Technische Information / Technical Information

eupec

Netz-Thyristor
Phase Control Thyristor

T 548 N 12 ...18

N

Elektrische Eigenschften / Electrical properties

Vorläufige Daten
Preliminary Data

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 1600	1400 1800	V V
Vorwärts-Stoßspitzensperrspannung non-repetitive peak foward off-state voltage	T_{vj} = - 40°C...$T_{vj\,max}$	V_{DSM}	1200 1600	1400 1800	V V
Rückwärts-Stoßspitzensperrspannung non-repetitive peak reverse voltage	T_{vj} = + 25°C...$T_{vj\,max}$	V_{RSM}	1300 1700	1500 1900	V V
Durchlaßstrom-Grenzeffektivwert RMSM on-state current		I_{TRSMSM}		860	A
Dauergrenzstrom average on-state current	T_C = 85 °C	I_{TAVM}		548	A
Stoßstrom-Grenzwert surge current	T_{vj} = 25°C, t_p = 10 ms T_{vj} = $T_{vj\,max}$, t_p = 10 ms	I_{TSM}		8400 7400	A A
Grenzlastintegral I²t-value	T_{vj} = 25°C, t_p = 10ms T_{vj} = $T_{vj\,max}$, t_p = 10ms	I²t		360 274	A²s *10³ A²s *10³
Kritische Stromsteilheit critical rate of rise of on-state current	DIN IEC 747-6 f=50 Hz, v_L = 10V, 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 = 0,67 V_{DRM} 5.Kennbuchstabe / 5th letter F	$(dv_D/dt)_{cr}$		1000	V/µs

Charakteristische Werte / Characteristic values

Durchlaßspannung on-state voltage	T_{vj} = $T_{vj\,max}$, i_T = 1200 A	v_T	max.	1,68	V
Schleusenspannung threshold voltage	T_{vj} = $T_{vj\,max}$	$V_{T(TO)}$		0,8	V
Ersatzwiderstand slope resistance	T_{vj} = $T_{vj\,max}$	r_T		0,6	mΩ
Durchlaßkennlinie on-state voltage $v_T = A + B \times i_T + C \times \ln(i_T + 1) + D \times \sqrt{i_T}$	T_{vj} = $T_{vj\,max}$	A= 1,03803 B= 3,90E-04 C=-8,88E-02 D= 2,32E-02			
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 = 6V	V_{GT}	max.	1,5	V
Nicht zündener Steuerstrom gate non-trigger current	T_{vj} = $T_{vj\,max}$, v_D = 6 V T_{vj} = $T_{vj\,max}$,v_D = 0,5 V_{DRM}	I_{GD}	max. max.	10 5	mA mA
Nicht zündene Steuerspannung gate non-trigger voltage	T_{vj} = $T_{vj\,max}$,v_D = 0,5 V_{DRM}	V_{GD}	max.	0,2	mV
Haltestrom holding current	T_{vj} = 25°C, v_D = 6 V, R_A = 5 Ω	I_H	max.	300	mA
Einraststrom latching current	T_{vj} = 25°C, v_D = 6 V, $R_{GK>}$= 10 Ω i_{GM} = 1 A, di_G/dt = 1 A/µs t_g = 20 µs	I_L	max.	1200	mA
Vorwärts- und Rückwärts-Sperrstrom forward off-state and reverse currents	T_{vj} = $T_{vj\,max}$ v_D = V_{DRM}, vR = V_{RRM}	i_D, i_R	max.	50	mA
Zündverzug gate controlled delay time	DIN IEC 747-6 T_{vj} = 25°C i_{GM} = 1 A, di_G/dt = 1 A/µs	t_{gd}	max.	4	µs

Elektrische Eigenschften / Electrical properties

Vorläufige Daten
Preliminary Data

Charakteristische Werte / Characteristic values

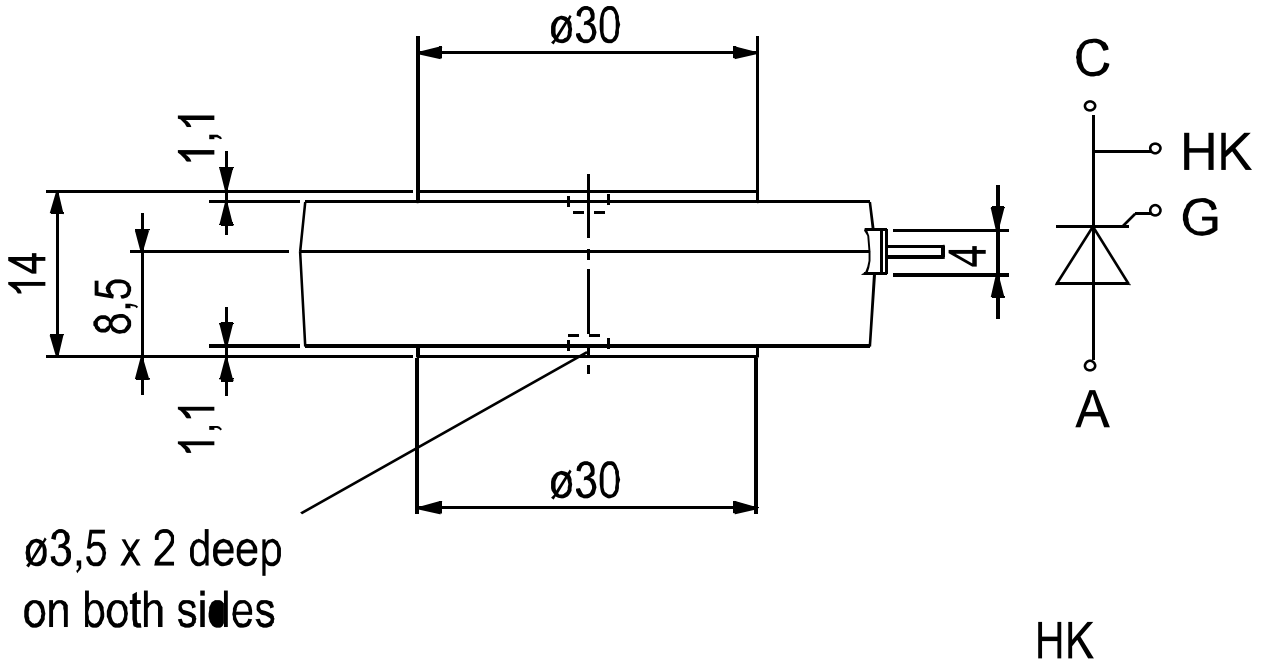
Freiwerdezeit circuit commutatet turn-off time	$T_{vj} = T_{vj\,max}$, $i_{TM}=I_{TAVM}$ v_{RM} =100V, v_{DM} = 0,67 V_{DRM} dv_D/dt = 20 V/µs, $-di_T/dt$ = 10 A/µs 4. Kennbuchstabe / 4th letter O	t_q	typ.	250	µs

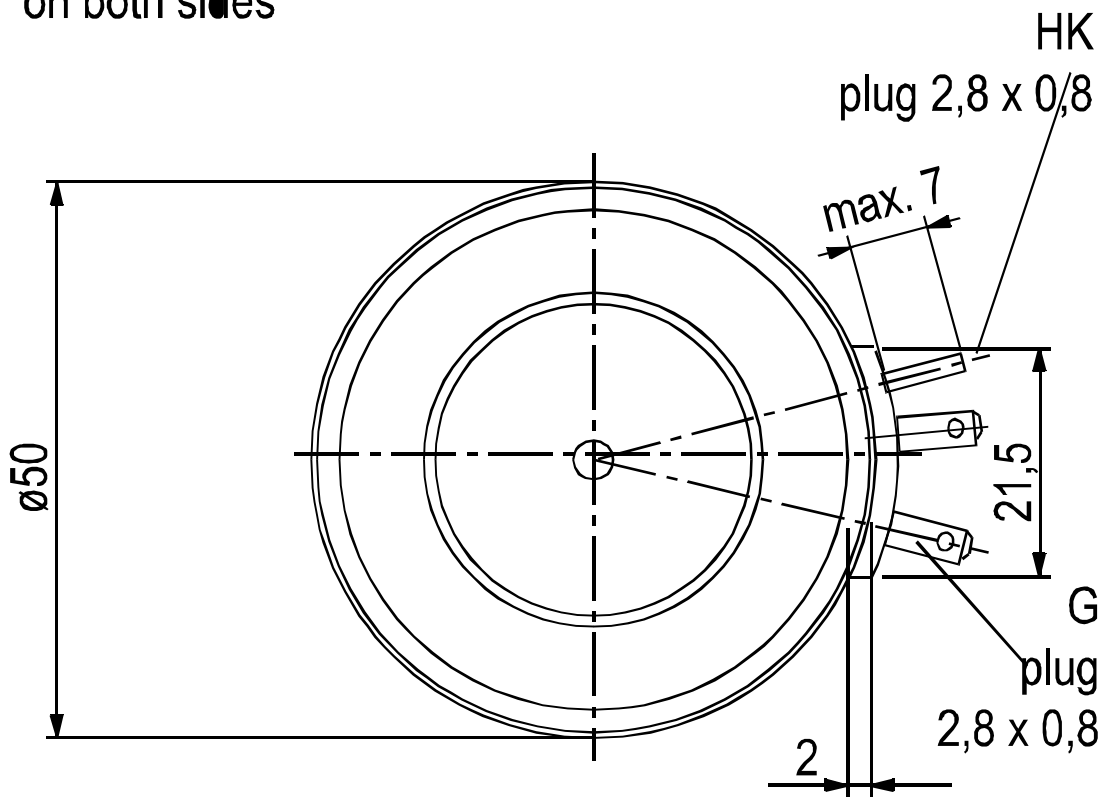
Thermische Eigenschaften / Thermal properties

Innerer Wärmewiderstand thermal resitance, junction to case	Kühlfläche / cooling surface beidseitig / two-sided, Ž=180°sin beidseitig / two-sided, DC Anode / anode, Ž=180°sin Anode / anode, DC Kathode / cathode, Ž=180°sin Kathode / cathode, DC	R_{thJC}	 max. max. max. max. max. max.	 0,0450 0,0410 0,0740 0,0700 0,1040 0,1000	 °C/W °C/W °C/W °C/W °C/W °C/W
Übergangs- Wärmewiderstand thermal resitance, case to heatsink	Kühlfläche / cooling surface beidseitig / two-sided einseitig / single-sided	R_{thCK}	 max. max.	 0,0070 0,0140	 °C/W °C/W
Höchstzulässige 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

