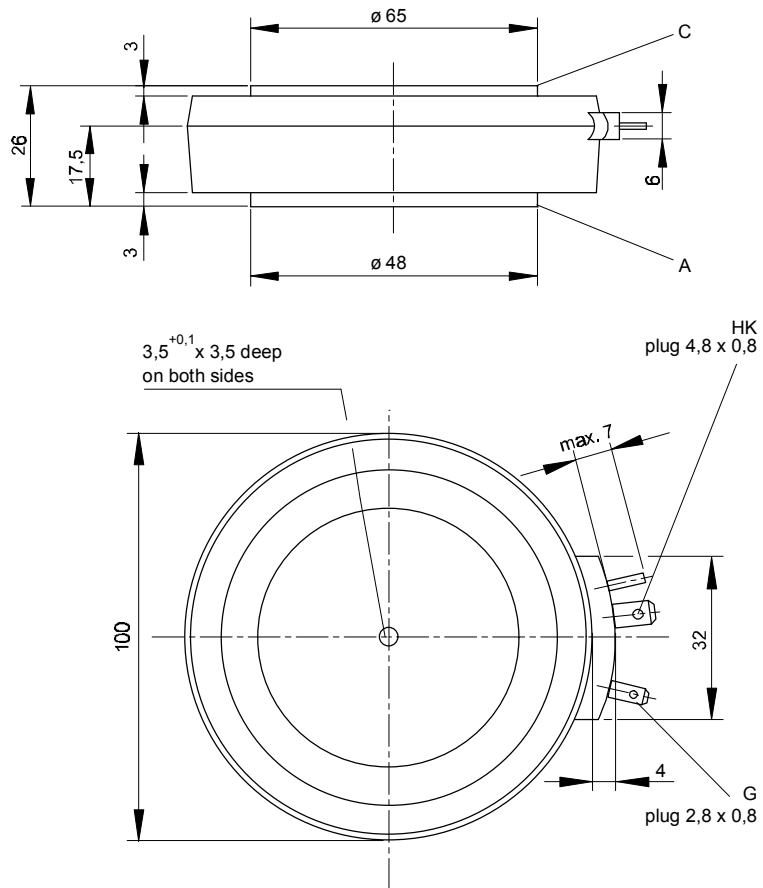




European Power-Semiconductor and Electronics Company

Marketing Information T 1989 N



T 1989 N

Elektrische Eigenschaften

Höchstzulässige Werte

Periodische Vorwärts- und Rückwärts-Spitzenspannung

Vorwärts-Stoßspitzenspannung

Rückwärts-Stoßspitzenspannung

Durchlaßstrom-Grenzeffektivwert

Dauergrenzstrom

Stoßstrom-Grenzwert

Grenzlastintegral

Kritische Stromsteilheit

Kritische Spannungssteilheit

Electrical properties

Maximum rated values

repetitive peak forward off-state and reverse voltages

non-repetitive peak forward off-state voltage

non-repetitive peak reverse voltage

RMS on-state current

average on-state current

surge current

$I^2 t$ -value

critical rate of rise of on-state current

critical rate of rise of off-state voltage

$$t_{vj} = -40^\circ\text{C} \dots t_{vj\max}$$

$$t_{vj} = -40^\circ\text{C} \dots t_{vj\max}$$

$$t_{vj} = +25^\circ\text{C} \dots t_{vj\max}$$

$$t_c = 85^\circ\text{C}$$

$$t_c = 65^\circ\text{C}$$

$$t_{vj} = 25^\circ\text{C}, t_p = 10 \text{ ms}$$

$$t_{vj} = t_{vj\max}, t_p = 10 \text{ ms}$$

$$t_{vj} = 25^\circ\text{C}, t_p = 10 \text{ ms}$$

$$t_{vj} = t_{vj\max}, t_p = 10 \text{ ms}$$

DIN IEC 747-6, $f = 50 \text{ Hz}$,

$V_L = 10 \text{ V}$, $i_{GM} = 1 \text{ A}$, $di_G/dt = 1 \text{ A}/\mu\text{s}$

