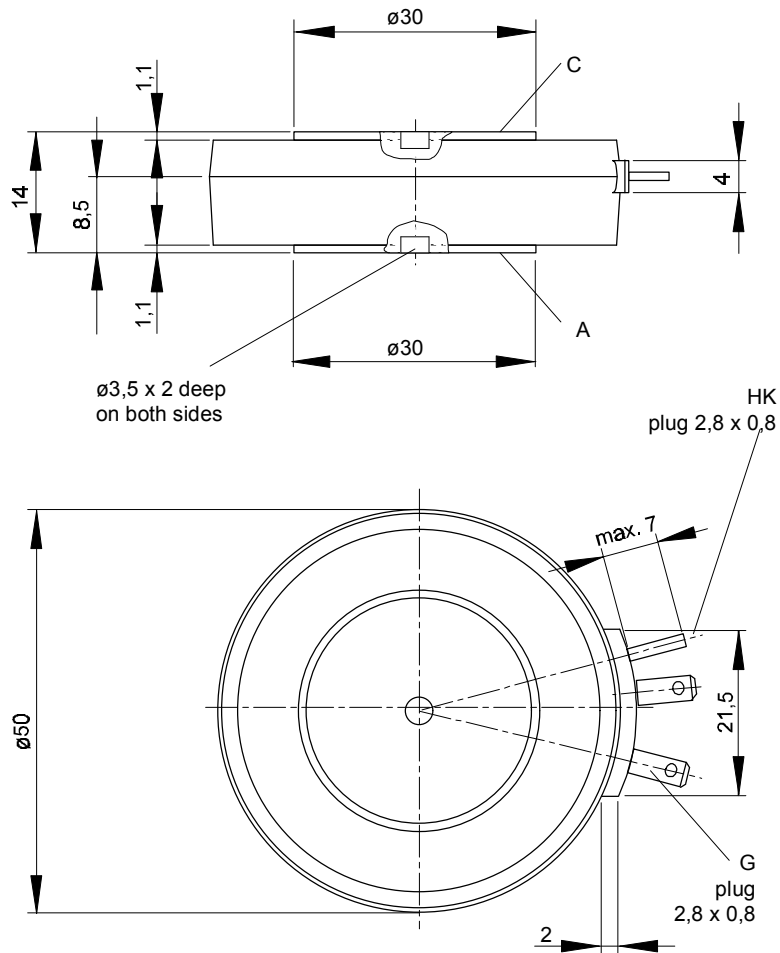




European Power-Semiconductor and Electronics Company

Marketing Information

T 388 N



T 388 N

Elektrische Eigenschaften

Höchstzulässige Werte

Periodische Vorwärts- und Rückwärts-Spitzensperrspannung

Electrical properties

Maximum rated values

repetitive peak forward off-state and reverse voltages

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

$$V_{\text{DRM}}, V_{\text{RRM}} \quad 600 \ 800 \ 1000 \ 1200 \quad \text{V}$$

$$1400 \ 1600 \ 1800^*$$

Vorwärts-Stoßspitzensperrspannung

non-repetitive peak forward off-state voltage

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

$$V_{\text{DSM}} = V_{\text{DRM}} \quad 600 \ 800 \ 1000 \ 1200 \quad \text{V}$$

$$1400 \ 1600 \ 1800^*$$

Rückwärts-Stoßspitzensperrspannung

non-repetitive peak reverse voltage

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

$$V_{\text{RSM}} = V_{\text{RRM}} \quad 700 \ 900 \ 1100 \ 1300 \quad \text{V}$$

$$1500 \ 1700 \ 1900$$

Durchlaßstrom-Grenzeffektivwert

RMS on-state current

$$I_{\text{TRMSM}} \quad 730 \quad \text{A}$$

Dauergrenzstrom

average on-state current

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

$$I_{\text{TAVM}} \quad 388 \quad \text{A}$$

$$t_c = 72^{\circ}\text{C}$$

$$465 \quad \text{A}$$

Stoßstrom-Grenzwert

surge current

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

$$I_{\text{TSM}} \quad 7200 \quad \text{A}$$

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

$$6400 \quad \text{A}$$

Grenzlastintegral

$I^2 t$ -value

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

$$I^2 t \quad 260000 \quad \text{A}^2\text{s}$$

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

$$205000 \quad \text{A}^2\text{s}$$

Kritische Stromsteilheit

critical rate of rise of on-state current

$$V_D \leq 67\%, V_{\text{DRM}}, f = 50 \text{ Hz}$$

$$(di_T/dt)_{\text{cr}} \quad 120 \quad \text{A}/\mu\text{s}$$

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

Kritische Spannungssteilheit

critical rate of rise of off-state voltage

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

$$(dv/dt)_{\text{cr}} \quad 1000 \quad \text{V}/\mu\text{s}$$

Charakteristische Werte

Characteristic values

Durchlaßspannung

on-state voltage

$$t_{vj} = t_{vj \text{ max}}, i_T = 1500 \text{ A}$$

$$V_T \quad \text{max. } 2,1 \quad \text{V}$$

Schleusenspannung

threshold voltage

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

$$V_{T(\text{TO})} \quad 0,9 \quad \text{V}$$

Ersatzwiderstand

slope resistance

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

$$r_T \quad 0,75 \quad \text{m}\Omega$$

Zündstrom

gate trigger current

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

$$I_{\text{GT}} \quad \text{max. } 200 \quad \text{mA}$$

Zündspannung

gate trigger voltage

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

$$V_{\text{GT}} \quad \text{max. } 2 \quad \text{V}$$

Nicht zündender Steuerstrom

gate non-trigger current

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

$$I_{\text{GD}} \quad \text{max. } 10 \quad \text{mA}$$

