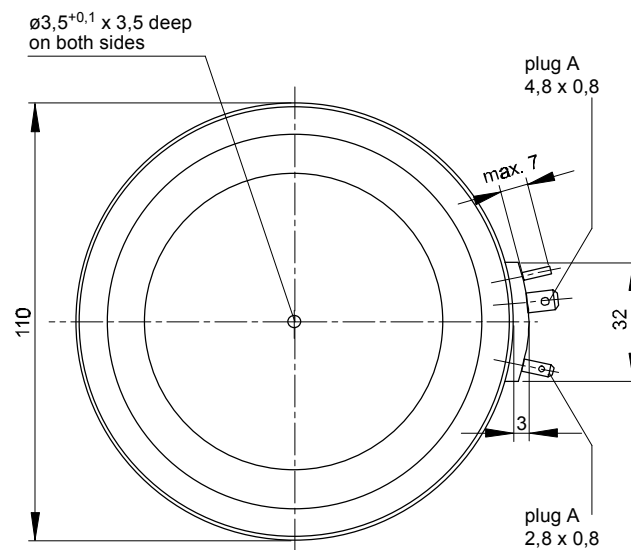
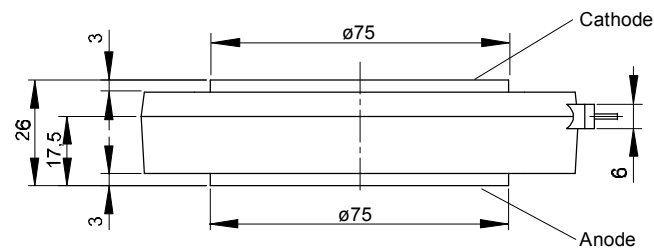




