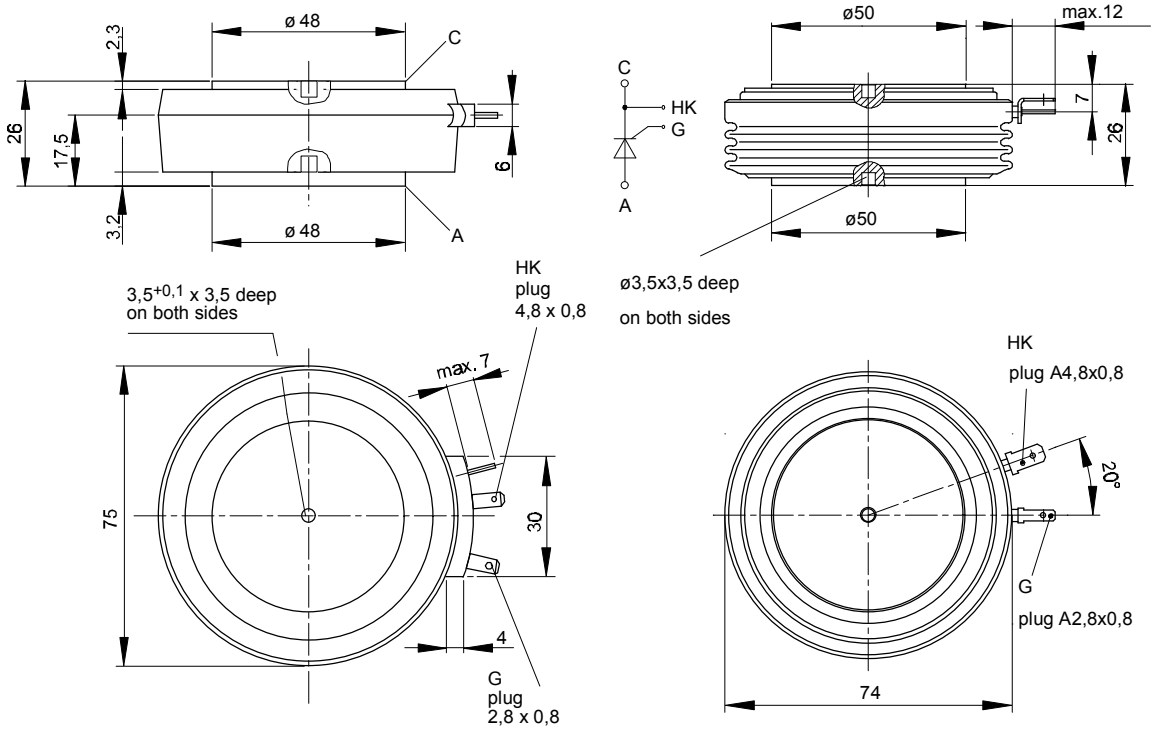
European Power-
Semiconductor and
Electronics Company

Marketing Information

T 1189 N

T 1190 N



VWK Aug. 1996

T 1189 N T 1190 N

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
Vorwärts-Stoßspitzensperrspannung	non-repetitive peak forward off-state voltage	t_{vj} = -40°C...$t_{vj\,max}$	V_{DSM} = V_{DRM}	1200 1400 1600 1800	V
Rückwärts-Stoßspitzensperrspannung	non-repetitive peak reverse voltage	t_{vj} = +25°C...$t_{vj\,max}$	V_{RSM} = V_{RRM}	1300 1500 1700 1900	V
Durchlaßstrom-Grenzeffektivwert	RMS on-state current		I_{TRMSM}	2800	A
Dauergrenzstrom	average on-state current	t_c = 85°C	I_{TAVM}	1190	A
		t_c = 53°C		1800	A
Stoßstrom-Grenzwert	surge current	t_{vj} = 25°C, t_p = 10 ms	I_{TSM}	25500	A
		t_{vj} = $t_{vj\,max}$, t_p = 10 ms		22500	A
Grenzlastintegral	I^2t-value	t_{vj} = 25°C, t_p = 10 ms	I^2t	3,25 . 20^6	A^2s
		t_{vj} = $t_{vj\,max}$, t_p = 10 ms		2,53 . 20^6	A^2s
Kritische Stromsteilheit	critical rate of rise of on-state current	$v_D \leq$ 67%, v_{DRM}, f = 50 Hz 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 = 67% V_{DRM}	$(dv/dt)_{cr}$	1000	V/µs