Nicht zündende Steuerspannung

gate non-trigger voltage

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

$$V_{\text{GD}} \quad \text{max. } 0,2 \quad \text{V}$$

Haltestrom

holding current

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

$$I_H \quad \text{max. } 300 \quad \text{mA}$$

Einraststrom

latching current

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

$$I_L \quad \text{max. } 1,2 \quad \text{A}$$

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

Vorwärts- und Rückwärts-Sperrstrom

forward off-state and reverse currents

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

$$i_D, i_R \quad \text{max. } 50 \quad \text{mA}$$

Zündverzug

gate controlled delay time

$$t_{vj} = 25^{\circ}\text{C}, i_{\text{GM}} = 1 \text{ A}, di_G/dt = 1 \text{ A}/\mu\text{s}$$

$$t_{\text{gd}} \quad \text{max. } 4 \quad \mu\text{s}$$

Freiwerdezeit

circuit commutated turn-off time

siehe Techn.Erl./see Techn. Inf.

$$t_q \quad \text{typ. } 220 \quad \mu\text{s}$$

Thermische Eigenschaften

Thermal properties

Innerer Wärmewiderstand für beidseitige Kühlung

thermal resistance, junction to case for two-sided cooling

$$\Theta = 180^{\circ} \text{ el, sin}$$

$$R_{\text{thJC}} \quad \text{max. } 0,068 \quad ^{\circ}\text{C/W}$$

DC

$$\text{max. } 0,065 \quad ^{\circ}\text{C/W}$$

für anodenseitige Kühlung

for anode-sided cooling

$$\Theta = 180^{\circ} \text{ el, sin}$$

$$R_{\text{thJC(A)}} \quad \text{max. } 0,113 \quad ^{\circ}\text{C/W}$$

DC

$$\text{max. } 0,11 \quad ^{\circ}\text{C/W}$$

für kathodenseitige Kühlung

for cathode-sided cooling

$$\Theta = 180^{\circ} \text{ el, sin}$$

$$R_{\text{thJC(K)}} \quad \text{max. } 0,159 \quad ^{\circ}\text{C/W}$$

DC

$$\text{max. } 0,156 \quad ^{\circ}\text{C/W}$$

Übergangs-Wärmewiderstand

thermal resistance, case to heatsink

beidseitig/two-sided

$$R_{\text{thCK}} \quad \text{max. } 0,01 \quad ^{\circ}\text{C/W}$$

einseitig/one-sided

$$\text{max. } 0,02 \quad ^{\circ}\text{C/W}$$

Höchstzul. Sperrschichttemperatur

max. junction temperature

$$t_{vj \text{ max}} \quad 125 \quad ^{\circ}\text{C}$$

Betriebstemperatur

operating temperature

$$t_{c \text{ op}} \quad -40 \dots +125 \quad ^{\circ}\text{C}$$

Lagertemperatur

storage temperature

$$t_{\text{stg}} \quad -40 \dots +140 \quad ^{\circ}\text{C}$$

Mechanische Eigenschaften

Mechanical properties

Si-Elemente mit Druckkontakt

Si-pellet with pressure contact

Anpreßkraft

clamping force

$$F \quad 5 \dots 10 \quad \text{kN}$$

Gewicht

weight

$$G \quad \text{typ. } 100 \quad \text{g}$$

Kriechstrecke

creepage distance

$$17 \quad \text{mm}$$

Feuchteklasse

humidity classification

$$\text{DIN } 40040$$

$$\text{C}$$

Schwingfestigkeit

vibration resistance

$$f = 50 \text{ Hz}$$

$$50 \quad \text{m/s}^2$$

Maßbild, anliegend

outline, attached

$$\text{DIN } 41814-152 \text{ A4}$$

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

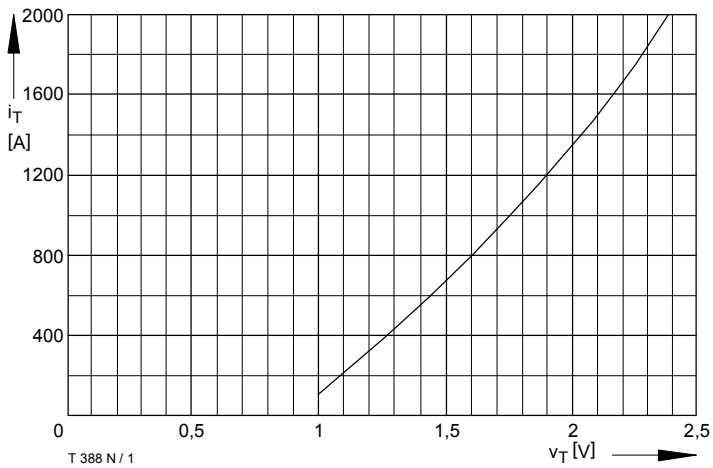


Bild / Fig. 1
Grenzdurchlaßkennlinie / Limiting on-state characteristic
 $i_T = f(v_T)$, $t_{vj} = t_{vj \max}$