European Power-Semiconductor and Electronics Company

Marketing Information T 2709 N



T 2709 N

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 2200
Vorwärts-Stoßsperrspannung	non-repetitive peak forward off-state voltage	$t_{vj} = -40^{\circ}\text{C} \dots t_{vj \text{ max}}$	V_{DSM}	1600 1800 V 2000 2200
Rückwärts-Stoßsperrspannung	non-repetitive peak reverse voltage	$t_{vj} = +25^{\circ}\text{C} \dots t_{vj \text{ max}}$	V_{RSM}	1700 1900 V 2100 2300
Durchlaßstrom-Grenzeffektivwert	RMS on-state current		I_{TRMSM}	5800 A
Dauergrenzstrom	average on-state current	$t_c = 85^{\circ}\text{C}$	I_{TAVM}	2709 A
		$t_c = 61^{\circ}\text{C}$		3700 A
Stoßstrom-Grenzwert	surge current	$t_{vj} = 25^{\circ}\text{C}, t_p = 10 \text{ ms}$	I_{TSM}	54000 A ¹⁾
		$t_{vj} = t_{vj \text{ max}}, t_p = 10 \text{ ms}$		50000 A ¹⁾
Grenzlastintegral	$I^2 t$ -value	$t_{vj} = 25^{\circ}\text{C}, t_p = 10 \text{ ms}$	$I^2 t$	$14,58 \cdot 10^6 \text{ A}^2\text{s}$
		$t_{vj} = t_{vj \text{ max}}, t_p = 10 \text{ ms}$		$12,5 \cdot 10^6 \text{ A}^2\text{s}$
Kritische Stromsteilheit	critical rate of rise of on-state current	DIN IEC 747-6, $f = 50 \text{ Hz}$	$(di_T/dt)_{\text{cr}}$	200 A/ μs
		$I_{\text{GM}} = 1 \text{ A}, di_G/dt = 1 \text{ A}/\mu\text{s}$		
Kritische Spannungssteilheit	critical rate of rise of off-state voltage	$t_{vj} = t_{vj \text{ max}}, v_D = 0,67 V_{\text{DRM}}$	$(dv_D/dt)_{\text{cr}}$	1000 V/ μs
		5.Kennbuchstabe/5th letter F		
Charakteristische Werte	Characteristic values			
Durchlaßspannung	on-state voltage	$t_{vj} = t_{vj \text{ max}}, i_T = 11000 \text{ A}$	v_T	max. 2,35 V
Schleusenspannung	threshold voltage	$t_{vj} = t_{vj \text{ max}}$	$V_{\text{T(TO)}}$	0,9 V
Ersatzwiderstand	slope resistance	$t_{vj} = t_{vj \text{ max}}$	r_T	0,125 m Ω
Zündstrom	gate trigger current	$t_{vj} = 25^{\circ}\text{C}, v_D = 6 \text{ V}$	I_{GT}	max. 250 mA
Zündspannung	gate trigger voltage	$t_{vj} = 25^{\circ}\text{C}, v_D = 6 \text{ V}$	V_{GT}	max. 2 V
Nicht zündender Steuerstrom	gate non-trigger current	$t_{vj} = t_{vj \text{ max}}, v_D = 6 \text{ V}$	I_{GD}	max. 10 mA
		$t_{vj} = t_{vj \text{ max}}, v_D = 0,5 V_{\text{DRM}}$		max. 5 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	$t_{vj} = 25^{\circ}\text{C}, v_D = 6 \text{ V}, R_A = 5 \Omega$	I_{H}	max. 300 mA
Einraststrom	latching current	$t_{vj} = 25^{\circ}\text{C}, v_D = 6 \text{ V}, R_{\text{GK}} > = 10 \Omega$	I_{L}	max. 1500 mA
		$I_{\text{GM}} = 1 \text{ A}, di_G/dt = 1 \text{ A}/\mu\text{s}, t_g = 20 \mu\text{s}$		
Vorwärts- und Rückwärts-Sperrstrom	forward off-state and reverse currents	$t_{vj} = t_{vj \text{ max}}$	i_D, i_R	max. 250 mA
		$v_D = V_{\text{DRM}}, v_R = V_{\text{RRM}}$		
Zündverzögerung	gate controlled delay time	DIN IEC 747-6, $t_{vj} = 25^{\circ}\text{C}$	t_{gd}	max. 4 μs
		$i_{\text{GM}} = 1 \text{ A}, di_G/dt = 1 \text{ A}/\mu\text{s}$		
Freiwerdzeit	circuit commutated turn-off time	$t_{vj} = t_{vj \text{ max}}, i_{\text{TM}} = I_{\text{TAVM}}$	t_q	
		$v_{\text{RM}} = 100 \text{ V}, v_{\text{DM}} = 0,67 V_{\text{DRM}}$		
		$-di_T/dt = 20 \text{ A}/\mu\text{s}, -di_T/dt = 10 \text{ A}/\mu\text{s}$		
		4.Kennbuchstabe/4th letter O		typ. 300 μs
Thermische Eigenschaften	Thermal properties			
Innerer Wärmewiderstand	thermal resistance, junction to case	Kühlfläche/cooling surface beidseitig/two-sided, $\Theta = 180^{\circ} \sin$	R_{thJC}	max. 0,0085 $^{\circ}\text{C}/\text{W}$ max. 0,0078 $^{\circ}\text{C}/\text{W}$
Übergangs-Wärmewiderstand	thermal resistance, case to heatsink	Kühlfläche/cooling surface beidseitig/two-sided einseitig /single-sided	R_{thCK}	max. 0,0025 $^{\circ}\text{C}/\text{W}$ max. 0,0050 $^{\circ}\text{C}/\text{W}$
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_{stg}	-40...+150 $^{\circ}\text{C}$
Mechanische Eigenschaften	Mechanical properties			
Si-Elemente mit Druckkontakt, Amplifying-Gate, verzweigt	Si-pellet with pressure contact, amplifying gate, interdigitated			
Anpreßkraft	clamping force		F	42...95 kN
Gewicht	weight		G	typ. 1200 g
Kriechstrecke	creepage distance			30 mm
Feuchteklasse	humidity classification	DIN 40040		C
Schwingfestigkeit	vibration resistance	$f = 50 \text{ Hz}$		50 m/s ²
Gehäuse	case			Titelseite / front page

¹⁾ Gehäusegrenzstrom 38 kA (50Hz Sinushalbwellen). / Current limit of case 38 kA (50Hz sinusoidal half-wave).

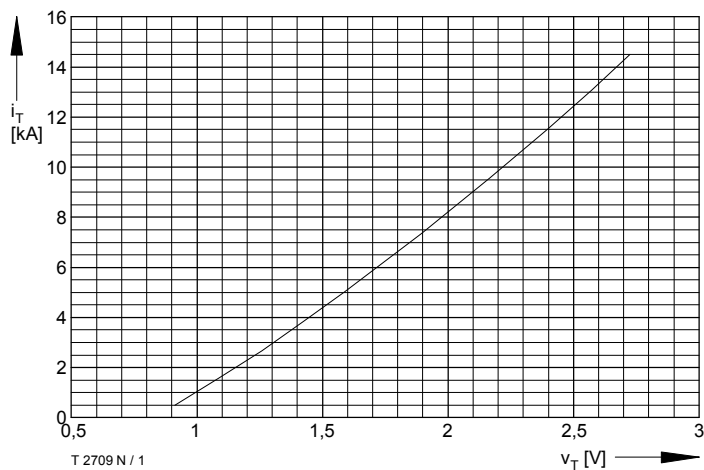


Bild / Fig. 1
Grenzdurchlaßkennlinie / Limiting on-state characteristic $i_T = f(v_T)$
 $t_{vj} = t_{vj \max}$