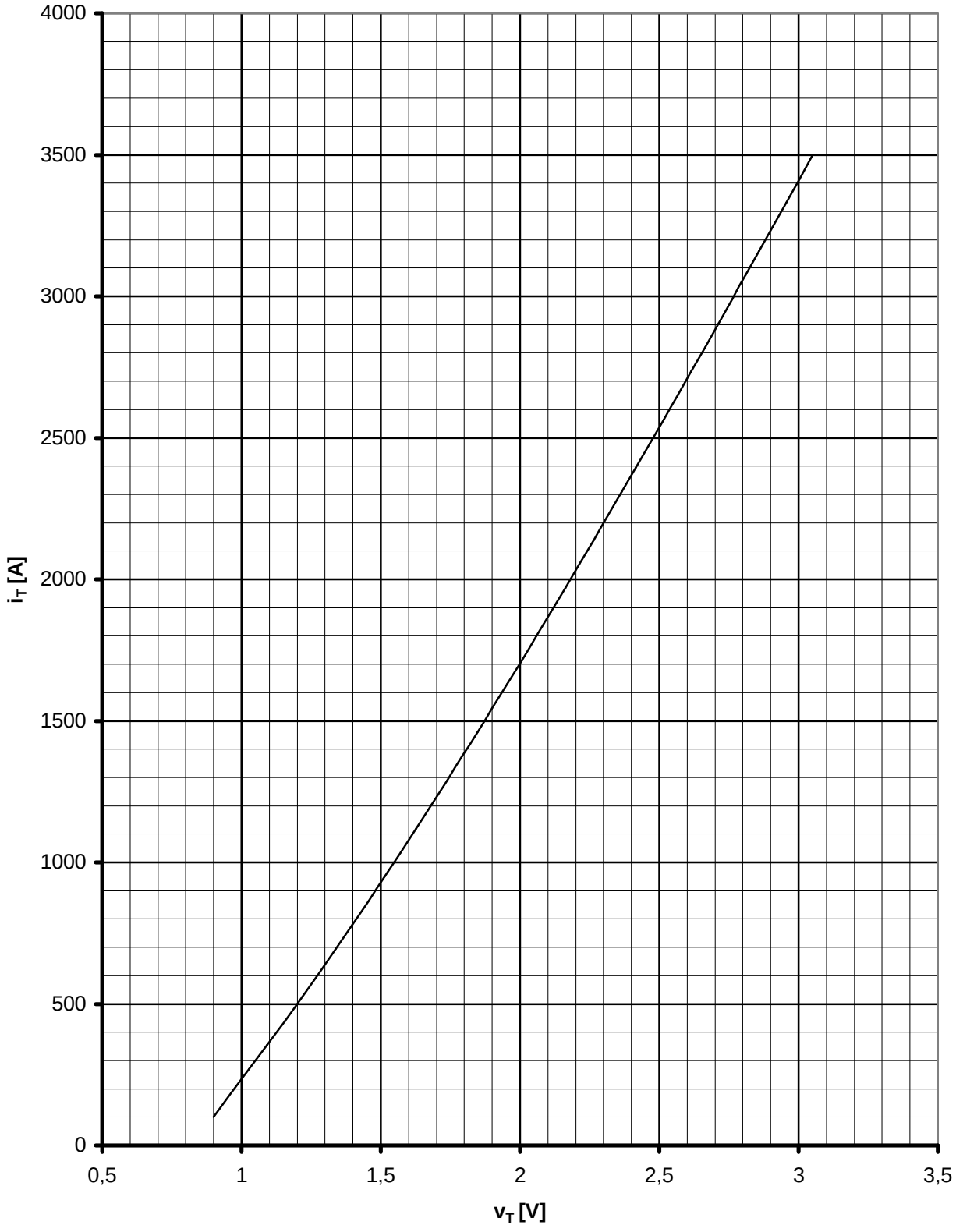
Gehäuse, siehe Anlage case, see appendix				Seite 3 page 3	
Si-Element mit Druckkontakt, Amplifying-Gate Si-pellet with pressure contact, amplifying gate					
Anpreßkraft clamping force		F		6 ...12	kN
Gewicht weight		G	typ.	100	g
Kriechstrecke creepage distance				17	mm
Feuchteklasse humidity classification	DIN 40040			C	
Schwingfestigkeit vibration resistance	f = 50Hz			50	m/s²


ø30
1,1
14
8,5
1,1
4
ø30
C
HK
G
A
ø3,5 x 2 deep
on both sides

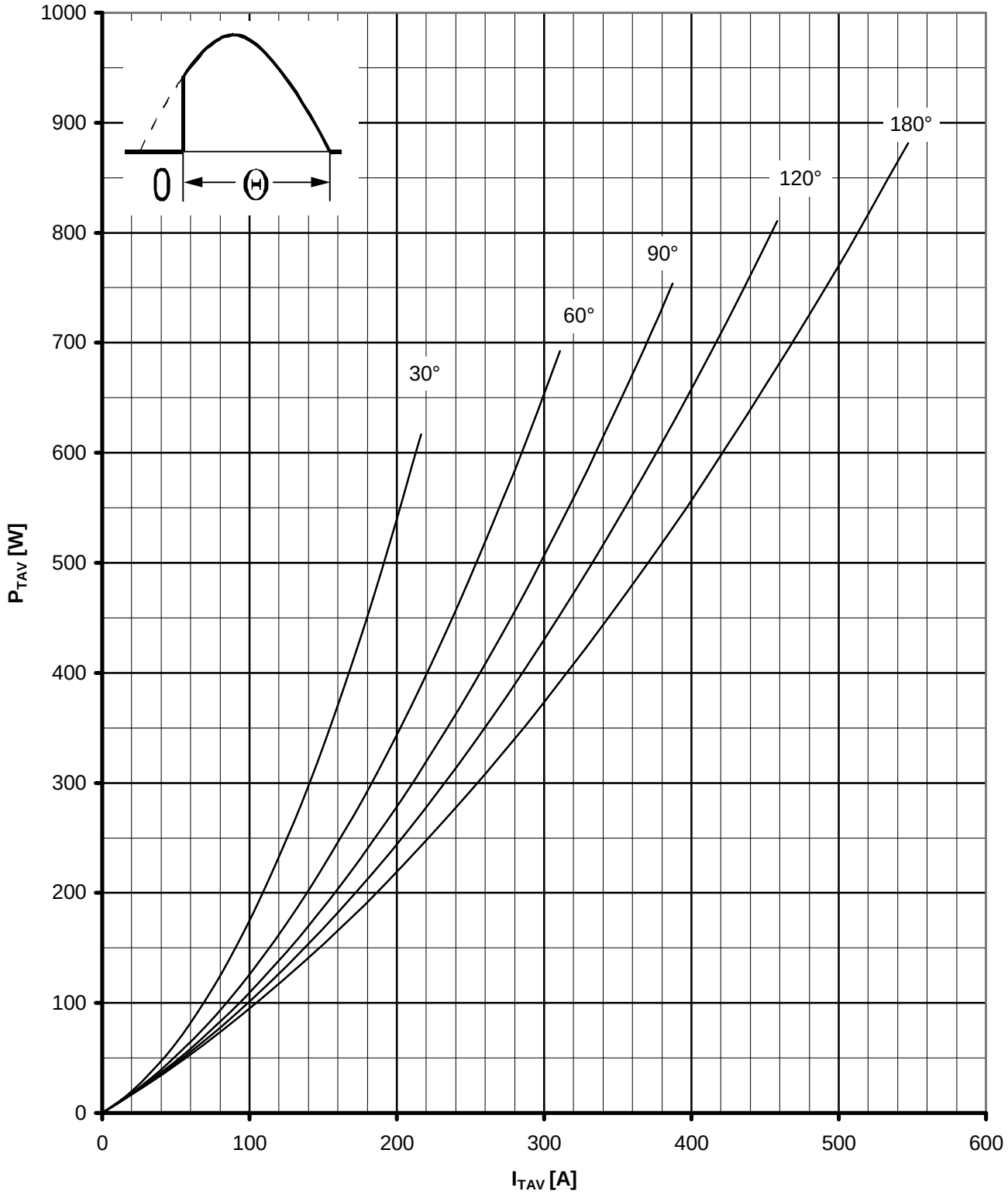

HK
plug 2,8 x 0,8
max. 7
ø50
21,5
G
plug
2,8 x 0,8
2

Kühlung cooling	Analytische Elemente des transienten Wärmewiderstandes Z_{thJC} für DC Analytical ementes of transient thermal impedanceZ_{thJC} for DC							
	Pos.n	1	2	3	4	5	6	7
beidseitig	R_{thn} [°C/W]	0,00043	0,00557	0,019	0,016			
two-sided	τ_n [s]	0,00027	0,00221	0,085	0,36			
anodenseitig	R_{thn} [°C/W]	0,00034	0,00541	0,00486	0,0234	0,036		
anode-sided	τ_n [s]	0,00024	0,0021	0,0376	0,158	2,47		
kathodenseitig	R_{thn} [°C/W]	0,00026	0,00524	0,0132	0,0346	0,0468		
cathode-sided	τ_n [s]	0,00019	0,00192	0,0562	0,65	2,91		

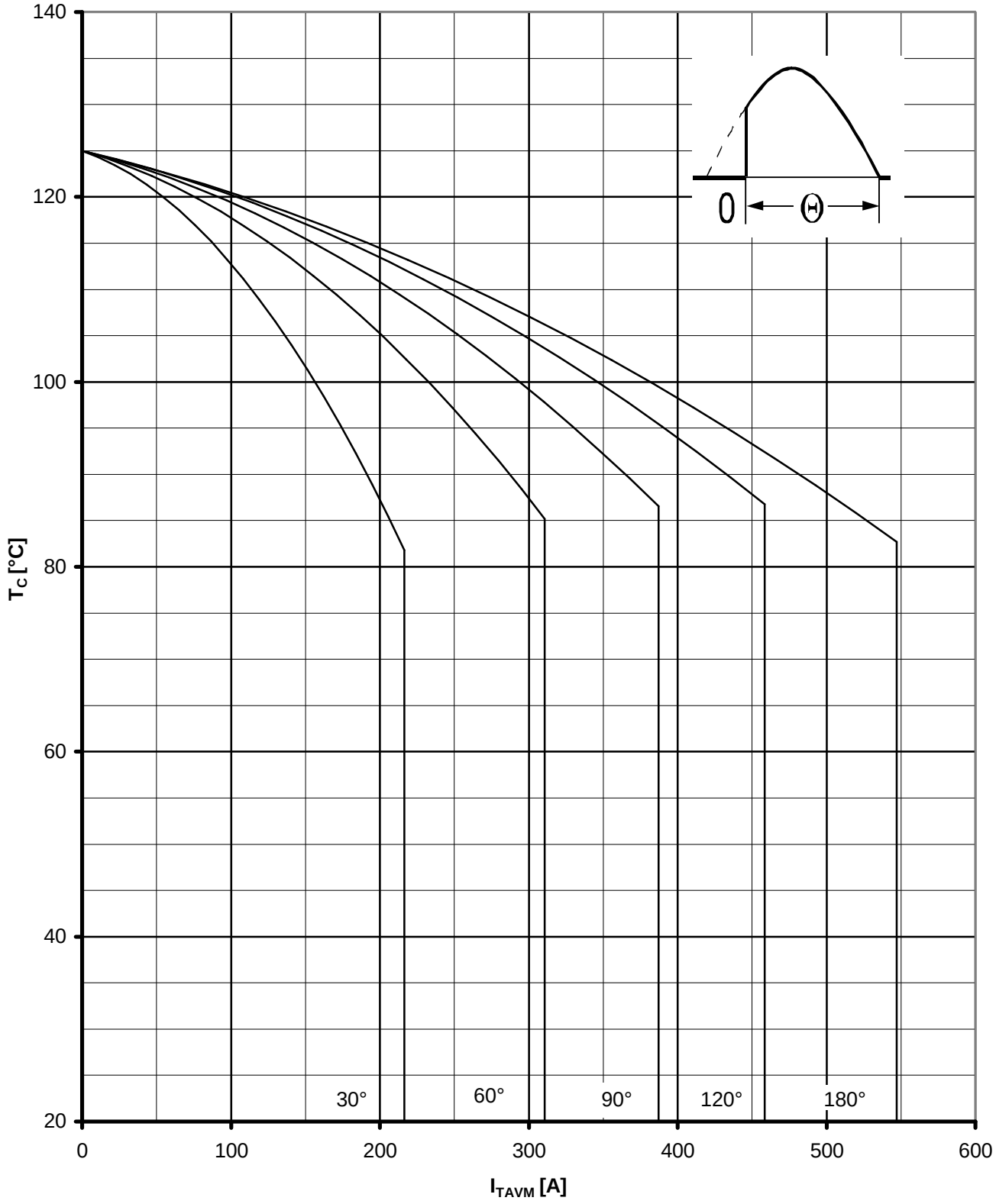
Analytische Funktion / analytical function : $Z_{thJC} = \sum_{n=1}^{n_{max}} R_{thn} (1 - EXP (- t / \tau_n))$



