Elektrische Eigenschaften — Electrical properties

Höchstzulässige Werte — Maximum rated values

Periodische Vorwärts-Spitzensperrspannung	repetitive peak forward off-state voltage	$t_{vj} = -40°C \ldots t_{vj\,max}$	V_{DRM}		600, 800 1000, 1100 1200, 1300*	V v V
Vorwärts-Stoßspitzenspannung	non repetitive peak forward off-state voltage	$t_{vj} = -40°C \ldots t_{vj\,max}$	$V_{DSM} = V_{DRM}$			
Periodische Rückwärts-Spitzensperrspannung	repetitive peak reverse voltage	$t_{vj} = -40°C \ldots t_{vj\,max}$	V_{RRM}		15	v
Periodische Rückwärts-Spitzensperrspannung nach der Kommutierung	repetitive peak reverse voltage after commutation	$t_{vj} = -40°C \ldots t_{vj\,max}$, t_p = 1 µs	$V_{RRM(C)}$		50	V
Durchlaßstrom-Grenzeffektivwert	RMS on-state current		I_{TRMSM}		400	A
Dauergrenzstrom	average on-state current	tc = 85°C	I_{TAVM}		198	A
		tc = 88°C			254	A
Stoßstrom-Grenzwert	surge current	t_{vj} = 25°C, t_p = 10 ms	I_{TSM}		3,1	kA
		$t_{vj} = t_{vj\,max}$, t_p = 10 ms			2,7	kA
Grenzlastintegral	∫i²dt-value	t_{vj} = 25°C, t_p = 10 ms	∫i²dt		48	kA²s
		$t_{vj} = t_{vj\,max}$, t_p = 10 ms			36,5	kA²s
Kritische Stromsteilheit	critical rate of rise of on-state current	$v_D \leq$ 67% v_{DRM}, f_o = 50 Hz v_L = 10 V, i_{GM} = 1,2 A, di_G/dt = 1,2 A/µs	$(di/dt)_{cr}$		400	A/µs
Kritische Spannungssteilheit	critical rate of rise of off-state voltage	$t_{vj} = t_{vj\,max}$, v_D = 67% V_{DRM}	$(dv/dt)_{cr}$			
		5. Kennbuchstabe/5th letter C			500	V/µs
		5. Kennbuchstabel5th letter F			1000	V/µs

Charakteristische Werte — Characteristic values

Durchlaßspannung	on-state voltage	$t_{vj} = t_{vj\,max}$, i_T = 250 A	v_T	max.	2	v
Schleusenspannung	threshold voltage	$t_{vj} = t_{vj\,max}$	$V_{T(TO)}$		1,1	v
Ersatzwiderstand	slope resistance	$t_{vj} = t_{vj\,max}$	r_T		1,3	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.	2,7	V
Nicht zündender Steuerstrom	gate non-trigger current	$t_{vj} = t_{vj\,max}$, v_D = 12 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 = 12 V, R_A = 10 Ω	I_H	max.	300	mA
Einraststrom	latching current	t_{vj} = 25°C, v_D = 12 V, $R_{GK} \geq$ 10 Ω i_{GM} = 1,2 A, di_G/dt = 1,2 A/µs, t_g = 20 µs	I_L	max.	1,2	A
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	max.	30	mA
			i_R	max.	150	mA
Zündverzug	gate controlled delay time	t_{vj} = 25°C, i_{GM} = 1,2 A, di_G/dt = 1,2 Alps	t_{gd}	max.	1,4	µs
Freiwerdezeit	circuit commutated turn-off time	siehe Techn. Erl./see Techn. Inf.	t_q D:	max.	15	µs[1]
			E:	max.	20	µs[1]

