}\text{C}/\text{W}$
Höchstzul. Sperrschichttemperatur	max. junction temperature		$t_{vj\text{max}}$		125 $^{\circ}\text{C}$
Betriebstemperatur	Operating temperature		$t_{c\text{op}}$		-40 ... + 125 $^{\circ}\text{C}$
Lagertemperatur	storage temperature		$t_{\text{stq}}$		-40 ... + 140 $^{\circ}\text{C}$

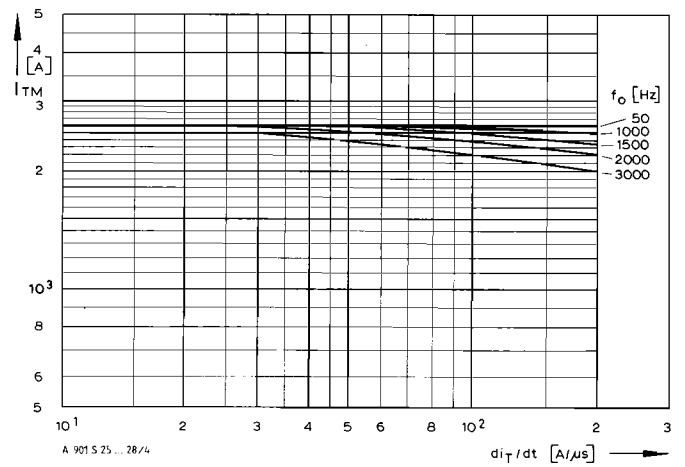
Mechanische Eigenschaften Mechanical properties

Si-Elemente mit Druckkontakt	Si-pellets with pressure contact		F		13,5 ... 24 kN
Anpreßkraft	Clamping force		G	typ.	550 g
Gewicht	weight				25 mm
Kriechstrecke	Creepage distance				C
Feuchteklasse	humidity classification	DIN 40040			50 m/s <sup>2</sup>
Schwingfestigkeit	Vibration resistance	f = 50 Hz			
Maßbild	outline				Seite/page 155

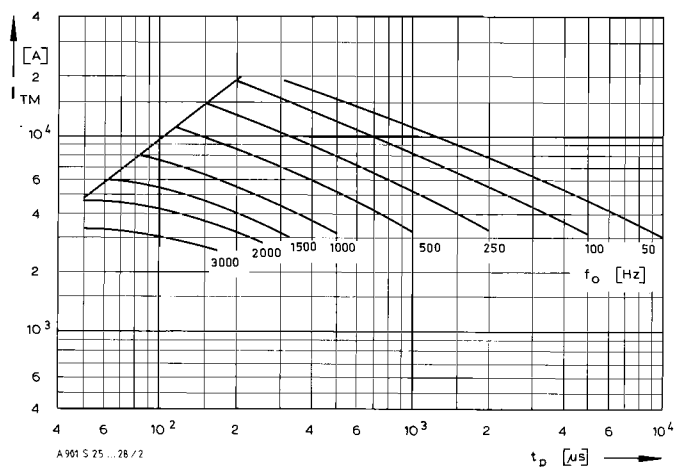
1) mit antiparalleler Diode/with inverse paralleled diode



