



Elektrische Eigenschaften / Electrical properties

Vorläufige Daten

Höchstzulässige Werte / Maximum rated values

Preliminary Data

| | | | | |
|---|---|----------------------------------|--------------------------|--|
| Periodische Vorwärts- und Rückwärts-Spitzenspannung repetitive peak forward off-state and reverse voltages | $T_{vj} = -40^{\circ}\text{C} \dots T_{vj\text{max}}$ | $V_{\text{DRM}}, V_{\text{RRM}}$ | 1200, 1400 1600, 1800 | V V |
| Vorwärts-Stoßspitzenspannung non-repetitive peak forward off-state voltage | $T_{vj} = -40^{\circ}\text{C} \dots T_{vj\text{max}}$ | V_{DSM} | 1200, 1400 1600, 1800 | V V |
| Rückwärts-Stoßspitzenspannung non-repetitive peak reverse voltage | $T_{vj} = +25^{\circ}\text{C} \dots T_{vj\text{max}}$ | V_{RSM} | 1300, 1500 1700, 1900 | V V |
| Durchlaßstrom-Grenzeffektivwert RMSM on-state current | | I_{TRSM} | 7000 | A |
| Dauergrenzstrom average on-state current | $T_{\text{C}} = 85^{\circ}\text{C}$ $T_{\text{C}} = 59^{\circ}\text{C}$ | I_{TAVM} | 3160 4460 | A 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} | 63000 57000 | A ¹⁾ A |
| Grenzlastintegral I^2t -value | $T_{vj} = 25^{\circ}\text{C}, t_p = 10\text{ms}$ $T_{vj} = T_{vj\text{max}}, t_p = 10\text{ms}$ | I^2t | 19845 16245 | $\text{A}^2\text{s} \cdot 10^3$ $\text{A}^2\text{s} \cdot 10^3$ |
| Kritische Stromsteilheit critical rate of rise of on-state current | DIN IEC 747-6 $f=50\text{Hz}, V_L = 10\text{V}, i_{\text{GM}} = 1\text{A}$ $di_{\text{G}}/dt = 1\text{A}/\mu\text{s}$ | $(di_{\text{T}}/dt)_{\text{cr}}$ | 200 | $\text{A}/\mu\text{s}$ |
| Kritische Spannungssteilheit critical rate of rise of off-state voltage | $T_{vj} = T_{vj\text{max}}, V_{\text{D}} = 0,67 V_{\text{DRM}}$ 5.Kennbuchstabe / 5th letter F | $(dv_{\text{D}}/dt)_{\text{cr}}$ | 1000 | $\text{V}/\mu\text{s}$ |

Charakteristische Werte / Characteristic values

| | | | | |
|---|---|------------------------------|--|----------------------------|
| Durchlaßspannung on-state voltage | $T_{vj} = T_{vj\text{max}}, i_{\text{T}} = 14.000\text{A}$ $T_{vj} = T_{vj\text{max}}, i_{\text{T}} = 6000\text{A}$ | v_{T} | max. 2,04 max. 1,37 | V V |
| Schleusenspannung threshold voltage | $T_{vj} = T_{vj\text{max}}$ | $V_{\text{T(TO)}}$ | 0,85 | V |
| Ersatzwiderstand slope resistance | $T_{vj} = T_{vj\text{max}}$ | r_{T} | 0,082 | $\text{m}\Omega$ |
| Durchlaßkennlinie on-state voltage $v_{\text{T}} = A + B \times i_{\text{T}} + C \times \ln(i_{\text{T}} + 1) + D \times \sqrt{i_{\text{T}}}$ | $T_{vj} = T_{vj\text{max}}$ | A B C D | 0,728 7,670 E-5 7,743 E-3 1,570 E-3 | |
| Zündstrom gate trigger current | $T_{vj} = 25^{\circ}\text{C}, v_{\text{D}} = 6\text{V}$ | I_{GT} | max. 250 | mA |
| Zündspannung gate trigger voltage | $T_{vj} = 25^{\circ}\text{C}, v_{\text{D}} = 6\text{V}$ | V_{GT} | max. 2,5 | V |
| Nicht zündener Steuerstrom gate non-trigger current | $T_{vj} = T_{vj\text{max}}, v_{\text{D}} = 6\text{V}$ $T_{vj} = T_{vj\text{max}}, v_{\text{D}} = 0,5 V_{\text{DRM}}$ | I_{GD} | max. 10 max. 5 | mA mA |
| Nicht zündene Steuerspannung gate non-trigger voltage | $T_{vj} = T_{vj\text{max}}, v_{\text{D}} = 0,5 V_{\text{DRM}}$ | V_{GD} | max. 0,25 | mV |
| Haltestrom holding current | $T_{vj} = 25^{\circ}\text{C}, v_{\text{D}} = 6\text{V}, R_{\text{A}} = 5\Omega$ | I_{H} | max. 300 | mA |
| Einraststrom latching current | $T_{vj} = 25^{\circ}\text{C}, v_{\text{D}} = 6\text{V}, R_{\text{GK}} \geq 10\Omega$ $i_{\text{GM}} = 1\text{A}, di_{\text{G}}/dt = 1\text{A}/\mu\text{s}$ $t_{\text{g}} = 20\mu\text{s}$ | I_{L} | max. 1500 | mA |
| Vorwärts- und Rückwärts-Sperrstrom forward off-state and reverse currents | $T_{vj} = T_{vj\text{max}}$ $v_{\text{D}} = V_{\text{DRM}}, v_{\text{R}} = V_{\text{RRM}}$ | $i_{\text{D}}, i_{\text{R}}$ | max. 250 | mA |
| Zündverzug gate controlled delay time | DIN IEC 747-6 $T_{vj} = 25^{\circ}\text{C}$ $i_{\text{GM}} = 1\text{A}, di_{\text{G}}/dt = 1\text{A}/\mu\text{s}$ | t_{gd} | max. 4 | μs |

