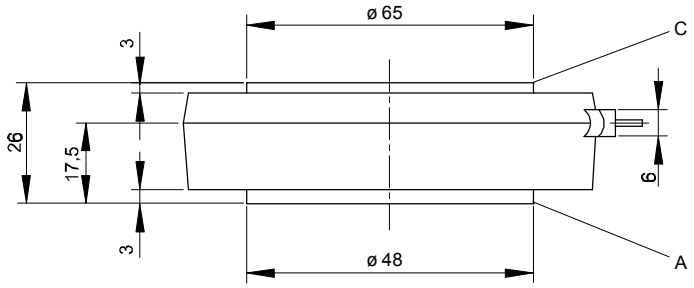
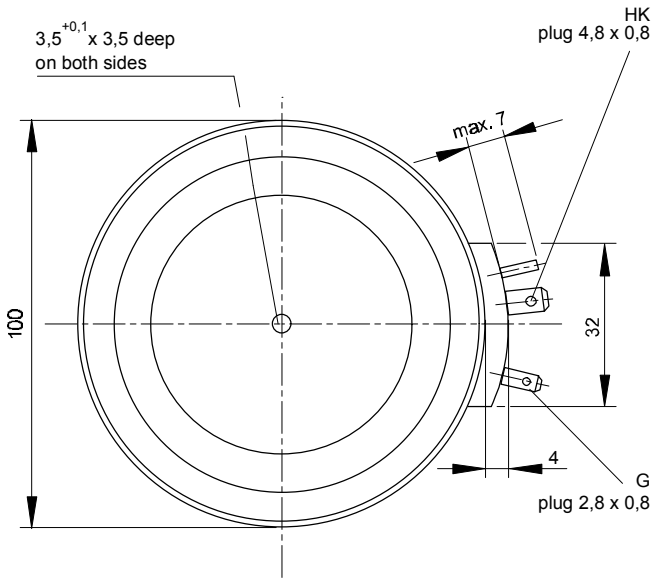
European Power-
Semiconductor and
Electronics Company

Marketing Information
T 1989 N





VWK Nov. 1996

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Elektrische Eigenschaften / Electrical properties

Höchstzulässige Werte / Maximum rated values

Periodische Vorwärts- und Rückwärts-Spitzensperrspannung	repetitive peak forward off-state and reverse voltages	t_{vj} = -40°C...$t_{vj\,max}$	V_{DRM}, V_{RRM}	1200 1400 1600 1800	V [1]
Vorwärts-Stoßspitzensperrspannung	non-repetitive peak forward off-state voltage	t_{vj} = -40°C...$t_{vj\,max}$	V_{DSM}	1200 1400 1600 1800	V
Rückwärts-Stoßspitzensperrspannung	non-repetitive peak reverse voltage	t_{vj} = +25°C...$t_{vj\,max}$	V_{RSM}	1300 1500 1700 1900	V
Durchlaßstrom-Grenzeffektivwert	RMS on-state current		I_{TRMSM}	4200	A
Dauergrenzstrom	average on-state current	t_c = 85°C	I_{TAVM}	1990	A
		t_c = 65°C		2675	A
Stoßstrom-Grenzwert	surge current	t_{vj} = 25°C, t_p = 10 ms	I_{TSM}	40000	A [1]
		t_{vj} = $t_{vj\,max}$, t_p = 10 ms		36000	A
Grenzlastintegral	I^2t-value	t_{vj} = 25°C, t_p = 10 ms	I^2t	$8 \cdot 10^6$	A^2s
		t_{vj} = $t_{vj\,max}$, t_p = 10 ms		$6{,}48 \cdot 10^6$	A^2s
Kritische Stromsteilheit	critical rate of rise of on-state current	DIN IEC 747-6, f= 50 Hz, v_L=10 V, i_{GM}= 1 A, di_G/dt = 1 A/µs	$(di_T/dt)_{cr}$	200	A/µs
Kritische Spannungssteilheit	critical rate of rise of off-state voltage	t_{vj} = $t_{vj\,max}$, v_D =0,67 V_{DRM}	$(dv_D/dt)_{cr}$		
		5.Kennbuchstabe/5th letter C		500	V/µs
		5.Kennbuchstabe/5th letter F		1000	V/µs