Charakteristische Werte *Characteristic values*

Durchlaßspannung	on-state voltage	t_{vj} = $t_{vj\,max}$, i_T = 5400 A	v_T	max. 2,05	V
Schleusenspannung	threshold voltage	t_{vj} = $t_{vj\,max}$	$V_{T(TO)}$	0,9	V
Ersatzwiderstand	slope resistance	t_{vj} = $t_{vj\,max}$	r_T	0,19	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. 200	mA
		t_{vj} = $t_{vj\,max}$, v_D = 0,5 V_{DRM}		max. 10	mA
Nicht zündende Steuerspannung	gate non-trigger voltage	t_{vj} = $t_{vj\,max}$, v_D = 0,5 V_{DRM}	V_{GD}	max. 0,2	V
Haltestrom	holding current	t_{vj} = 25 °C, v_D = 6 V, R_A = 2 Ω	I_H	max. 500	mA
Einraststrom	latching current	t_{vj} = 25 °C,v_D = 6 V, $R_{GK} \geq$ 10 Ω i_{GM} = 1 A, di_G/dt = 1 A/µs, t_g = 20 µs	I_L	max. 2500	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. 150	mA
Zündverzug	gate controlled delay time	t_{vj}=25°C, i_{GM} = 1 A, di_G/dt = 1 A/µs	t_{gd}	max. 4	µs
Freiwerdezeit	circuit commutated turn-off time	siehe Techn.Erl./see Techn. Inf.	t_q	typ. 240	µs

Thermische Eigenschaften Thermal properties

Innerer Wärmewiderstand für beidseitige Kühlung	thermal resistance, junction to case for two-sided cooling	Θ =180° el, sin	R_{thJC}	max. 0,0230	°C/W
		DC		max. 0,0210	°C/W
für anodenseitige Kühlung	for anode-sided cooling	Θ =180° el, sin	$R_{thJC(A)}$	max. 0,0395	°C/W
		DC		max. 0,0375	°C/W
für kathodenseitige Kühlung	for cathode-sided cooling	Θ =180° el, sin	$R_{thJC(K)}$	max. 0,0500	°C/W
		DC		max. 0,0480	°C/W
Übergangs-Wärmewiderstand	thermal resistance, case to heatsink	beidseitig/two-sided	R_{thCK}	max. 0,0035	°C/W
		einseitig/one-sided		max. 0,0070	°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-Elemente mit Druckkontakt	Si-pellet with pressure contact				
Anpreßkraft	clamping force		F	16...32	kN
Gewicht	weight	T 1189 N/T 1190 N	G	typ. 520/580	g
Kriechstrecke	creepage distance	T 1189 N/T 1190 N		32/30	mm
Feuchteklasse	humidity classification	DIN 40040			C
Schwingfestigkeit	vibration resistance	f = 50 Hz		50	m/s²
Maßbild, anliegend	outline, attached	DIN 41814-155B4			

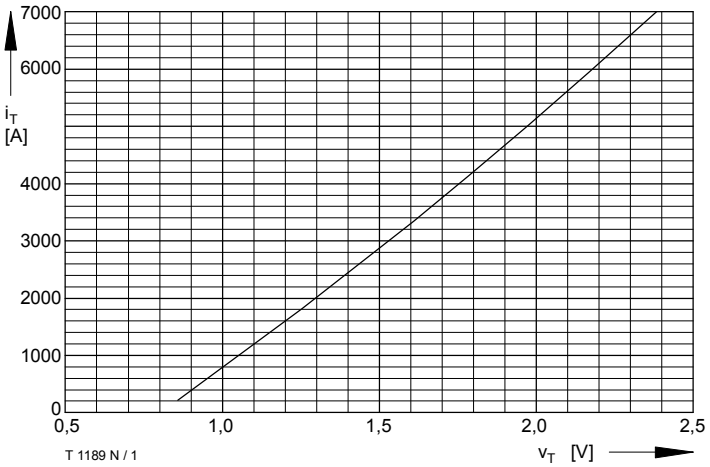


Bild / Fig. 1
Grenzdurchlaßkennlinie / Limiting on-state characteristic
$i_T = f(v_T)$, $t_{vj} = t_{vj\ max}$

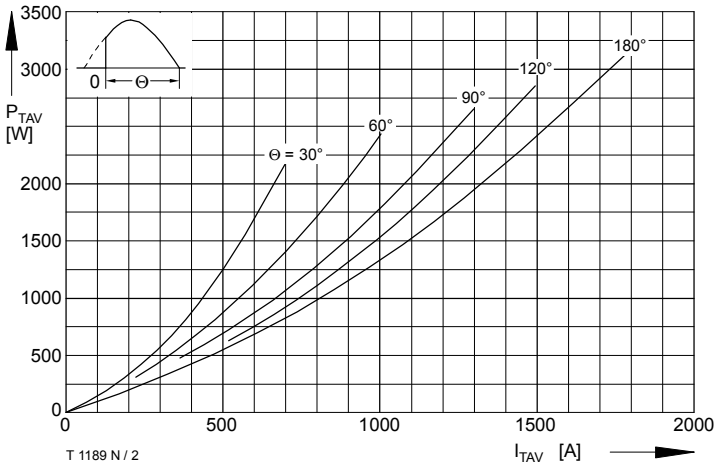


Bild / Fig. 2
Durchlaßverlustleistung / On-state power loss $P_{TAV} = f(I_{TAV})$
Parameter: Stromflußwinkel / Current conduction angle θ