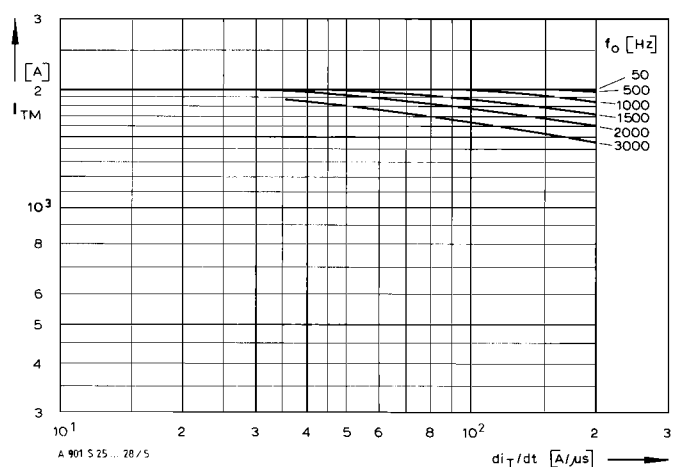
Bild/Fig. 1  $t_c = 60^\circ\text{C}$



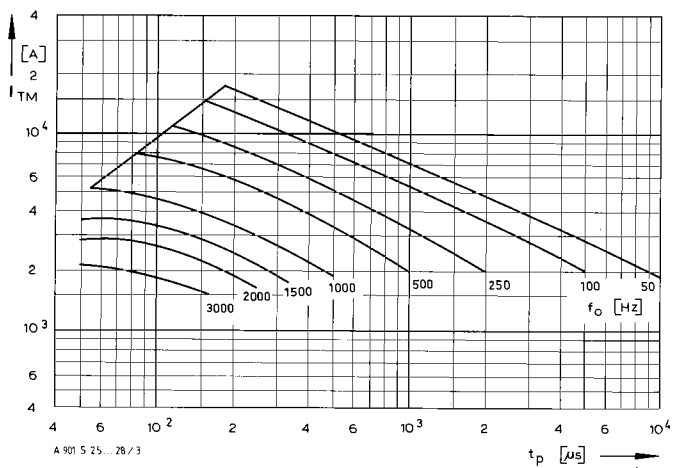
Bild/Fig. 4  $t_c = 60^\circ\text{C}$



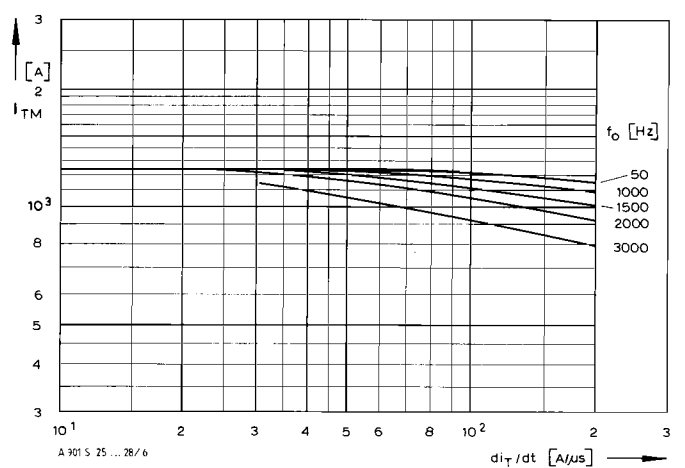
Bild/Fig. 2  $t_c = 80^\circ\text{C}$



Bild/Fig. 5  $t_c = 80^\circ\text{C}$



Bild/Fig. 3  $t_c = 100^\circ\text{C}$



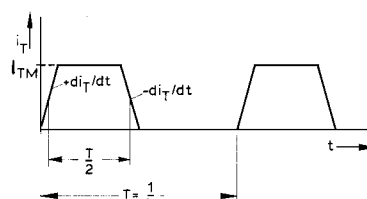
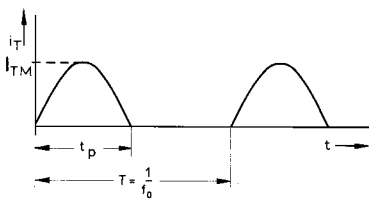
Bild/Fig. 6  $t_c = 100^\circ\text{C}$