Thermische Eigenschaften — Thermal properties

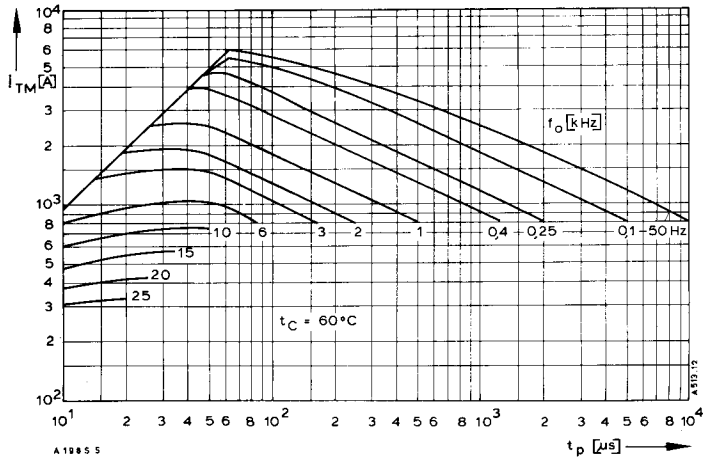
Innerer Wärmewiderstand	thermal resistance, junction to case				
für beidseitige Kühlung	for two-sided cooling	Θ = 180" el, sin	R_{thJC}	max.	0,117 °C/W
		DC		max.	0,103 °C/W
für anodenseitige Kühlung	for anode-sided cooling	Θ = 180" el, sin	$R_{thJC(A)}$	max.	0,18 °C/W
		DC		max.	0,166 °C/W
für kathodenseitige Kühlung	for cathode-sided cooling	Θ = 180" el, sin	$R_{thJC(K)}$	max.	0,28 °C/W
		DC		max.	0,266 °C/W
Übergangswärmewiderstand	thermal resistance, case to heatsink	beidseitigltwo-sided	R_{thCK}	max.	0,015 °C/W
		einseitiglonesided		max.	0,03 °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 ... + 140°C

Mechanische Eigenschaften — Mechanical properties

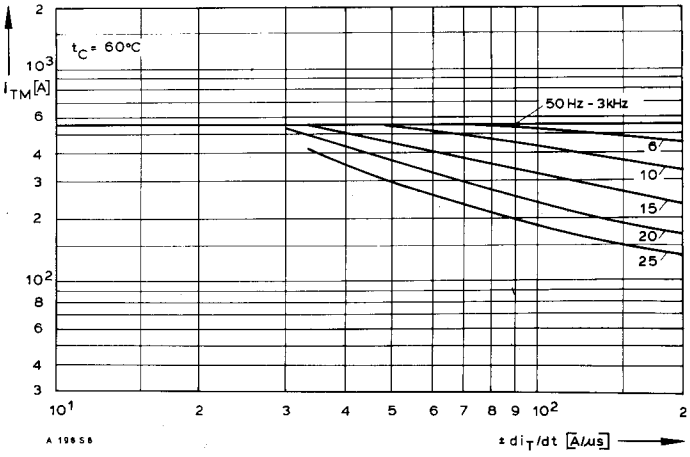
Si-Elemente mit Druckkontakt	Si-pellets with pressure contact				
Anpreßkraft	Clamping force		F		2,5 ... 4,5 kN
Gewicht	weight		G	typ.	70 g
Kriechstrecke	Creepage distance				17 mm
Feuchteklasse	humidity classification	DIN 40040			C
Schwingfestigkeit	Vibration resistance	f = 50 Hz			50 m/s²
Maßbild	outline	DIN 41814-151A4			Seitelpage 154

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

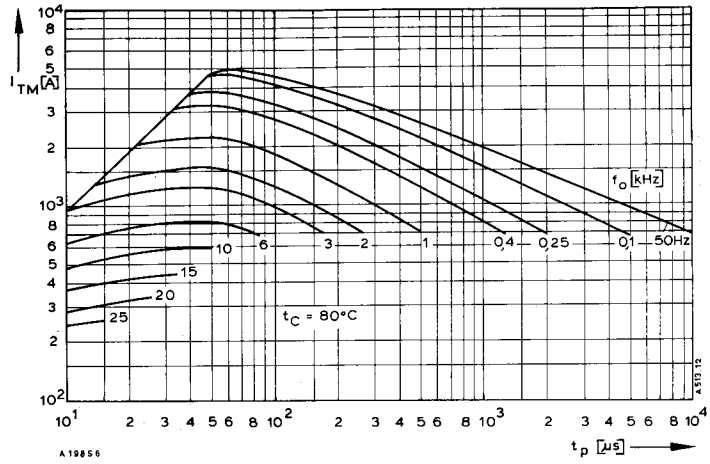
1) mit antiparalleler Diode/with inverse paralleled diode
2) $V_{DRM} \leq$ 1000 V