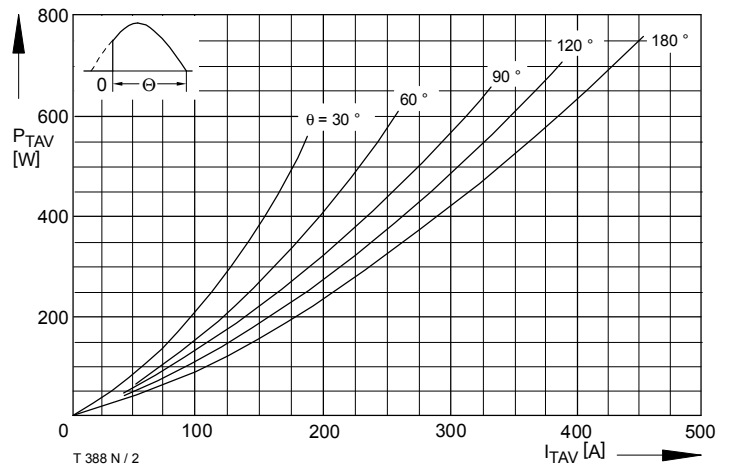


Bild / Fig. 2
Durchlaßverlustleistung / On-state power loss $P_{TAV} = f(I_{TAV})$
Parameter: Stromflußwinkel / Current conduction angle θ

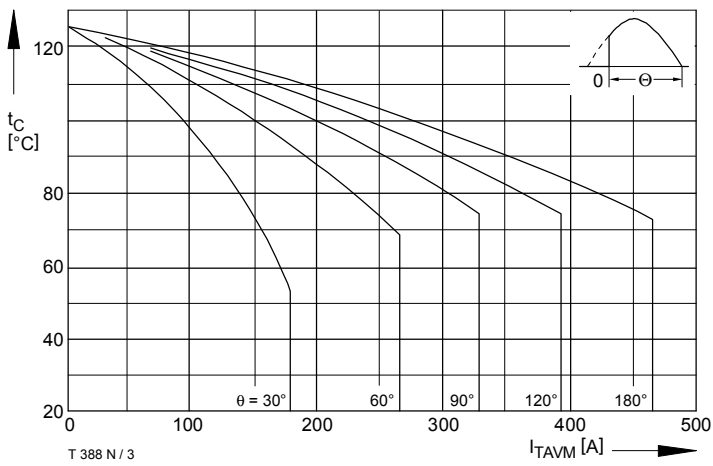


Bild / Fig. 3
Höchstzulässige Gehäusetemperatur / Max. allowable case temperature
 $t_C = f(I_{TAVM})$
Beidseitige Kühlung / Two-sided cooling
Parameter: Stromflußwinkel / Current conduction angle θ

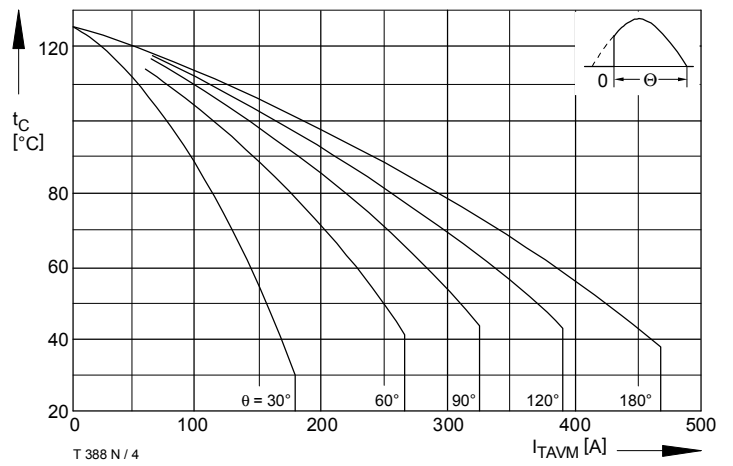


Bild / Fig. 4
Höchstzulässige Gehäusetemperatur / Max. allowable case temperature
 $t_C = f(I_{TAVM})$
Anodenseitige Kühlung / Anode-sided cooling
Parameter: Stromflußwinkel / Current conduction angle θ

