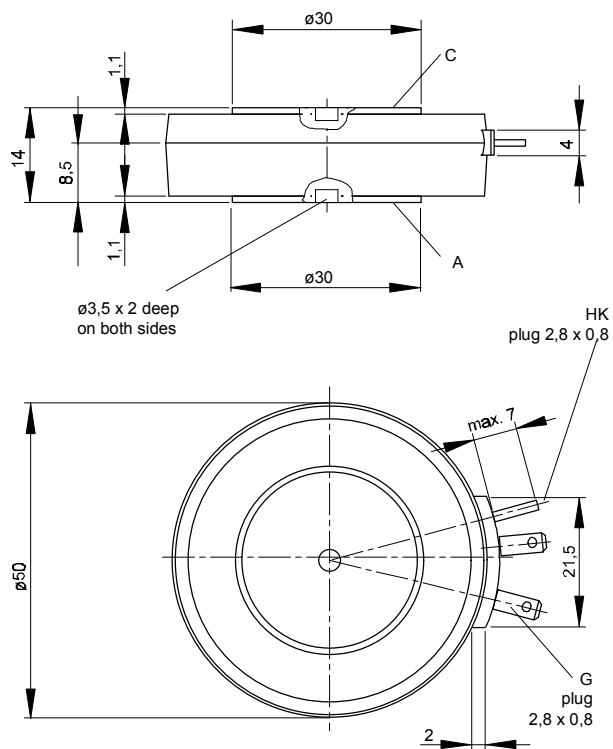




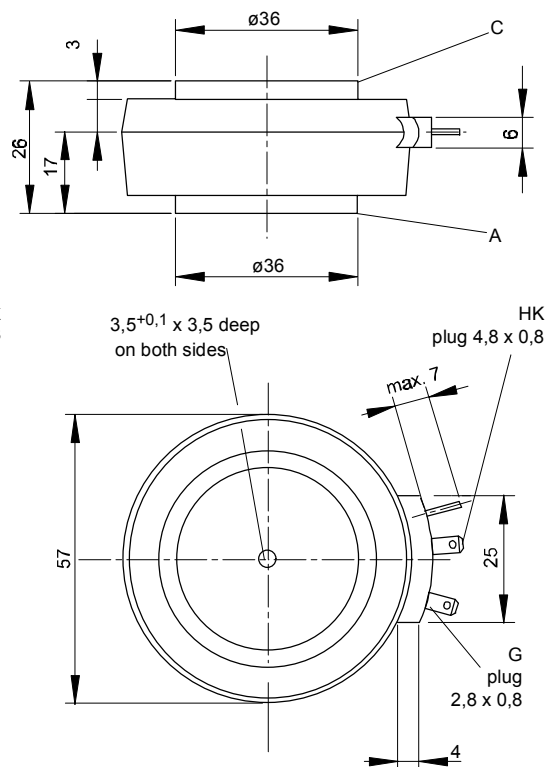
European Power-Semiconductor and Electronics Company

Marketing Information

T 588 N



T 589 N



T 588 N T 589 N

Elektrische Eigenschaften

Höchstzulässige Werte

Parameter	Electrical properties	Electrical properties	Maximum rated values	Electrical properties	Maximum rated values
Periodische Vorwärts- und Rückwärts-Spitzensperrspannung	repetitive peak forward off-state and reverse voltages	$t_{vj} = -40^\circ\text{C} \dots t_{vj\text{ max}}$	$V_{\text{DRM}}, V_{\text{RRM}}$	600 800 1000 1200 1400 1600 1800*	V
Vorwärts-Stoßspitzensperrspannung	non-repetitive peak forward off-state voltage	$t_{vj} = -40^\circ\text{C} \dots t_{vj\text{ max}}$	$V_{\text{DSM}} = V_{\text{DRM}}$	600 800 1000 1200 1400 1600 1800*	V
Rückwärts-Stoßspitzensperrspannung	non-repetitive peak reverse voltage	$t_{vj} = +25^\circ\text{C} \dots t_{vj\text{ max}}$	$V_{\text{RSM}} = V_{\text{RRM}}$	700 900 1100 1300 1500 1700 1900	V
Durchlaßstrom-Grenzeffektivwert	RMS on-state current		I_{TRMSM}	1250	A
Dauergrenzstrom	average on-state current	$t_c = 85^\circ\text{C}$ $t_c = 61^\circ\text{C}$	I_{TAVM}	588 795	A
Stoßstrom-Grenzwert	surge current	$t_{vj} = 25^\circ\text{C}, t_p = 10\text{ ms}$ $t_{vj} = t_{vj\text{ max}}, t_p = 10\text{ ms}$	I_{TSM}	9400 8000	A
Grenzlastintegral	$I^2 t$ -value	$t_{vj} = 25^\circ\text{C}, t_p = 10\text{ ms}$ $t_{vj} = t_{vj\text{ max}}, t_p = 10\text{ ms}$	$I^2 t$	442000 320000	$A^2 s$ $A^2 s$
Kritische Stromsteilheit	critical rate of rise of on-state current	$V_D \leq 67\%, V_{\text{DRM}}, f = 50\text{ Hz}$	$(di_T/dt)_{\text{cr}}$	200	A/ μs
Kritische Spannungssteilheit	critical rate of rise of off-state voltage	$V_L = 10\text{ V}, i_{\text{GM}} = 1\text{ A}, di_G/dt = 1\text{ A}/\mu s$ $t_{vj} = t_{vj\text{ max}}, V_D = 67\% V_{\text{DRM}}$	$(dv/dt)_{\text{cr}}$	1000	V/ μs