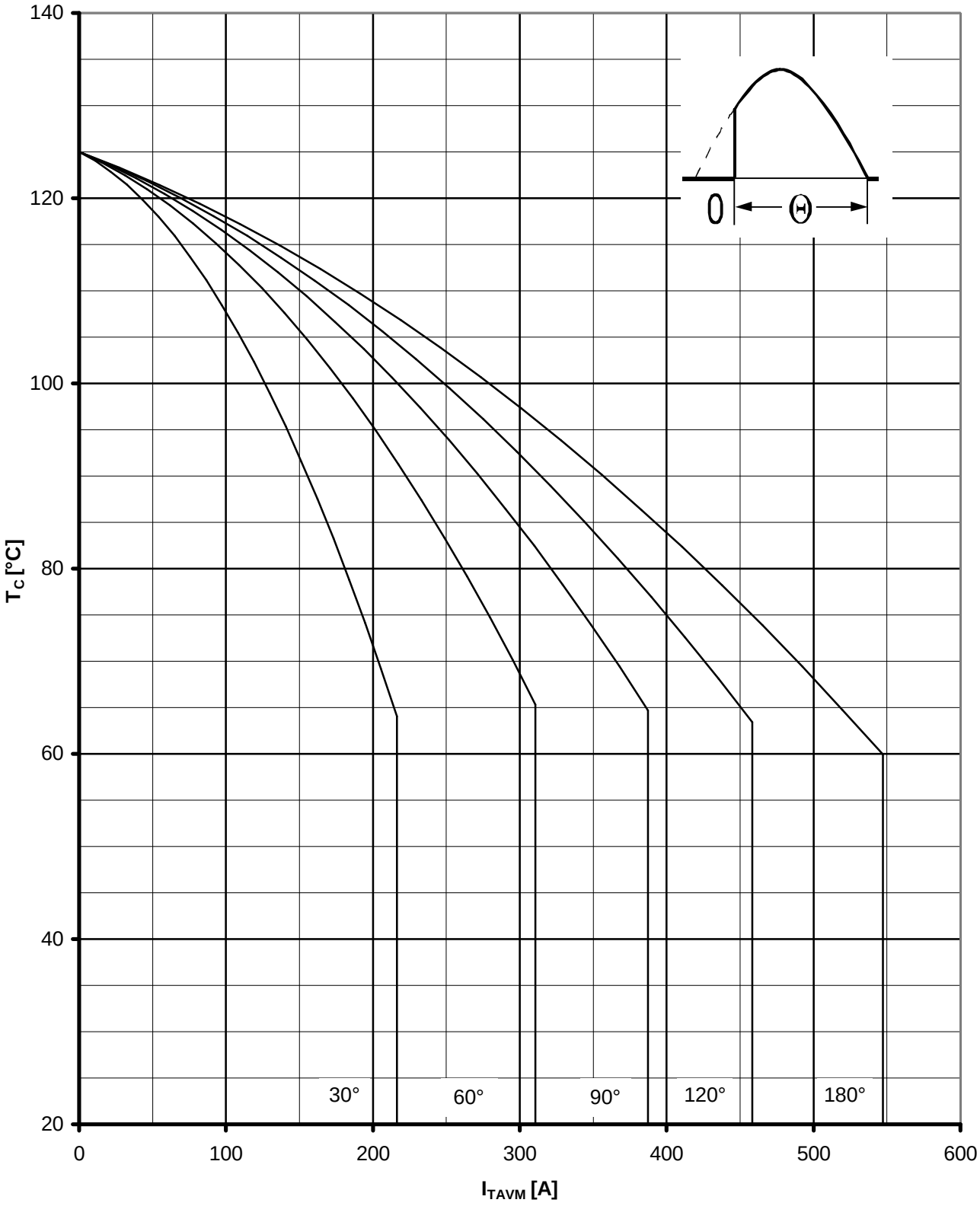
Grenzdurchlaßkennlinie / Limiting 0n-state characteristic $i_T = f(v_T)$
$T_{vj} = T_{vj\ max}$



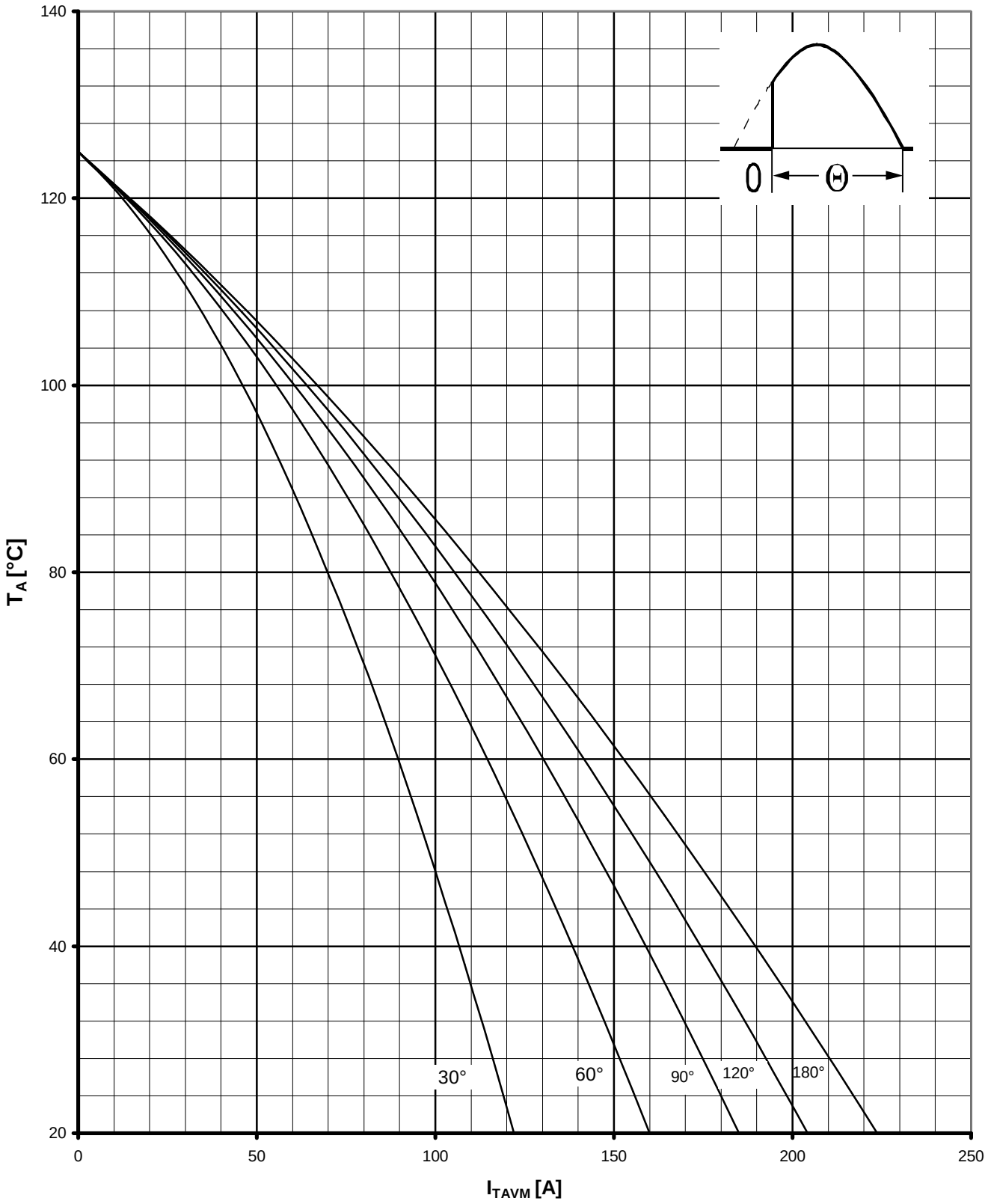
Durchlaßverlustleistung / On-state power loss $P_{TAV} = f(I_{TAV})$
Parameter: Stromflußwinkel Θ / current conduction angle Θ



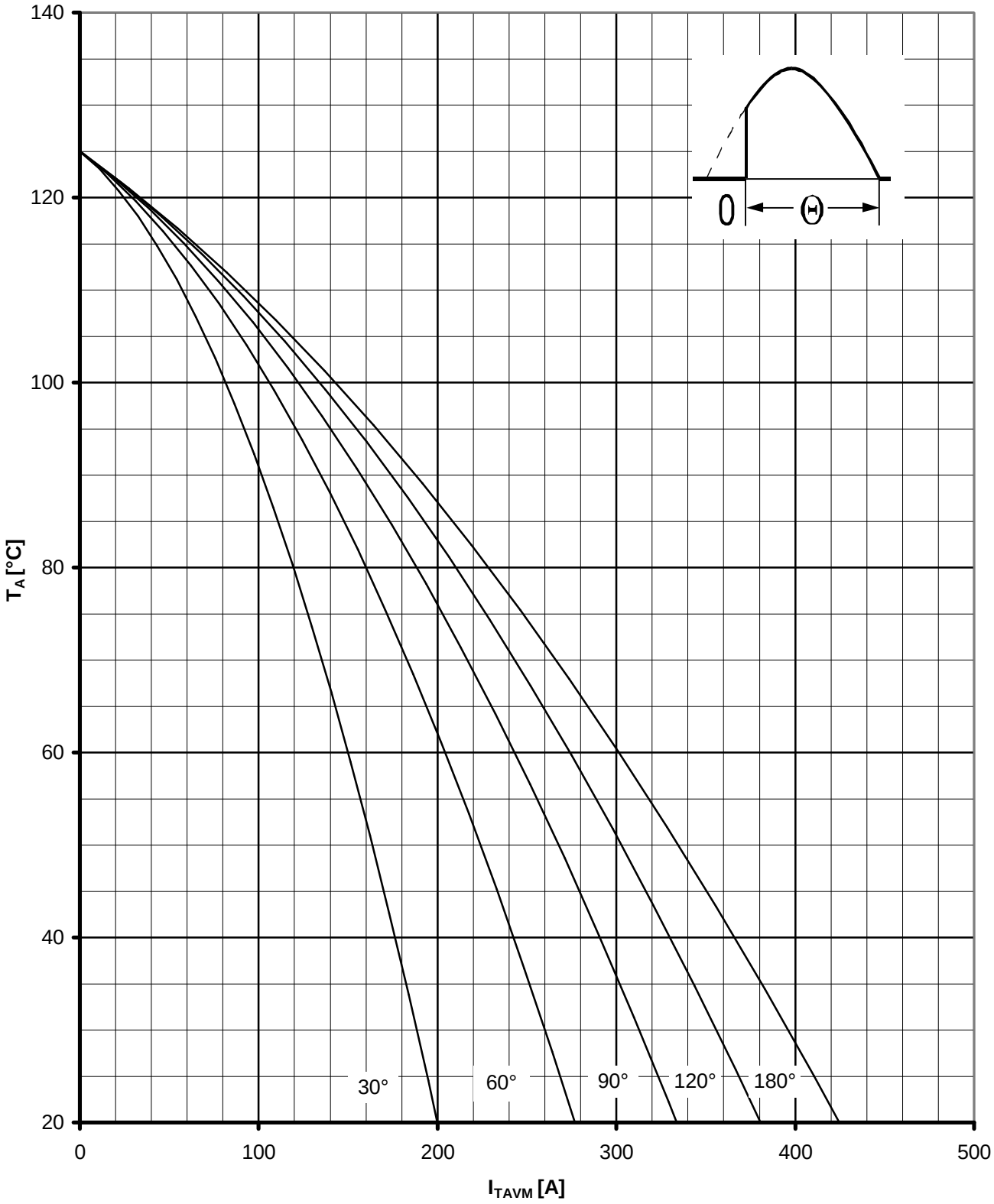
Höchstzulässige Gehäusetemperatur / Maximum allowable case temperature $T_C = f(I_{TAVM})$
Beidseitige Kühlung / Two-sided cooling
Parameter: Stromflußwinkel Θ / current conduction angle Θ



