

**Elektrische Eigenschaften****Electrical properties**

## Höchstzulässige Werte

## Maximum rated values

Periodische Vorwärts-Spitzenspannung	repetitive peak forward off-state voltage	$t_{vj} = -40^{\circ}\text{C} \dots t_{vj\text{ max}}$	$V_{\text{DRM}}$	600, 800 V 1000, 1100 v 1200, 1300* 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	$t_{vj} = -40^{\circ}\text{C} \dots t_{vj\text{ max}}$	$V_{\text{RRM}}$	15 v
Periodische Rückwärts-Spitzenspannung nach der Kommutierung	repetitive peak reverse voltage after commutation	$t_{vj} = -40^{\circ}\text{C} \dots t_{vj\text{ max}}, t_p = 1 \text{ ps}$	$V_{\text{RRM(C)}}$	50 v
Durchlaßstrom-Grenzeffektivwert	RMS on-state current	$t_c = 05^{\circ}\text{C}$	$I_{\text{TRMSM}}$	900 A
Dauerstrom	average on-state current	$t_c = 56^{\circ}\text{C}$	$I_{\text{TAVM}}$	438 A 573 A
Stoßstrom-Grenzwert	surge current	$t_{vj} = 25^{\circ}\text{C}, t_p = 10 \text{ ms}$ $t_{vj} = t_{vj\text{ max}}, t_p = 10 \text{ ms}$	$I_{\text{TSM}}$	6,2 kA 5,5 kA
Grenzlastintegral	$\int i^2 dt$ -value	$t_{vj} = 25^{\circ}\text{C}, t_p = 10 \text{ n-s}$ $t_{vj} = t_{vj\text{ max}}, t_p = 10 \text{ ms}$	$\int i^2 dt$	192 kA <sup>2</sup> s 151 kA <sup>2</sup> s
Kritische Stromsteilheit	critical rate of rise of on-state current	$v_D \leq 67\% V_{\text{DRM}}, f_o = 50 \text{ Hz}$	$(di/dt)_{\text{cr}}$	500 A/ $\mu\text{s}$
Kritische Spannungssteilheit	critical rate of rise of off-state voltage	$v_L = 10 \text{ V}, i_{\text{GM}} = 1,2 \text{ A}, di_G/dt = 1,2 \text{ A}/\mu\text{s}$ $t_{vj} = t_{vj\text{ max}}, v_D = 67\% V_{\text{DRM}}$ 5. Kennbuchstabe/5th letter C 5. Kennbuchstabe/5th letter F	$(dv/dt)_{\text{cr}}$	500 V/ $\mu\text{s}$ 1000 V/ $\mu\text{s}$

## Charakteristische Werte

## Characteristic values

Durchlaßspannung	on-state voltage	$t_{vj} = t_{vj\text{ max}}, i_T = 1500 \text{ A}$	$V_T$	max.	2,1 v
Schleusenspannung	threshold voltage	$t_{vj} = t_{vj\text{ max}}$	$V_{T(TO)}$		1,1 v
Ersatzwiderstand	slope resistance	$t_{vj} = t_{vj\text{ max}}$	$r_T$		0,6 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.	2,7 V
Nicht zündender Steuerstrom	gate non-trigger current	$t_{vj} = t_{vj\text{ max}}, v_D = 12 \text{ V}$	$I_{\text{GD}}$	max.	10 mA
Nicht zündende Steuerspannung	gate non-trigger voltage	$t_{vj} = t_{vj\text{ max}}, v_D = 0,5 V_{\text{DRM}}$	$V_{\text{GD}}$	max.	0,25 V
Haltestrom	holding current	$t_{vj} = 25^{\circ}\text{C}, v_D = 12 \text{ V}, R_{\text{GK}} = 10 \Omega$	$I_{\text{H}}$	max.	300 mA
Einraststrom	latching current	$t_{vj} = 25^{\circ}\text{C}, v_D = 12 \text{ V}, R_{\text{GK}} \geq 10 \Omega$ $I_{\text{GM}} = 1,2 \text{ A}, di_G/dt = 1,2 \text{ A}/\mu\text{s}, t_g = 20 \mu\text{s}$	$I_{\text{L}}$	max.	1,2 A
Vorwärts- u. Rückwärts-Sperrstrom	forward off-state and reverse Currents	$t_{vj} = t_{vj\text{ max}}, v_D = \text{VORM}, v_R = V_{\text{RRM}}$	$i_D$	max.	50 mA
Zündverzögerung	gate controlled delay time	$t_{vj} = 25^{\circ}\text{C}, i_{\text{GM}} = 1,2 \text{ A}, di_G/dt = 1,2 \text{ A}/\mu\text{s}$	$i_R$	max.	250 mA
Freiwerdezeit	circuit commutated turn-off time	siehe Techn. Erl./see Techn. Inf.	$t_{\text{gd}}$	max.	1,4 $\mu\text{s}$
			$t_q$	D: max.	15 $\mu\text{s}^1)$
				E: max.	20 $\mu\text{s}^1)$
				F: max.	25 $\mu\text{s}^1)$