Charakteristische Werte

Characteristic values

Durchlaßspannung	on-state voltage	$t_{vj} = t_{vj\text{ max}}, i_T = 2400\text{ A}$	V_T	max. 2,15	V
Schleusenspannung	threshold voltage	$t_{vj} = t_{vj\text{ max}}$	$V_{\text{T(TO)}}$	0,8	V
Ersatzwiderstand	slope resistance	$t_{vj} = t_{vj\text{ max}}$	r_T	0,5	$m\Omega$
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. 2,2	V
Nicht zündender Steuerstrom	gate non-trigger current	$t_{vj} = t_{vj\text{ max}}, V_D = 6\text{ V}$	I_{GD}	max. 10	mA
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	$t_{vj} = 25^\circ\text{C}, V_D = 6\text{ V}, R_{\text{GK}} \geq 10\ \Omega$ $i_{\text{GM}} = 1\text{ A}, di_G/dt = 1\text{ A}/\mu s, t_g = 20\ \mu s$	I_{L}	max. 1,2	A
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	max. 50	mA
Zündverzug	gate controlled delay time	$t_{vj} = 25^\circ\text{C}, i_{\text{GM}} = 1\text{ A}, di_G/dt = 1\text{ A}/\mu s$	t_{gd}	max. 4	μs
Freiwerdezeit	circuit commutated turn-off time	siehe Techn.Erl./see Techn. Inf.	t_q	typ. 250	μs

Thermische Eigenschaften

Thermal properties

Innerer Wärmewiderstand für beidseitige Kühlung	thermal resistance, junction to case for two-sided cooling	$\Theta = 180^\circ\text{ el, sin}$ DC	R_{thJC}	max. 0,045 max. 0,041	$^\circ\text{C}/\text{W}$ $^\circ\text{C}/\text{W}$
für anodenseitige Kühlung	for anode-sided cooling	$\Theta = 180^\circ\text{ el, sin}$ DC	$R_{\text{thJC(A)}}$	max. 0,074 max. 0,07	$^\circ\text{C}/\text{W}$ $^\circ\text{C}/\text{W}$
für kathodenseitige Kühlung	for cathode-sided cooling	$\Theta = 180^\circ\text{ el, sin}$ DC	$R_{\text{thJC(K)}}$	max. 0,104 max. 0,1	$^\circ\text{C}/\text{W}$ $^\circ\text{C}/\text{W}$
Übergangs-Wärmewiderstand	thermal resistance, case to heatsink	beidseitig/two-sided einseitig/one-sided	R_{thCK}	max. 0,007 max. 0,014	$^\circ\text{C}/\text{W}$ $^\circ\text{C}/\text{W}$
Höchstzul. Sperrschichttemperatur	max. junction temperature		$t_{vj\text{ max}}$	125	$^\circ\text{C}$
Betriebstemperatur	operating temperature		$t_{c\text{ op}}$	-40...+125	$^\circ\text{C}$
Lagertemperatur	storage temperature		t_{stg}	-40...+140	$^\circ\text{C}$

Mechanische Eigenschaften

Mechanical properties

Si-Elemente mit Druckkontakt	Si-pellet with pressure contact				
Anpreßkraft	clamping force		F	6...12	kN
Gewicht	weight	T 588 N/T 589 N	G	typ. 100/270	g
Kriechstrecke	creepage distance	T 588 N/T 589 N		17/28	mm
Feuchteklasse	humidity classification	DIN 40040			C
Schwingfestigkeit	vibration resistance	f = 50 Hz		50	m/s^2
Maßbild, anliegend	outline, attached	DIN 41814-152 A4/-153C4			

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

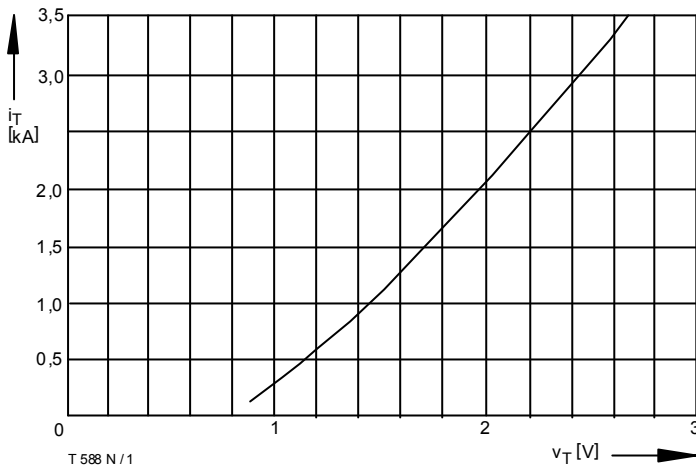


Bild / Fig. 1
Grenzdurchlaßkennlinie / Limiting on-state characteristic
 $i_T = f(v_T)$, $t_{vj} = t_{vj \text{ max}}$