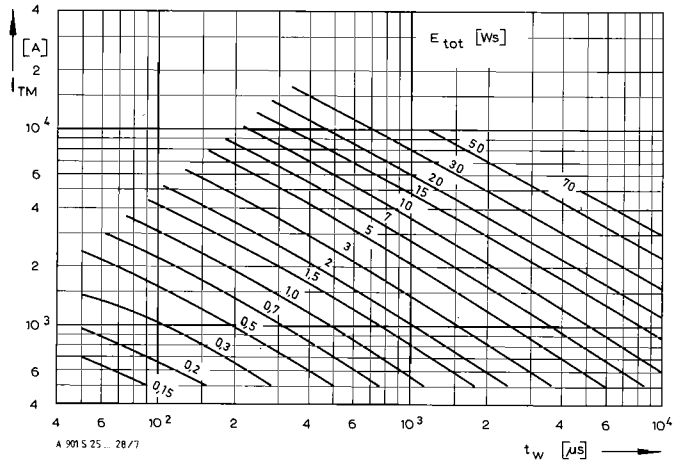
Bild/Fig. 1, 2, 3  
Steuergenerator/pulse generator:  
 $i_G = 4 \text{ A}$ ,  $di_G/dt = 8 \text{ A}/\mu\text{s}$

RC-Glied/RC-network:  
 $R [\Omega] \geq 12 \Omega$   
 $C \leq 1 \mu\text{F}$   
 $v_{DM} \leq 0,67 V_{DRM}$

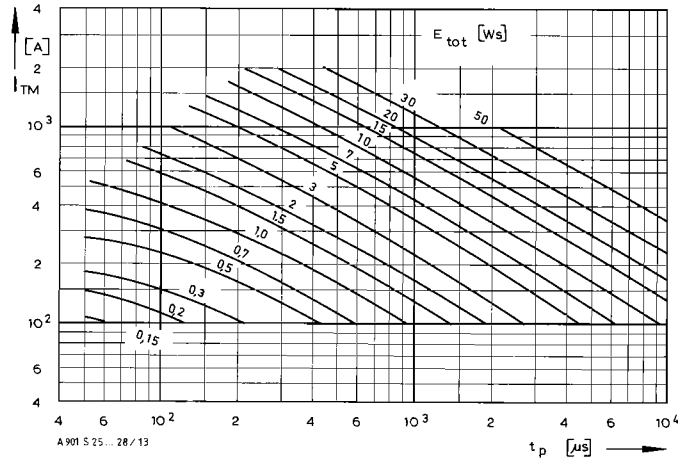
Bild/Fig. 4, 5, 6  
Steuergenerator/pulse generator:  
 $i_G = 4 \text{ A}$ ,  $di_G/dt = 8 \text{ A}/\mu\text{s}$

RC-Glied/RC-network:  
 $R [\Omega] \geq 12 \Omega$   
 $C \leq 1 \mu\text{F}$   
 $v_{DM} \leq 0,67 V_{DRM}$