Charakteristische Werte / Characteristic values

Durchlaßspannung	on-state voltage	t_{vj} = $t_{vj\,max}$, i_T = 8000 A	v_T	max. 2,053	V
Schleusenspannung	threshold voltage	t_{vj} = $t_{vj\,max}$	$V_{T(TO)}$	0,90	V
Ersatzwiderstand	slope resistance	t_{vj} = $t_{vj\,max}$	r_T	0,120	mΩ
Zündstrom	gate trigger current	t_{vj} = 25 °C, v_D = 6 V	I_{GT}	max. 250	mA
Zündspannung	gate trigger voltage	t_{vj} = 25 °C, v_D = 6 V	V_{GT}	max. 2	V
Nicht zündender Steuerstrom	gate non-trigger current	t_{vj} = $t_{vj\,max}$, v_D = 6 V	I_{GD}	max. 10	mA
		t_{vj} = $t_{vj\,max}$, v_D = 0,5 V_{DRM}		max. 5	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 = 6 V, R_A = 5 Ω	I_H	max. 300	mA
Einraststrom	latching current	t_{vj} = 25 °C,v_D = 6 V, R_{GK} ≥ 10 Ω, i_{GM} = 1 A, di_G/dt = 1 A/µs, t_g = 20 µs	I_L	max. 1500	mA
Vorwärts- und Rückwärts-Sperrstrom	forward off-state and reverse currents	t_{vj} = $t_{vj\,max}$, v_D = V_{DRM}, v_R = V_{RRM}	i_D, i_R	max. 250	mA
Zündverzug	gate controlled delay time	DIN IEC 747-6, t_{vj}=25°C, i_{GM}=1A, di_G/dt=1A/µs	t_{gd}	max. 4	µs
Freiwerdezeit	circuit commutated turn-off time	t_{vj}=$t_{vj\,max}$, i_{TM}=i_{TAVM}, v_{RM}=100 V, v_{DM}=0,67 v_{DRM}, dv_D/dt=20V/µs,-di_T/dt=10A/µs, 4.Kennbuchstabe/4th letter O	t_q	typ. 250	µs

Thermische Eigenschaften / Thermal properties

Innerer Wärmewiderstand	thermal resistance, junction to case	Kühlfläche/cooling surface	R_{thJC}		
		beidseitig/two-sided, Θ =180° sin		max. 0,0133	°C/W
		beidseitig/two-sided, DC		max. 0,0125	°C/W
Übergangs-Wärmewiderstand	thermal resistance, case to heatsink	Kühlfläche/cooling surface	R_{thCK}		
		beidseitig/two-sided		max. 0,0030	°C/W
		einseitig/single-sided		max. 0,0060	°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...+150	°C

Mechanische Eigenschaften / Mechanical properties

Si-Element mit Druckkontakt, Amplifying-Gate	Si-pellet with pressure contact, amplifying gate				
Anpreßkraft	clamping force		F	30...65	kN
Gewicht	weight		G	typ. 900	g
Kriechstrecke	creepage distance			30	mm
Feuchteklasse	humidity classification	DIN 40040			C
Schwingfestigkeit	vibration resistance	f = 50 Hz		50	m/s²
Gehäuse	case			Titelseite / front page	

[1] Gehäusegrenzstrom 36 kA (50Hz Sinushalbwelle). / Current limit of case 36 kA (50Hz sinusoidal half-wave).

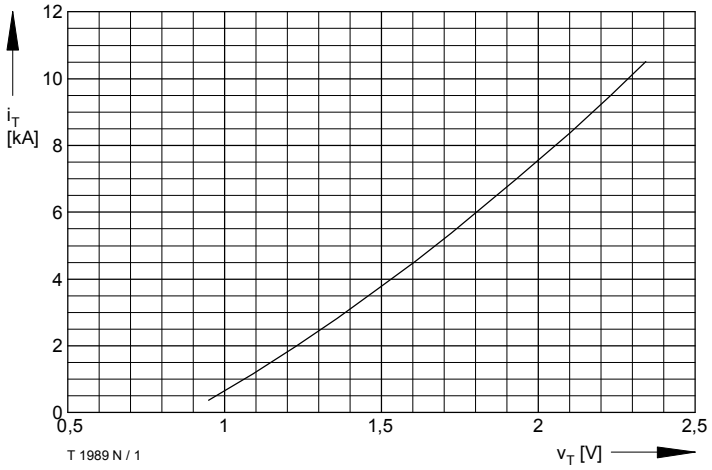

Bild / Fig. 1
Grenzdurchlaßkennlinie / Limiting on-state characteristic $i_T = f(v_T)$
$t_{vj} = t_{vj\ max}$