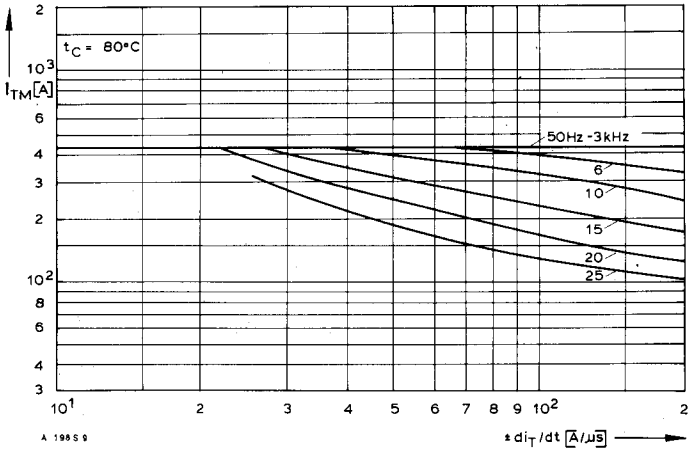
Bild/Fig. 1



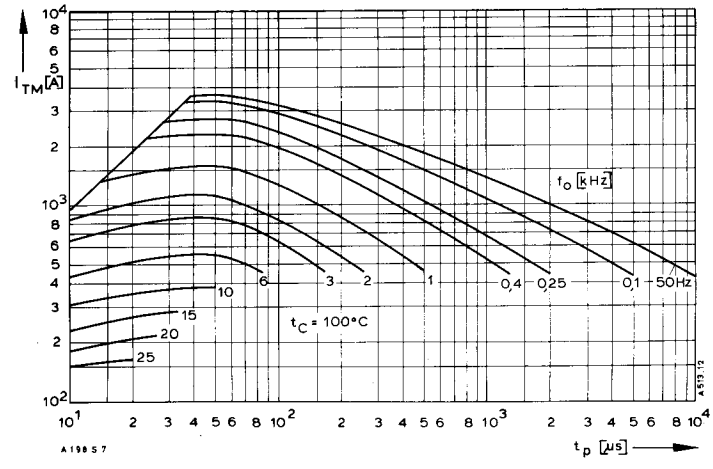
Bild/Fig. 4



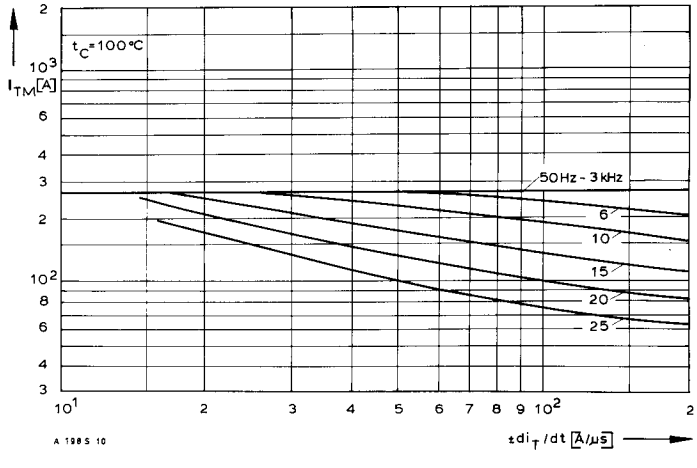
Bild/Fig. 2



Bild/Fig. 5



Bild/Fig. 3



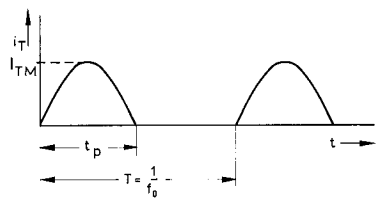
Bild/Fig. 6

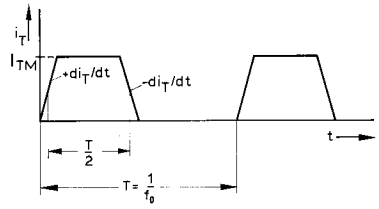
Bild/Fig. 1, 2, 3
Steuergenerator/pulse generator:
i_G = 2,4 A, di_G/dt = 2,4 A/µs