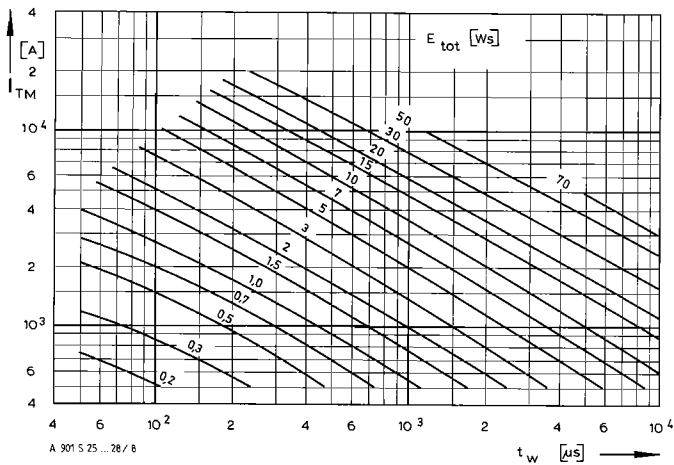




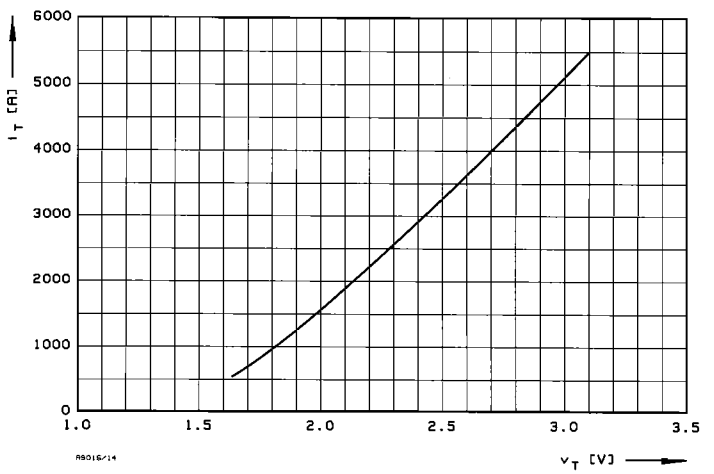
Bild/Fig. 7  $-di_T/dt = 100 \text{ A}/\mu\text{s}$



Bild/Fig. 13



Bild/Fig. 8  $-di_T/dt = 200 \text{ A}/\mu\text{s}$



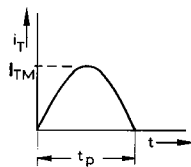
Bild/Fig. 14

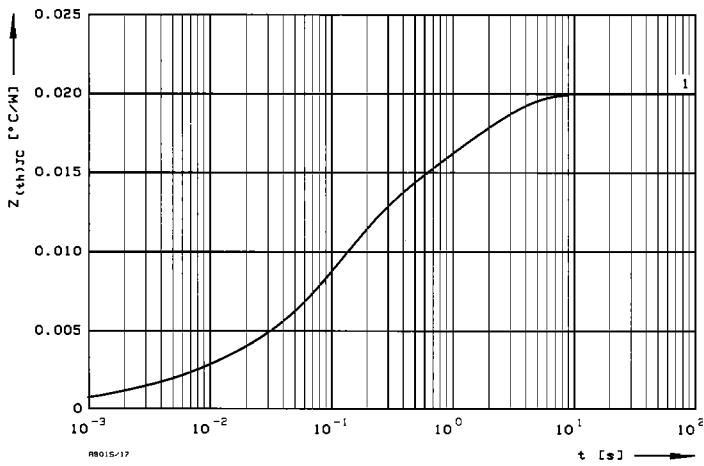
Bild/Fig. 7, 8  
Steuergenerator/pulse generator:  
 $i_G = 4 \text{ A}$ ,  $di_G/dt = 8 \text{ A}/\mu\text{s}$

RC-Glied/RC-network:  
 $R \geq 12 \Omega$   
 $C \leq 1 \mu\text{F}$   
 $v_{DM} \leq 0,67 v_{DRM}$   
 $v_{RM} \leq 20 \text{ V}$

(zu Bild/to Fig. 13)  
Steuergenerator/pulse generator:  
 $i_G = 4 \text{ A}$ ,  $di_G/dt = 8 \text{ A}/\mu\text{s}$

RC-Glied/RC-network:  
 $R \geq 12 \Omega$   
 $C \leq 1 \mu\text{F}$   
 $v_{RM} \leq 20 \text{ V}$





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

Analytische Elemente des transienten Wärmewiderstandes  $Z_{th(JC)}$  für DC  
 Analytical elements of transient thermal impedance  $Z_{th(JC)}$  for DC

Kühlung	Pos. n	1	2	3	4	5	6	7
beidseitig	$R_{thn} [°C/W]$	0,00067	0,00175	0,0078	0,00378	0,006		
two-sided	$\tau_n [s]$	0,001	0,0074	0,096	0,35	1,95		
anodenseitig	$R_{thn} [°C/W]$							
anode-sided	$\tau_n [s]$							
kathodenseitig	$R_{thn} [°C/W]$							
cathode-sided	$\tau_n [s]$							

Analytische Funktion/analytical function:

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