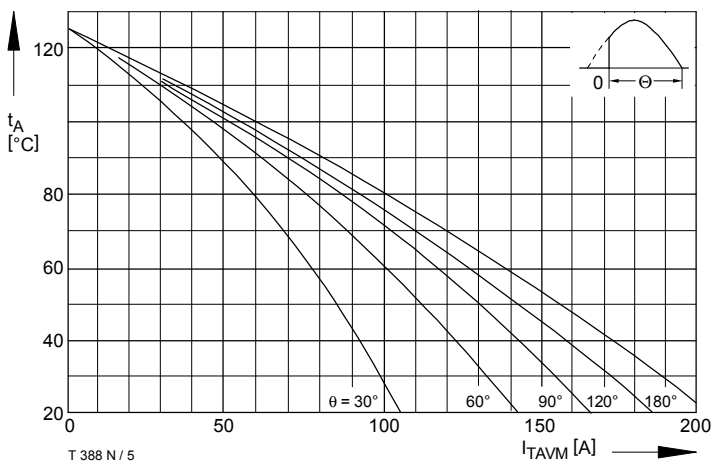


Bild / Fig. 5
Höchstzulässige Kühlmitteltemperatur / Max. allowable cooling medium temperature $t_A = f(I_{TAVM})$
Luftselbstkühlung / Natural air-cooling
Kühlkörper / Heatsink: K0.36S
Parameter: Stromflußwinkel / Current conduction angle θ

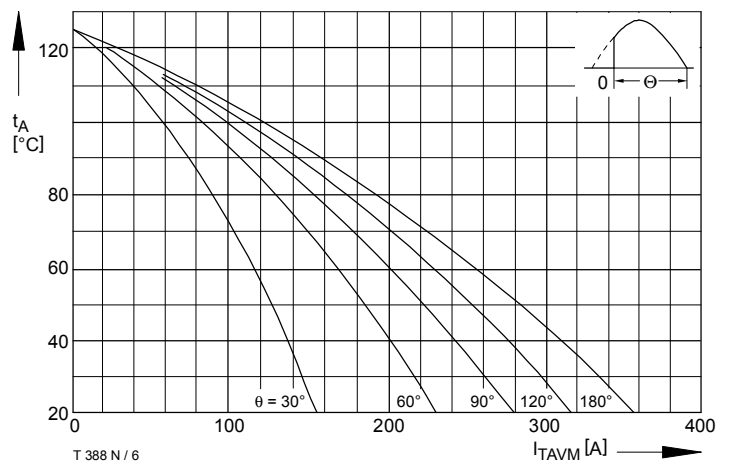


Bild / Fig. 6
Höchstzulässige Kühlmitteltemperatur / Max. allowable cooling medium temperature $t_A = f(I_{TAVM})$
Verstärkte Luftkühlung / Forced air cooling
Kühlkörper / Heatsink: K0.12F, $V_L = 50$ l/s
Parameter: Stromflußwinkel / Current conduction angle θ

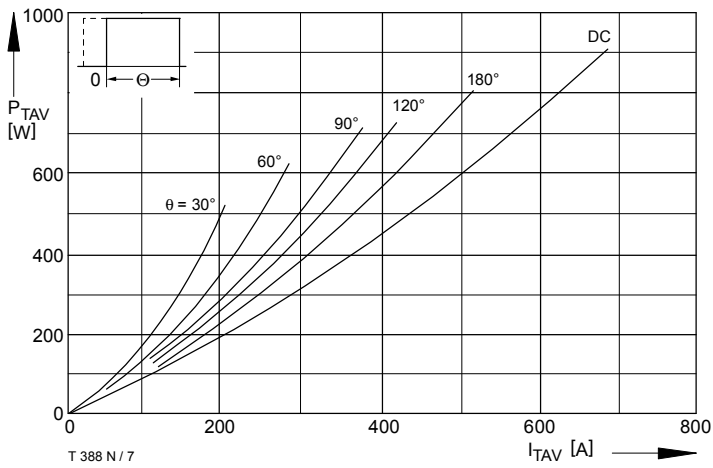


Bild / Fig. 7
 Durchlaßverlustleistung / On-state power loss $P_{TAV} = f(I_{TAV})$
 Parameter: Stromflußwinkel / Current conduction angle θ

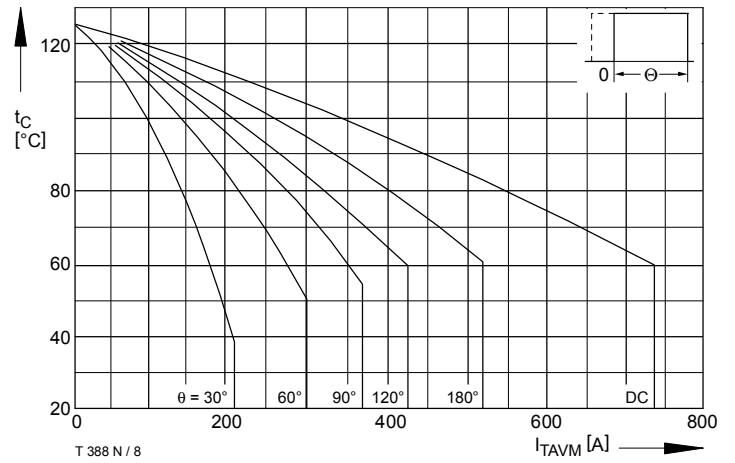


Bild / Fig. 8
 Höchstzulässige Gehäusetemperatur / Max. allowable case temperature
 $t_C = f(I_{TAVM})$
 Beidseitige Kühlung / Two-sided cooling
 Parameter: Stromflußwinkel / Current conduction angle θ