$t_{vj} = t_{vj\max}$, $V_D = 0,67 V_{DRM}$

5.Kennbuchstabe/5th letter C

5.Kennbuchstabe/5th letter F

V_{DRM}, V_{RRM}

V_{DSM}

V_{RSM}

I_{TRMSM}

I_{TAVM}

I_{TSM}

$I^2 t$

$(di_T/dt)_{cr}$

$(dv_D/dt)_{cr}$

1200 1400 1600 $V^{1)}$

1800

1200 1400 1600 V

1800

1300 1500 1700 V

1900

4200 A

1990 A

2675 A

40000 $A^{1)}$

36000 A

$8 \cdot 10^6 \text{ A}^2\text{s}$

$6,48 \cdot 10^6 \text{ A}^2\text{s}$

200 $A/\mu\text{s}$

500 $V/\mu\text{s}$

1000 $V/\mu\text{s}$

Charakteristische Werte

Durchlaßspannung

Schleusenspannung

Ersatzwiderstand

Zündstrom

Zündspannung

Nicht zündender Steuerstrom

Nicht zündende Steuerspannung

Haltestrom

Einraststrom

Vorwärts- und Rückwärts-Sperrstrom

Zündverzögerung

Freiwerdezeit

Characteristic values

on-state voltage

threshold voltage

slope resistance

gate trigger current

gate trigger voltage

gate non-trigger current

gate non-trigger voltage

holding current

latching current

forward off-state and reverse currents

gate controlled delay time

circuit commutated turn-off time

$$t_{vj} = t_{vj\max}, i_T = 8000 \text{ A}$$

$$t_{vj} = t_{vj\max}$$

$$t_{vj} = t_{vj\max}$$

$$t_{vj} = 25^\circ\text{C}, V_D = 6 \text{ V}$$

$$t_{vj} = 25^\circ\text{C}, V_D = 6 \text{ V}$$

$$t_{vj} = t_{vj\max}, V_D = 6 \text{ V}$$

$$t_{vj} = t_{vj\max}, V_D = 0,5 V_{DRM}$$

$$t_{vj} = t_{vj\max}, V_D = 0,5 V_{DRM}$$

$$t_{vj} = 25^\circ\text{C}, V_D = 6 \text{ V}, R_A = 5 \Omega$$

$$t_{vj} = 25^\circ\text{C}, V_D = 6 \text{ V}, R_{GK} \geq 10 \Omega$$

$$i_{GM} = 1 \text{ A}, di_G/dt = 1 \text{ A}/\mu\text{s}, t_g = 20 \mu\text{s}$$

$$t_{vj} = t_{vj\max}, V_D = V_{DRM}, V_R = V_{RRM}$$

$$\text{DIN IEC 747-6, } t_{vj} = 25^\circ\text{C}, i_{GM} = 1 \text{ A,}$$

$$di_G/dt = 1 \text{ A}/\mu\text{s}$$

$$t_{vj} = t_{vj\max}, I_{TM} = I_{TAVM}, V_{RM} = 100 \text{ V}, V_{DM} = 0,67 t_{vj}$$

$$V_{DRM}, dv_D/dt = 20 \text{ V}/\mu\text{s}, -di_T/dt = 10 \text{ A}/\mu\text{s,}$$