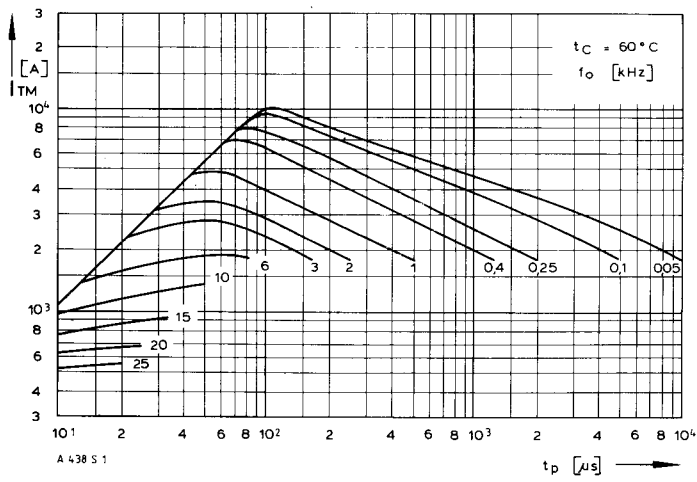
**Thermische Eigenschaften****Thermal properties**

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.	0,053 $^{\circ}\text{C}/\text{W}$ max. 0,05 $^{\circ}\text{C}/\text{W}$
für anodenseitige Kühlung	for anode-sided cooling	$\theta = 180^{\circ} \text{ el, sin DC}$	$R_{\text{thJC(A)}}$	max.	0,088 $^{\circ}\text{C}/\text{W}$ max. 0,085 $^{\circ}\text{C}/\text{W}$
für kathodenseitige Kühlung	for cathode-sided cooling	$\theta = 180^{\circ} \text{ el, sin DC}$	$R_{\text{thJC(K)}}$	max.	0,123 $^{\circ}\text{C}/\text{W}$ max. 0,12 $^{\circ}\text{C}/\text{W}$
Übergangswärmewiderstand	thermal resistance, case to heatsink	beidseitig/two-sided einseitig/one-sided	$R_{\text{thCK}}$	max.	0,01 $^{\circ}\text{C}/\text{W}$ max. 0,02 $^{\circ}\text{C}/\text{W}$
Höchstzul. Sperrschichttemperatur	max. junction temperature		$t_{vj\text{ max}}$		125 $^{\circ}\text{C}$
Betriebstemperatur	Operating temperature		$t_{\text{c op}}$		-40 ... + 125 $^{\circ}\text{C}$
Lagertemperatur	storage temperature		$t_{\text{stg}}$		-40 ... + 140 $^{\circ}\text{C}$

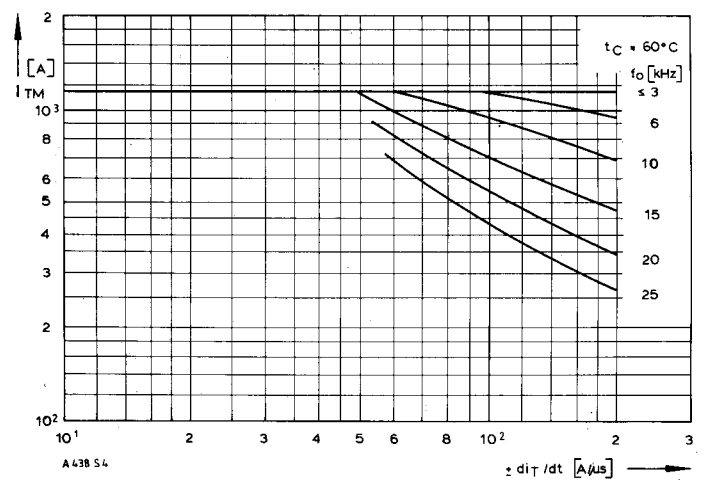
**Mechanische Eigenschaften****Mechanical properties**