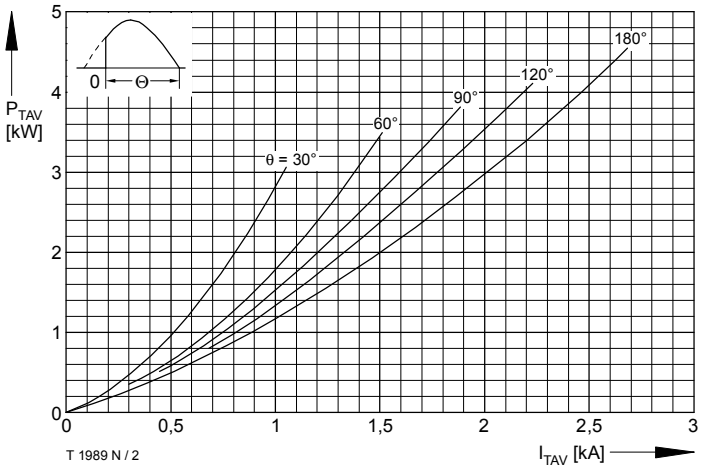

Bild / Fig. 2
Durchlaßverlustleistung / On-state power loss $P_{TAV} = f(I_{TAV})$
Parameter: Stromflußwinkel / Current conduction angle θ

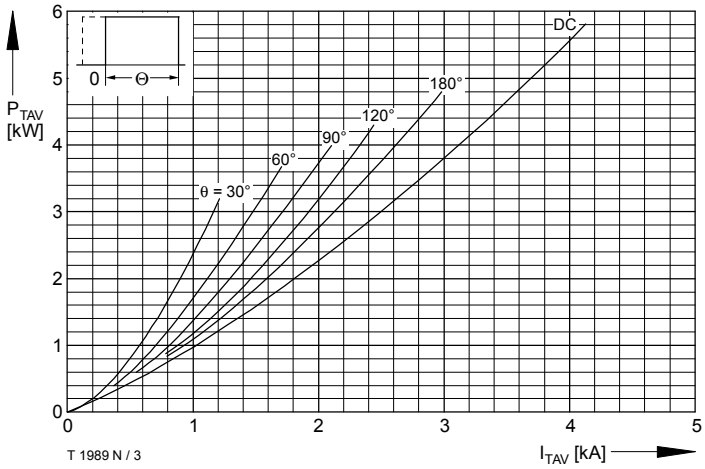

Bild / Fig. 3
Durchlaßverlustleistung / On-state power loss $P_{TAV} = f(I_{TAV})$
Parameter: Stromflußwinkel / Current conduction angle θ

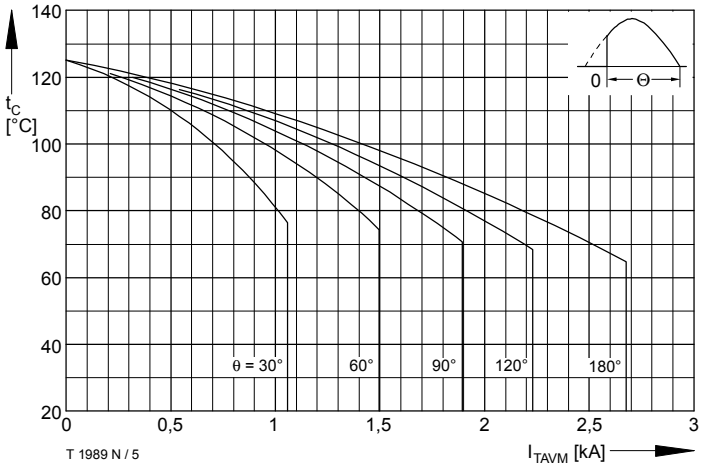

Bild / Fig. 5
Höchstzulässige Gehäusetemperatur / Maximum allowable case temperature
$t_c = f(I_{TAVM})$
Beidseitige Kühlung / Two sided cooling
Parameter: Stromflußwinkel / current conduction angle θ
Berechnungsgrundlage P_{TAV} (Schaltverluste gesondert berücksichtigen) /
Calculation base P_{TAV} (switching losses should be condidered separately)