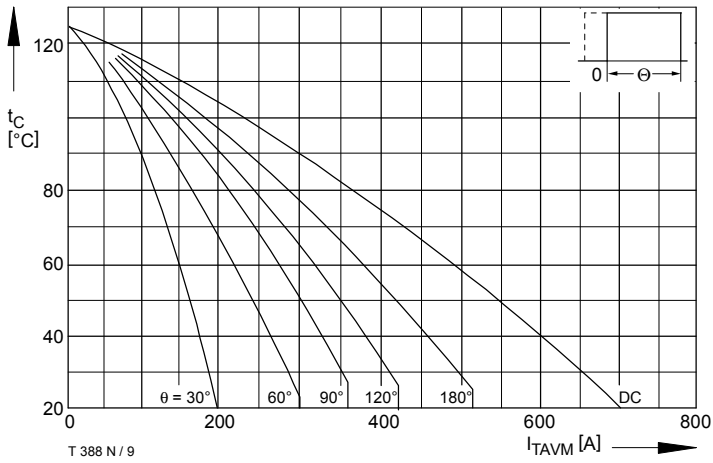


Bild / Fig. 9
 Höchstzulässige Gehäusetemperatur / Max. allowable case temperature
 $t_C = f(I_{TAVM})$
 Anodenseitige Kühlung / Anode-sided cooling
 Parameter: Stromflußwinkel / Current conduction angle θ

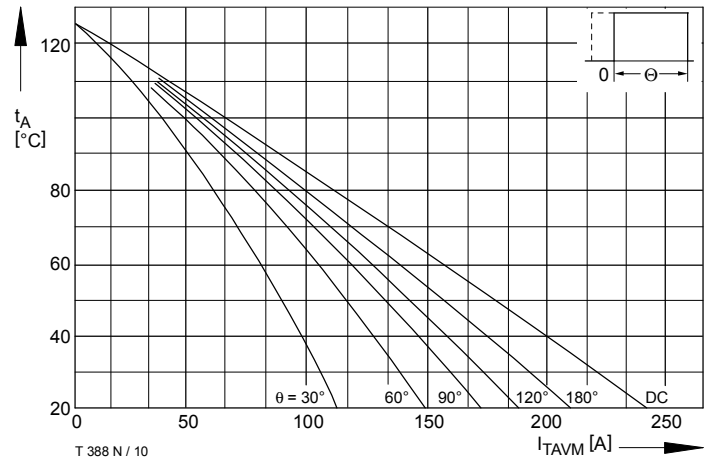


Bild / Fig. 10
 Höchstzulässige Kühlmitteltemperatur / Max. allowable cooling medium
 temperatur $t_A = f(I_{TAVM})$
 Luftselbstkühlung / Natural air-cooling
 Kühlkörper / Heatsink: K0.36S
 Parameter: Stromflußwinkel / Current conduction angle θ

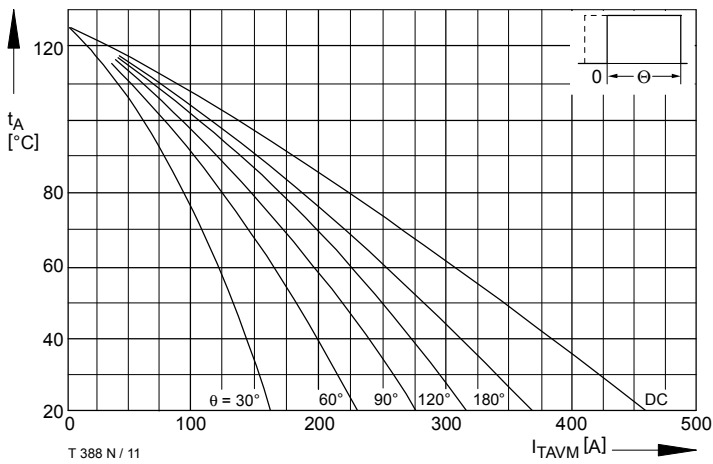


Bild / Fig. 11
 Höchstzulässige Kühlmitteltemperatur / Max. allowable cooling medium
 temperatur $t_A = f(I_{TAVM})$
 Verstärkte Luftkühlung / forced air cooling
 Kühlkörper / Heatsink: K0.12F, $V_L = 50$ l/s
 Parameter: Stromflußwinkel / Current conduction angle θ

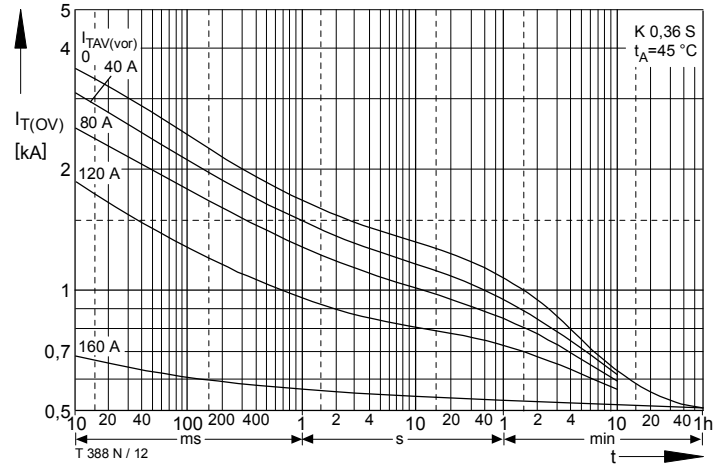


Bild / Fig. 12
 Überstrom / Overload on-state current $I_{T(OV)} = f(t)$
 Luftselbstkühlung / Natural air-cooling $t_A = 45^\circ\text{C}$
 Kühlkörper / Heatsink: K0.36S
 Parameter: Vorlaststrom / Pre-load current $I_{TAV(vor)}$