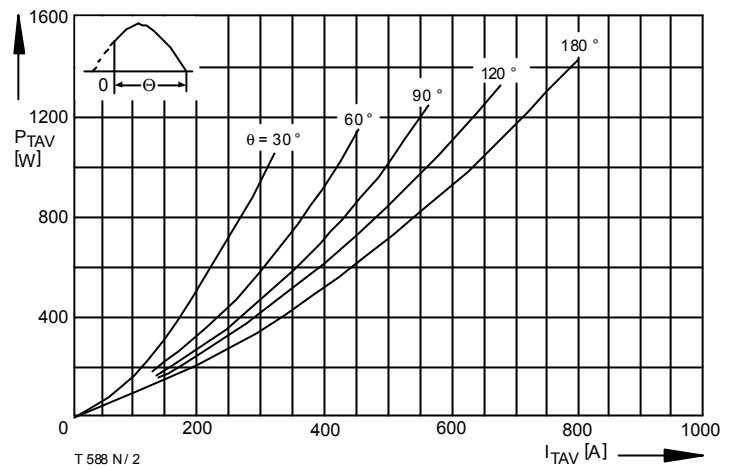


Bild / Fig. 2
Durchlaßverlustleistung / On-state power loss $P_{TAV} = f(I_{TAV})$
Parameter: Stromflußwinkel / Current conduction angle θ

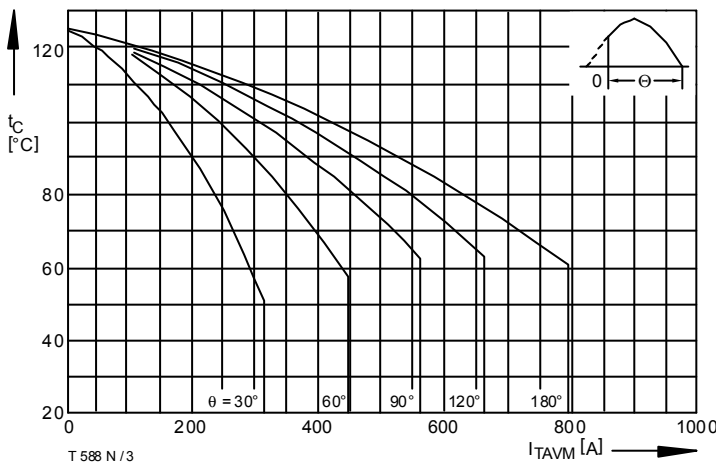


Bild / Fig. 3
Höchstzulässige Gehäusetemperatur / Max. allowable case temperature
 $t_c = f(I_{TAVM})$
Beidseitige Kühlung / Two-sided cooling
Parameter: Stromflußwinkel / Current conduction angle θ

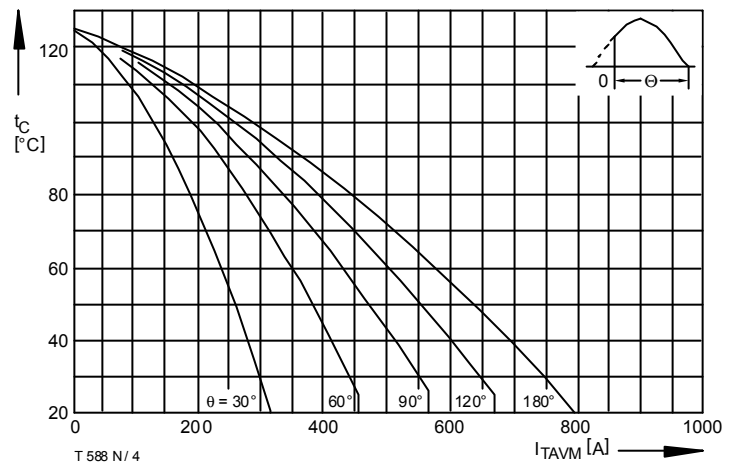


Bild / Fig. 4
Höchstzulässige Gehäusetemperatur / Max. allowable case temperature
 $t_c = f(I_{TAVM})$
Anodenseitige Kühlung / Anode-sided cooling
Parameter: Stromflußwinkel / Current conduction angle θ

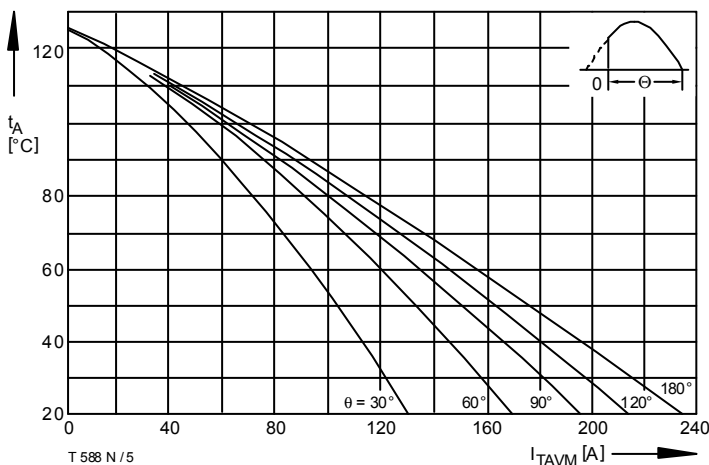


Bild / Fig. 5
Höchstzulässige Kühlmitteltemperatur / Max. allowable cooling medium temperature $t_A = f(I_{TAVM})$
Luftselbstkühlung / Natural air-cooling
Kühlkörper / Heatsink: K0.36S
Parameter: Stromflußwinkel / Current conduction angle θ

