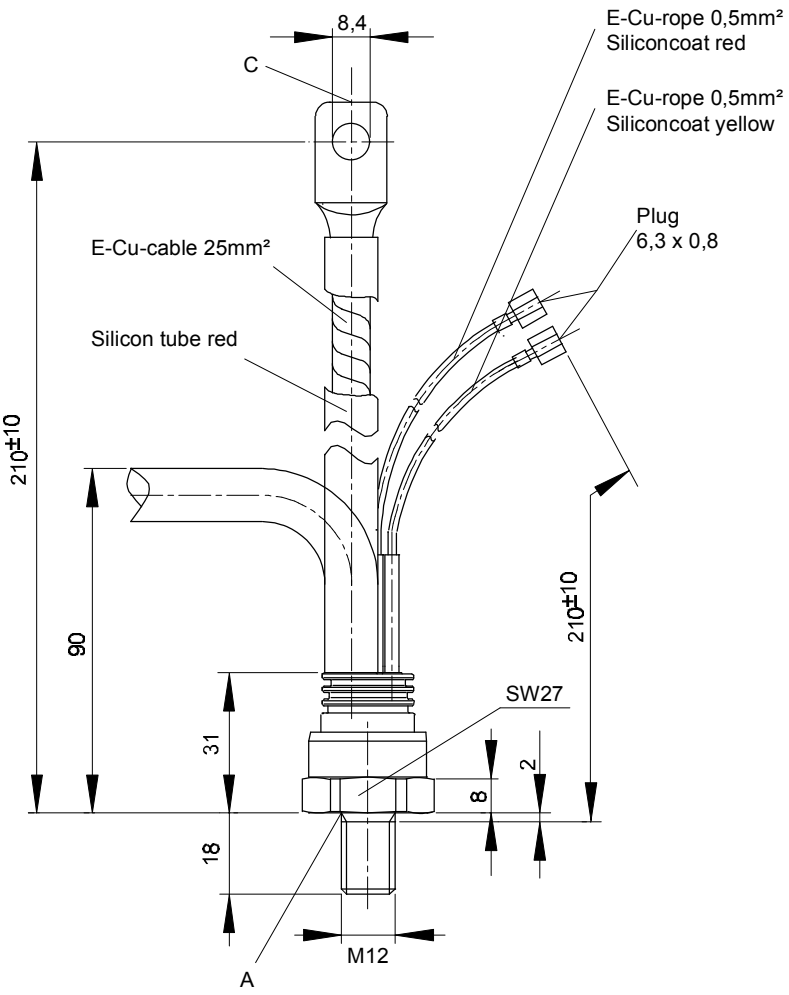
European Power-
Semiconductor and
Electronics Company

Marketing Information
T 86 N



VWK Aug. 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}	600 800 1000 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}	600 800 1000 1200 1400 1600 1800*	V
Rückwärts-Stoßspitzensperrspannung	non-repetitive peak reverse voltage	t_{vj} = +25°C...$t_{vj\,max}$	V_{RSM} = V_{RRM}	700 900 1100 1300 1500 1700 1900	V
Durchlaßstrom-Grenzeffektivwert	RMS on-state current		I_{TRMSM}	200	A
Dauergrenzstrom	average on-state current	t_c = 85°C	I_{TAVM}	86	A
		t_c = 56°C		127	A
Stoßstrom-Grenzwert	surge current	t_{vj} = 25°C, t_p = 10 ms	I_{TSM}	2300	A
		t_{vj} = $t_{vj\,max}$, t_p = 10 ms		2000	A
Grenzlastintegral	I^2t-value	t_{vj} = 25°C, t_p = 10 ms	I^2t	26500	A^2s
		t_{vj} = $t_{vj\,max}$, t_p = 10 ms		20000	A^2s
Kritische Stromsteilheit	critical rate of rise of on-state current	$v_D \leq$ 67%, v_{DRM}, f = 50 Hz v_L=8 V, i_{GM}= 0,6 A, di_G/dt =0,6 A/µs	$(di_T/dt)_{cr}$	150	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 = 400 A	v_T	max. 1,99	V
Schleusenspannung	threshold voltage	t_{vj} = $t_{vj\,max}$	$V_{T(TO)}$	1	V
Ersatzwiderstand	slope resistance	t_{vj} = $t_{vj\,max}$	r_T	2,6	mΩ
Zündstrom	gate trigger current	t_{vj} = 25 °C, v_D = 6 V	I_{GT}	max. 150	mA
Zündspannung	gate trigger voltage	t_{vj} = 25 °C, v_D = 6 V	V_{GT}	max. 1,4	V
Nicht zündender Steuerstrom	gate non-trigger current	t_{vj} = $t_{vj\,max}$, v_D = 6 V	I_{GD}	max. 5	mA
Nicht zündende Steuerspannung	gate non-trigger voltage	t_{vj} = $t_{vj\,max}$, v_D = 0,5 V_{DRM}	V_{GD}	max. 0,2	V
Haltestrom	holding current	t_{vj} = 25 °C, v_D = 6 V, R_A = 5 Ω	I_H	max. 200	mA
Einraststrom	latching current	t_{vj} = 25 °C,v_D = 6 V, R_{GK} ≥ 10 Ω i_{GM} =0,6 A, di_G/dt =0,6 A/µs, t_g = 20 µs	I_L	max. 620	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. 25	mA
Zündverzug	gate controlled delay time	t_{vj}=25°C, i_{GM} = 0,6 A, di_G/dt = 0,6 A/µs	t_{gd}	max. 3	µs
Freiwerdezeit	circuit commutated turn-off time	siehe Techn.Erl./see Techn. Inf.	t_q	typ. 200	µs