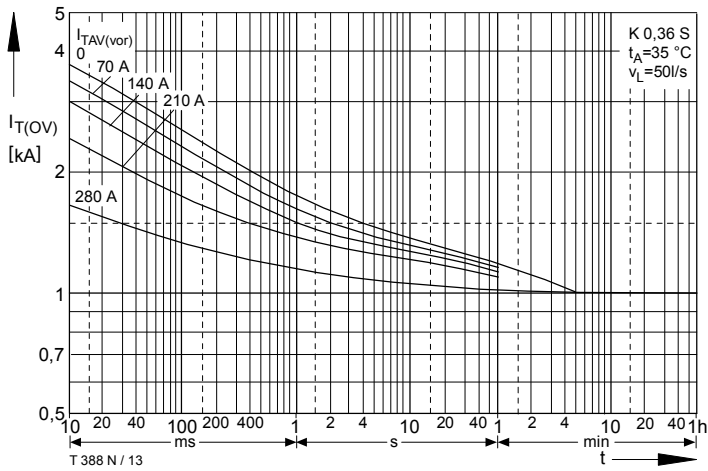


Bild / Fig. 13
 Überstrom / Overload on-state current $I_{T(OV)} = f(t)$
 Verstärkte Luftkühlung / Forced air-cooling, $t_A = 35\text{ °C}$
 Kühlkörper / Heatsink: K0.12F, $v_L = 50\text{ l/s}$
 Parameter: Vorlaststrom / Pre-load current $I_{TAV(vor)}$

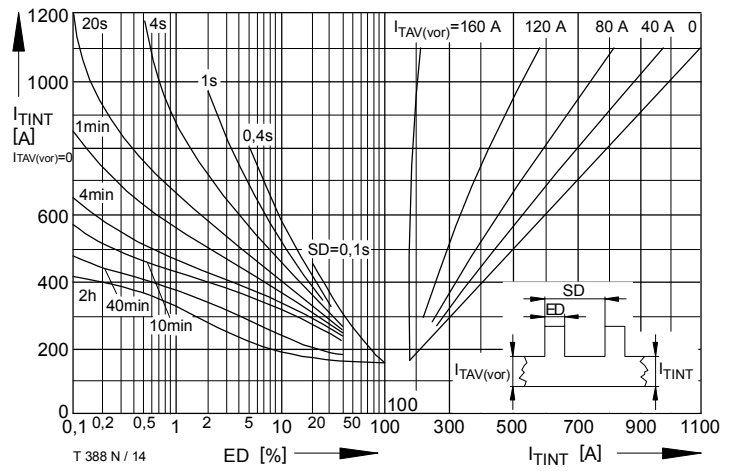


Bild / Fig. 14
 Höchstzulässiger Durchlaßstrom bei Aussetzbetrieb / Max. allowable on-state current at intermittent operation $I_{TINT} = f(ED)$
 Luftselbstkühlung / Natural air-cooling, $t_A = 45\text{ °C}$
 Kühlkörper / Heatsink: K0.36S
 Parameter: Spieldauer / Cycle duration SD
 Vorlaststrom / Pre-load current $I_{TAV(vor)}$

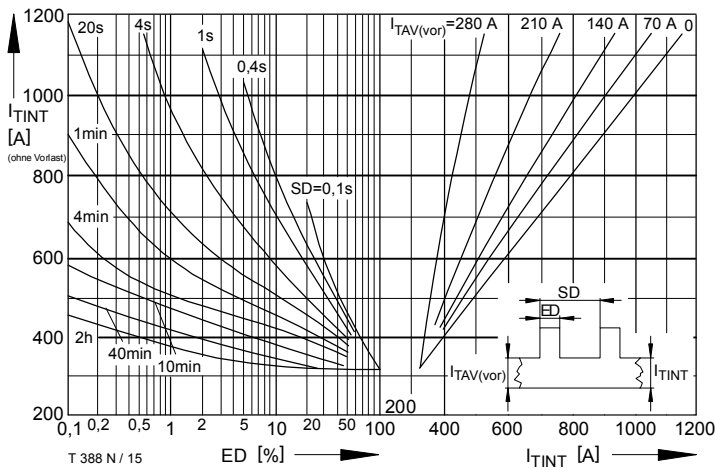


Bild / Fig. 15
 Höchstzulässiger Durchlaßstrom bei Aussetzbetrieb / Max. allowable on-state current at intermittent operation $I_{TINT} = f(ED)$
 Verstärkte Luftkühlung / Forced air-cooling, $t_A = 35\text{ °C}$
 Kühlkörper / Heatsink: K0.12F, $v_L = 50\text{ l/s}$
 Parameter: Spieldauer / Cycle duration SD
 Vorlaststrom / Pre-load current $I_{TAV(vor)}$