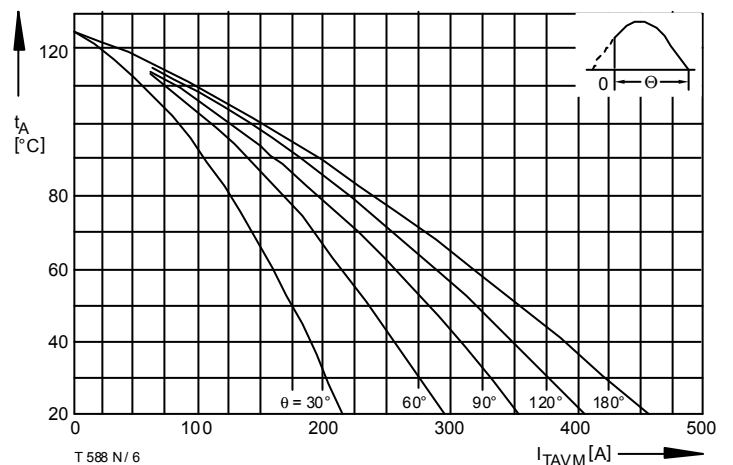


Bild / Fig. 6
Höchstzulässige Kühlmitteltemperatur / Max. allowable cooling medium temperature $t_A = f(I_{TAVM})$
Verstärkte Luftkühlung / Forced air cooling
Kühlkörper / Heatsink: K0.12F, $V_L = 50 \text{ l/s}$
Parameter: Stromflußwinkel / Current conduction angle θ

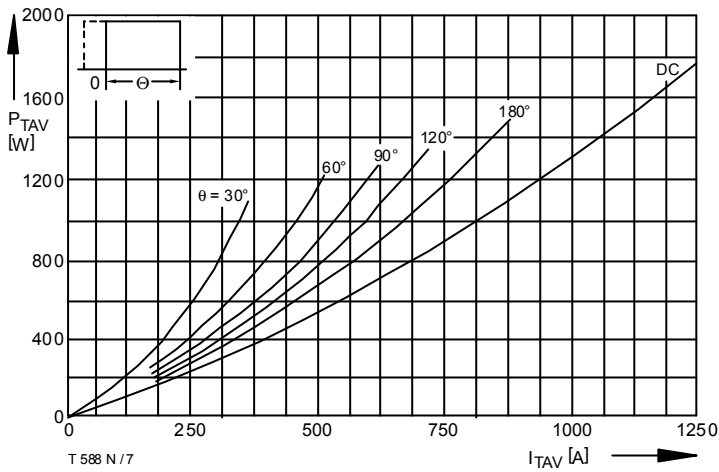


Bild / Fig. 7
Durchlaßverlustleistung / On-state power loss $P_{TAV} = f(I_{TAV})$
Parameter: Stromflußwinkel / Current conduction angle θ

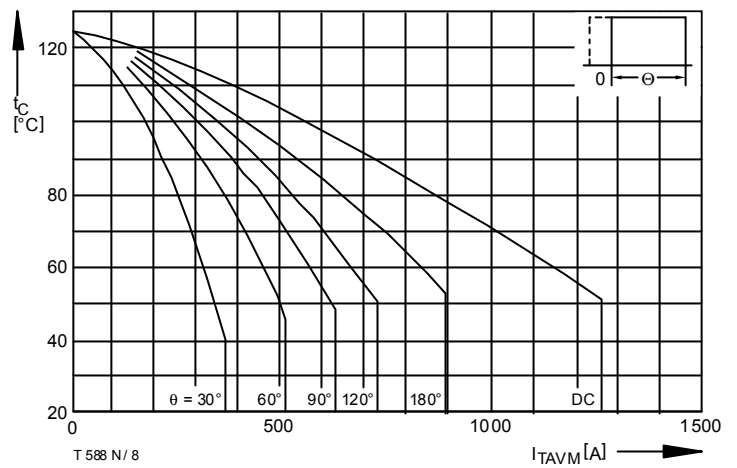


Bild / Fig. 8
Höchstzulässige Gehäusetemperatur / Max. allowable case temperature
 $t_C = f(I_{TAVM})$
Beidseitige Kühlung / Two-sided cooling
Parameter: Stromflußwinkel / Current conduction angle θ

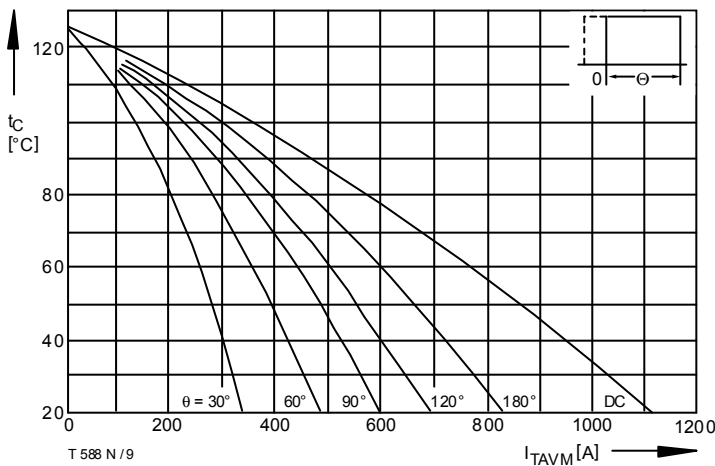


Bild / Fig. 9
Höchstzulässige Gehäusetemperatur / Max. allowable case temperature
 $t_C = f(I_{TAVM})$
Anodenseitige Kühlung / Anode-sided cooling
Parameter: Stromflußwinkel / Current conduction angle θ