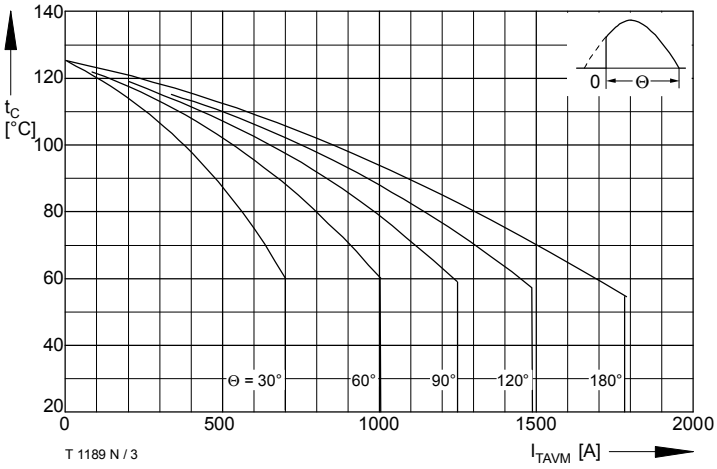


Bild / Fig. 3
Höchstzulässige Gehäusetemperatur / Max. allowable case temperature
$t_C = f(I_{TAVM})$
Beidseitige Kühlung / Two-sided cooling
Parameter: Stromflußwinkel / Current conduction angle θ

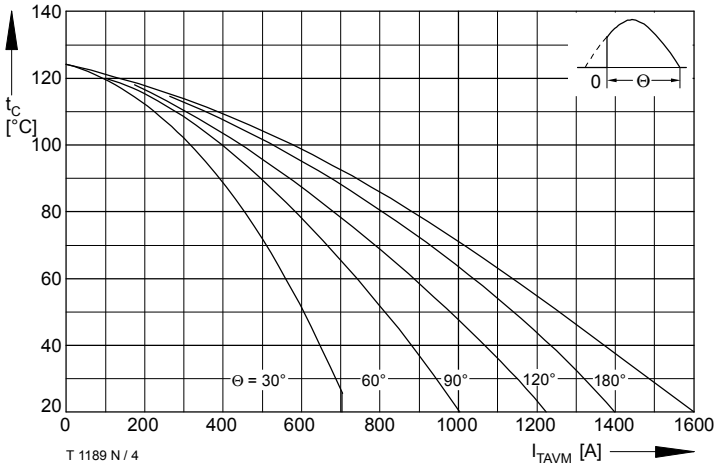


Bild / Fig. 4
Höchstzulässige Gehäusetemperatur / Max. allowable case temperature
$t_C = f(I_{TAVM})$
Anodenseitige Kühlung / Anode-sided cooling
Parameter: Stromflußwinkel / Current conduction angle θ

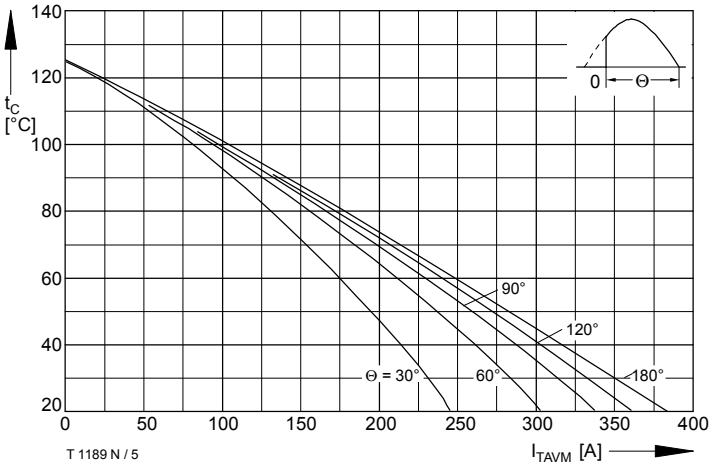


Bild / Fig. 5
Höchstzulässige Kühlmitteltemperatur / Max. allowable cooling medium temperatur $t_A = f(I_{TAVM})$
Luftselbstkühlung / Natural air-cooling
Kühlkörper / Heatsink: K0.05F
Parameter: Stromflußwinkel / Current conduction angle θ

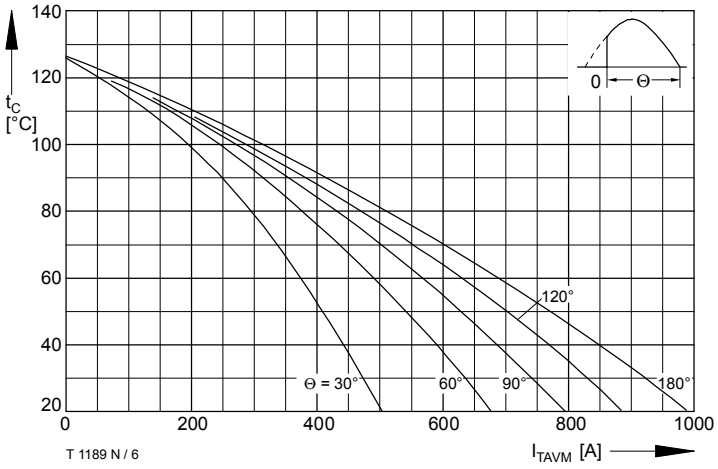


Bild / Fig. 6
Höchstzulässige Kühlmitteltemperatur / Max. allowable cooling medium temperatur $t_A = f(I_{TAVM})$
Verstärkte Luftkühlung / Forced air cooling
Kühlkörper / Heatsink: K0.05F, V_L = 120 l/s
Parameter: Stromflußwinkel / Current conduction angle θ