Thermische Eigenschaften / Thermal properties

Innerer Wärmewiderstand	thermal resistance, junction to case	Θ =180° el, sin	R_{thJC}	max. 0,3	°C/W
		DC		max. 0,28	°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...+130	°C

Mechanische Eigenschaften / Mechanical properties

Si-Elemente mit Druckkontakt	Si-pellet with pressure contact				
Anzugsdrehmoment	tightening torque		M	20	Nm
Gewicht, Bauform E	weight, case design E		G	typ. 180	g
Kriechstrecke	creepage distance			8	mm
Feuchteklasse	humidity classification	DIN 40040			C
Schwingfestigkeit	vibration resistance	f = 50 Hz		50	m/s²
Maßbild, anliegend	outline, attached	DIN 41 892-204B3			

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

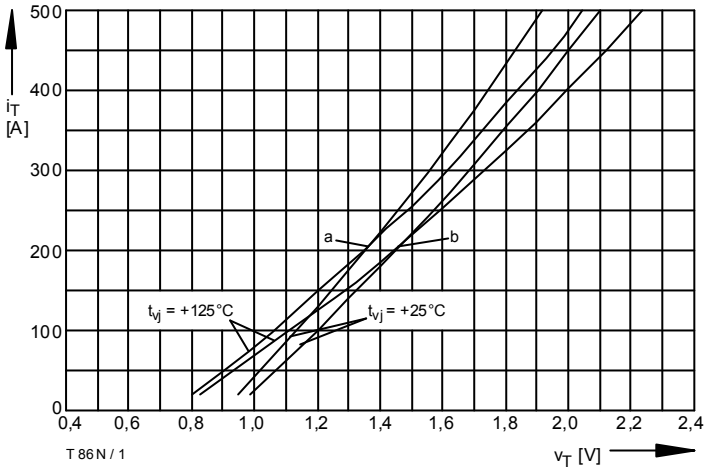

Bild / Fig. 1
Durchlaßkennlinie / On-state characteristic $i_T = f(v_T)$
a - Typische Kennlinien / typical characteristics
b - Grenzkennlinien / limiting characteristics

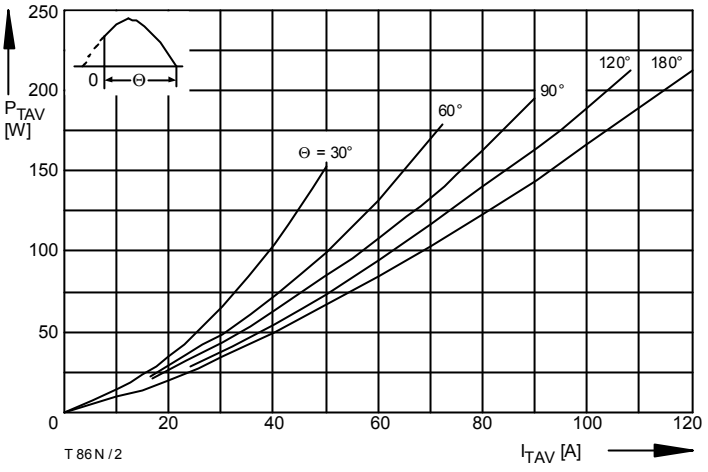

Bild / Fig. 2
Durchlaßverlustleistung / On-state power loss $P_{TAV} = f(I_{TAV})$
Parameter: Stromflußwinkel / Current conduction angle θ