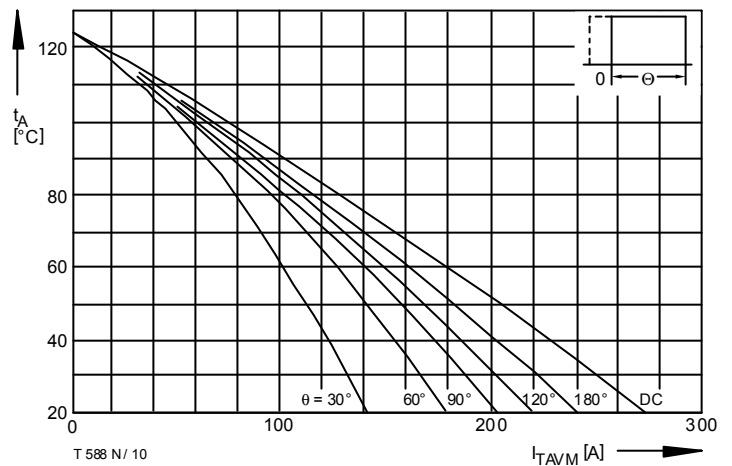


Bild / Fig. 10
Höchstzulässige Kühlmitteltemperatur / Max. allowable cooling medium temperature $t_A = f(I_{TAVM})$
Luftselbstkühlung / Natural air-cooling
Kühlkörper / Heatsink: K0.36S
Parameter: Stromflußwinkel / Current conduction angle θ

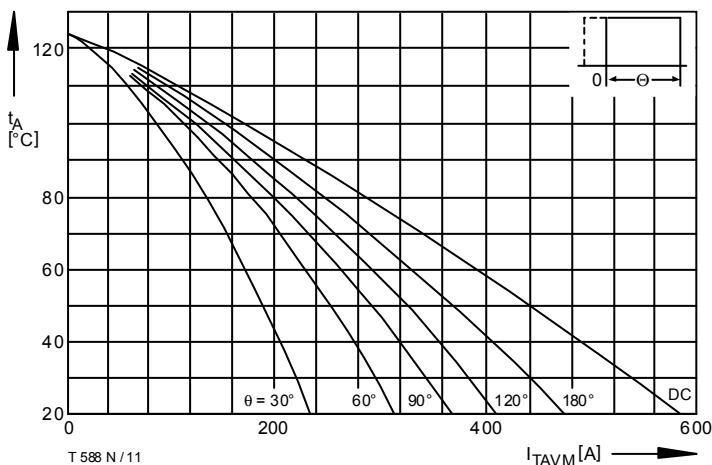


Bild / Fig. 11
Höchstzulässige Kühlmitteltemperatur / Max. allowable cooling medium temperature $t_A = f(I_{TAVM})$
Verstärkte Luftkühlung / Forced air cooling
Kühlkörper / Heatsink: K0.12F, $V_L = 50$ l/s
Parameter: Stromflußwinkel / Current conduction angle θ

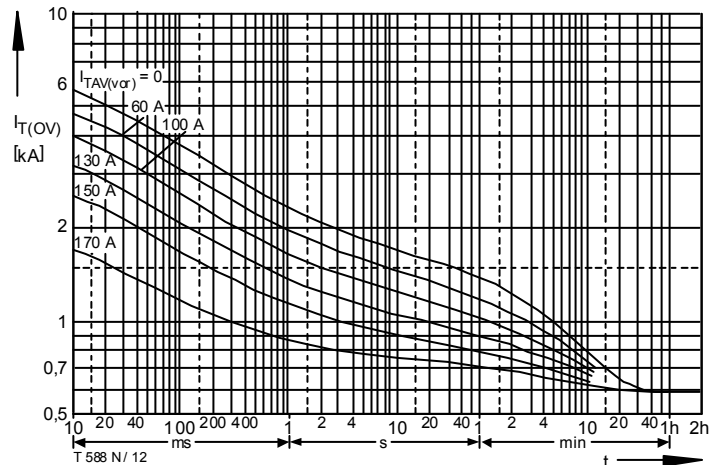


Bild / Fig. 12
Überstrom / Overload on-state current $I_{T(OV)} = f(t)$
Luftselbstkühlung / Natural air-cooling $t_A = 45^\circ\text{C}$
Kühlkörper / Heatsink: K0.36S
Parameter: Vorlaststrom / Pre-load current $I_{TAV(vor)}$

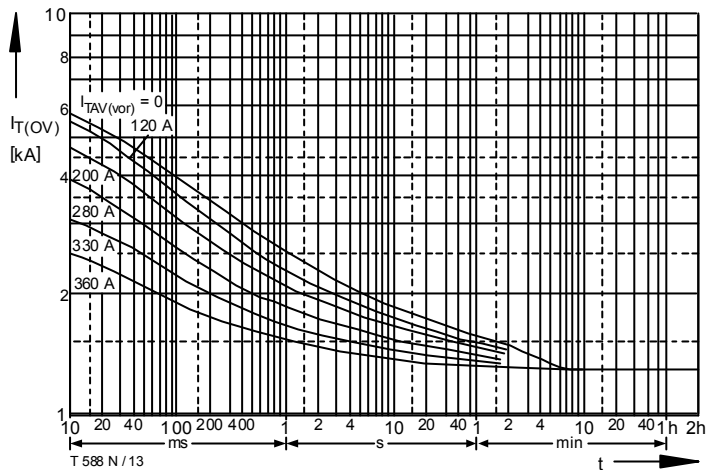


Bild / Fig. 13
 Überstrom / Overload on-state current $I_{T(OV)} = f(t)$
 Verstärkte Luftkühlung / Forced air-cooling, $t_A = 35^\circ\text{C}$
 Kühlkörper / Heatsink: K0.12F, $V_L = 50 \text{ l/s}$
 Parameter: Vorlaststrom / Pre-load current $I_{TAV(vor)}$