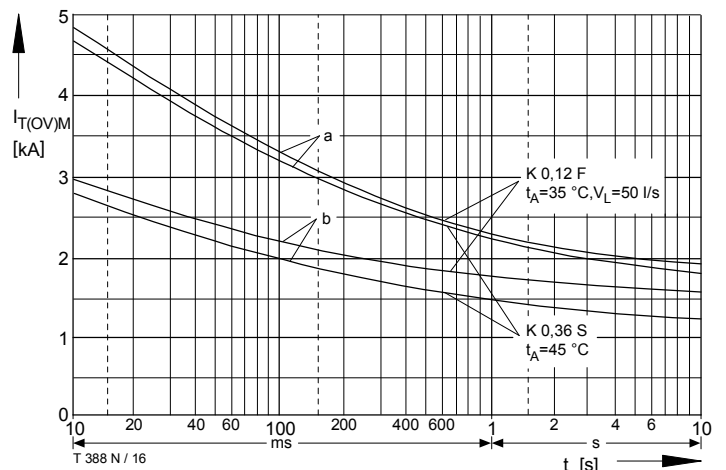


Bild / Fig. 16
 Grenzstrom / Max. overload on-state current $I_{T(OV)M} = f(t)$, $v_{RM} = 0,8\text{ }V_{RRM}$
 Beidseitige Kühlung / Two-sided cooling
 Kühlkörper / Heatsink: K0.36S, K0.12F
 Belastung aus / Surge current occurs:
 a - Leerlauf / No-load conditions
 b - Betrieb mit Dauergrenzstrom / During operation at max. average on-state current I_{TAVM}

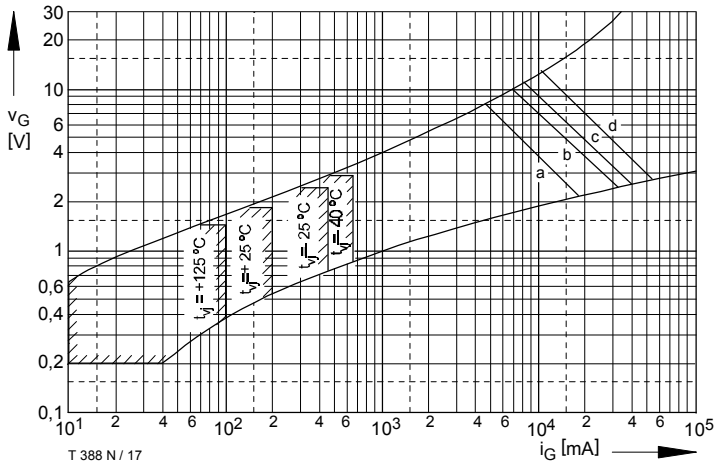


Bild / Fig. 17
 Steuercharakteristik mit Zündbereichen / Gate characteristic with triggering areas $V_G = f(i_G)$, $V_D = 6\text{ V}$
 Parameter:

	a	b	c	d
Steuerimpulsdauer / trigger puls duration t_g [ms]	10	1	0,5	0,1
Höchstzulässige Spitzensteuerverlustleistung / Max. rated peak gate power dissipation [W]	40	80	100	150

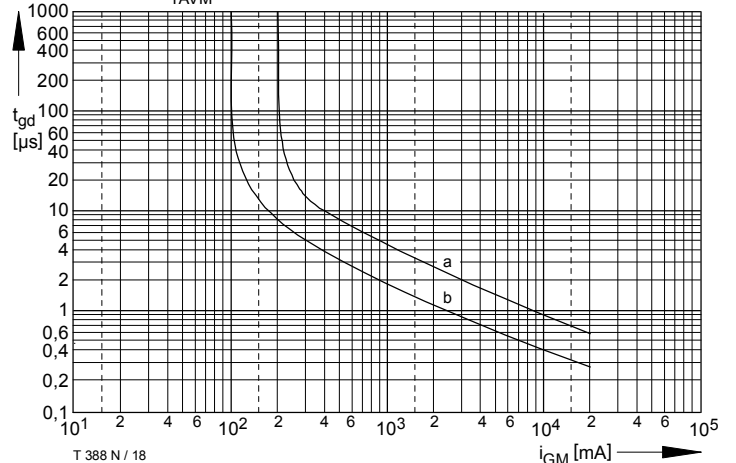


Bild / Fig. 18
 Zündverzug / Gate controlled delay time $t_{gd} = f(i_{GM})$
 $t_{vj} = 25\text{ °C}$, $di_G/dt = i_{GM}/1\mu\text{s}$
 a - Maximaler Verlauf / Limiting characteristic
 b - Typischer Verlauf / Typical characteristic