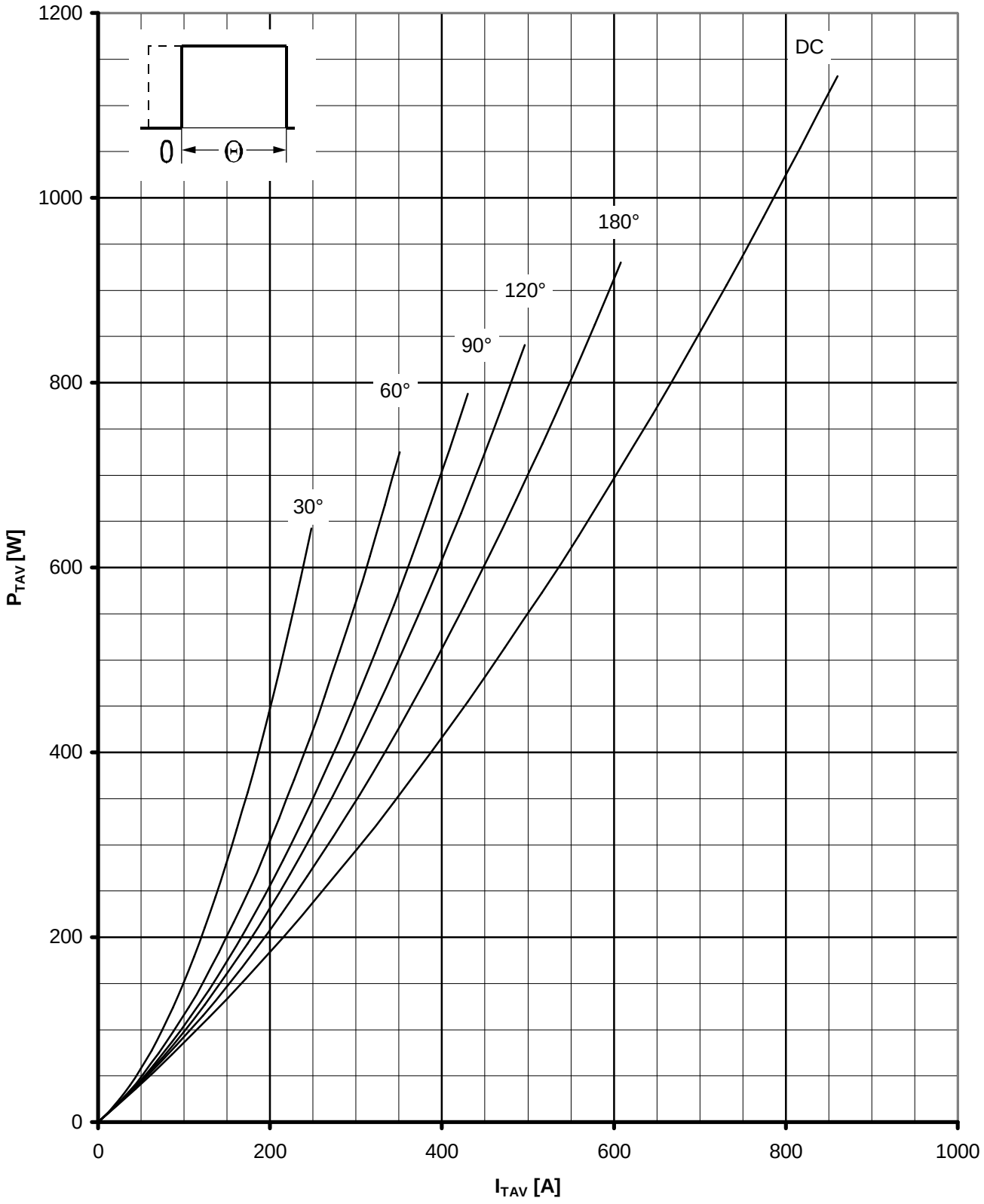
Höchstzulässige Gehäusetemperatur / Maximum allowable case temperature $T_C = f(I_{TAVM})$
Anodenseitige Kühlung / anode sided cooling
Parameter: Stromflußwinkel Θ / current conduction angle Θ



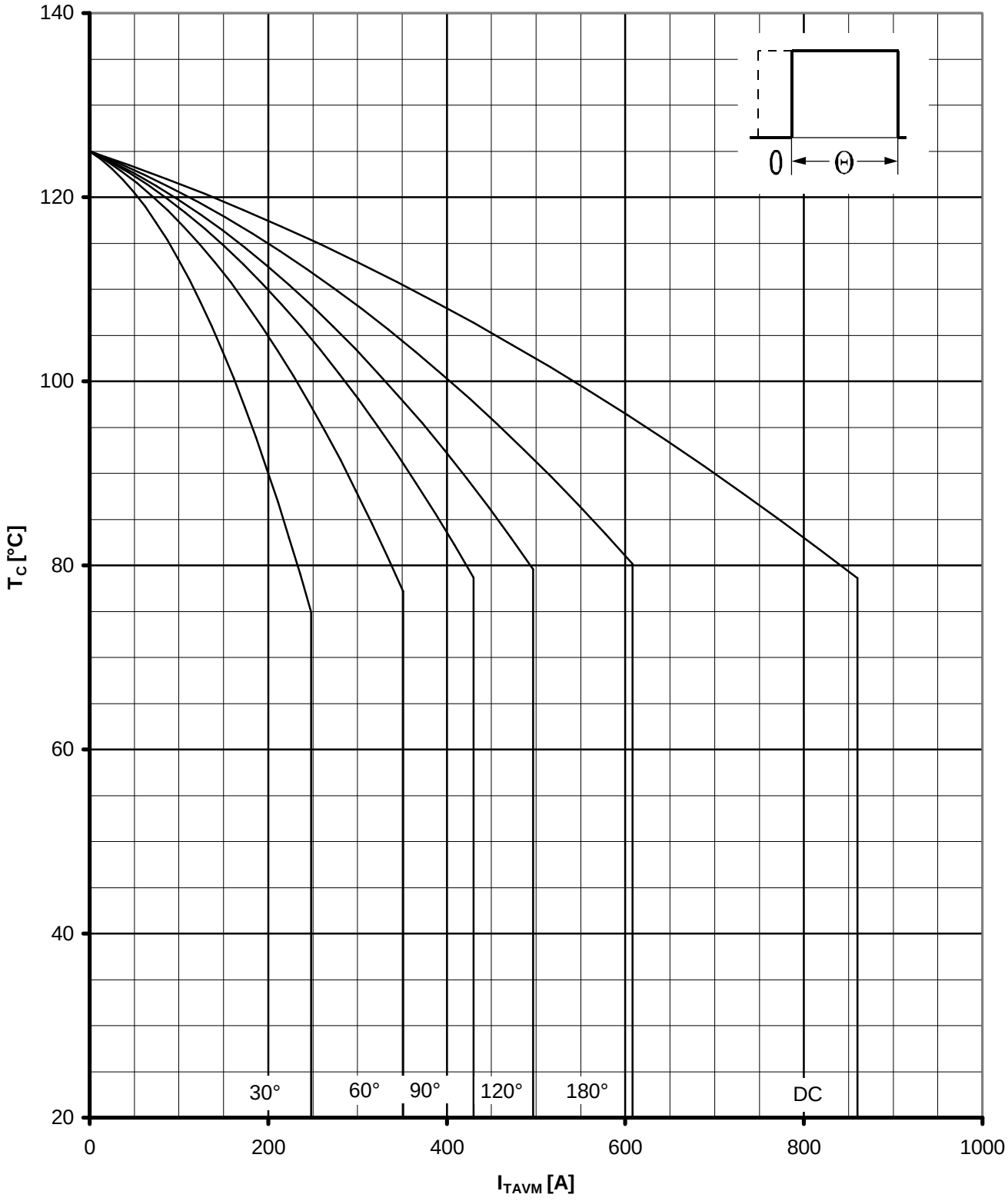
Höchstzulässige Kühlmitteltemperatur / Max. allowable cooling medium temperature $T_A = f(I_{TAVM})$
Luftselbstkühlung / Natural air-cooling
Kühlkörper/Heatsink. K0.36S
Parameter: Stromflußwinkel Θ / current conduction angle Θ



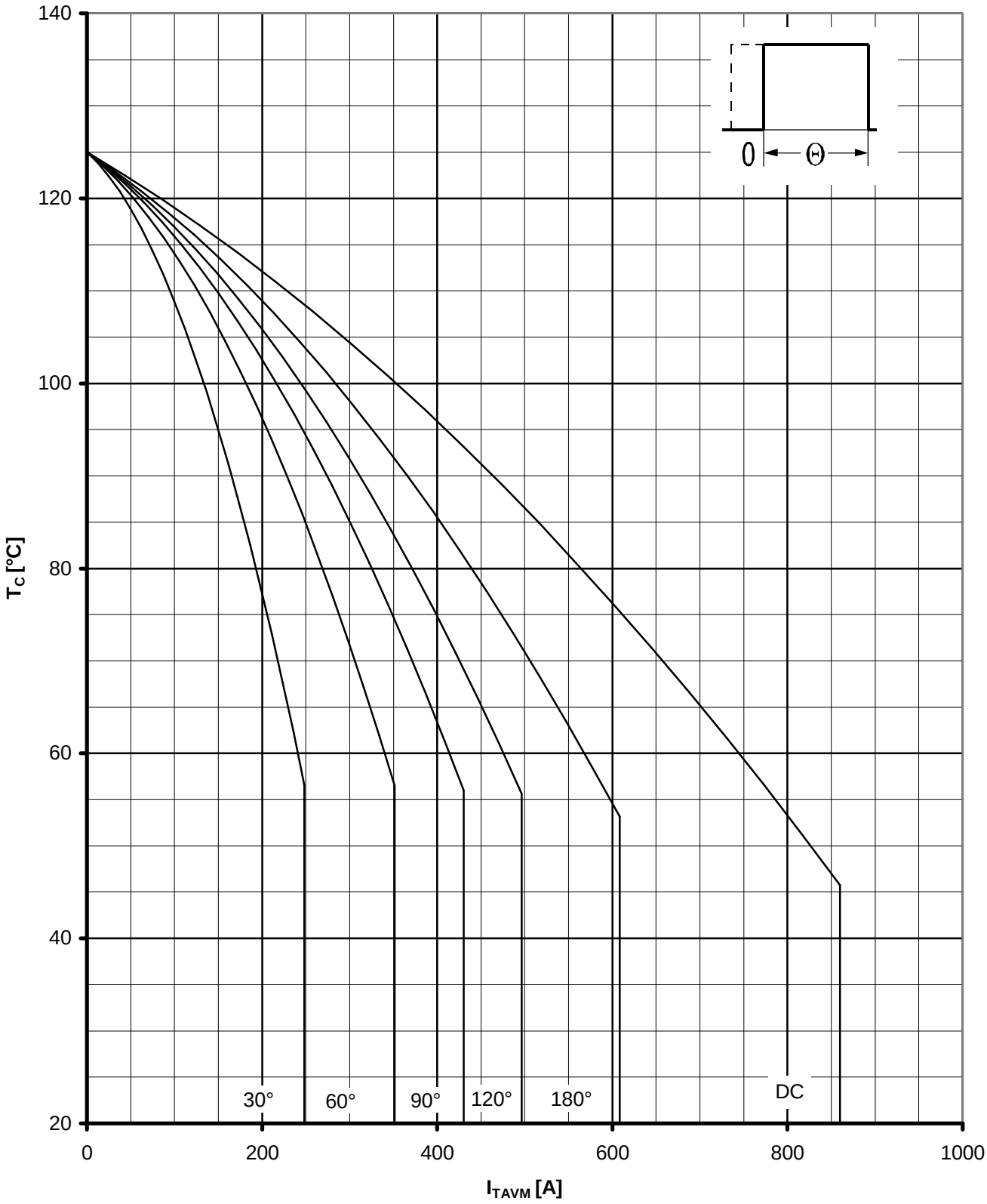
Höchstzulässige Kühlmitteltemperatur / Max. allowable cooling medium temperature $T_A = f(I_{TAVM})$
Verstärkte Luftkühlung / Forced air-cooling
Kühlkörper/Heatsink. K0.12F, V_L = 50 L/s
Parameter: Stromflußwinkel Θ / current conduction angle Θ