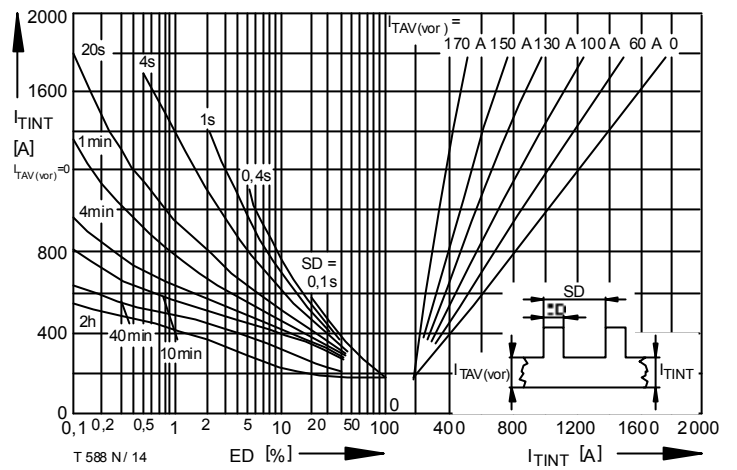


Bild / Fig. 14
 Höchstzulässiger Durchlaßstrom bei Aussetzbetrieb / Max. allowable on-state current at intermittent operation $I_{TINT} = f(ED)$
 Luftselbstkühlung / Natural air-cooling, $t_A = 45^\circ\text{C}$
 Kühlkörper / Heatsink: K0.36S
 Parameter: Spieldauer / Cycle duration SD
 Vorlaststrom /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

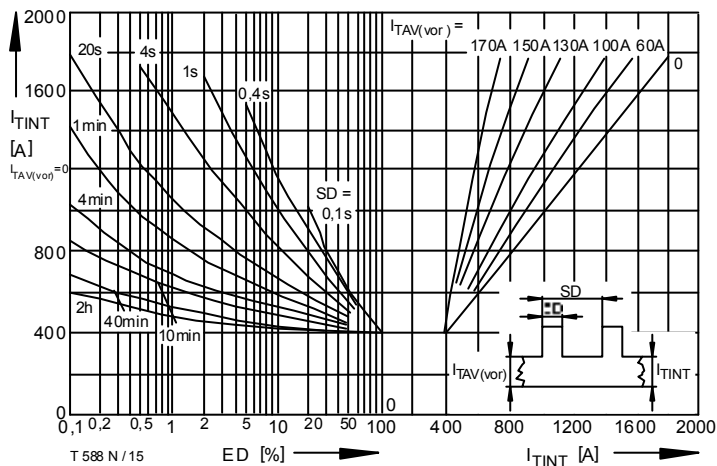


Bild / Fig. 15
 Höchstzulässiger Durchlaßstrom bei Aussetzbetrieb / Max. allowable on-state current at intermittent operation $I_{TINT} = f(ED)$
 Verstärkte Luftkühlung / Forced air-cooling, $t_A = 35^\circ\text{C}$
 Kühlkörper / Heatsink: K0.12F, $V_L = 50 \text{ l/s}$
 Parameter: Spieldauer / Cycle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

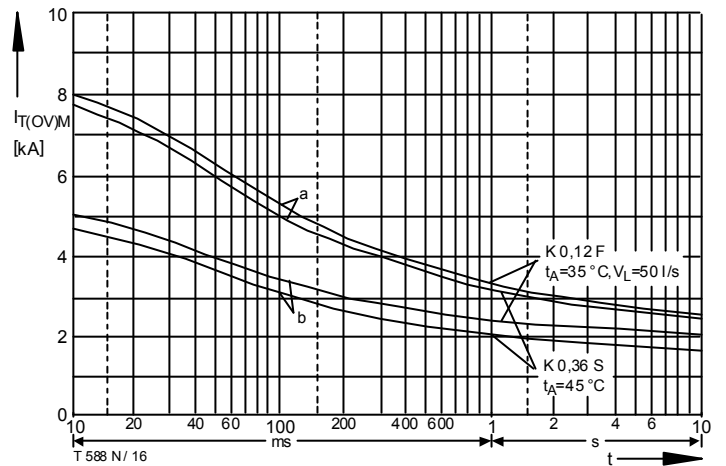


Bild / Fig. 16
 Grenzstrom / Max. overload on-state current $I_{T(OV)M} = f(t)$, $V_{RM} = 0,8 V_{RRM}$
 Beidseitige Kühlung / Two-sided cooling
 Kühlkörper / Heatsink: K0.36S, K0.12F
 Belastung aus / Surge current occurs:
 a - Leerlauf / No-load conditions
 b - Betrieb mit Dauerrenzstrom / During operation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