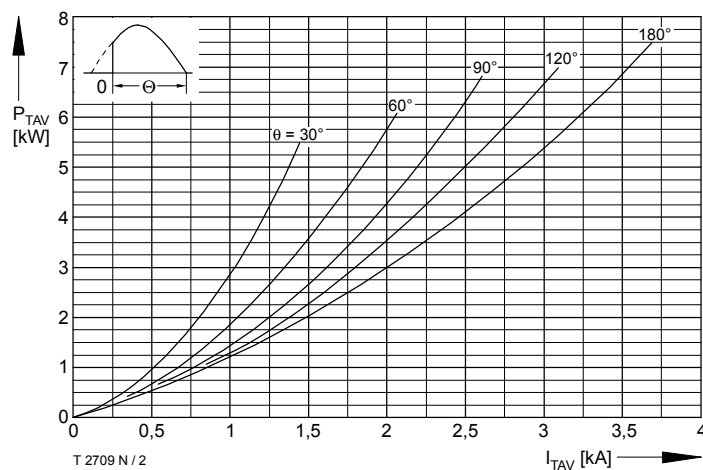


Bild / Fig. 2
Durchlaßverlustleistung / On-state power loss $P_{TAV} = f(I_{TAV})$
Parameter: Stromflußwinkel / Current conduction angle θ

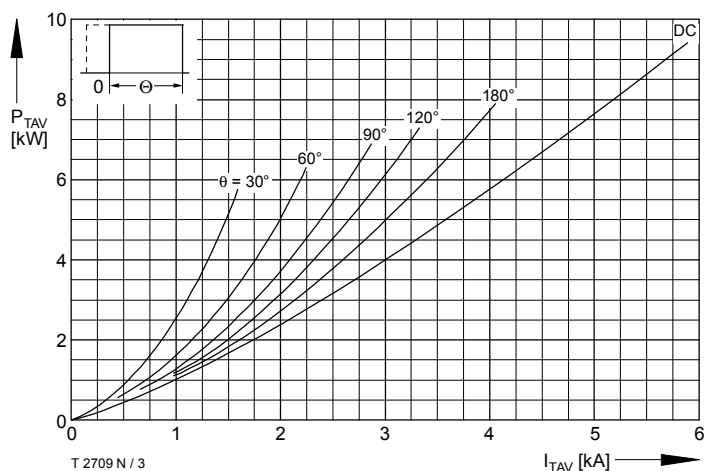


Bild / Fig. 3
Durchlaßverlustleistung / On-state power loss $P_{TAV} = f(I_{TAV})$
Parameter: Stromflußwinkel / Current conduction angle θ

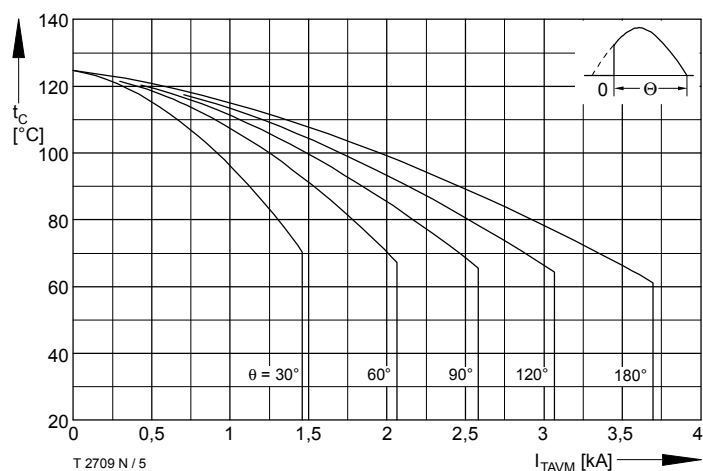


Bild / Fig. 5
Höchstzulässige Gehäusetemperatur / Maximum allowable case temperature $t_c = f(I_{TAVM})$
Beidseitige Kühlung / Two sided cooling
Parameter: Stromflußwinkel / current conduction angle θ