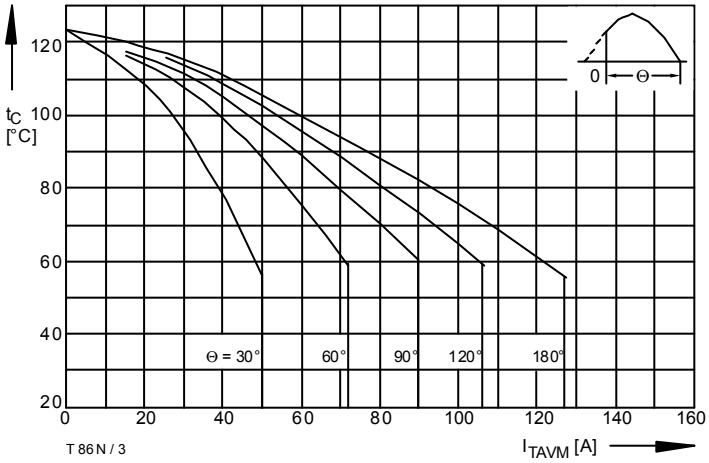

Bild / Fig. 3
Höchstzulässige Gehäusetemperatur / Max. allowable case temperature
$t_C = f(I_{TAVM})$
Beidseitege Kühlung / Two-sided cooling
Parameter: Stromflußwinkel / Current conduction angle θ

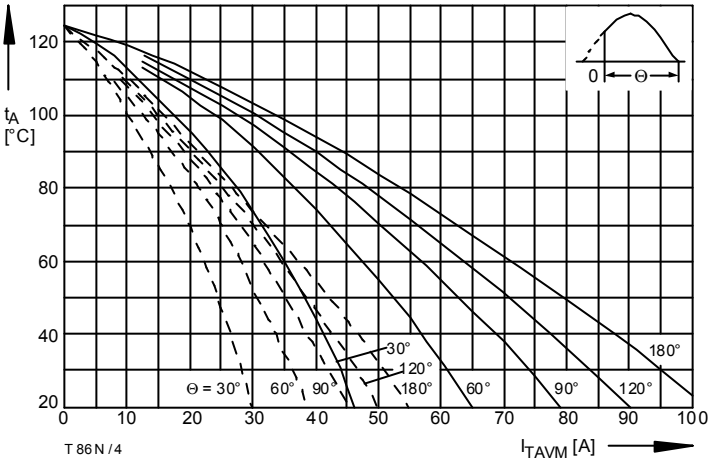

Bild / Fig. 4
Höchstzulässige Kühlmitteltemperatur / Max. allowable cooling medium temperature $t_A = f(I_{TAVM})$
Kühlkörper / Heatsink: K1.1-M12A
- - - - - - - - - Luftsebstkühlung / Natural air-cooling
———— Verstärkte Luftkühlung / Forced air-cooling, V_L = 30 l/s
Parameter: Stromflußwinkel / Current conduction angle θ

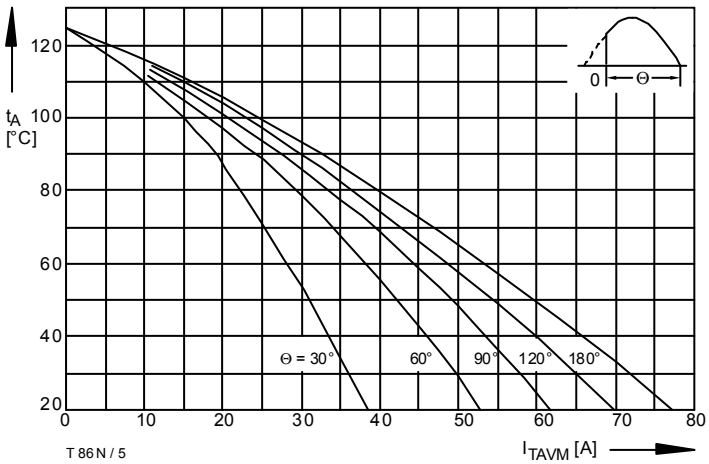

Bild / Fig. 5
Höchzulässige Kühlmitteltemperatur / Max. allowable cooling medium temperatur $t_A = f(I_{TAVM})$
Luftselbstkühlung / Natural air-cooling
Kühlkörper / Heatsink: K0.55-M12-A
Parameter: Stromflußwinkel / Current conduction angle θ