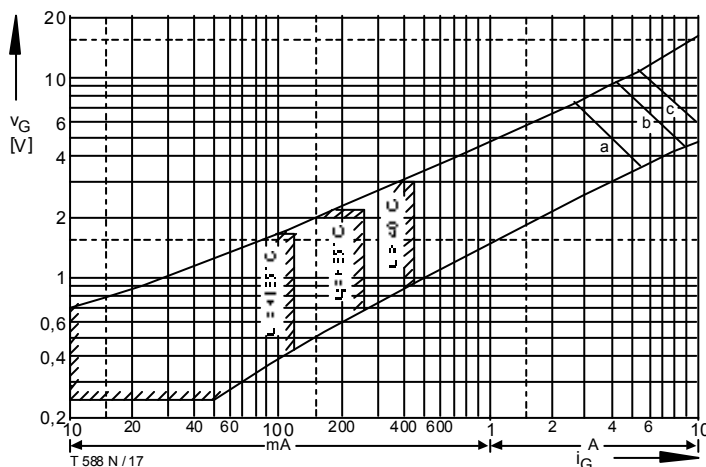


Bild / Fig. 17
 Steuercharakteristik mit Zündbereichen / Gate characteristic with triggering areas $V_G = f(I_G)$, $V_D = 6 \text{ V}$
 Parameter: a b c

Steuerimpulsdauer / trigger puls duration t_g [ms]	10	1	0,5
Höchstzulässige Spitzensteuerleistung / Max. rated peak gate power dissipation [W]	20	40	60

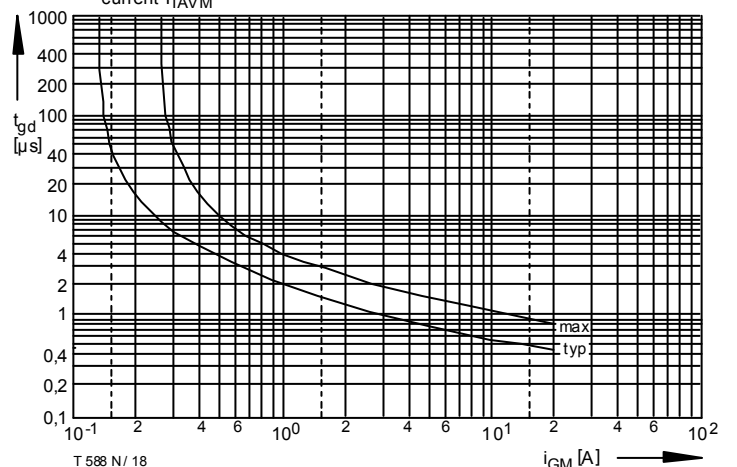


Bild / Fig. 18
 Zündverzug / Gate controlled delay time $t_{gd} = f(I_{GM})$
 $t_{vj} = 25^\circ\text{C}$, $di_G/dt = i_{GM}/1\mu\text{s}$
 a - Maximaler Verlauf / Limiting characteristic
 b - Typischer Verlauf / Typical characteristic

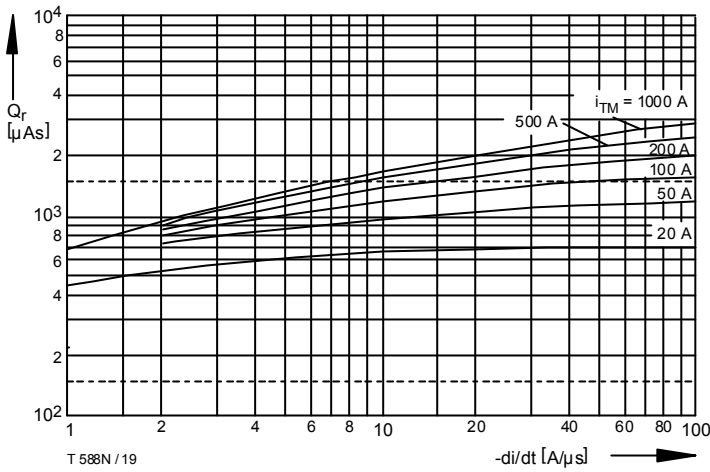


Bild / Fig. 19
 Sperrverzögerungsladung / Recovered charge $Q_r = f(di/dt)$
 $t_{vj} = t_{vj\ max}$, $V_R = 0,5 V_{RRM}$, $V_{RM} = 0,8 V_{RRM}$
 Parameter: Durchlaßstrom / On-state current i_{TM}

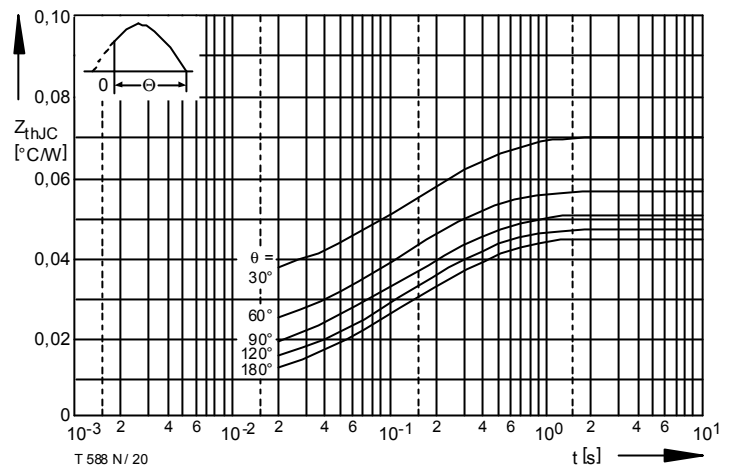


Bild / Fig. 20
 Transienter innerer Wärmewiderstand / Transient thermal impedance
 $Z_{thJC} = f(t)$
 Beidseitige Kühlung / Two-sided cooling
 Parameter: Stromflußwinkel / current conduction angle θ