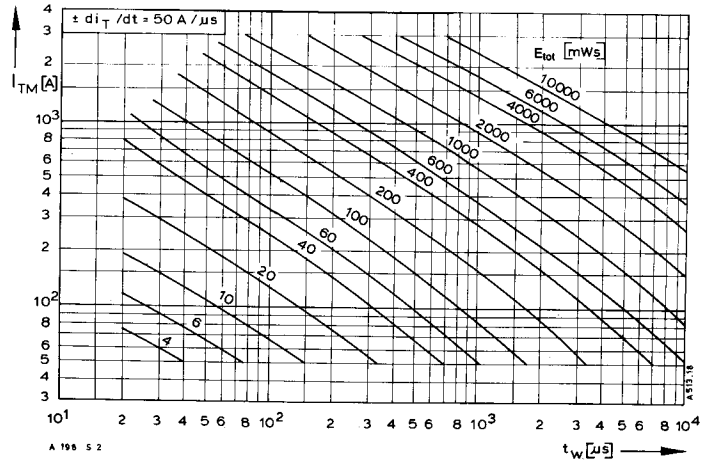
RC-Glied/RC-network:
R [Ω] ≥ 0,02 v_{DM} [V]
C ≤ 0,15 µF
v_{DM} ≤ 0,67 V_{DRM}

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

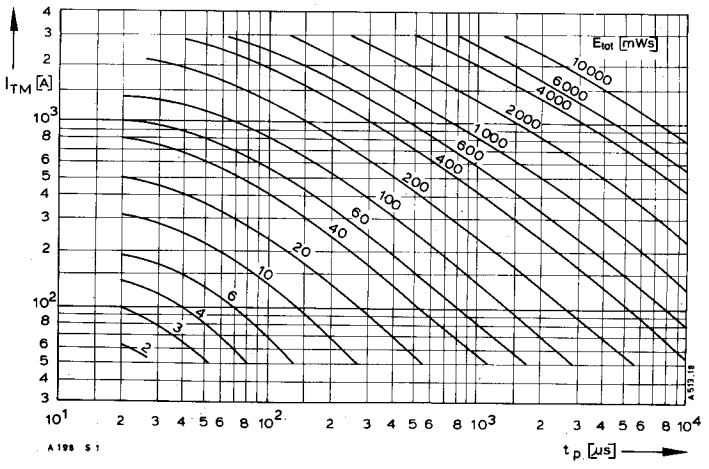
RC-Glied/RC-network:
R [Ω] ≥ 0,02 v_{DM} [V]
C ≤ 0,22 µF
v_{DM} ≤ 0,67 V_{DRM}