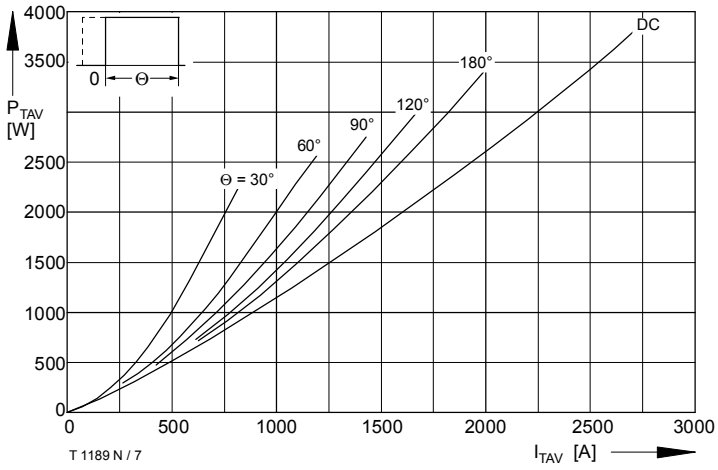


Bild / Fig. 7
Durchlaßverlustleistung / On-state power loss $P_{TAV} = f(I_{TAV})$
Parameter: Stromflußwinkel / Current conduction angle θ

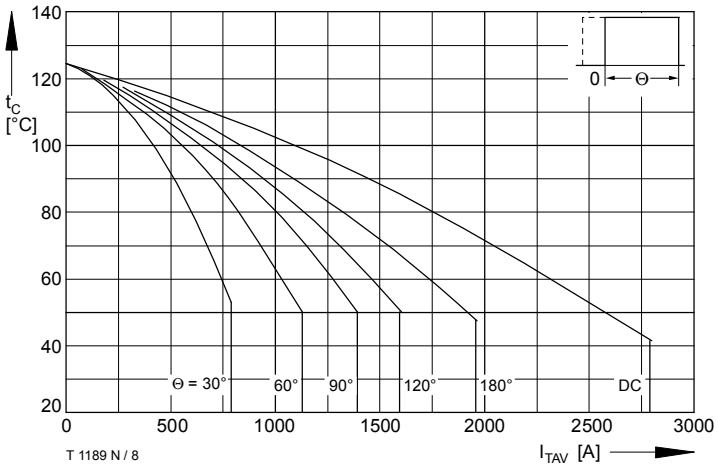


Bild / Fig. 8
Höchstzulässige Gehäusetemperatur / Max. allowable case temperature
$t_C = f(I_{TAVM})$
Beidseitige Kühlung / Two-sided cooling
Parameter: Stromflußwinkel / Current conduction angle θ

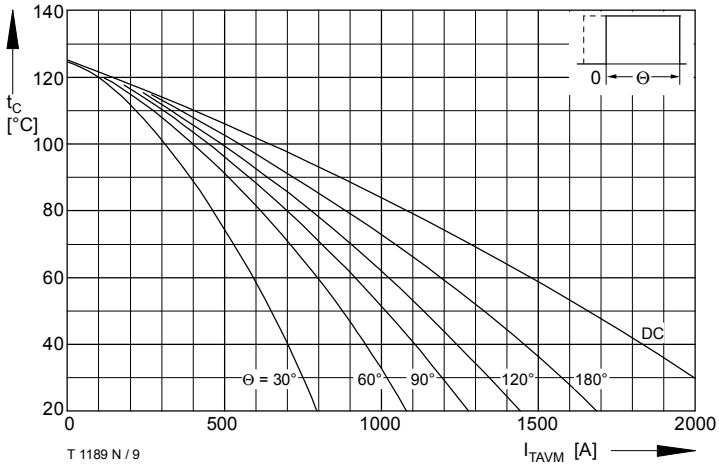


Bild / Fig. 9
Höchstzulässige Gehäusetemperatur / Max. allowable case temperature
$t_C = f(I_{TAVM})$
Anodenseitige Kühlung / Anode-sided cooling
Parameter: Stromflußwinkel / Current conduction angle θ

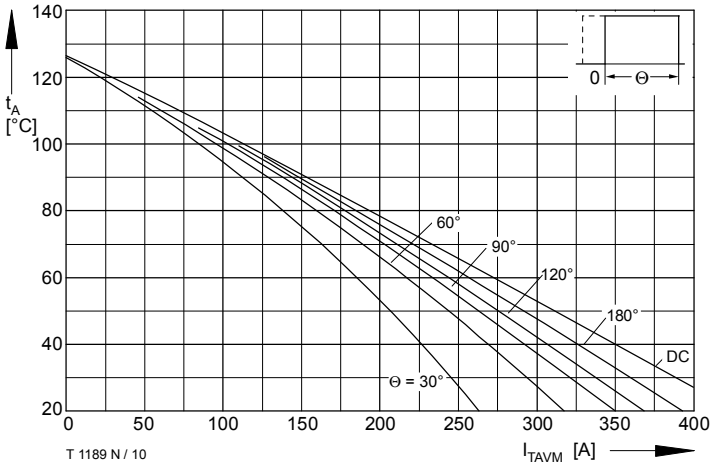


Bild / Fig. 10
Höchstzulässige Kühlmitteltemperatur / Max. allowable cooling medium temperatur $t_A = f(I_{TAVM})$
Luftselbstkühlung / Natural air-cooling
Kühlkörper / Heatsink: K0.55F
Parameter: Stromflußwinkel / Current conduction angle θ