¹⁾ Gehäusegrenzstrom 38 kA (50Hz Sinushalbwellen). / Current limit of case 38kA (50 Hz sinusoidal half-wave)

Technische Information / Technical Information



Netz-Thyristor
Phase Control Thyristor

T 3159 N 12...18

N



Elektrische Eigenschaften / Electrical properties

Charakteristische Werte / Characteristic values

Vorläufige Daten

Preliminary Data

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

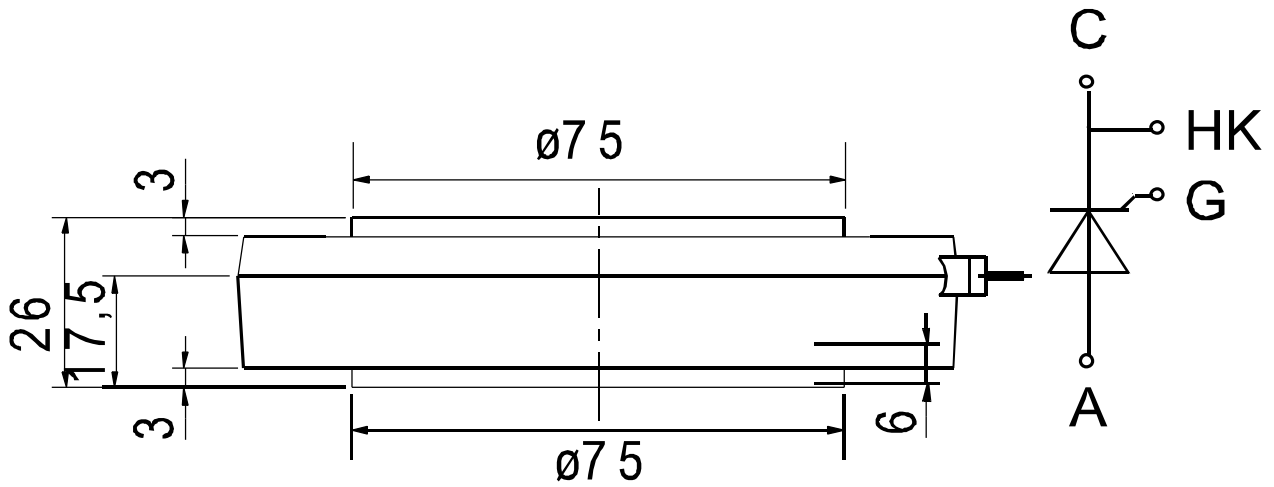
Thermische Eigenschaften / Thermal properties