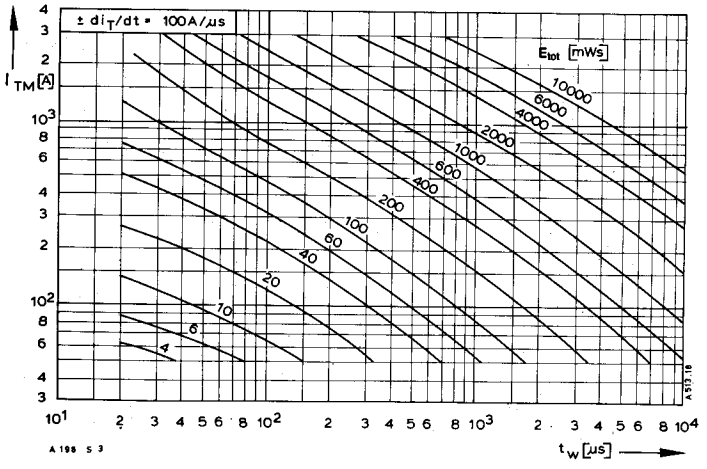




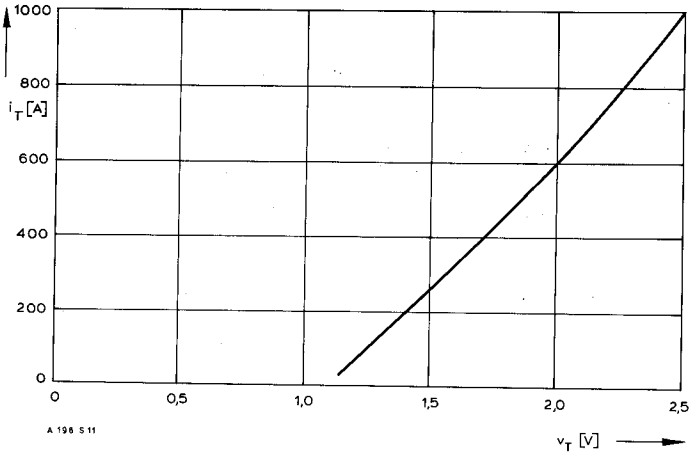
Bild/Fig. 7



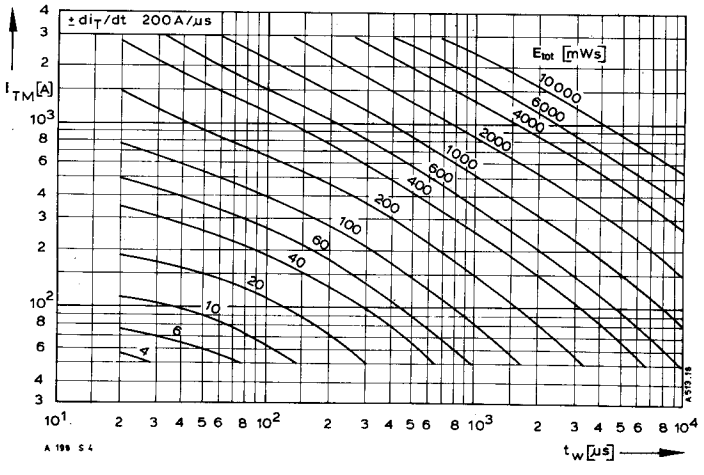
Bild/Fig. 13



Bild/Fig. 8



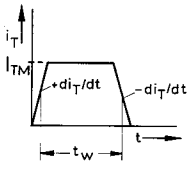
Bild/Fig. 14



Bild/Fig. 9

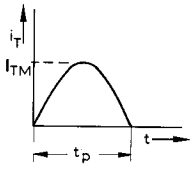
Bild/Fig. 7, 8, 9
Steuergenerator/pulse generator:
i_G = 2,4 A, di_G/dt = 2,4 A/µs

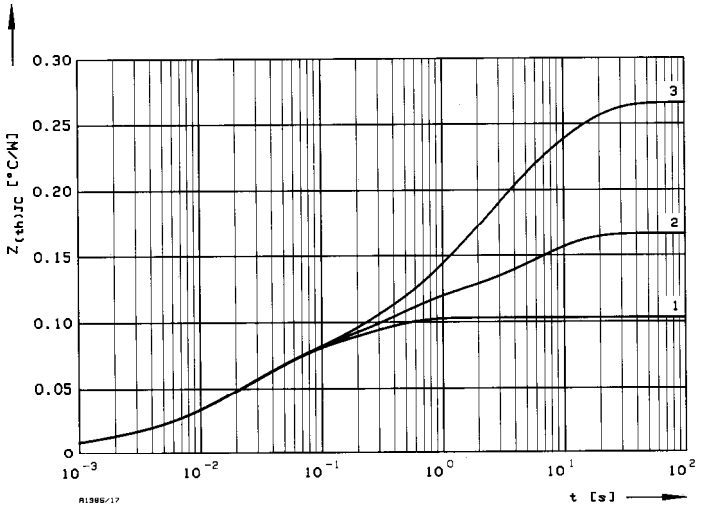
RC-Glied/RC-network:
R [Ω] ≥ 0,02 v_{DM} [V]
C ≤ 0,22 µF
$v_{DM} \leq 0{,}67\ V_{DRM}$
$v_{RM} \leq 15$ V