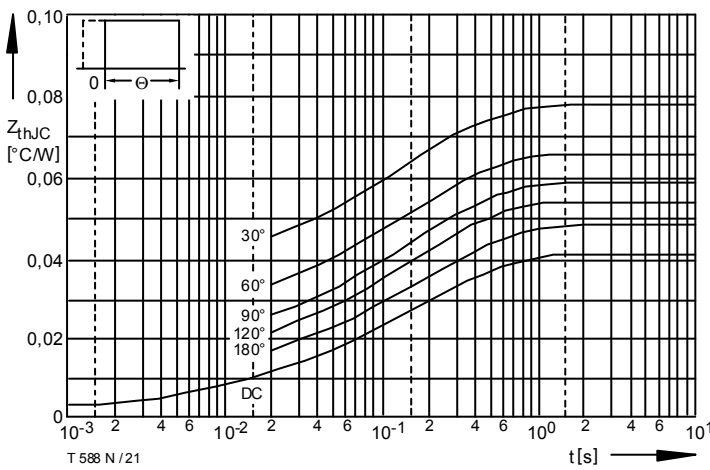


Bild / Fig. 21
 Transienter innerer Wärmewiderstand / Transient thermal impedance
 $Z_{thJC} = f(t)$
 Beidseitige Kühlung / Two-sided cooling
 Parameter: Stromflußwinkel / current conduction angle θ

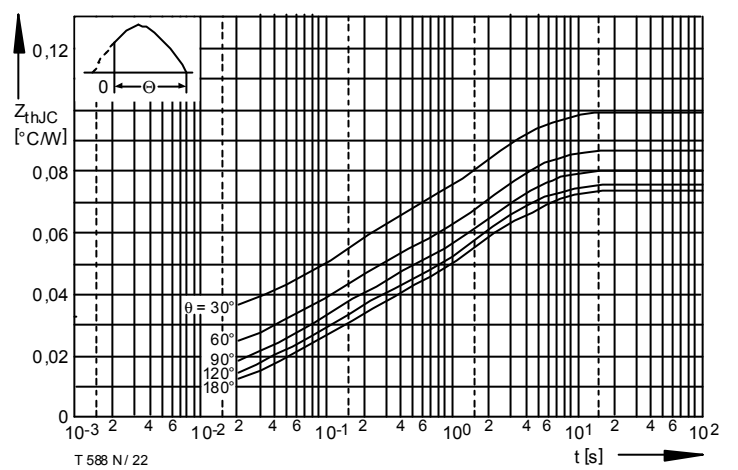


Bild / Fig. 22
 Transienter innerer Wärmewiderstand / Transient thermal impedance
 $Z_{thJC} = f(t)$
 Anodenseitige Kühlung / Anode-sided cooling
 Parameter: Stromflußwinkel / current conduction angle θ

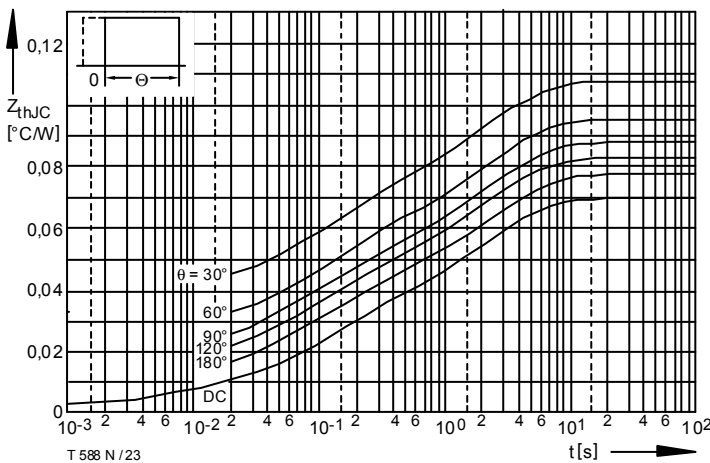


Bild / Fig. 23
 Transienter innerer Wärmewiderstand / Transient thermal impedance
 $Z_{thJC} = f(t)$
 Anodenseitige Kühlung / Anode-sided cooling
 Parameter: Stromflußwinkel / current conduction angle θ

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
$R_{thn} [°C/W]$	0,00043	0,00557	0,019	0,016	
$\tau_n [s]$	0,00027	0,00221	0,085	0,36	

Anodenseitig / Anode-sided

Pos. n	1	2	3	4	5
$R_{thn} [°C/W]$	0,00034	0,00541	0,00486	0,0234	0,036
$\tau_n [s]$	0,00024	0,0021	0,0376	0,158	2,47

Kathodenseitig / Cathode-sided

Pos. n	1	2	3	4	5
$R_{thn} [°C/W]$	0,00026	0,00524	0,0132	0,0346	0,0468
$\tau_n [s]$	0,00019	0,00192	0,0562	0,65	2,91

Analytische Funktion / Analytical function:

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

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