$$4 \text{ Kennbuchstabe/4th letter O}$$

V_T

$V_{T(TO)}$

r_T

I_{GT}

V_{GT}

I_{GD}

V_{GD}

I_H

I_L

i_D, i_R

t_{gd}

max. 2,053 V

0,90 V

0,120 $m\Omega$

max. 250 mA

max. 2 V

max. 10 mA

max. 5 mA

max. 0,25 V

max. 300 mA

max. 1500 mA

max. 250 mA

max. 4 μs

typ. 250 μs

Thermische Eigenschaften

Innerer Wärmewiderstand

Übergangs-Wärmewiderstand

Höchstzul. Sperrschichttemperatur

Betriebstemperatur

Lagertemperatur

Thermal properties

thermal resistance, junction to case

thermal resistance, case to heatsink

max. junction temperature

operating temperature

storage temperature

Kühlfläche/cooling surface

beidseitig/two-sided, $\Theta = 180^\circ \text{ sin}$

beidseitig/two-sided, DC

Kühlfläche/cooling surface

beidseitig/two-sided

einseitig/single-sided

R_{thJC}

R_{thCK}

$t_{vj\max}$

$t_{c\text{op}}$

t_{stg}

max. 0,0133 $^\circ\text{C}/\text{W}$

max. 0,0125 $^\circ\text{C}/\text{W}$

max. 0,0030 $^\circ\text{C}/\text{W}$

max. 0,0060 $^\circ\text{C}/\text{W}$

125 $^\circ\text{C}$

-40...+125 $^\circ\text{C}$

-40...+150 $^\circ\text{C}$

Mechanische Eigenschaften

Si-Element mit Druckkontakt, Amplifying-
Gate

Anpreßkraft

Gewicht

Kriechstrecke

Feuchteklasse

Schwingfestigkeit

Gehäuse

Mechanical properties

Si-pellet with pressure contact, amplifying
gate

clamping force

weight