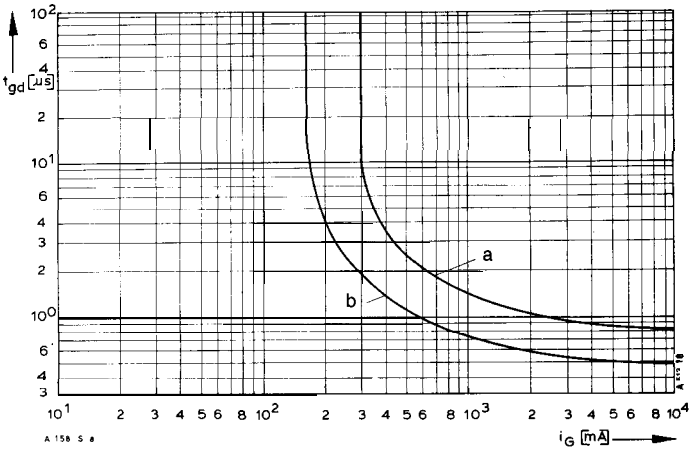
(zu Bild/to Fig. 13)
Steuergenerator/pulse generator:
i_G = 2,4 A, di_G/dt = 2,4 A/µs

RC-Glied/RC-network:
R [Ω] ≥ 0,02 v_{DM} [V]
C ≤ 0,15 µF
$v_{RM} \leq 15$ V

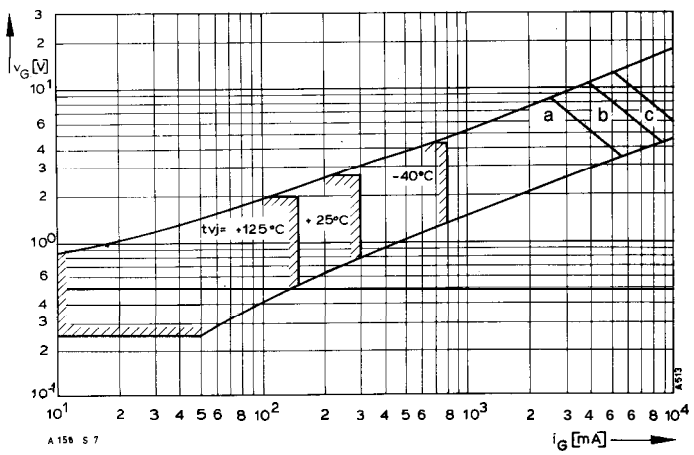




BildlFig. 17
Transienter innerer Wärmewiderstand $Z_{(th)JC} = f(t)$, DC
Transient thermal impedance $Z_{(th)JC} = f(t)$, DC
1 Beidseitige Kühlung/two-sided cooling
2 Anodenseitige Kühlunglanode side cooling
3 Kathodenseitige Kühlunglcathode side cooling



Bild/Fig. 16
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



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

Parameter:		a	b	c
Steuerimpulsdauer/Trigger pulse duration t_g	[ms]	10	1	0,5
Höchstzulässige Spitzensteuerverlustleistung/ Max. rated peak aate power dissipation P_{GM}	IWI	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]	0,007545	0,018999	0,046128	0,030328			
two-sided	τ_n [s]	0,000788	0,008775	0,032627	0,241467			
anodenseitig	R_{thn} [°C/W]	0,007705	0,022843	0,044024	0,040095	0,051333		
anode-sided	τ_n [s]	0,000805	0,009796	0,036779	0,373654	5,973800		
kathodenseitig	R_{thn} [°C/W]	0,007899	0,013758	0,038934	0,023369	0,028398	0,079099	0,074643
cathode-sided	τ_n [s]	0,000827	0,008751	0,022657	0,118979	0,577846	2,171151	9,760818

Analytische Funktion/analytical function:

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