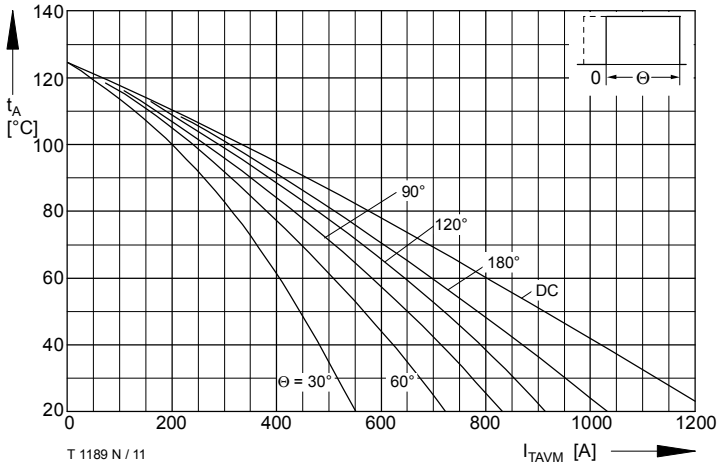


Bild / Fig. 11
Höchstzulässige Kühlmitteltemperatur / Max. allowable cooling medium temperatur $t_A = f(I_{TAVM})$
Verstärkte Luftkühlung / forced air cooling
Kühlkörper / Heatsink: K0.05F, V_L = 120 l/s
Parameter: Stromflußwinkel / Current conduction angle θ

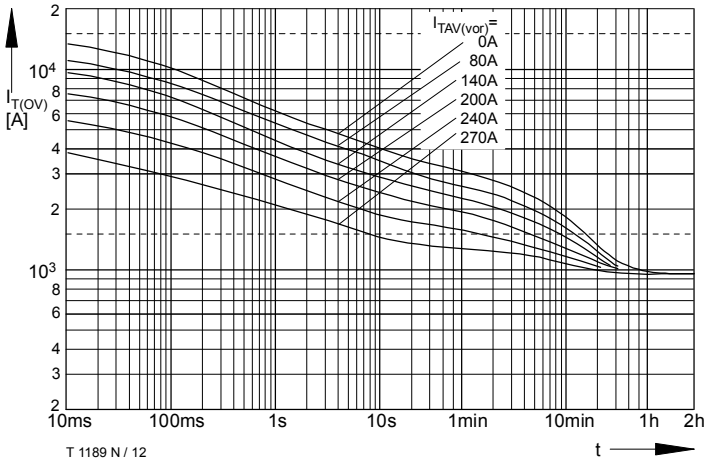


Bild / Fig. 12
Überstrom / Overload on-state current $I_{T(OV)} = f(t)$
Luftselbstkühlung / Natural air-cooling, t_A = 45°C
Kühlkörper / Heatsink: K0.55F
Parameter: Vorlaststrom / Pre-load current $I_{TAV(vor)}$

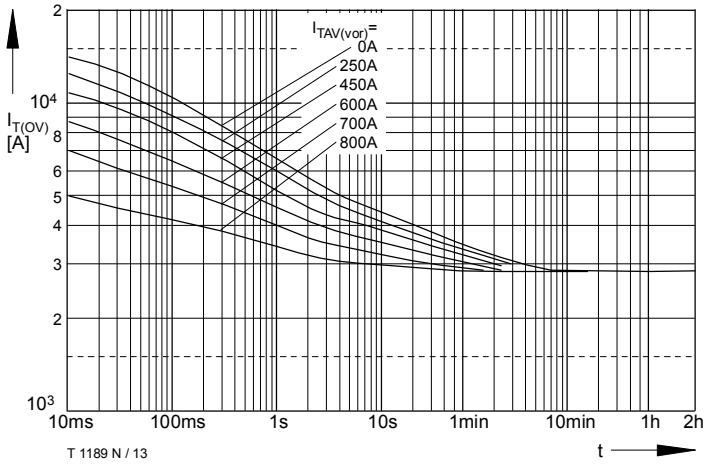


Bild / Fig. 13
Überstrom / Overload on-state current $I_{T(OV)} = f(t)$
Verstärkte Luftkühlung / Forced air-cooling, t_A= 35 °C
Kühlkörper / Heatsink: K0.05F, V_L = 120 l/s
Parameter: Vorlaststrom / Pre-load current $I_{TAV(vor)}$