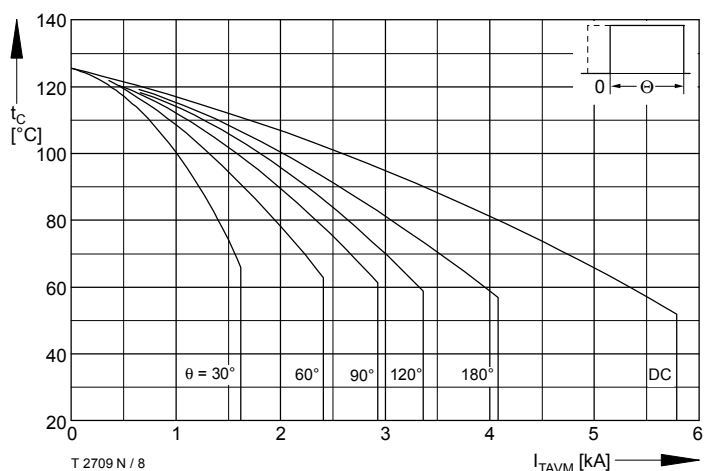


Bild / Fig. 8
Höchstzulässige Gehäusetemperatur / Maximum allowable case temperature $t_c = f(I_{TAVM})$
Beidseitige Kühlung / Two sided cooling
Parameter: Stromflußwinkel / current conduction angle θ

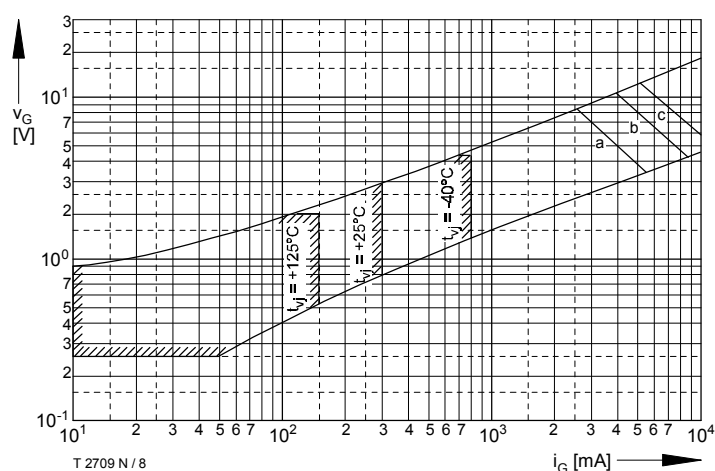


Bild / Fig. 8
Steuercharakteristik mit Zündbereichen / Gate characteristic with triggering areas $v_G = f(i_G)$, $V_D = 6 \text{ V}$
Parameter:

	a	b	c
Steuerimpulsdauer / Puls duration t_G [ms]	10	1	0,5
Höchstzulässige Spitzensteuerleistung / Maximum allowable peak gate power [W]	20	40	60

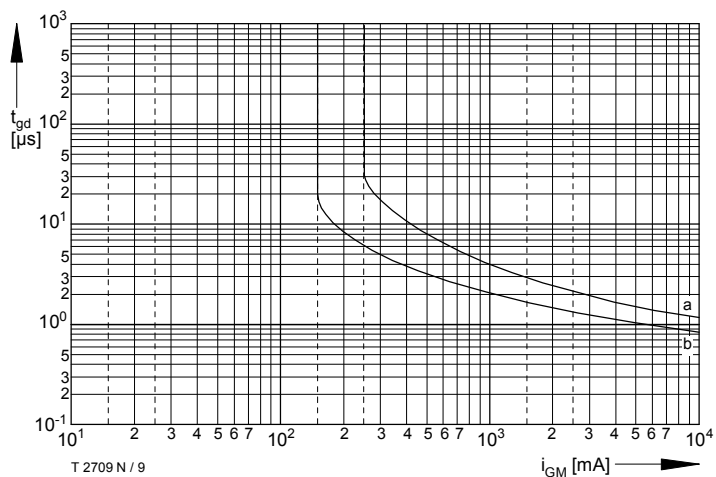


Bild / Fig. 9
 Zündverzögerung / Gate controlled delay time $t_{gd} = f(i_{GM})$, $t_{vj} = 25^\circ\text{C}$,
 $di_G/dt = i_{GM}/1\mu\text{s}$
 a - Maximaler Verlauf / Limiting characteristic
 b - Typischer Verlauf / Typical characteristic