creepage distance

humidity classification

vibration resistance

case

DIN 40040

$f = 50 \text{ Hz}$

F

G

DIN 40040

$f = 50 \text{ Hz}$

30...65 kN

typ. 900 g

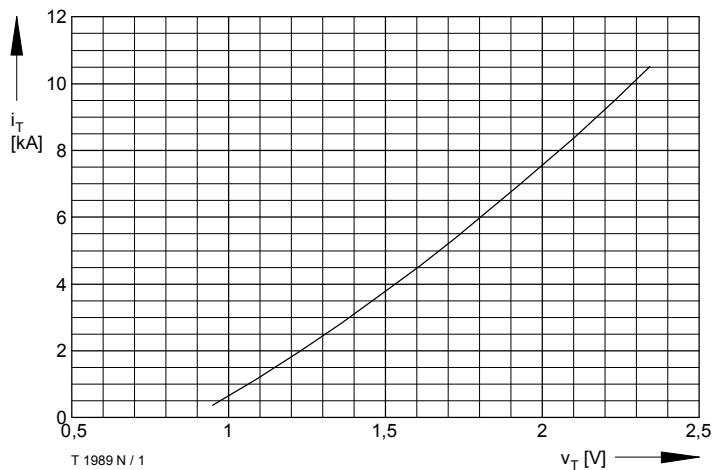
30 mm

C

50 m/s^2

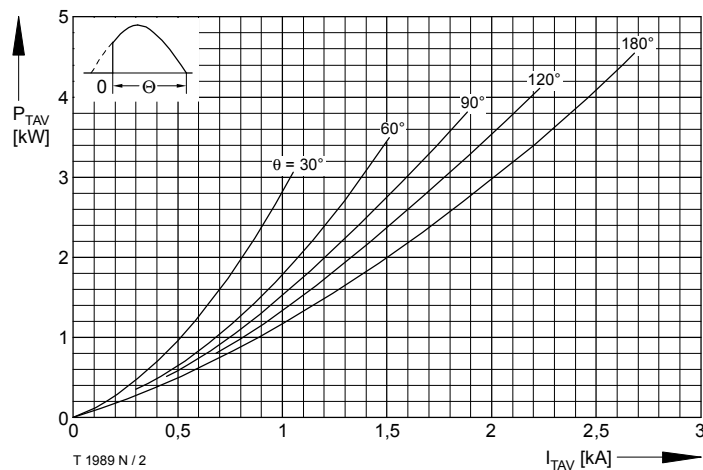
Titelseite / front page

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



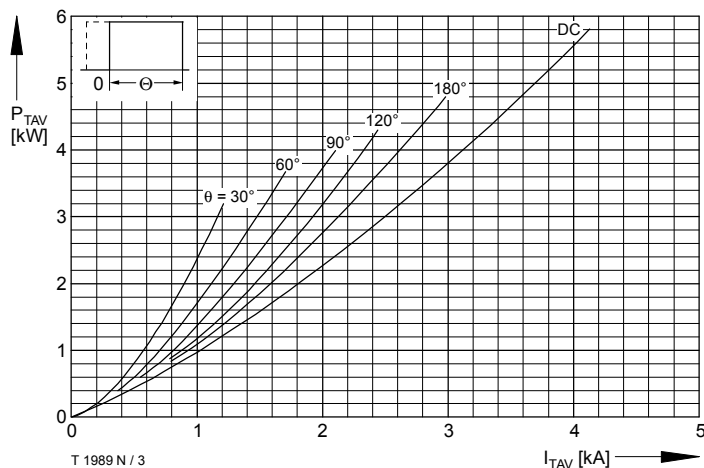
T 1989 N / 1

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



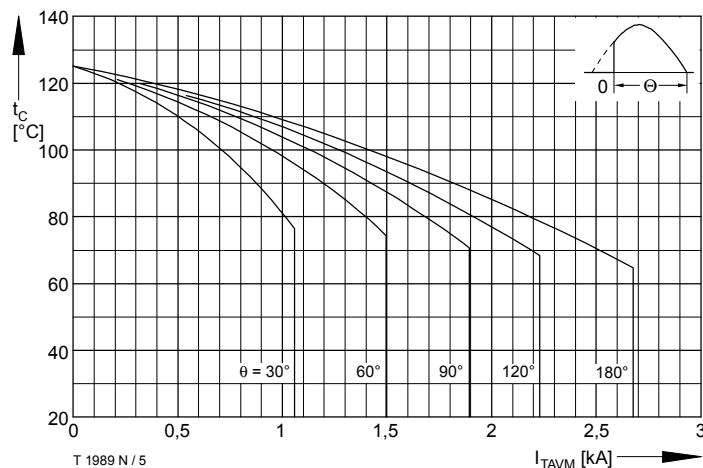
T 1989 N / 2

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



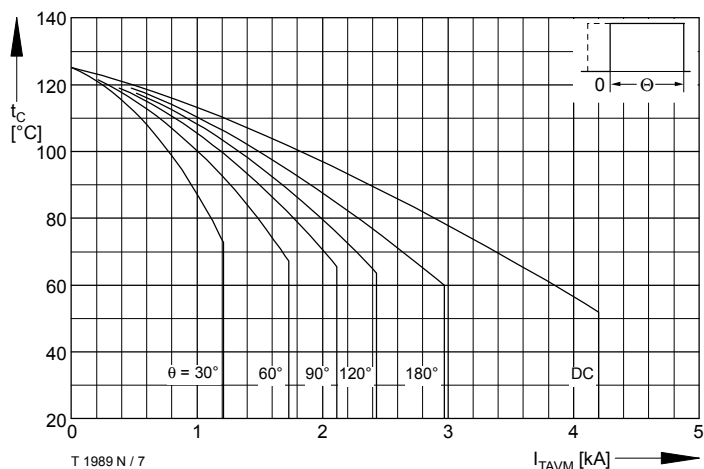
T 1989 N / 3

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



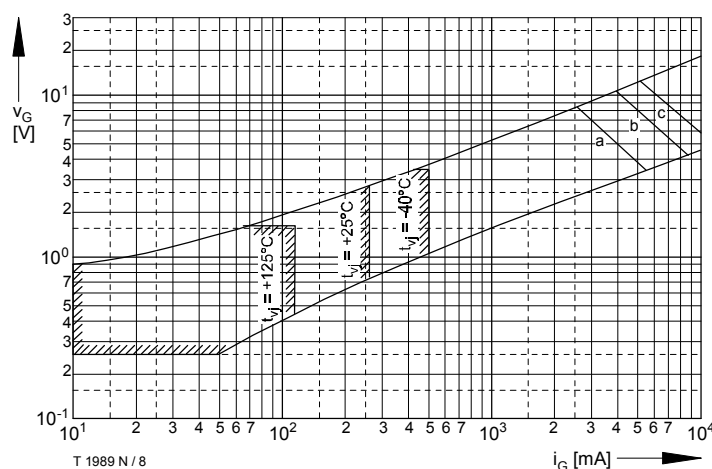
T 1989 N / 5

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 considered separately)



T 1989 N / 7

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



T 1989 N / 8

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_p [ms]	10	1	0.5
Höchstzulässige Spitzensteuerleistung / Maximum allowable peak gate power [W]	20	40	60

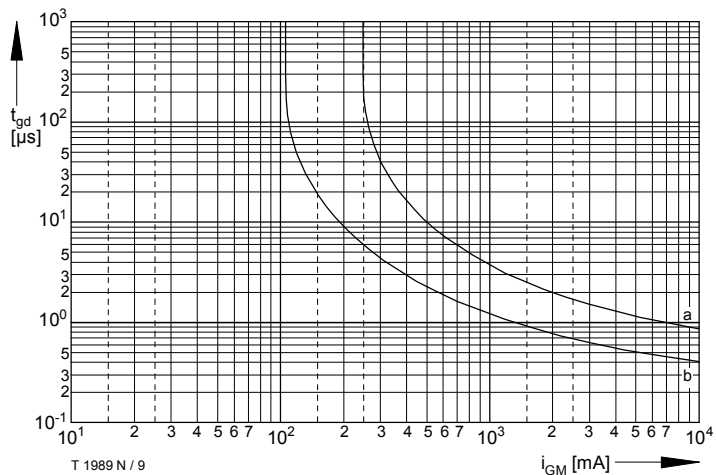


Bild / Fig. 9
 Zündverzögerung / Gate controlled delay time $t_{gd} = f(i_{GM})$, $t_{vj} = 25^\circ\text{C}$,
 $di_G/dt = i_{GM}/1\mu\text{s}$
 a - Maximaler Verlauf / Limiting characteristic
 b - Typischer Verlauf / Typical characteristic