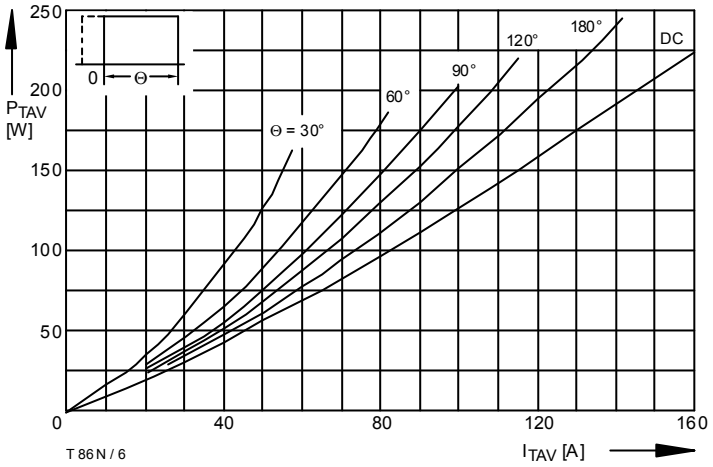

Bild / Fig. 6
Durchlaßverlustleistung / On-state power loss $P_{TAV} = f(I_{TAV})$
Parameter: Stromflußwinkel / Current conduction angle θ

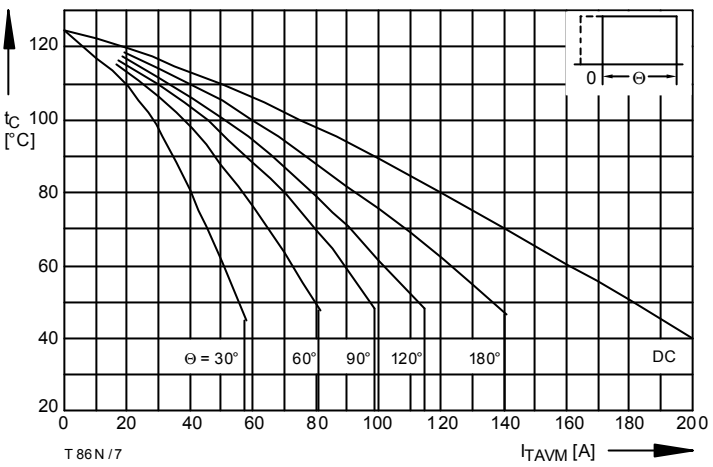

Bild / Fig. 7
Höchstzulässige Gehäusetemperatur / Max. allowable case temperature
$t_C = f(I_{TAVM})$
Beidseitige Kühlung / Two-sided cooling
Parameter: Stromflußwinkel / Current conduction angle θ

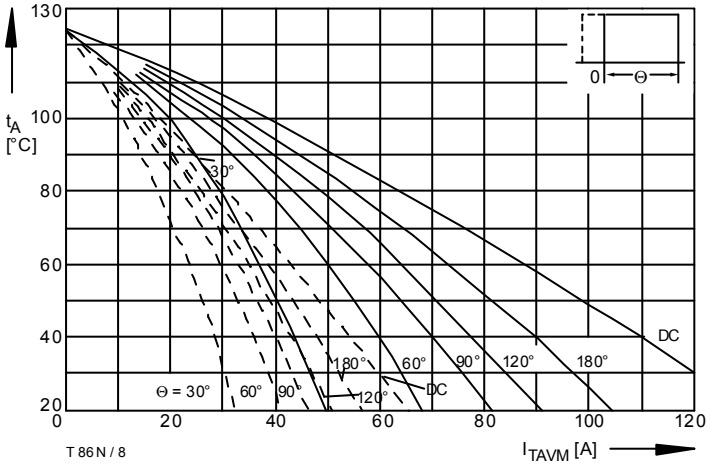

Bild / Fig. 8
Höchstzulässige Kühlmitteltemperatur / Max. allowable cooling medium temperature $t_A = f(I_{TAVM})$
Kühlkörper / Heatsink: K1.1-M12A
---------- Luftsebstkühlung / Natural air-cooling
——— Verstärkte Luftkühlung / Forced air-cooling, V_L = 30 l/s
Parameter: Stromflußwinkel / Current conduction angle θ