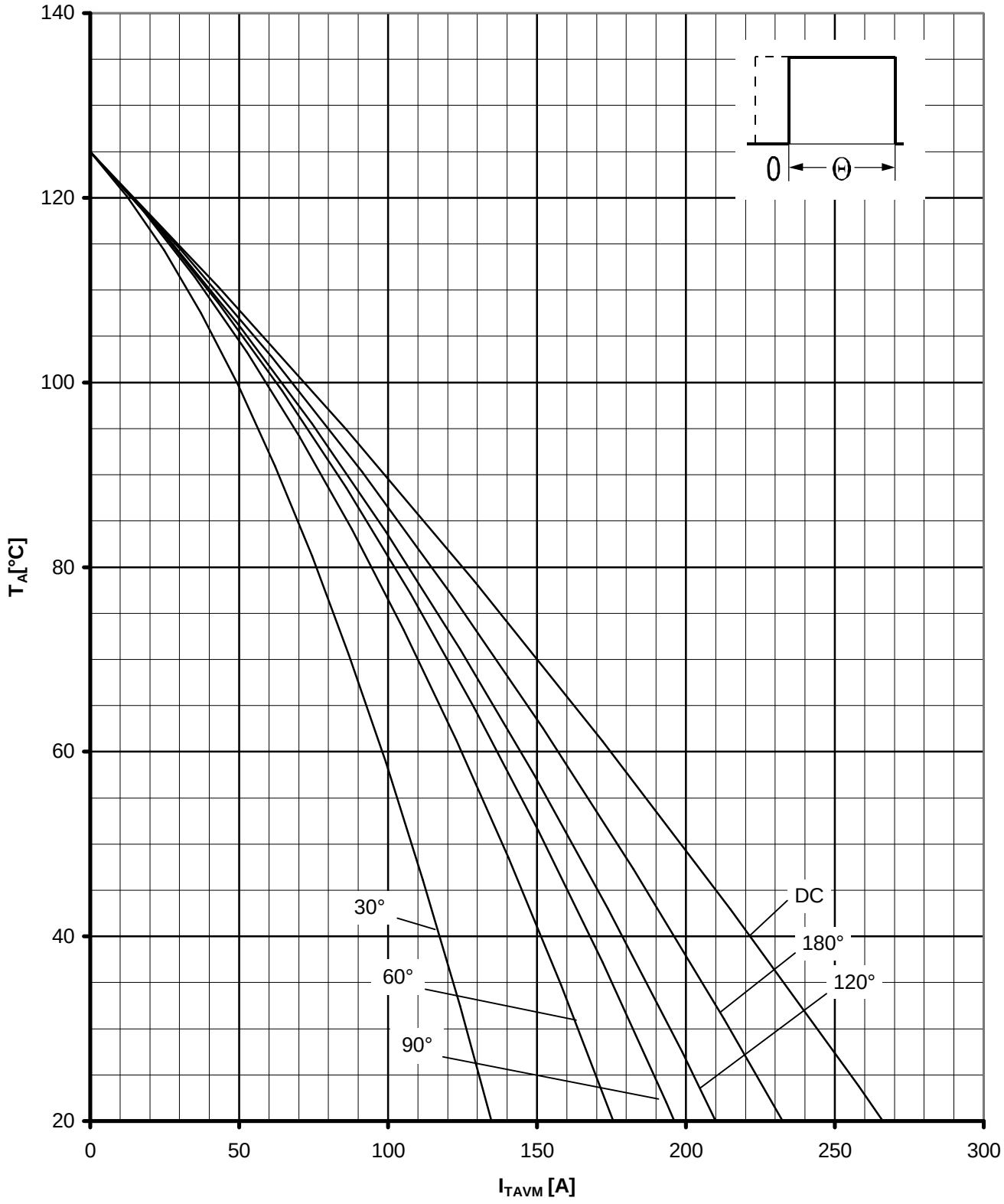
Durchlaßverlustleistung / On-state power loss $P_{TAV} = f(I_{TAV})$
Parameter: Stromflußwinkel Θ / current conduction angle Θ



Höchstzulässige Gehäusetemperatur / Maximum allowable case temperature $T_C = f(I_{TAVM})$
Beidseitige Kühlung / Two-sided cooling
Parameter: Stromflußwinkel Θ / current conduction angle Θ



Höchstzulässige Gehäusetemperatur / Maximum allowable case temperature $T_C = f(I_{TAVM})$
Anodenseitige Kühlung / anode sided cooling
Parameter: Stromflußwinkel Θ / current conduction angle Θ



Höchstzulässige Kühlmitteltemperatur / Max. allowable cooling medium temperature $T_A = f(I_{TAVM})$
Luftselbstkühlung / Natural air-cooling
Kühlkörper/Heatsink. K0.36S
Parameter: Stromflußwinkel Θ / current conduction angle Θ

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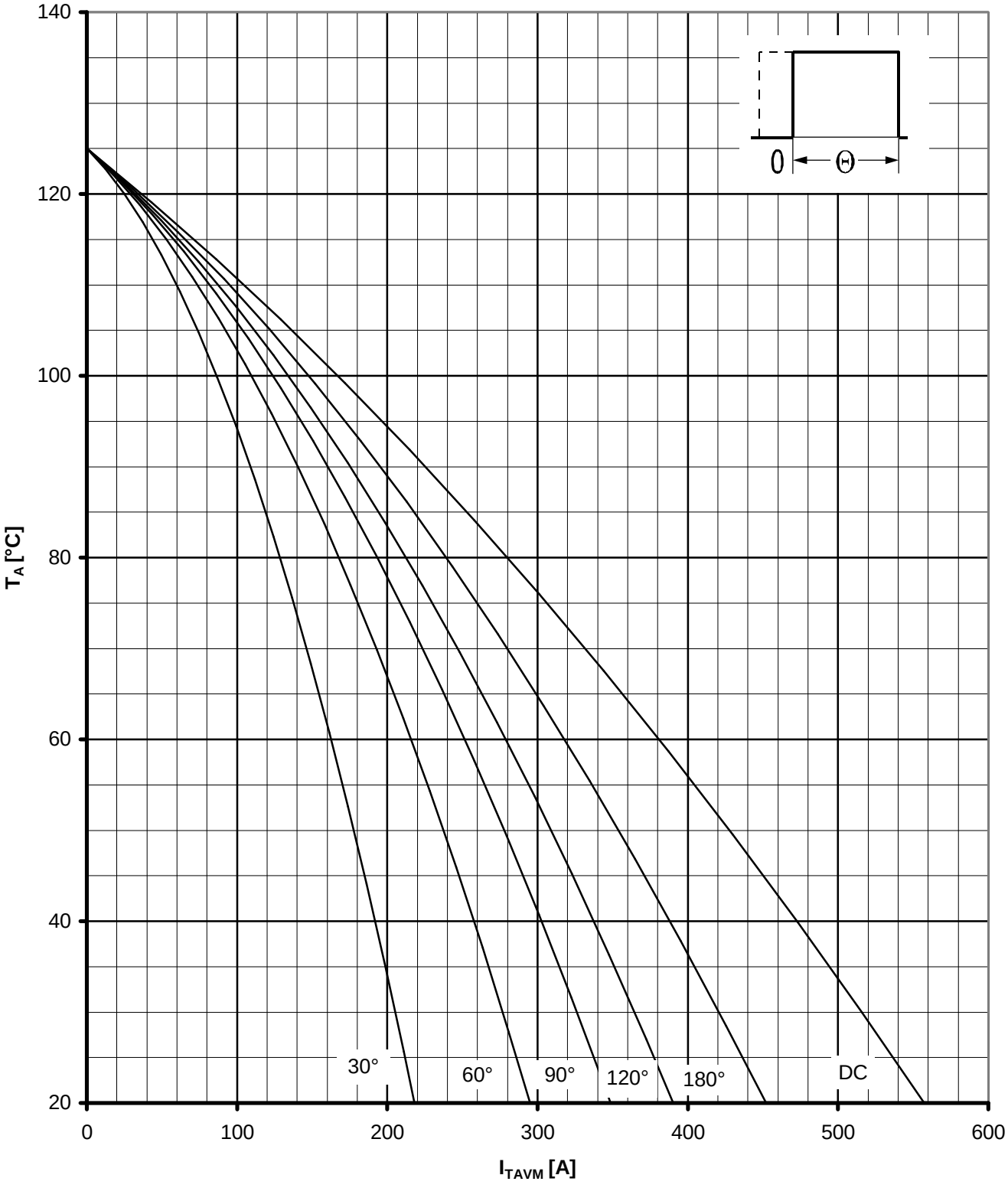
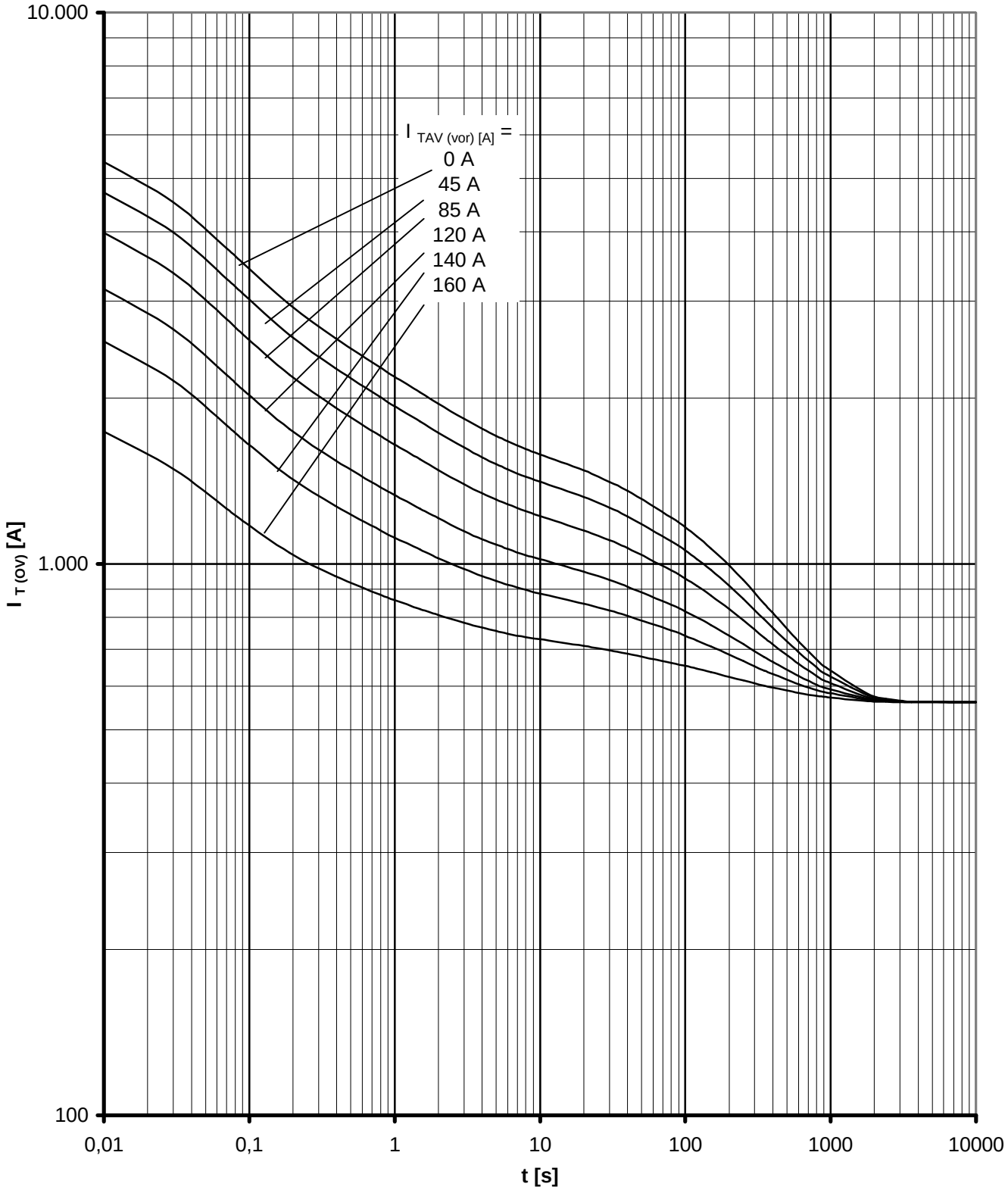