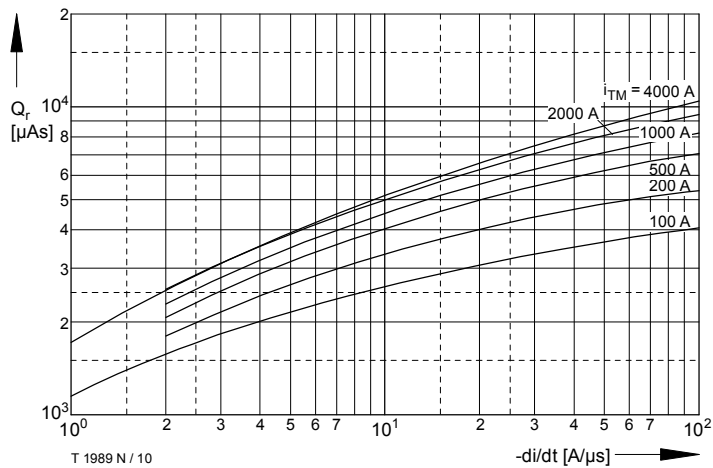


Bild / Fig. 10
 Sperrverzögerungsladung / Recovered charge $Q_r = f(di/dt)$
 $t_{vj} = t_{vj \max}$, $V_R \leq 0,5 V_{RRM}$, $V_{RM} = 0,8 V_{RRM}$
 Parameter: Durchlaßstrom / On-state current i_{TM}

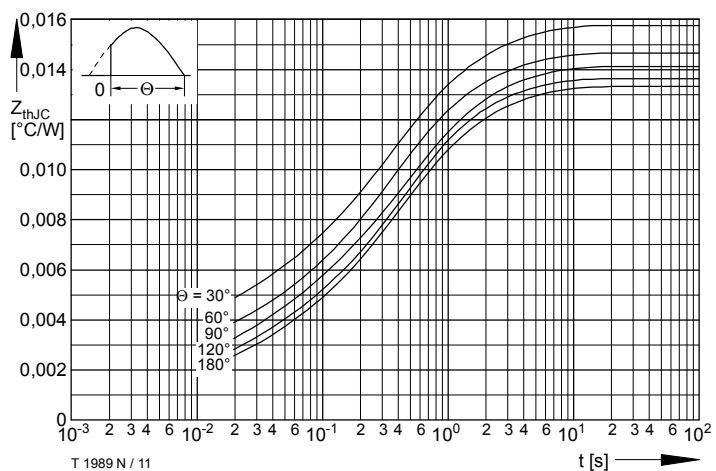


Bild / Fig. 11
 Transienter innerer Wärmewiderstand / Transient thermal impedance
 $Z_{thJC} = f(t)$
 Beidseitige Kühlung / Two-sided cooling
 Parameter: Stromflußwinkel / Current conduction angle θ

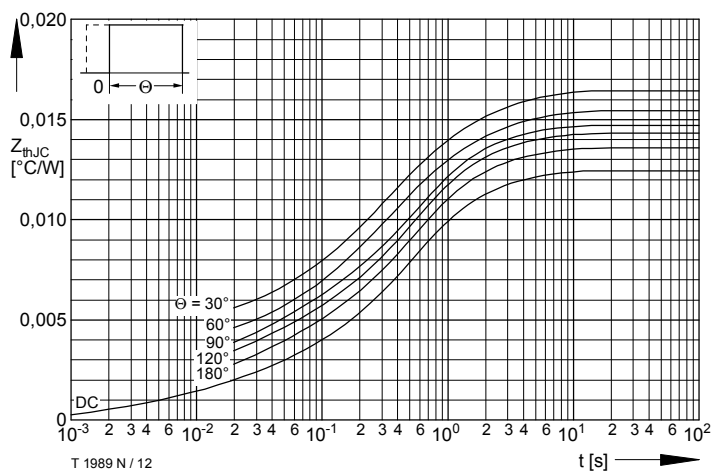


Bild / Fig. 12
 Transienter innerer Wärmewiderstand / Transient thermal impedance
 $Z_{thJC} = f(t)$
 Beidseitige Kühlung / Two-sided cooling
 Parameter: Stromflußwinkel / Current conduction angle θ

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
$R_{thn} [^\circ\text{C}/\text{W}]$	0,000036	0,0006	0,00097	0,002917	0,00456	0,0034
$\tau_n [\text{s}]$	0,000287	0,00298	0,0135	0,134	0,449	2,05

Analytische Funktion / Analytical function:

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

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