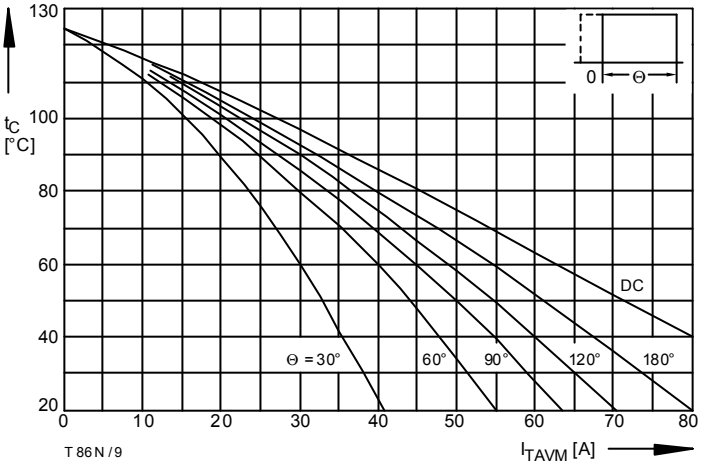

Bild / Fig. 9
Höchstzulässige Kühlmitteltemperatur / Max. allowable cooling medium temperature $t_A = f(I_{TAVM})$
Luftselbstkühlung / Natural air-cooling
Kühlkörper / Heatsink: K0.55-M12-A
Parameter: Stromflußwinkel / Current conduction angle θ

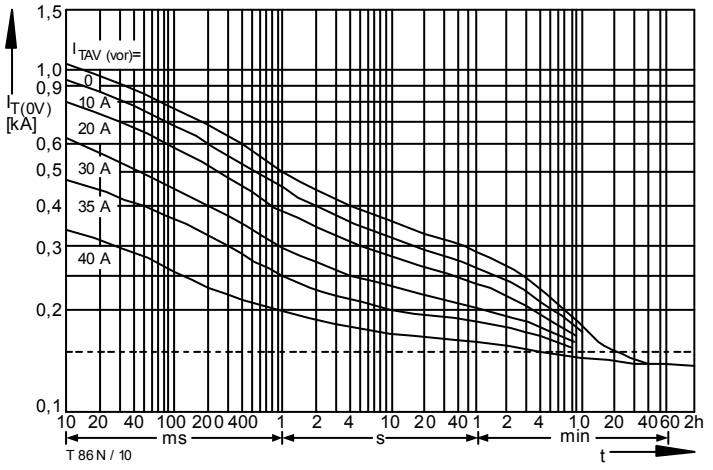

Bild / Fig. 10
Überstrom / Overload on-state current $I_{T(OV)} = f(t)$
Luftselbstkühlung / Natural air-cooling t_A = 45°C
Kühlkörper / Heatsink: K1.1-M12-A
Parameter: Vorlaststrom / Pre-load current $I_{TAV(vor)}$

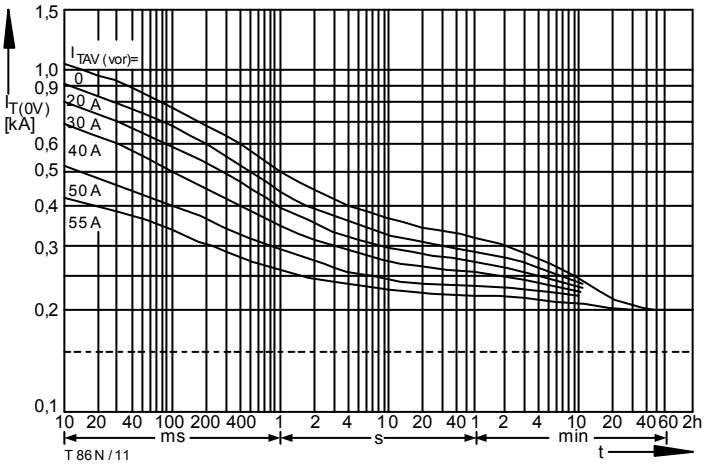

Bild / Fig. 11
Überstrom / Overload on-state current $I_{T(OV)} = f(t)$
Luftselbstkühlung / Natural air-cooling t_A = 45°C
Kühlkörper / Heatsink: K0.55-M12-A
Parameter: Vorlaststrom / Pre-load current $I_{TAV(vor)}$