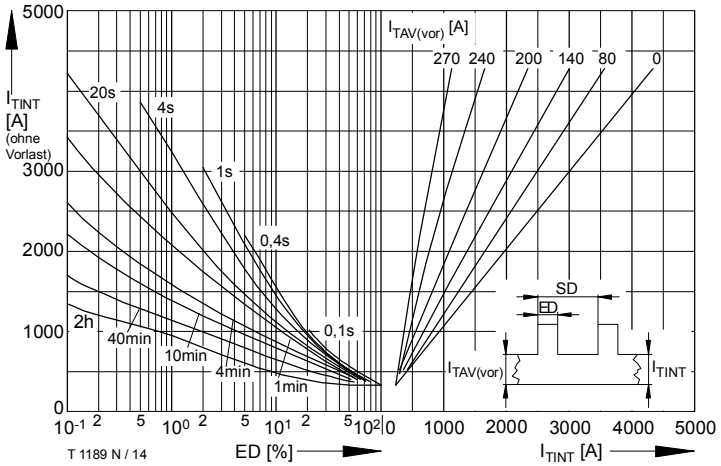


Bild / Fig. 14
Höchstzulässiger Durchlaßstrom bei Aussetzbetrieb / Max. allowable on-state current at intermittent operation $I_{TINT} = f(ED)$
Luftselbstkühlung / Natural air-cooling, t_A = 45°C
Kühlkörper / Heatsink: K0.05F
Parameter: Spieldauer / Cycle duration SD
Vorlaststrom / Pre-load current $I_{TAV(vor)}$

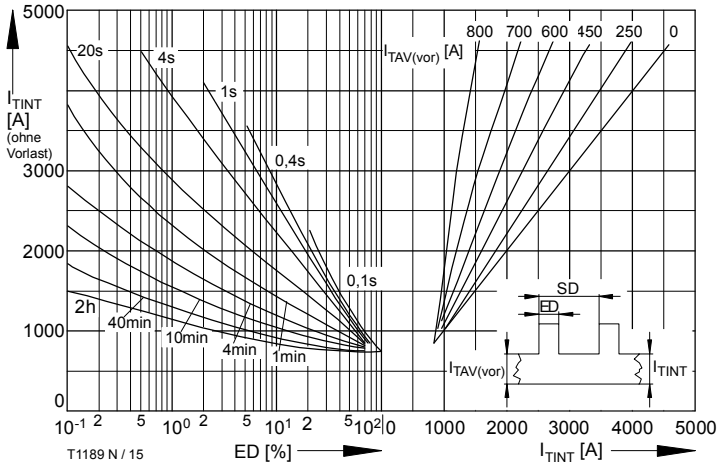


Bild / Fig. 15
Höchstzulässiger Durchlaßstrom bei Aussetzbetrieb / Max. allowable on-state current at intermittent operation $I_{TINT} = f(ED)$
Verstärkte Luftkühlung / Forced air-cooling, t_A= 35 °C
Kühlkörper / Heatsink: K0.05F, V_L = 120 l/s
Parameter: Spieldauer / Cycle duration SD
Vorlaststrom / Pre-load current $I_{TAV(vor)}$

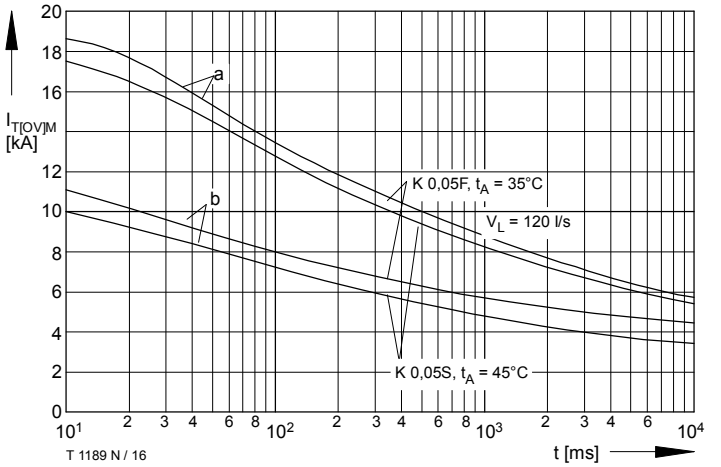


Bild / Fig. 16
Grenzstrom / Max. overload on-state current $I_{T(OV)M} = f(t)$, v_{RM} = 0,8 V_{RRM}
Beidseitige Kühlung / Two-sided cooling
Kühlkörper / Heatsink: K0.55F
Belastung aus / Surge current occurs:
a - Leerlauf / No-load conditions
b - Betrieb mit Dauergrenzstrom / During operation at max. average on-state current I_{TAVM}