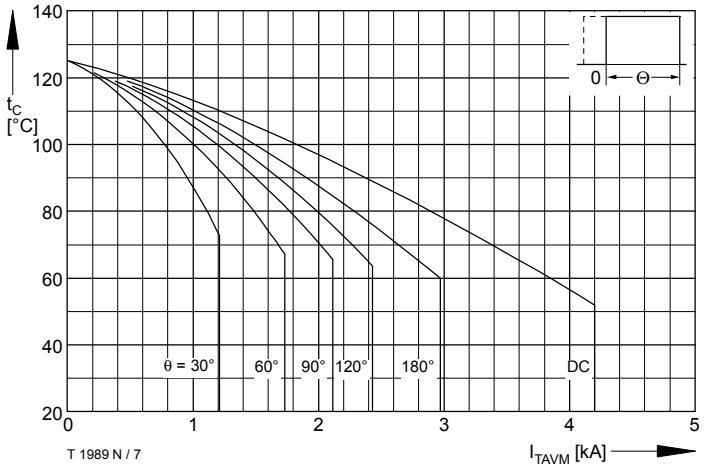

Bild / Fig. 7
Höchstzulässige Gehäusetemperatur / Maximum allowable case temperature
$t_c = f(I_{TAVM})$
Beidseitige Kühlung / Two sided cooling
Parameter: Stromflußwinkel / current conduction angle θ

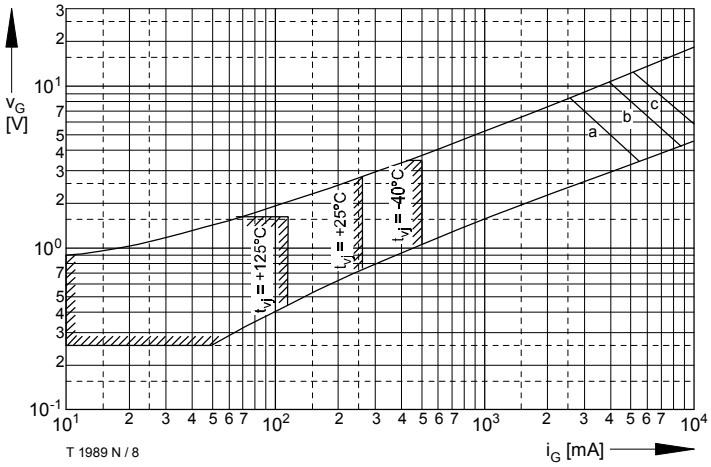

Bild / Fig. 8
Steuercharakteristik mit Zündbereichen / Gate characteristic with trigging areas $v_G = f(i_G)$, V_D = 6 V

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

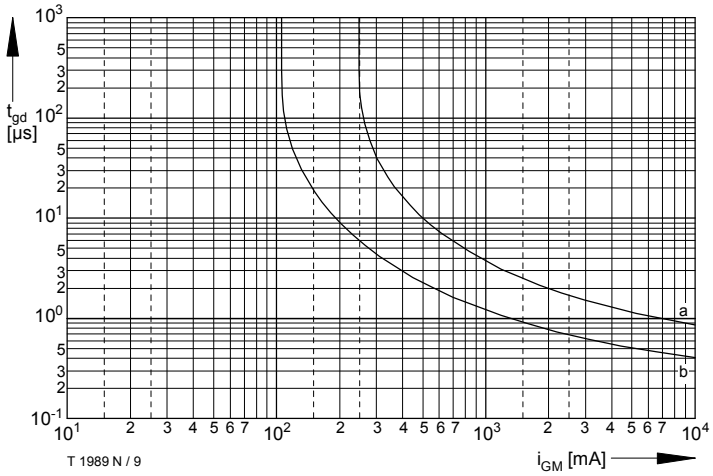

Bild / Fig. 9
Zündverzug / Gate controlled delay time $t_{gd} = f(i_{GM})$, $t_{vj} = 25°C$,
$di_G/dt = i_{GM}/1µs$
a - Maximaler Verlauf / Limiting characteristic
b - Typischer Verlauf / Typical characteristic