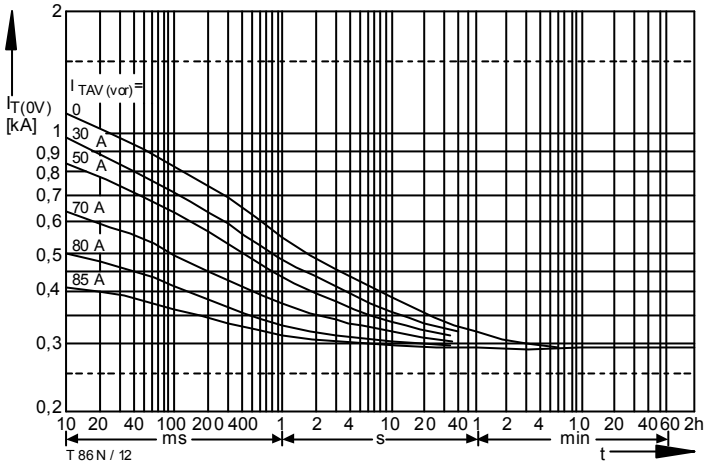

Bild / Fig. 12
Überstrom / Overload on-state current $I_{T(OV)} = f(t)$
Verstärkte Luftkühlung / Forced air-cooling, t_A = 35 °C
Kühlkörper / Heatsink: K1.1-M12-A, V_L = 30 l/s
Parameter: Vorlaststrom / Pre-load current $I_{TAV(vor)}$

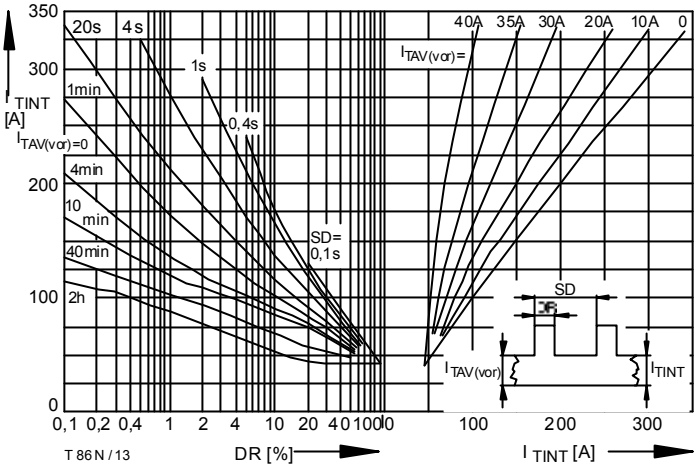

Bild / Fig. 13
Höchstzulässiger Durchlaßstrom bei Aussetzbetrieb / Max. allowable on-state current at intermittent operation $I_{TINT} = f(ED)$
Luftselbstkühlung / Natural air-cooling, t_A = 45 °C
Kühlkörper / Heatsink: K1.1-M12-A
Parameter: Spieldauer / Cycle duration SD
Vorlaststrom / Pre-load current $I_{TAV(vor)}$

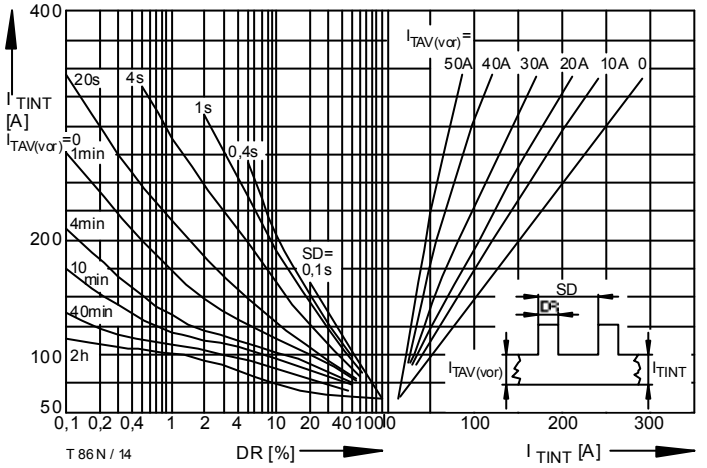

Bild / Fig. 14
Höchstzulässiger Durchlaßstrom bei Aussetzbetrieb / Max. allowable on-state current at intermittent operation $I_{TINT} = f(ED)$
Luftselbstkühlung / Natural air-cooling, t_A = 45 °C
Kühlkörper / Heatsink: K0.55-M12-A
Parameter: Spieldauer / Cycle duration SD
Vorlaststrom / Pre-load current $I_{TAV(vor)}$