| | | | | |
|---|---|---------------|----------------------------|------------------------------|
| Innerer Wärmewiderstand thermal resistance, junction to case | Kühlfläche / cooling surface beidseitig / two-sided, $Z = 180^\circ$ sin beidseitig / two-sided, DC | R_{thJC} | max. 0,0085 max. 0,0078 | $^\circ C/W$ $^\circ C/W$ |
| Übergangs-Wärmewiderstand thermal resistance, case to heatsink | Kühlfläche / cooling surface beidseitig / two-sided einseitig / single-sided | R_{thJK} | max. 0,0025 max. 0,0050 | $^\circ C/W$ $^\circ C/W$ |
| Höchstzulässige Sperrschichttemperatur max. junction temperature | | $T_{vj\ max}$ | 125 | $^\circ C$ |
| Betriebstemperatur operating temperature | | $T_{c\ op}$ | -40...125 | $^\circ C$ |
| Lagertemperatur storage temperature | | T_{stg} | -40...150 | $^\circ C$ |

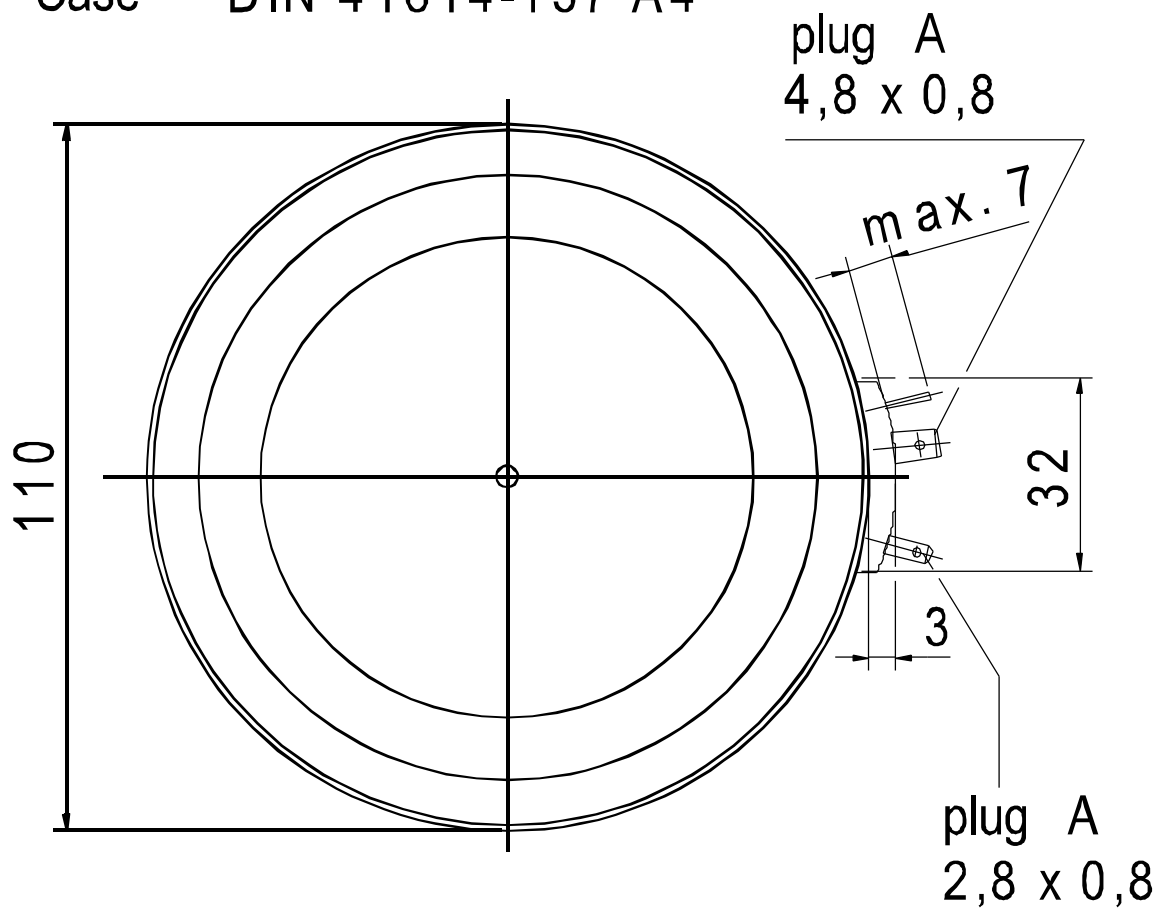
Mechanische Eigenschaften / Mechanical properties

| | | | | |
|--|-----------|---|-------------------|------------------|
| 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 | 42...95 | kN |
| Gewicht weight | | G | typ. 1200 | g |
| Kriechstrecke creepage distance | | | 30 | mm |
| Feuchteklasse humidity classification | DIN 40040 | | C | |
| Schwingfestigkeit vibration resistance | f = 50Hz | | 50 | m/s ² |