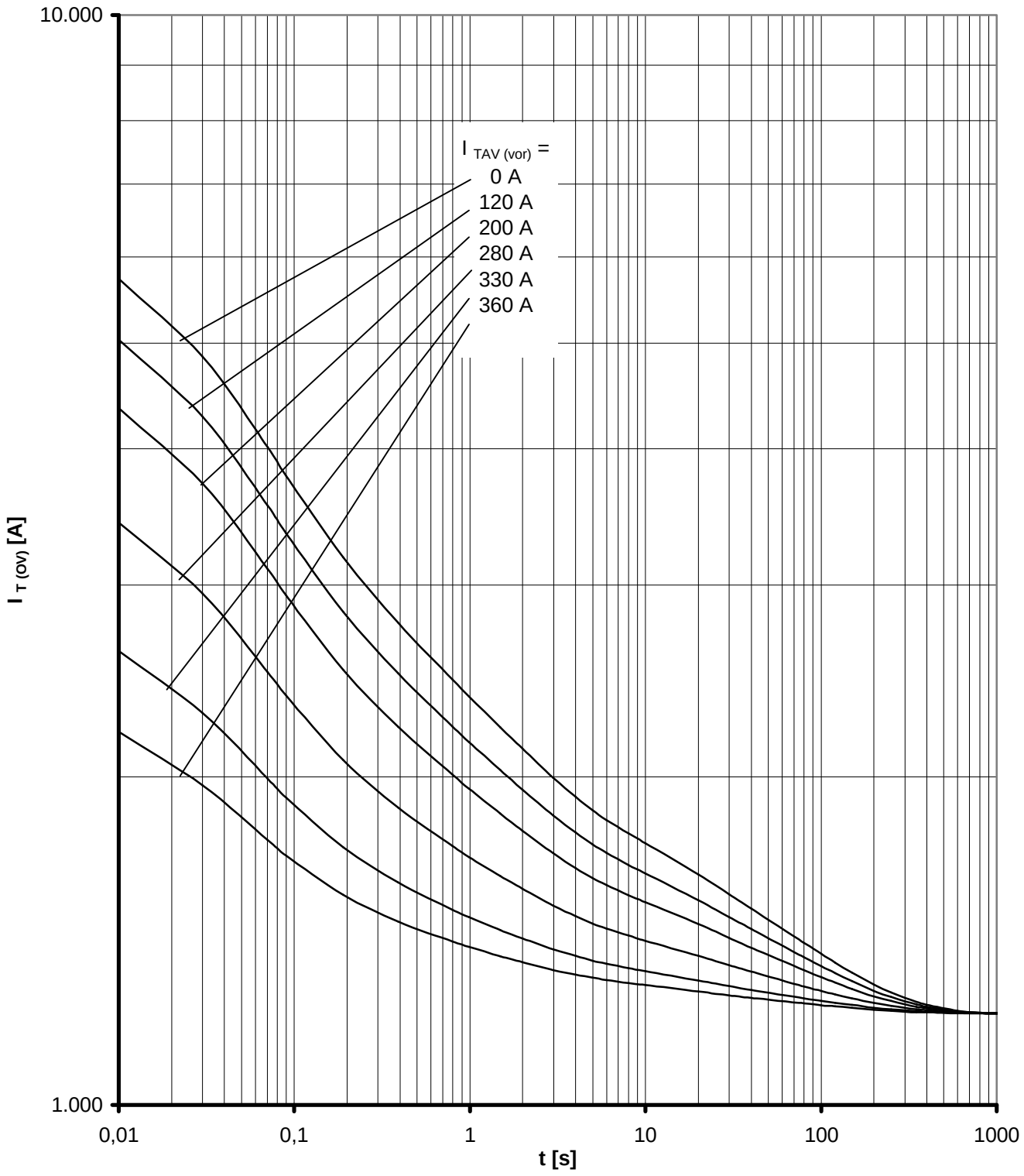
Höchstzulässige Kühlmitteltemperatur / Max. allowable cooling medium temperature $T_A = f(I_{TAVM})$
Verstärkte Luftkühlung / Forced air-cooling
Kühlkörper/Heatsink. K0.12F, V_L = 50 l/s
Parameter: Stromflußwinkel Θ / current conduction angle Θ



Überstrom / Overload on-state current $I_{T(OV)} = f(t)$

Beidseitige Luftselbstkühlung / Two-sided natural cooling K0.36S
$T_A = 45°C$

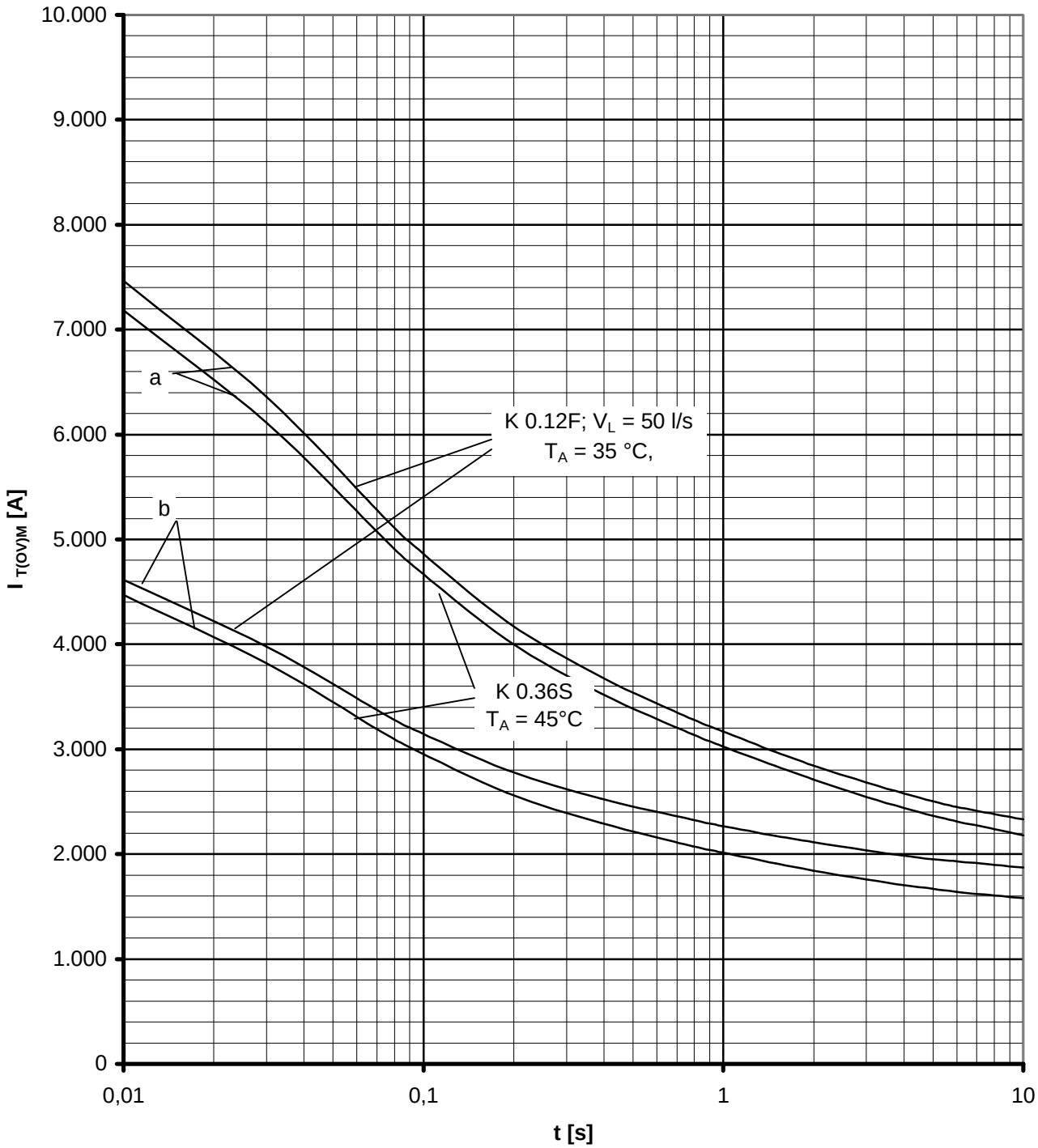
Parameter: Vorlaststrom / pre-load current $I_{TAV(vor)}$



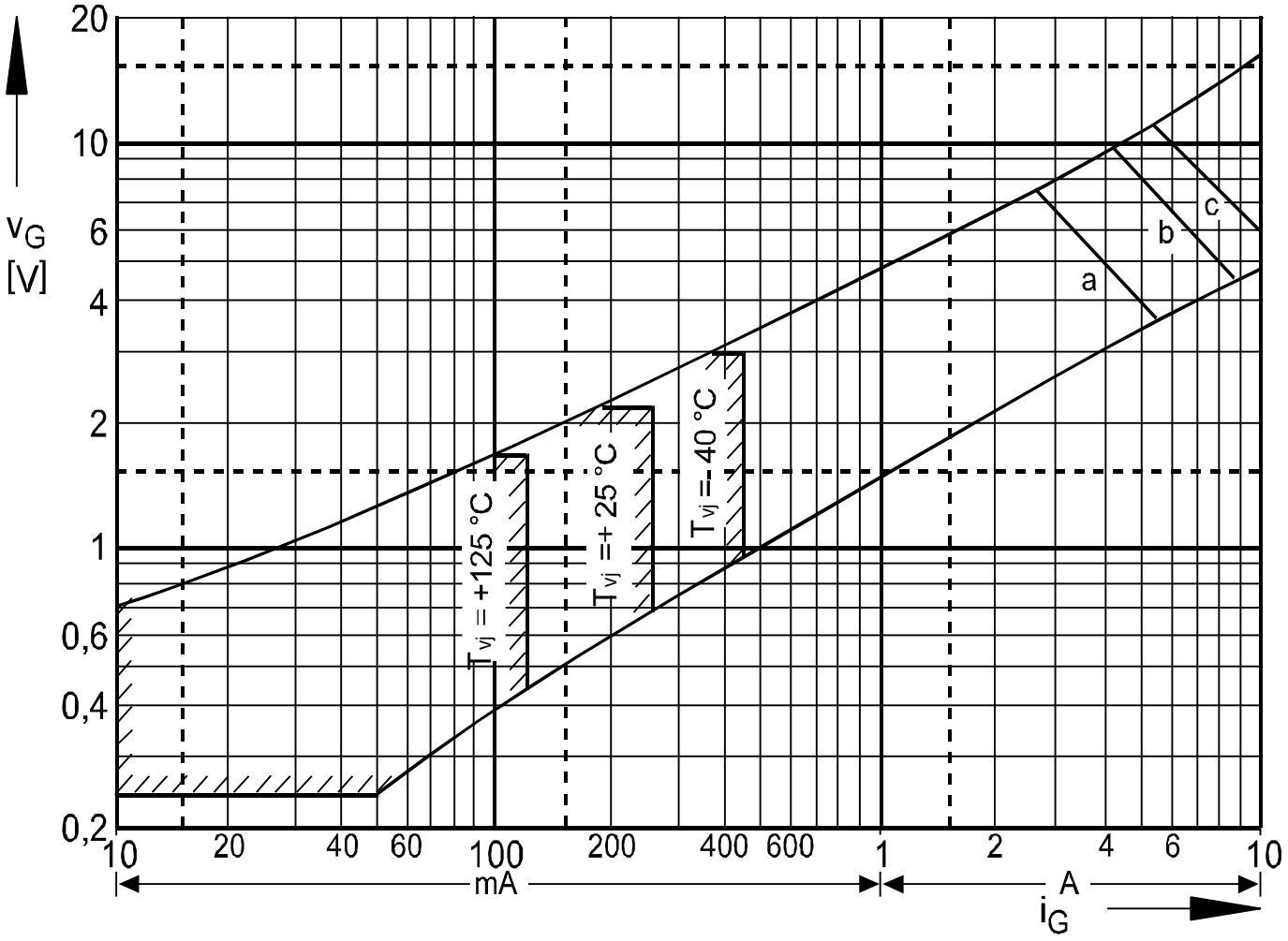
Überstrom / Overload on-state current $I_{T(OV)} = f(t)$

Beidseitige verstärkte Kühlung / forced two-sided cooling K0.12F
T_A = 35°C, V_L = 50 l/s