Si-Elemente mit Druckkontakt	Si-pellets with pressure contact		F		4,5...9 kN
Anpreßkraft	Clamping force		G	typ.	100 g
Gewicht	weight				17 mm
Kriechstrecke	Creepage distance				c
Feuchtklasse	humidity classification	DIN 40040			50 m/s <sup>2</sup>
Schwingfestigkeit	Vibration resistance	f = 50 Hz			
Maßbild	outline	DIN 41814-152A4			

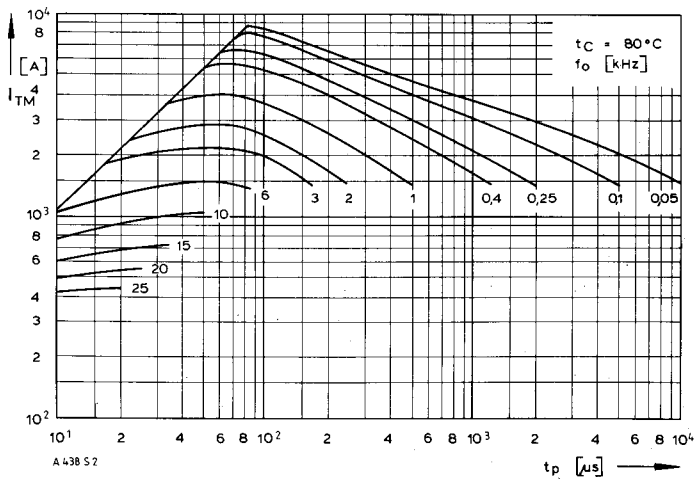
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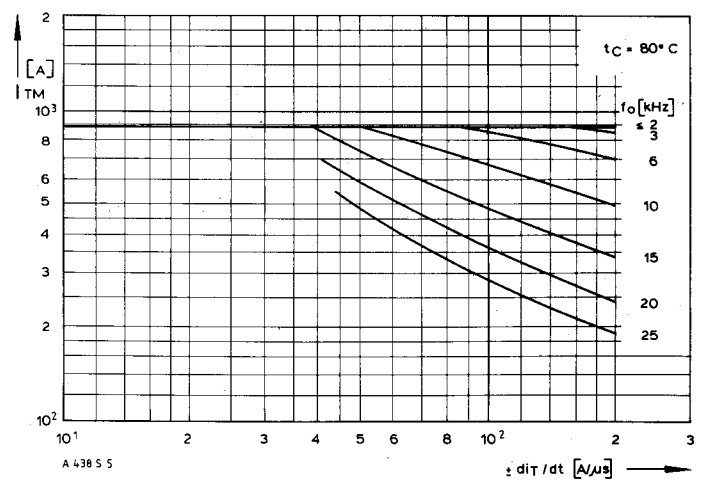
Bild/Fig. 1