Mit dieser technischen Information werden Halbleiterbauelemente spezifiziert, jedoch keine Eigenschaften zugesichert. Sie gilt in Verbindung mit den zugehörigen Technischen Erläuterungen./ This technical information specifies semiconductor devices but promises no characteristics. It is valid in combination with the belonging technical notes.

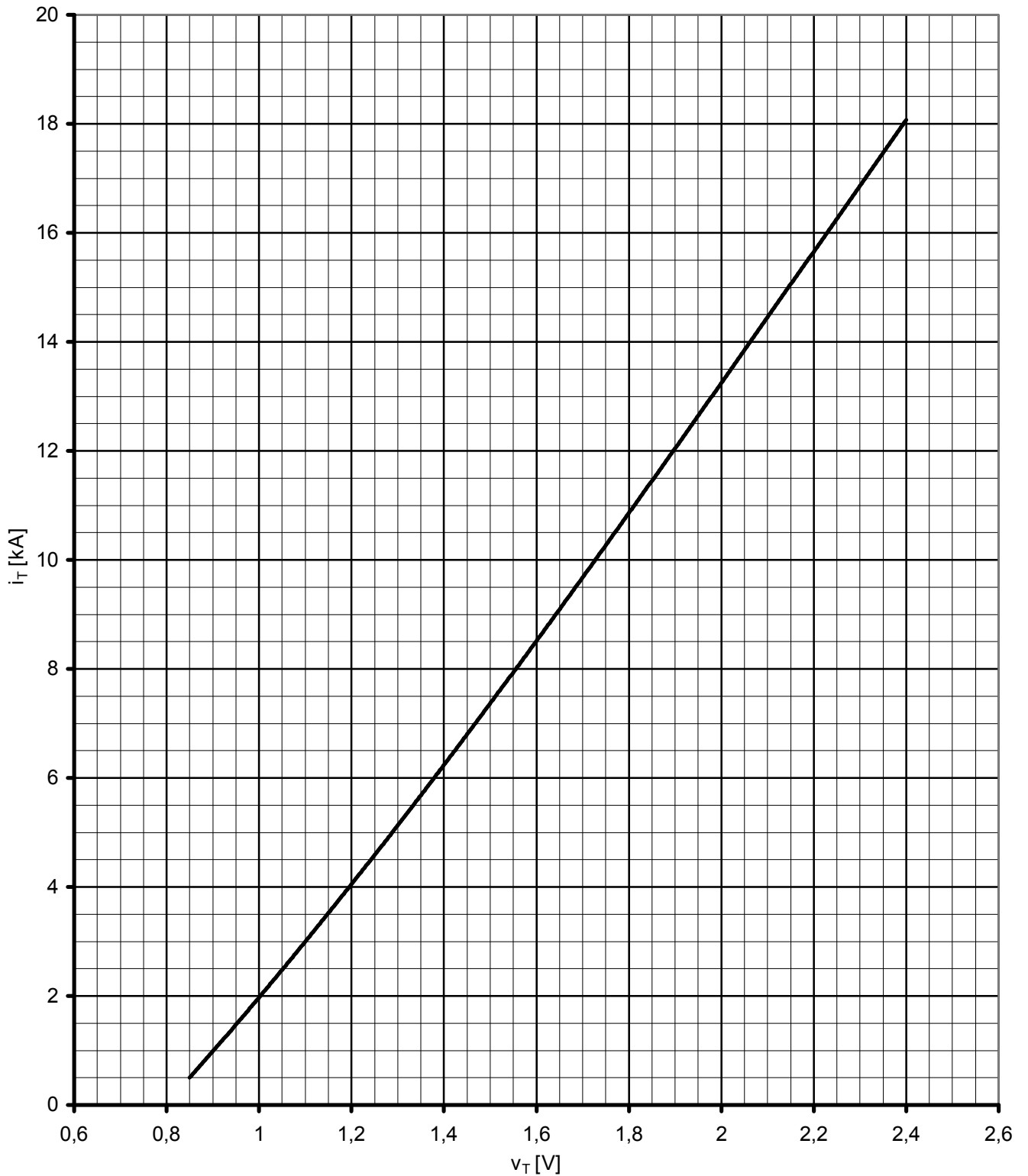


Case DIN 41814-157 A4



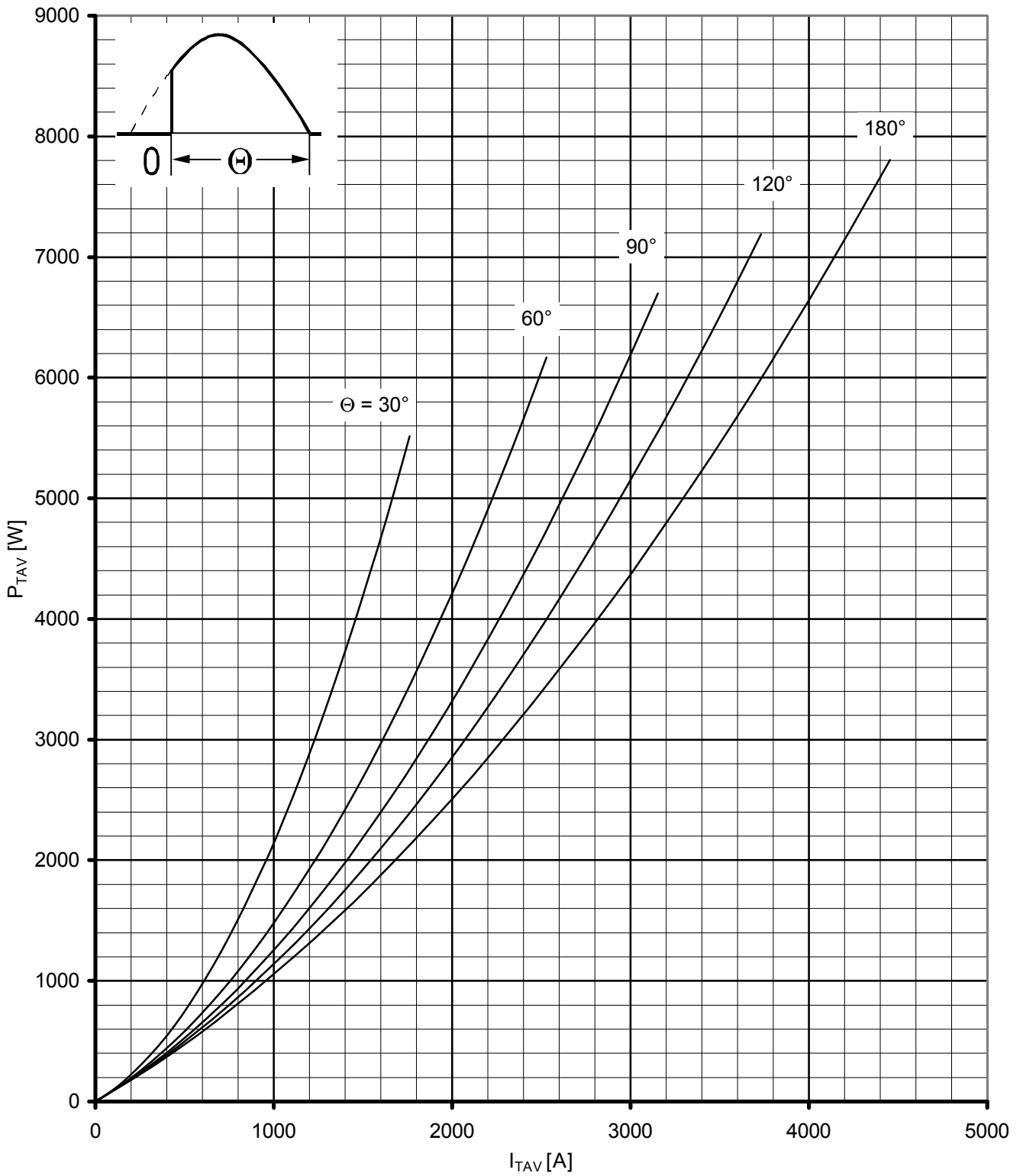
| | | | | | | | | |
|---------------------------------|--|----------|---------|---------|--------|---------|---|---|
| Kühlung cooling | Analytische Elemente des transienten Wärmewiderstandes Z_{thJC} für DC Analytical elements of transient thermal impedance Z_{thJC} for DC | | | | | | | |
| | Pos.n | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| beidseitig two-sided | R_{thn} [°C/W] | 0,00003 | 0,00039 | 0,00123 | 0,0028 | 0,00338 | | |
| | τ_n [s] | 0,000055 | 0,00392 | 0,0152 | 0,2068 | 1,0914 | | |
| anodenseitig anode-sided | R_{thn} [°C/W] | | | | | | | |
| | τ_n [s] | | | | | | | |
| kathodenseitig cathode-sided | R_{thn} [°C/W] | | | | | | | |
| | τ_n [s] | | | | | | | |