Parameter: Vorlaststrom / pre-load current $I_{TAV(vor)}$



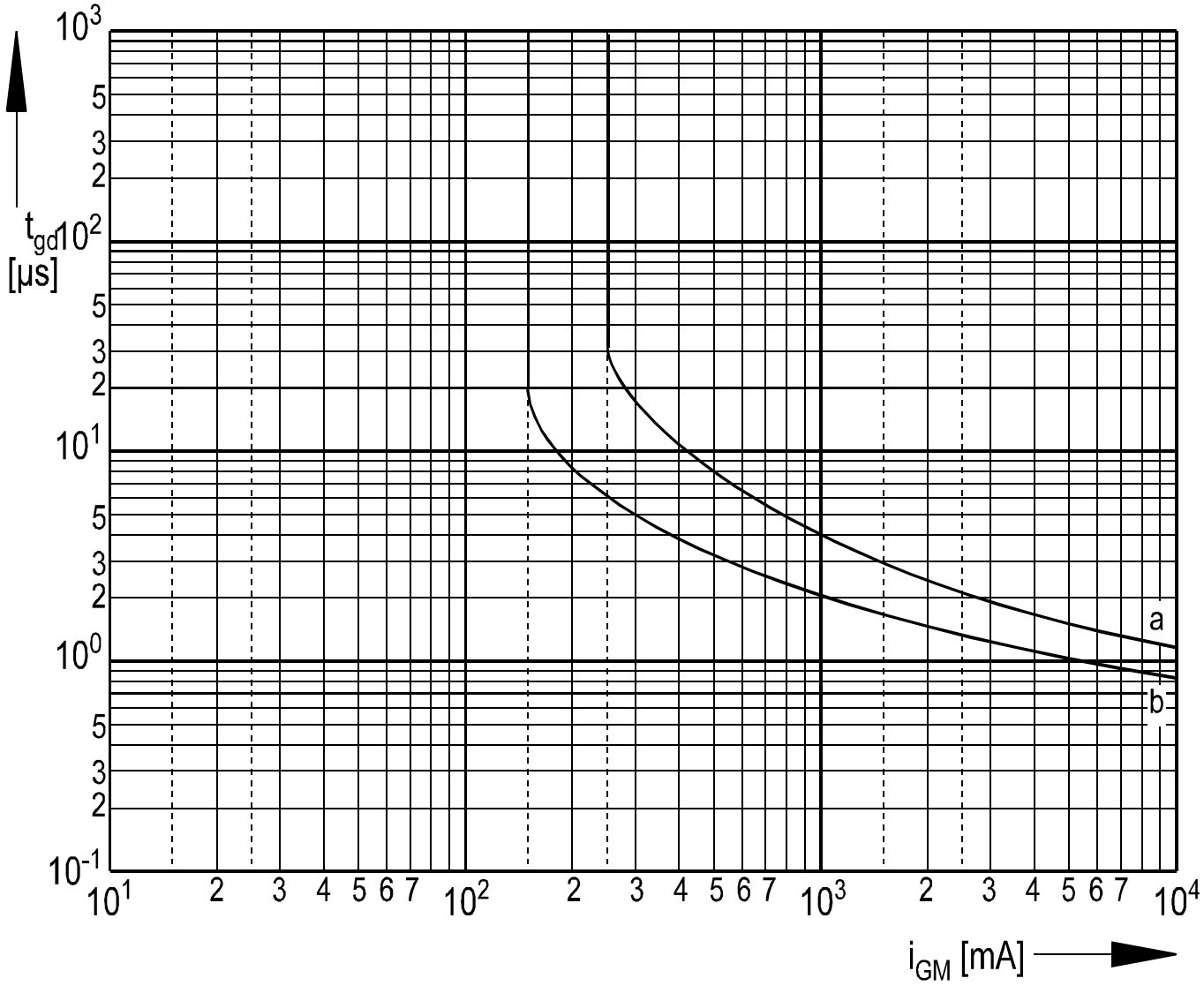
Grenzstrom / Max. overload on-state current $I_{T(OV)M} = f(t)$, $v_{RM} = 0{,}8\ V_{RRM}$
Beidseitige Kühlung / Two-sided cooling
Kühlkörper / Heatsink: K 0.35S, K0.12F
Belastung aus / Surge current occurs:
a - Leerlauf / No-load conditions
b - Betrieb mit Dauergrenzstrom I_{TAVM} / During operation at max. average on-state current I_{TAVM}



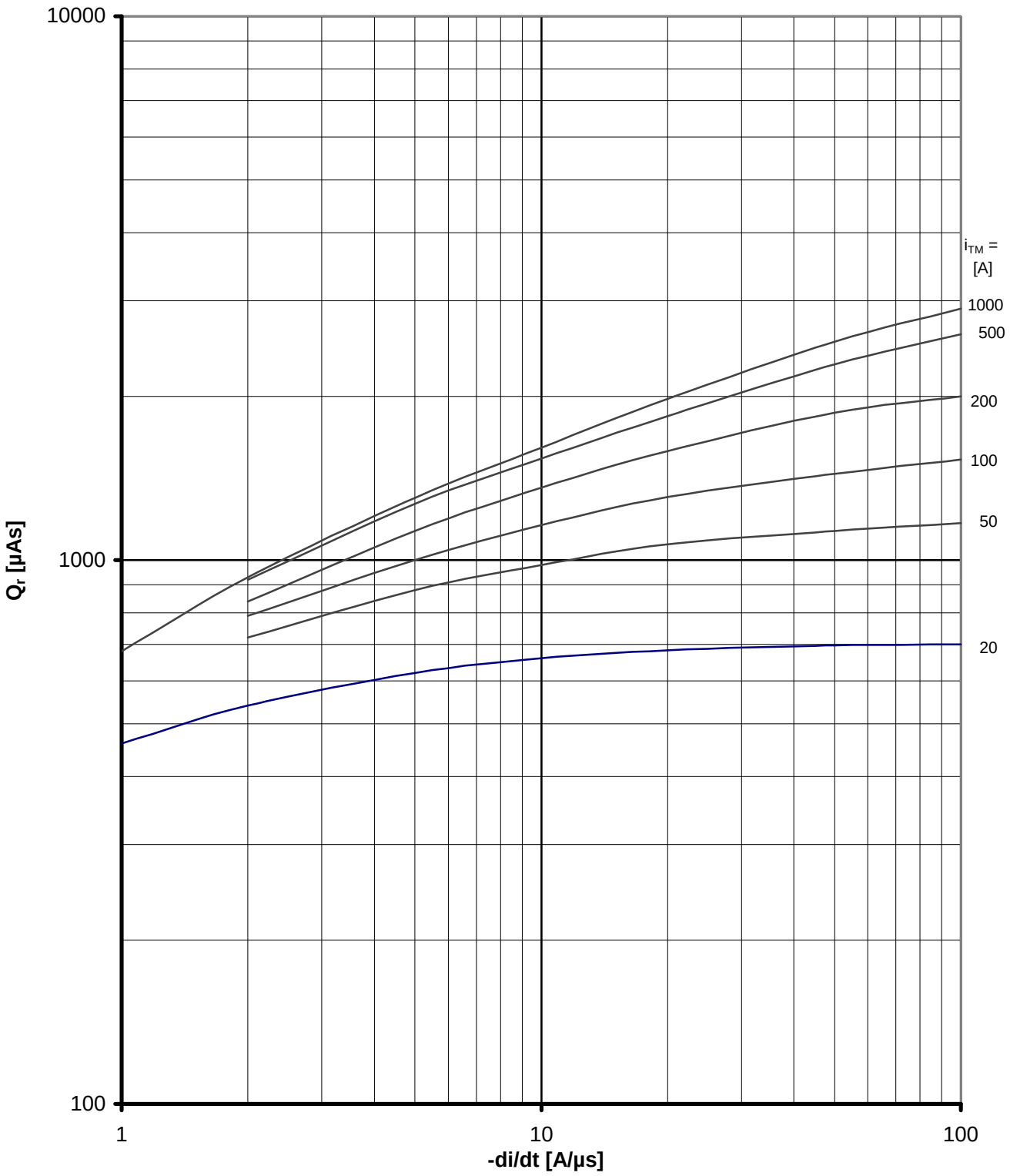
Steuercharakteristik $v_G = f(i_G)$ mit Zündbereichen für $V_D = 6$ V
Gate characteristic $v_G = f(i_G)$ with triggering area for $V_D = 6$ V

Höchstzulässige Spitzensteuerverlustleistung / Maximum rated peak gate power dissipation $P_{GM} = f(t_g)$:

a - 20 W/10ms b - 40 W/1ms c - 60 W/0,5ms



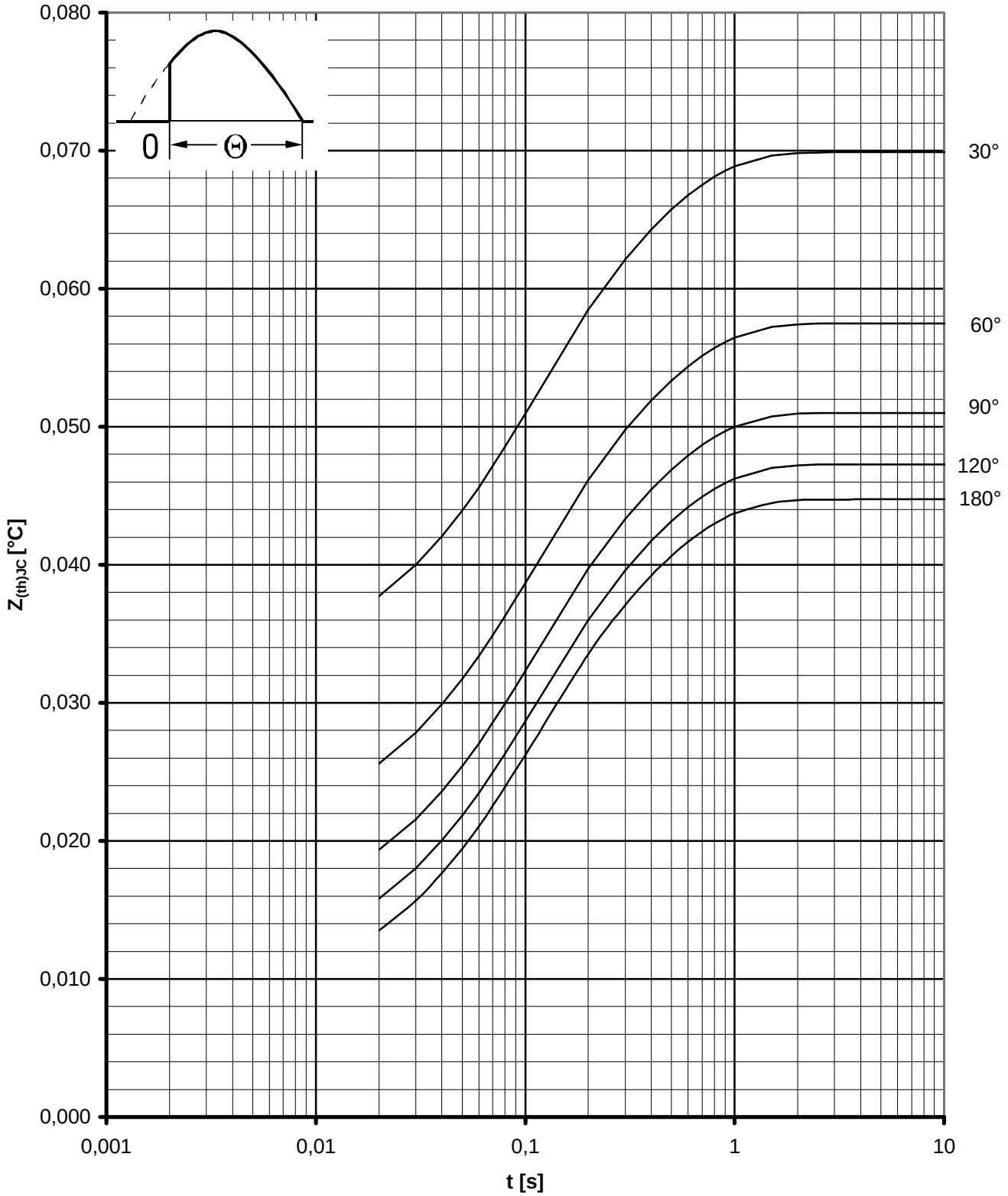
Zündverzug / Gate controlled delay time $t_{gd} = f(i_{GM})$
T_{vj} = 25°C, $di_G/dt = i_{GM}/1\mu s$
a - maximaler Verlauf / limiting characteristic
b - typischer Verlauf / typical characteristic