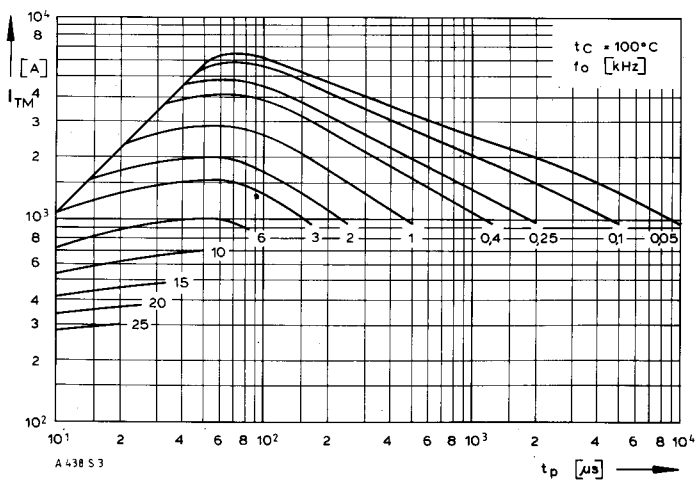
Bild/Fig. 4



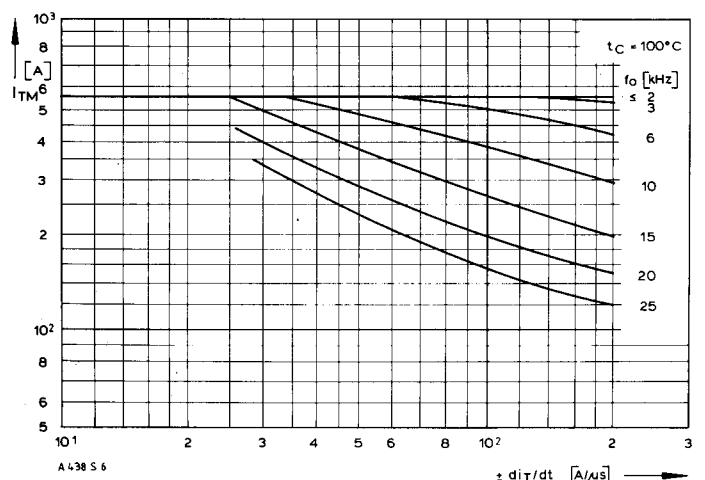
Bild/Fig. 2



Bild/Fig. 5



Bild/Fig. 3



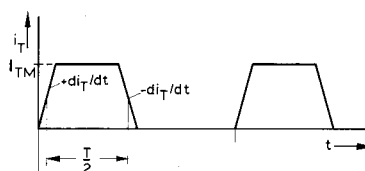
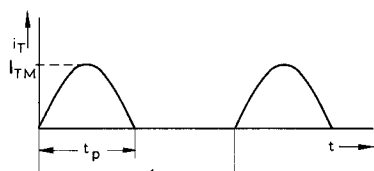
Bild/Fig. 6

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

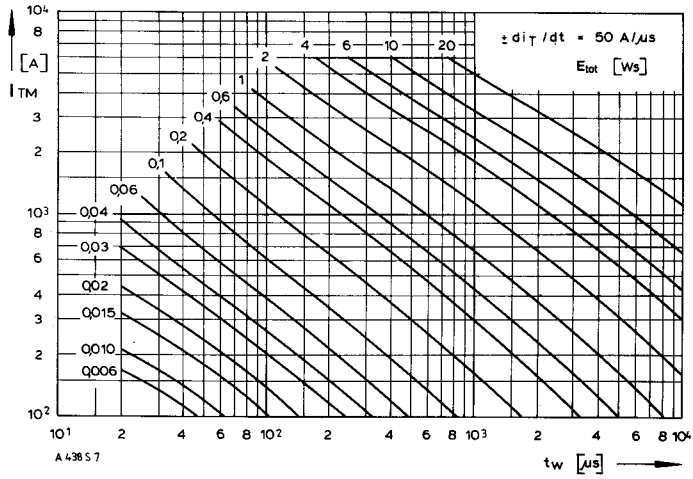
RC-Glied/RC-network:  
 $R [\Omega] \geq 0,02 V_{DM} [V]$   
 $C \leq 0,22 \mu\text{F}$   
 $V_{DM} \leq 0,67 V_{DRM}$

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

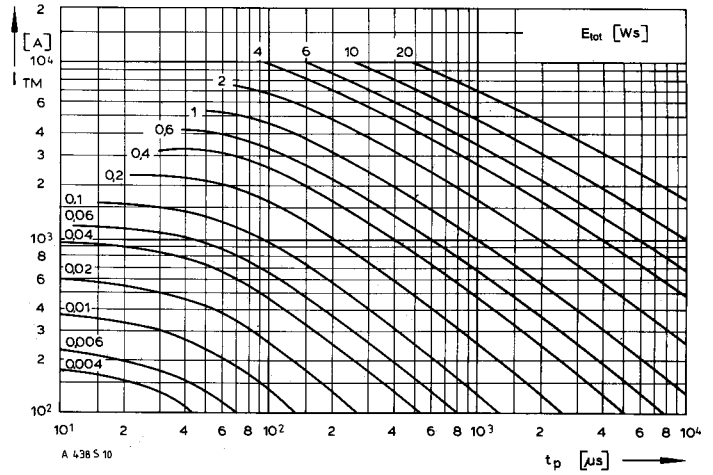
RC-Glied/RC-network:  
 $R [\Omega] \geq 0,02 V_{DM} [V]$   
 $C \leq 0,33 \mu\text{F}$   
 $V_{DM} \leq 0,67 V_{DRM}$