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

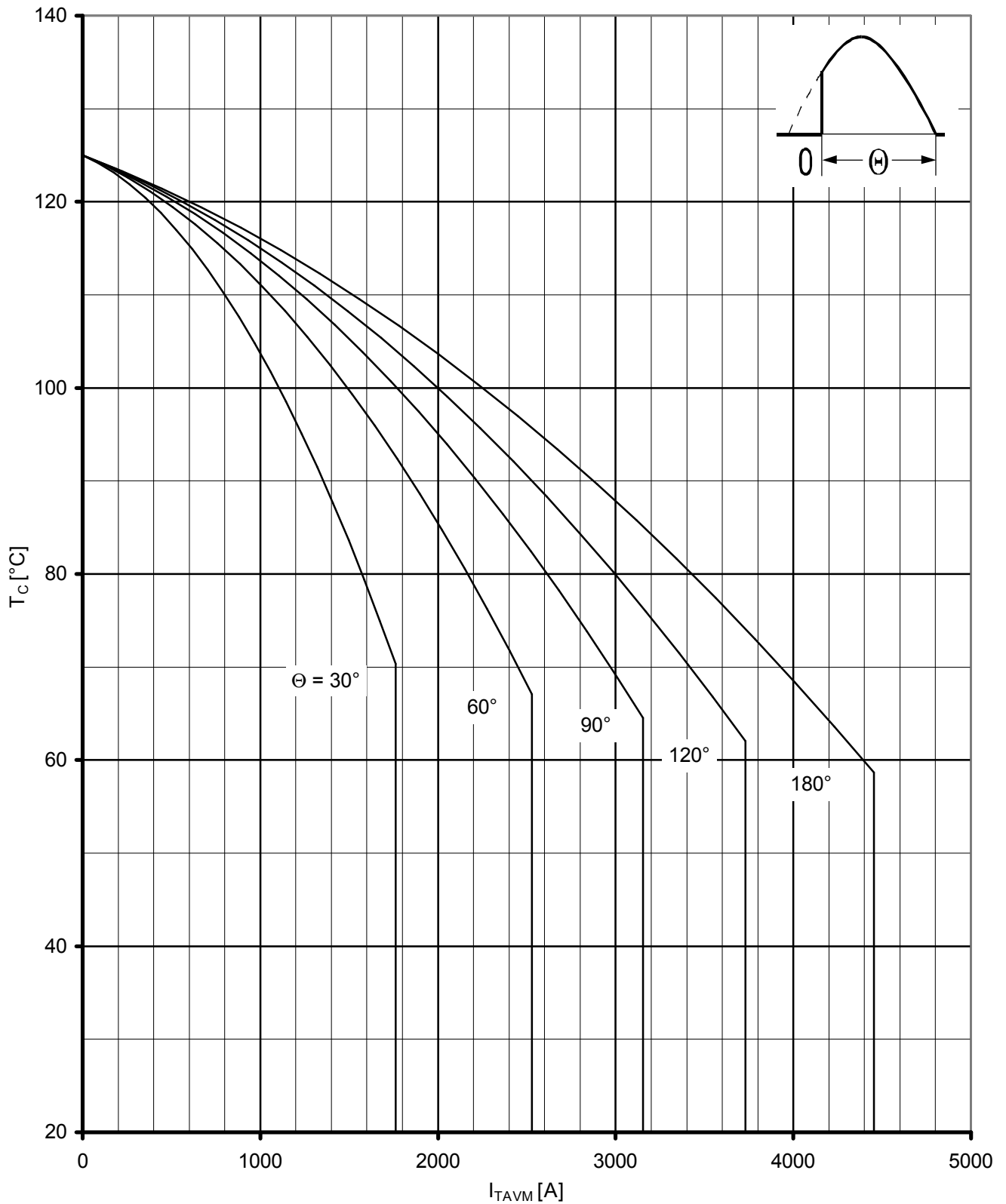


Grenzdurchlaßkennlinie / Limiting on-state characteristic $i_T = f(v_T)$