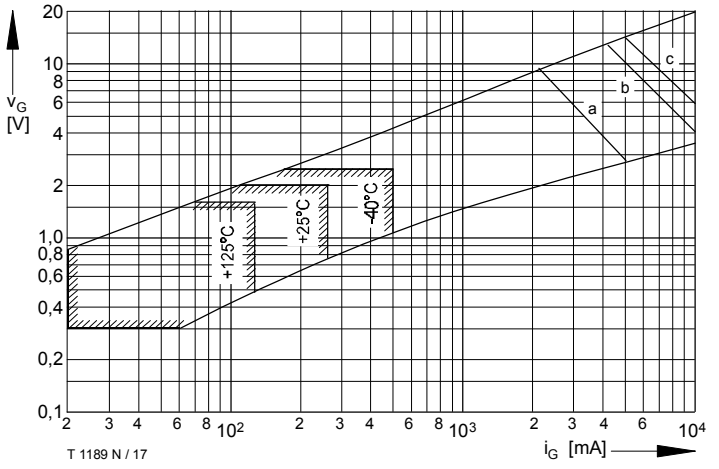


Bild / Fig. 17
Steuercharakteristik mit Zündbereichen / Gate characteristic with trigging areas $v_G = f(i_G)$, V_D = 6 V

Parameter:		a	b	c
Steuerimpulsdauer / trigger puls duration t_g	[ms]	10	1	0,5
Höchstzulässige Spitzensteuerverlustleistung / Max. rated peak gate power dissipation	[W]	20	40	60

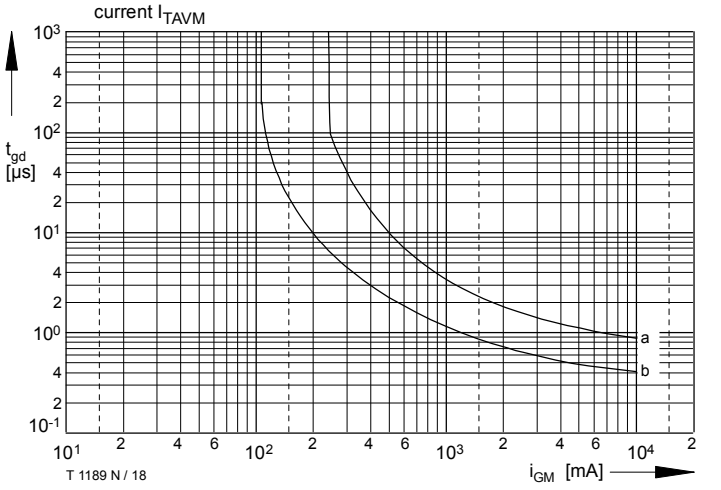


Bild / Fig. 18
Zündverzug / Gate controlled delay time $t_{gd} = f(i_{GM})$
t_{vj} = 25 °C, $di_G/dt = i_{GM}/1µs$
a - Maximaler Verlauf / Limiting characteristic
b - Typischer Verlauf / Typical characteristic

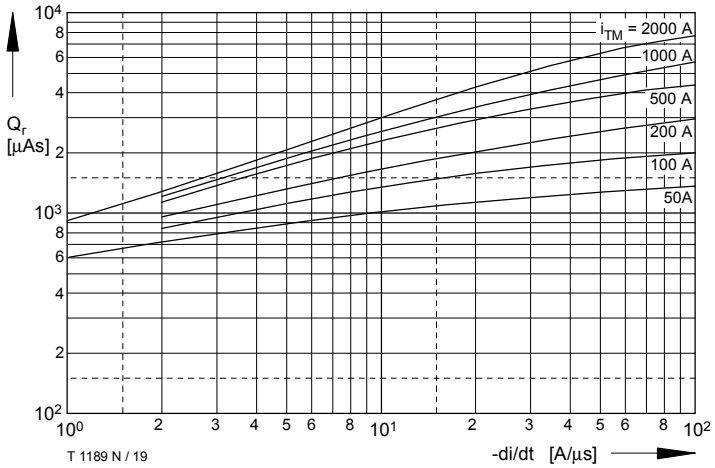


Bild / Fig. 19
Sperrverzögerungsladung / Recovered charge $Q_r = f(di/dt)$
$t_{vj} = t_{vj\,max}$, $v_R = 0{,}5\ V_{RRM}$, $v_{RM} = 0{,}8\ V_{RRM}$
Parameter: Durchlaßstrom / On-state current i_{TM}

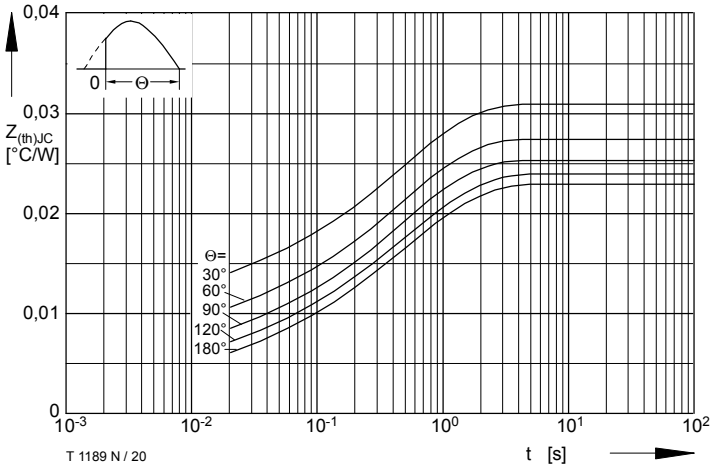


Bild / Fig. 20
Transienter innerer Wärmewiderstand / Transient thermal impedance
$Z_{thJC} = f(t)$
Beidseitige Kühlung / Two-sided cooling
Parameter: Stromflußwinkel / current conduction angle θ