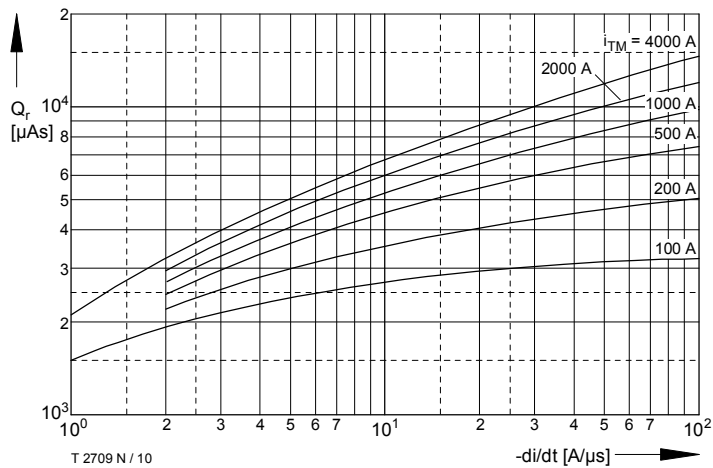


Bild / Fig. 10
 Sperrverzögerungsladung / Recovered charge $Q_r = f(di/dt)$
 $t_{vj} = t_{vj \max}$, $V_R \leq 0,5 V_{RRM}$, $V_{RM} = 0,8 V_{RRM}$
 Parameter: Durchlaßstrom / On-state current i_{TM}

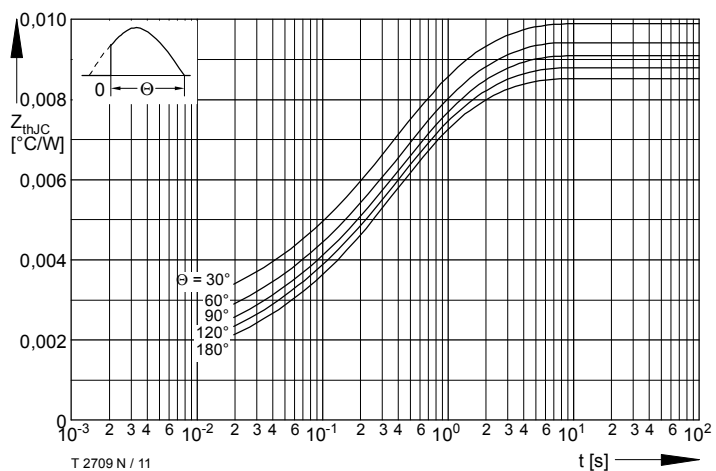


Bild / Fig. 11
 Transienter innerer Wärmewiderstand / Transient thermal impedance
 $Z_{thJC} = f(t)$
 Beidseitige Kühlung / Two-sided cooling
 Parameter: Stromflußwinkel / Current conduction angle θ

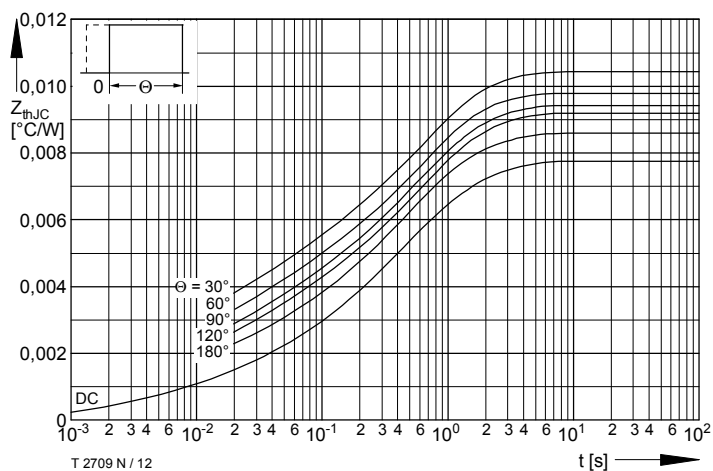


Bild / Fig. 12
 Transienter innerer Wärmewiderstand / Transient thermal impedance
 $Z_{thJC} = f(t)$
 Beidseitige Kühlung / Two-sided cooling
 Parameter: Stromflußwinkel / Current conduction angle θ

Analytische Elemente des transienten Wärmewiderstandes Z_{thJC} pro Zweig für DC
 Analytical elements of transient thermal impedance Z_{thJC} per arm for DC

Beidseitige Kühlung / Two-sided cooling

Pos. n	1	2	3	4	5	6
$R_{thn} [^\circ\text{C/W}]$	0,00003	0,00039	0,00123	0,0028	0,00338	
$\tau_n [s]$	0,000055	0,00392	0,0152	0,2068	1,0914	

Analytische Funktion / Analytical function:

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