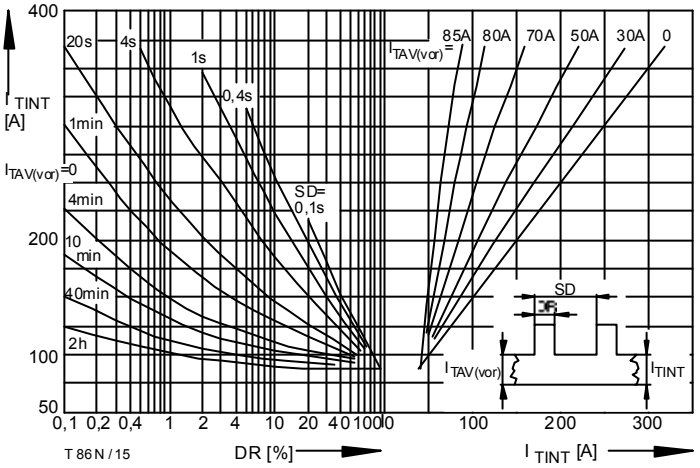

Bild / Fig. 15
Höchstzulässiger Durchlaßstrom bei Aussetzbetrieb / Max. allowable on-state current at intermittent operation $I_{TINT} = f(ED)$
Verstärkte Luftkühlung / Forced air-cooling, t_A = 35 °C
Kühlkörper / Heatsink: K1.1-M12-A, V_L = 30 l/s
Parameter: Spieldauer / Cycle duration SD
Vorlaststrom / Pre-load current $I_{TAV(vor)}$

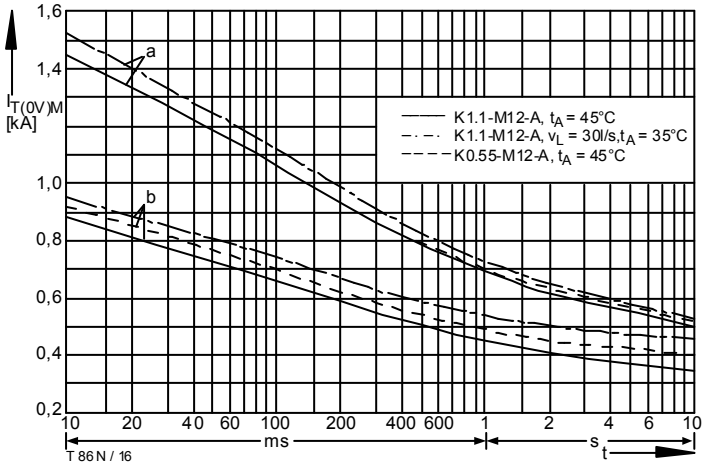

Bild / Fig. 16
Grenzstrom / Max. overload on-state current $I_{T(OV)M} = f(t)$, v_{RM} = 0,8 V_{RRM}
Luftselbstkühlung / Natural air-cooling, t_A = 45 °C
Verstärkte Luftkühlung / Forced air-cooling, t_A = 35 °C, V_L = 30 l/s
Kühlkörper / Heatsink: K1.1-M12-A und K0.55-M12-A
Belastung aus / Surge current occurs:
a - Leerlauf / No-load conditions
b - Betrieb mit Dauergrenzstrom / During operation at max. average on-state current I_{TAVM}

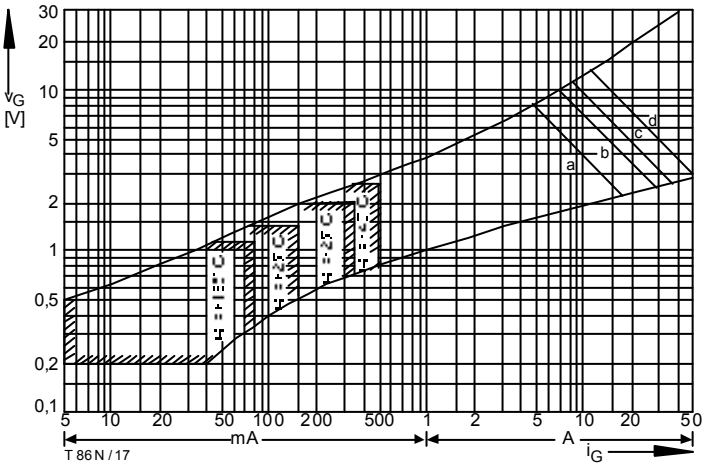

Bild / Fig. 17
Steuercharakteristik mit Zündbereichen / Gate characteristic with trigging areas $v_G = f(i_G)$, V_D = 6 V