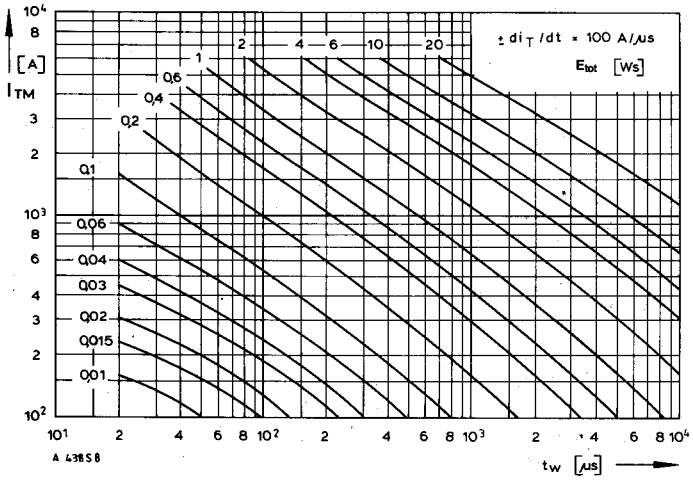
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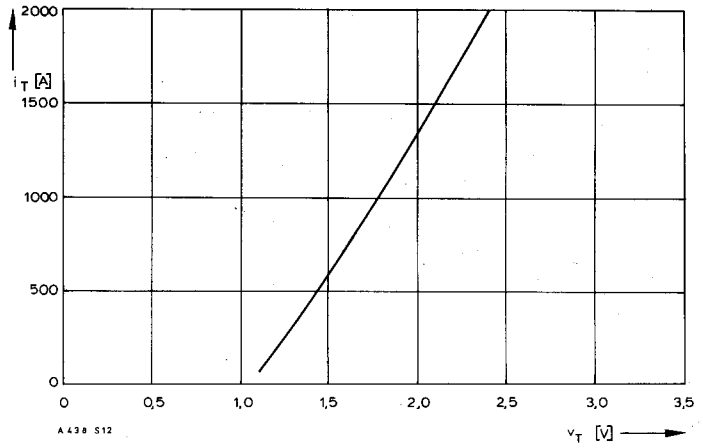
Bild/Fig. 7



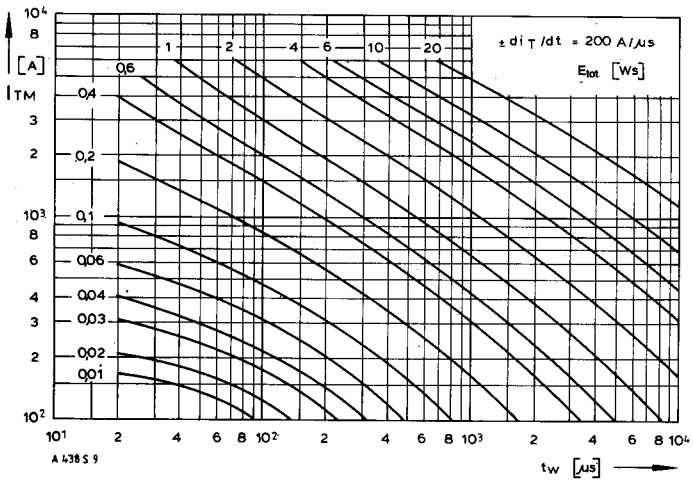
Bild/Fig. 13



Bild/Fig. 8



Bild/Fig. 14



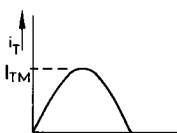
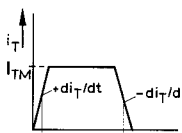
Bild/Fig. 9

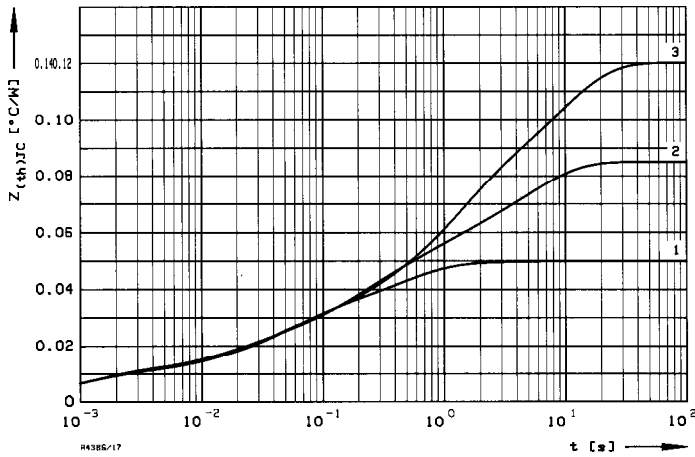
Bild/Fig. 7, 8, 9  
 Steuergenerator/pulse generator:  
 $i_G = 2,4 \text{ A}$ ,  $di_G/dt = 2,4 \text{ A}/\mu\text{s}$