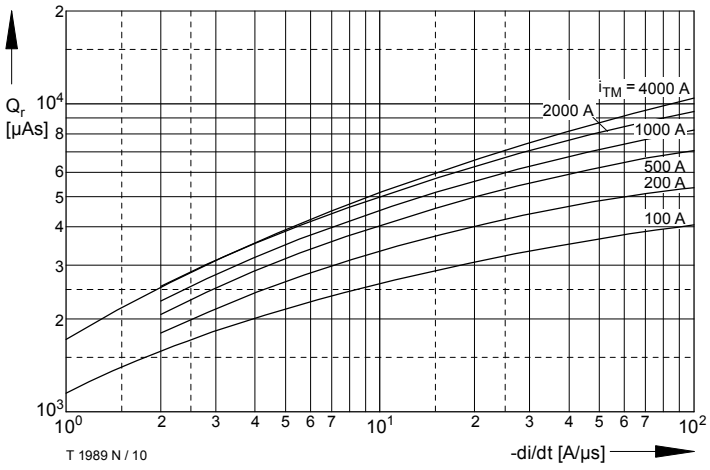

Bild / Fig. 10
Sperrverzögerungsladung / Recovered charge $Q_r = f(di/dt)$
$t_{vj} = t_{vj\,max}$, $v_R \leq 0,5\ V_{RRM}$, $v_{RM} = 0,8\ V_{RRM}$
Parameter: Durchlaßstrom / On-state current i_{TM}

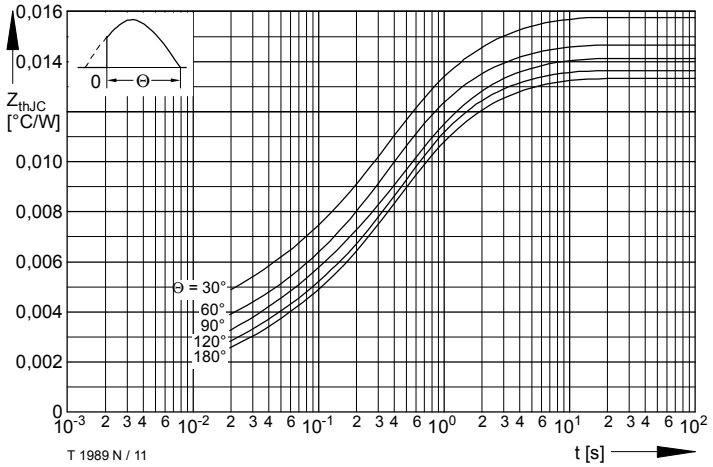

Bild / Fig. 11
Transienter innerer Wärmewiderstand / Transient thermal impedance
$Z_{thJC} = f(t)$
Beidseitige Kühlung / Two-sided cooling
Parameter: Stromflußwinkel / Current conduction angle θ

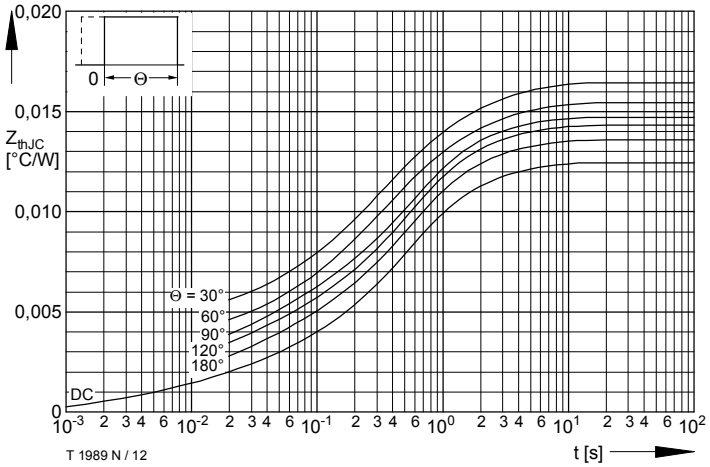

Bild / Fig. 12
Transienter innerer Wärmewiderstand / Transient thermal impedance
$Z_{thJC} = f(t)$
Beidseitige Kühlung / Two-sided cooling
Parameter: Stromflußwinkel / Current conduction angle θ

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}[°C/W]	0,000036	0,0006	0,00097	0,002917	0,00456	0,0034
τ_n[s]	0,000287	0,00298	0,0135	0,134	0,449	2,05

Analytische Funktion / Analytical function:

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