Parameter:		a	b	c	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

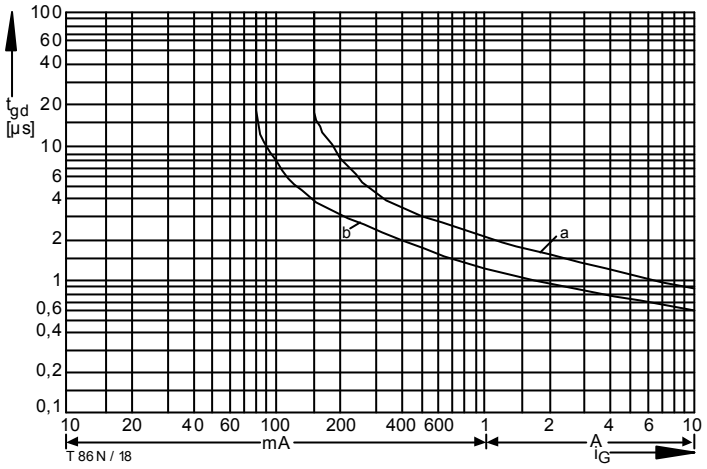

Bild / Fig. 18
Zündverzug / Gate controlled delay time $t_{gd} = f(i_G)$
t_{vj} = 25 °C, $di_G/dt = i_{GM}/1µs$
a - Maximaler Verlauf / Limiting characteristic
b - Typischer Verlauf / Typical characteristic

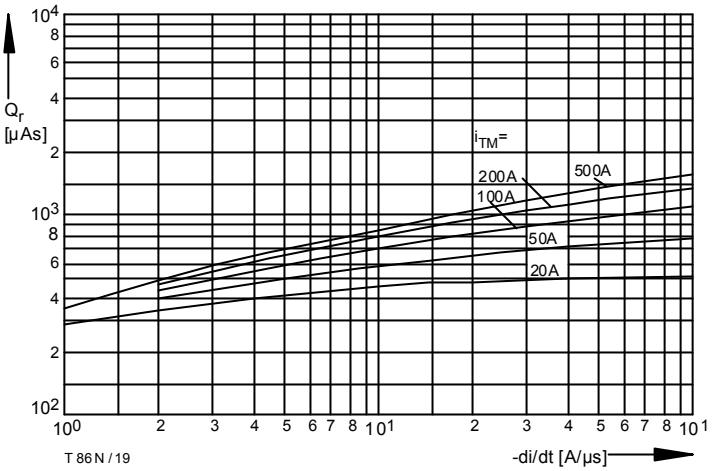

Bild / Fig. 19
Sperrverzögerungsladung / Recovered charge $Q_r = f(di/dt)$
$t_{vj} = t_{vj\,max}$, $v_R = 0,5\,V_{RRM}$, $v_{RM} = 0,8\,V_{RRM}$
Parameter: Durchlaßstrom / On-state current i_{TM}

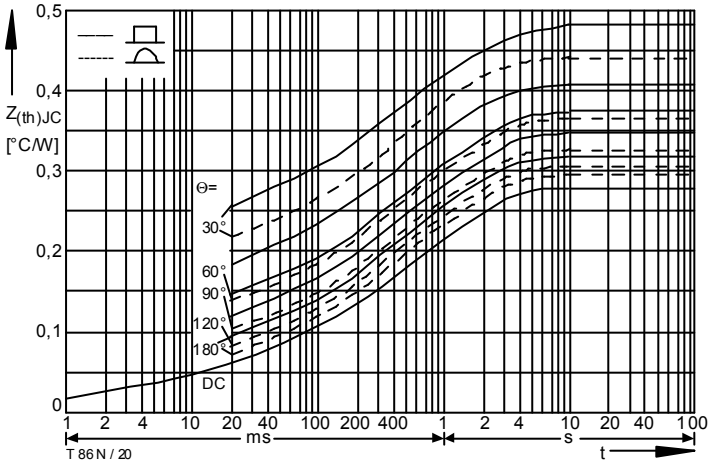

Bild / Fig. 20
Transienter innerer Wärmewiderstand / Transient thermal impedance
$Z_{thJC} = f(t)$
Parameter: Stromflußwinkel / current conduction angle θ

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

Pos. n	1	2	3	4	5	6	7
R_{thn}[°C/W]	0,0233	0,0433	0,094	0,122			
τ_n [s]	0,00137	0,0175	0,263	1,71			

Analytische Funktion / Analytical function:

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

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