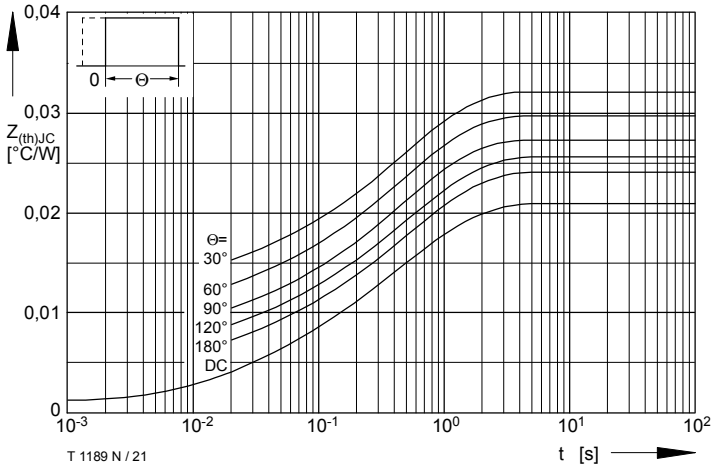


Bild / Fig. 21
Transienter innerer Wärmewiderstand / Transient thermal impedance
$Z_{thJC} = f(t)$
Beidseitige Kühlung / Two-sided cooling
Parameter: Stromflußwinkel / current conduction angle θ

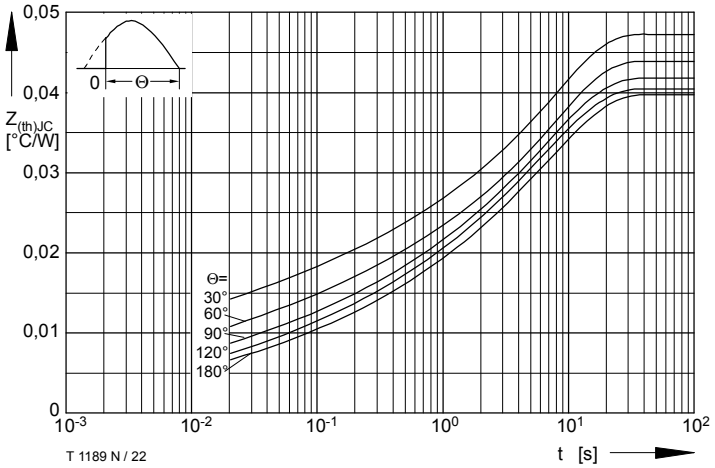


Bild / Fig. 22
Transienter innerer Wärmewiderstand / Transient thermal impedance
$Z_{thJC} = f(t)$
Anodenseitige Kühlung / Anode-sided cooling
Parameter: Stromflußwinkel / current conduction angle θ

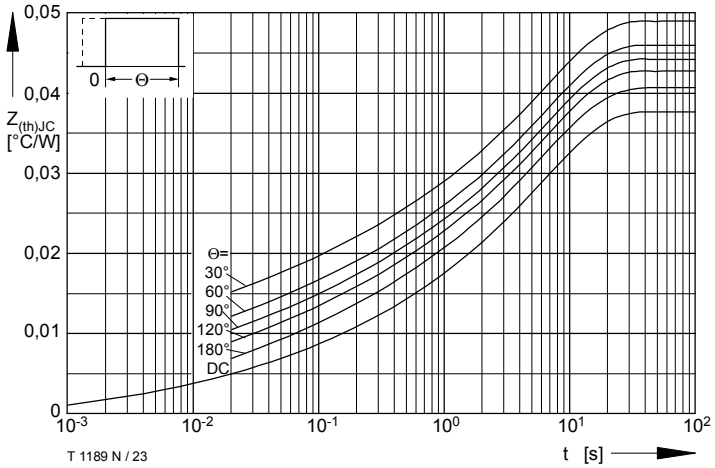


Bild / Fig. 23
Transienter innerer Wärmewiderstand / Transient thermal impedance
$Z_{thJC} = f(t)$
Anodenseitige Kühlung / Anode-sided cooling
Parameter: Stromflußwinkel / current conduction angle θ

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]	0,00113	0,0021	0,00229	0,00703	0,00845
τ_n [s]	0,00189	0,0065	0,0456	0,23	1,134

Anodenseitig / Anode-sided

Pos. n	1	2	3	4	5
R_{thn}[°C/W]	0,00066	0,00291	0,0037	0,00783	0,0224
τ_n [s]	0,00138	0,00614	0,0765	0,374	6,66

Kathodenseitig / Cathode-sided

Pos. n	1	2	3	4	5
R_{thn}[°C/W]	0,00127	0,0026	0,00623	0,0046	0,0333
τ_n [s]	0,00201	0,00843	0,126	0,57	7,83

Analytische Funktion / Analytical function:

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

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Attention
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