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

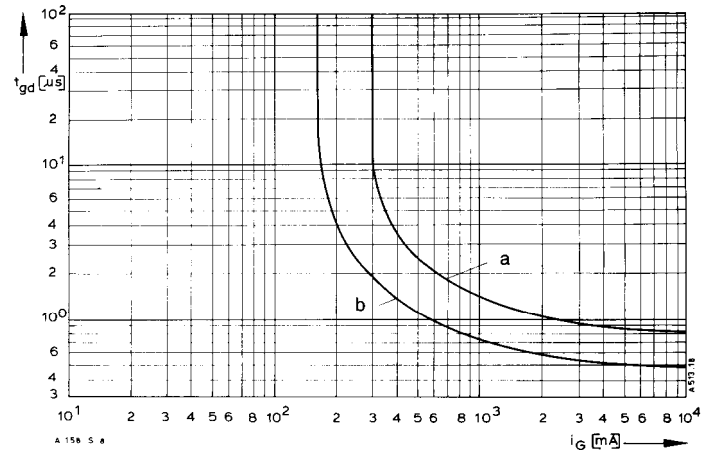
(zu Bild/to Fig. 13)  
 Steuergenerator/pulse generator:  
 $i_G = 2,4 \text{ A}$ ,  $di_G/dt = 2,4 \text{ A}/\mu\text{s}$

RC-Glied/RC-network:  
 $R [\Omega] \geq 0,02 v_{DM} [V]$   
 $C \leq 0,22 \mu\text{F}$

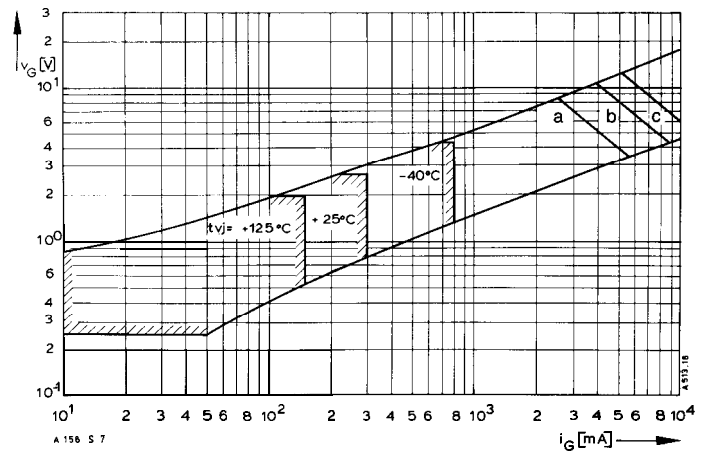




Bild/Fig. 17  
 Transienter innerer Wärmewiderstand  $Z_{(th)JC} = f(t)$ , DC  
 Transient thermal impedance  $Z_{(th)JC} = f(t)$ , DC  
 1 Beidseitige Kühlung/two-sided cooling  
 2 Anodenseitige Kühlung/anode side cooling  
 3 Kathodenseitige Kühlung/cathode side cooling



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



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

Parameter:	a	b	c
Steuerimpulsdauer/Triquer pulse duration $t_r$ [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	$R_{thn}$ [ $^{\circ}C/W$ ]	0,0105	0,00283	0,0167	0,0188	0,00116		
	$\tau_n$ [s]	0,00113	0,0255	0,0511	0,429	2,49		
anodenseitig/anode-sided	$R_{thn}$ [ $^{\circ}C/W$ ]	0,0094	0,00974	0,0182	0,0161	0,0316		
	$\tau_n$ [s]	0,000984	0,017	0,15	0,6	5,0		
kathodenseitig/cathode-sided	$R_{thn}$ [ $^{\circ}C/W$ ]	0,00928	0,0145	0,00868	0,0401	0,0475		
	$\tau_n$ [s]	0,000939	0,0285	0,156	1,12	9,1		

Analytische Funktion/analyticalfunction:

$$Z_{thJC} = \sum_{n=1}^{n_{max}} R_n \cdot (1 - \exp(-t/\tau_n))$$