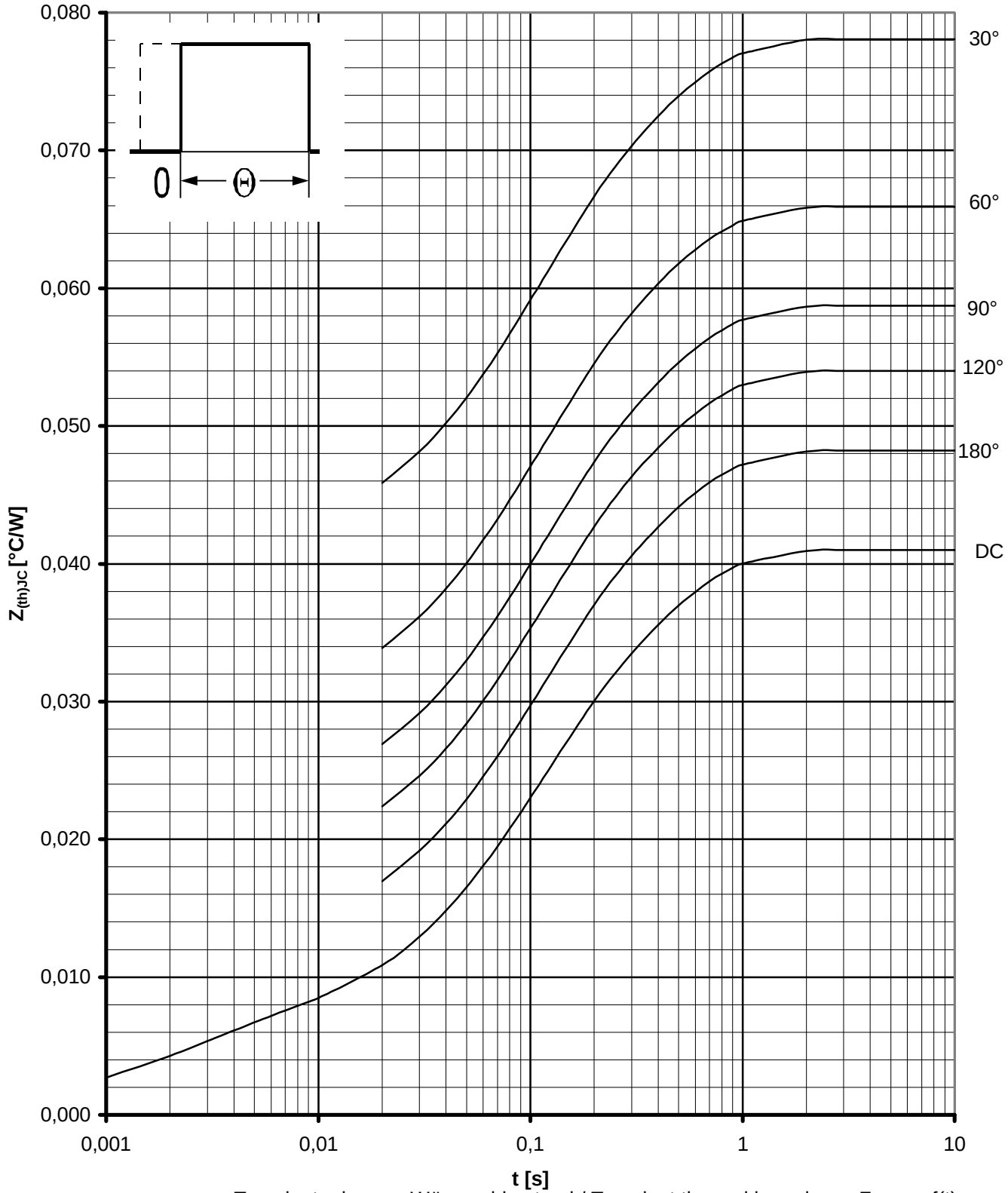
Sperrverzögerungsladung / Recovered charge $Q_r = f(-di/dt)$

$T_{vj} = T_{vj}$ max, $v_R = 0{,}5\ V_{RRM}$, $v_{RM} = 0{,}8\ V_{RRM}$

Parameter: Durchlaßstrom / On-state current i_{TM}



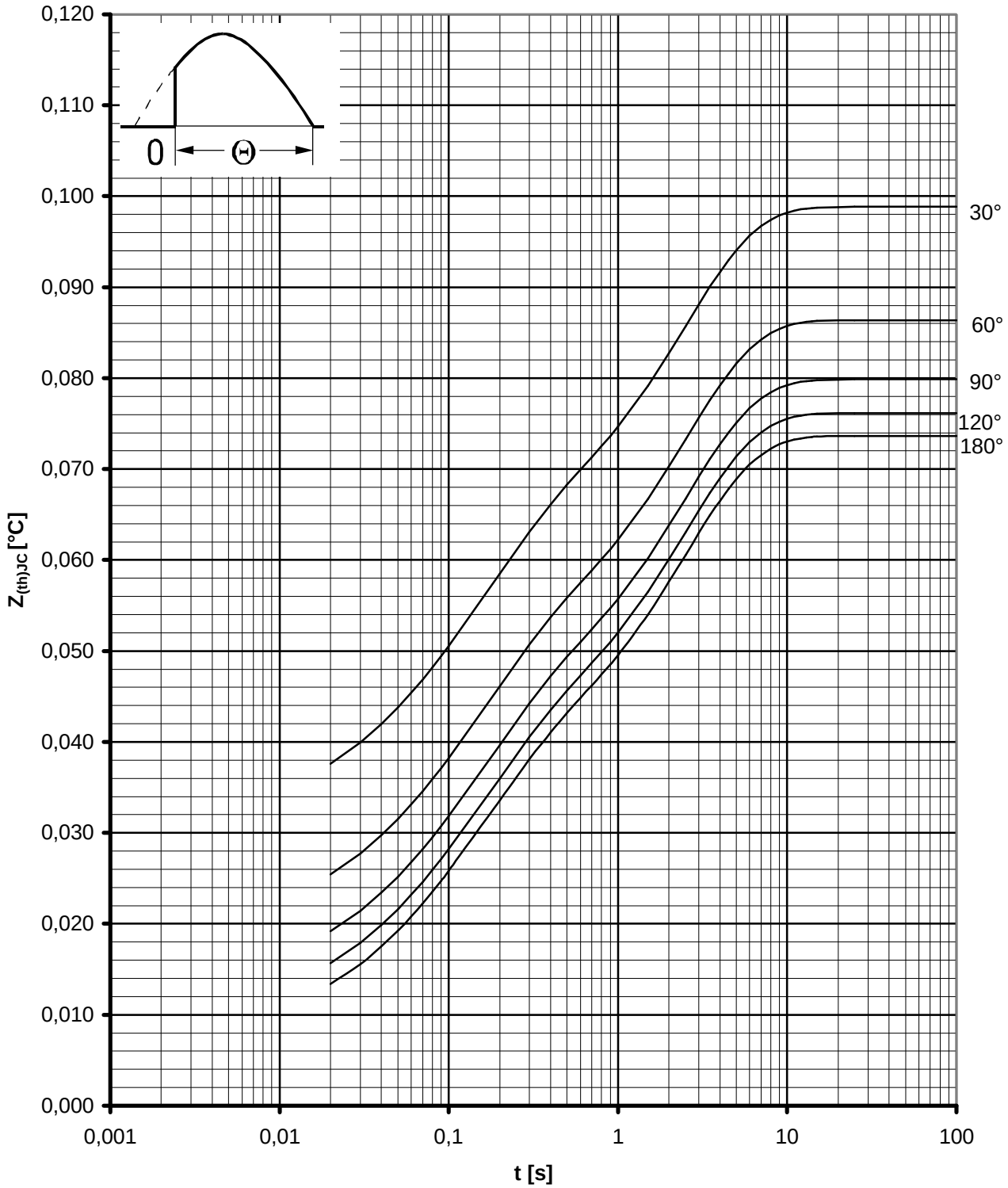
Transienter innerer Wärmewiderstand / Transient thermal impedance $Z_{(th)JC} = f(t)$
Beidseitige Kühlung / two sided cooling
Parameter: Stromflußwinkel Θ / current conduction angle Θ



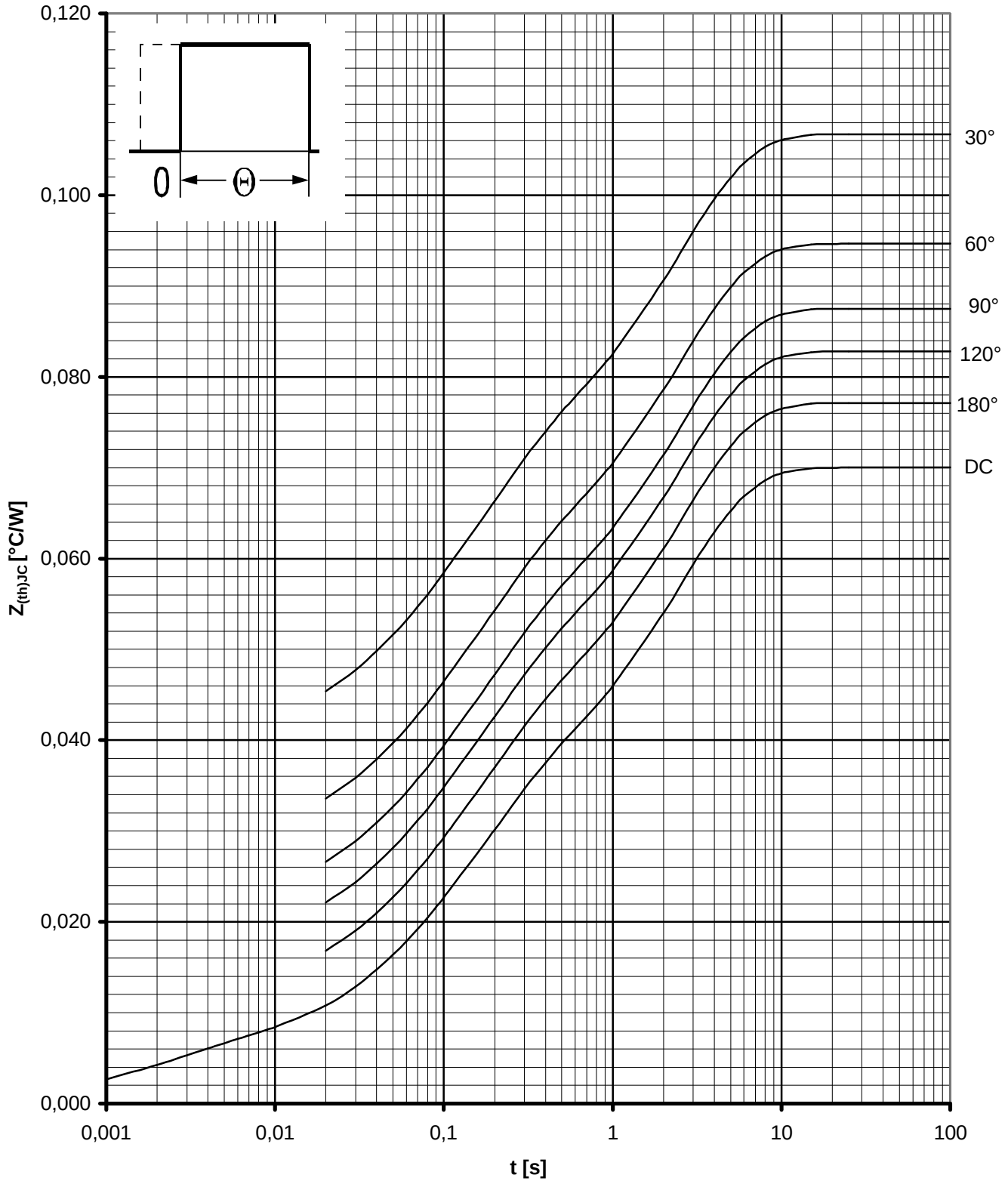
Transienter innerer Wärmewiderstand / Transient thermal impedance $Z_{(th)JC} = f(t)$

Beidseitige Kühlung / Two-sided cooling

Parameter: Stromflußwinkel Θ / current conduction angle Θ



Transienter innerer Wärmewiderstand / Transient thermal impedance $Z_{(th)JC} = f(t)$
Anodenseitige Kühlung / Anode-sided cooling
Parameter: Stromflußwinkel Θ / current conduction angle Θ



Transienter innerer Wärmewiderstand / Transient thermal impedance $Z_{(th)JC} = f(t)$
Anodenseitige Kühlung / Anode-sided sided cooling
Parameter: Stromflußwinkel Θ / current conduction angle Θ