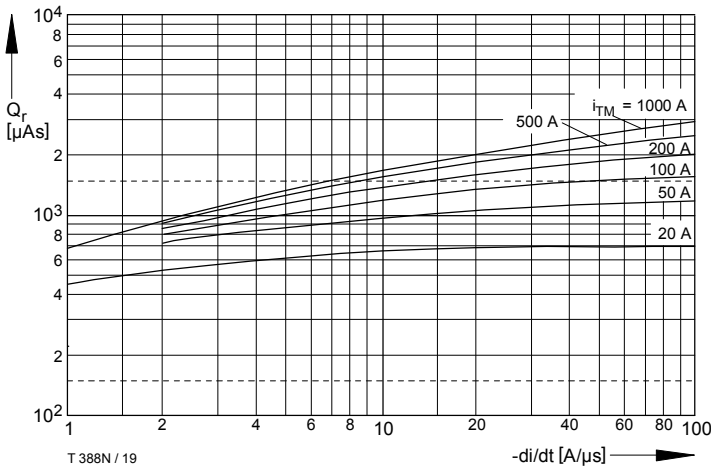


Bild / Fig. 19
 Sperrverzögerungsladung / Recovered charge $Q_r = f(di/dt)$
 $t_{vj} = t_{vj \max}$; $V_R = 0,5 V_{RRM}$; $V_{RM} = 0,8 V_{RRM}$
 Parameter: Durchlaßstrom / On-state current i_{TM}

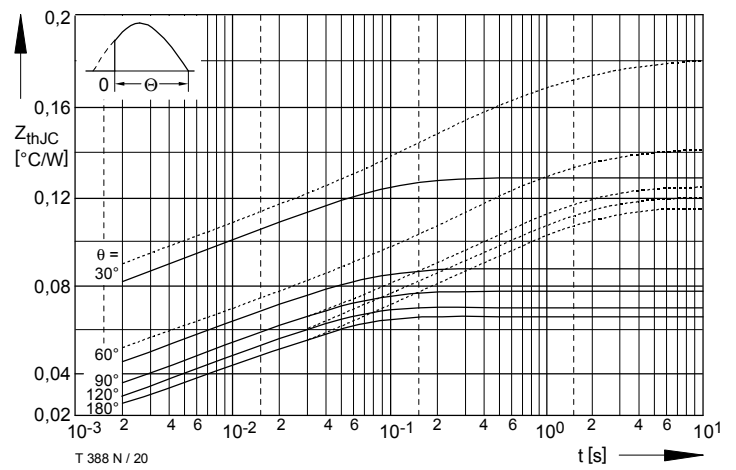


Bild / Fig. 20
 Transienter innerer Wärmewiderstand / Transient thermal impedance
 $Z_{thJC} = f(t)$
 ----- Anodenseitige Kühlung / Anode-sided cooling
 ————— Beidseitige Kühlung / Two-sided cooling
 Parameter: Stromflußwinkel / current conduction angle θ

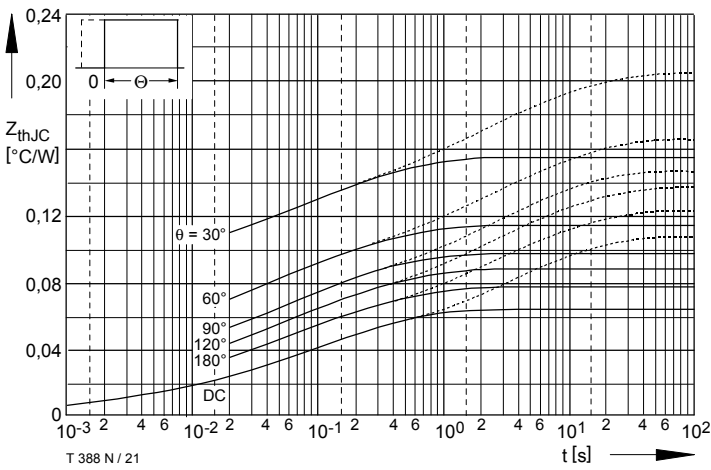


Bild / Fig. 21
 Transienter innerer Wärmewiderstand / Transient thermal impedance
 $Z_{thJC} = f(t)$
 ----- Anodenseitige Kühlung / Anode-sided cooling
 ————— Beidseitige Kühlung / Two-sided cooling
 Parameter: Stromflußwinkel / current conduction angle θ

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

Beidseitig / Two-sided

Pos. n	1	2	3	4	5	6
R_{thn} [$^{\circ}\text{C}/\text{W}$]	0,00832	0,0151	0,0181	0,0207	0,00286	
τ_n [s]	0,000826	0,0166	0,0808	0,359	1,957	

Anodenseitig / Anode-sided

Pos. n	1	2	3	4	5	6
R_{thn} [$^{\circ}\text{C}/\text{W}$]	0,00961	0,00543	0,0209	0,0142	0,0271	0,0328
τ_n [s]	0,00104	0,0133	0,0364	0,23	1,52	10,5

Kathodenseitig / Cathode-sided

Pos. n	1	2	3	4	5	6
R_{thn} [$^{\circ}\text{C}/\text{W}$]	0,0098	0,0186	0,0157	0,0617	0,0502	
τ_n [s]	0,00106	0,0027	0,0994	2,04	10,2	

Analytische Funktion / Analytical function:

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

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Warning

Due to technical requirements the products may contain dangerous substances. For information on the types in question please contact your local Sales Office via "www.eupec.com / sales & contact".