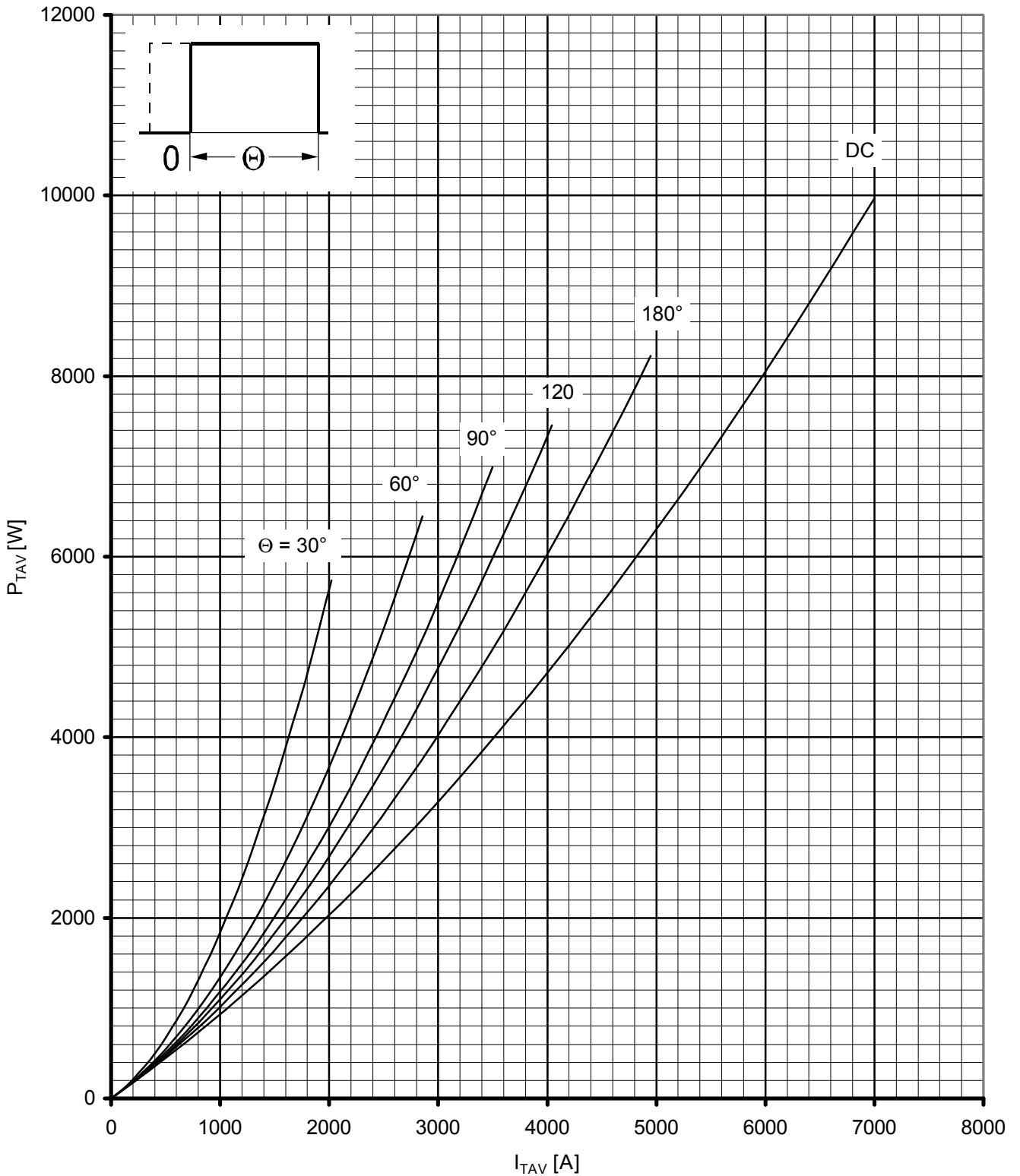
$T_{vj} = 125 \text{ °C}$



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



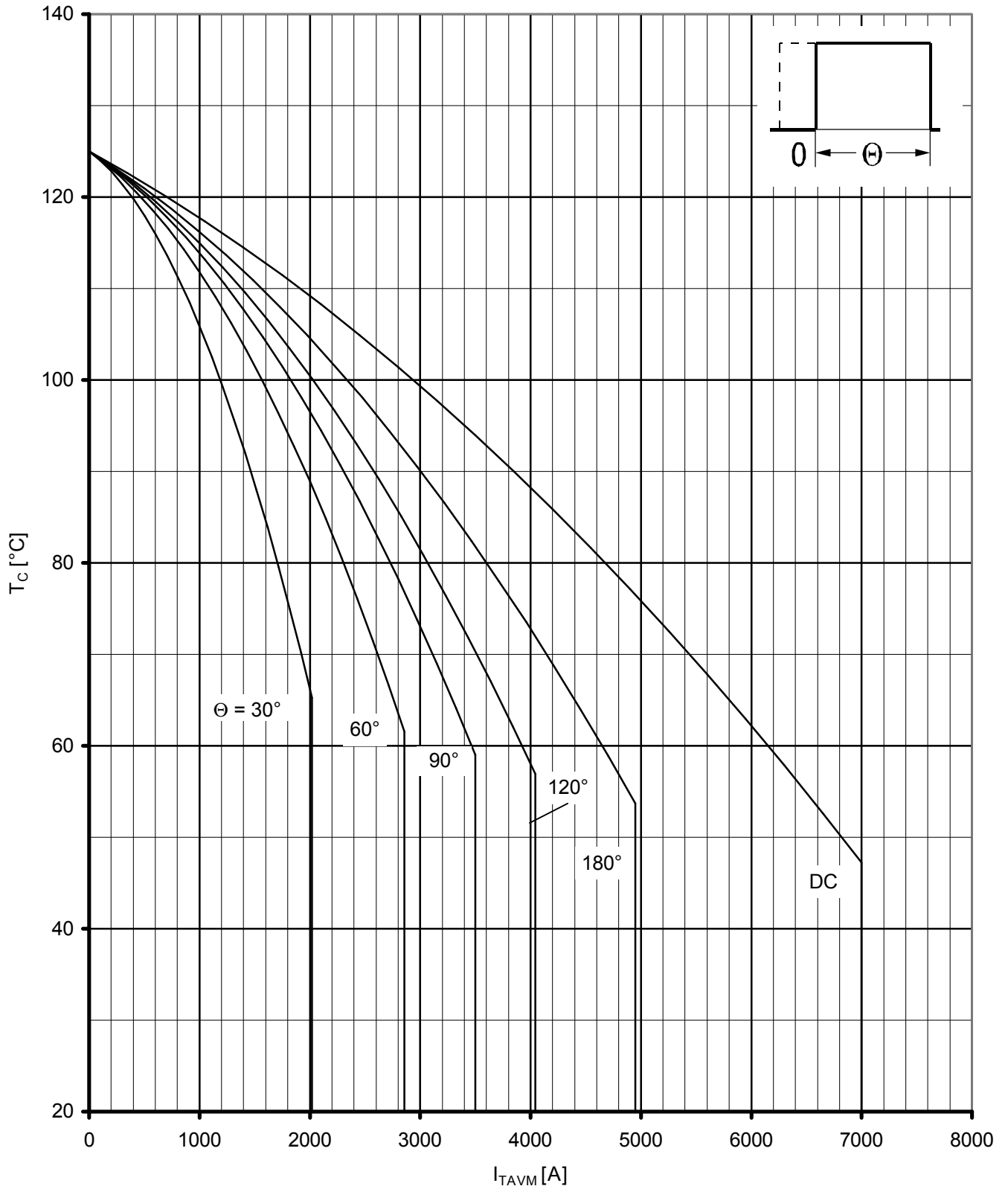
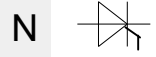
Höchstzulässige Gehäusetemperatur / Maximum allowable case temperature $T_c = f(I_{TAVM})$
 Beidseitige Kühlung / two sided cooling
 Parameter: Stromflußwinkel θ / current conduction angle θ



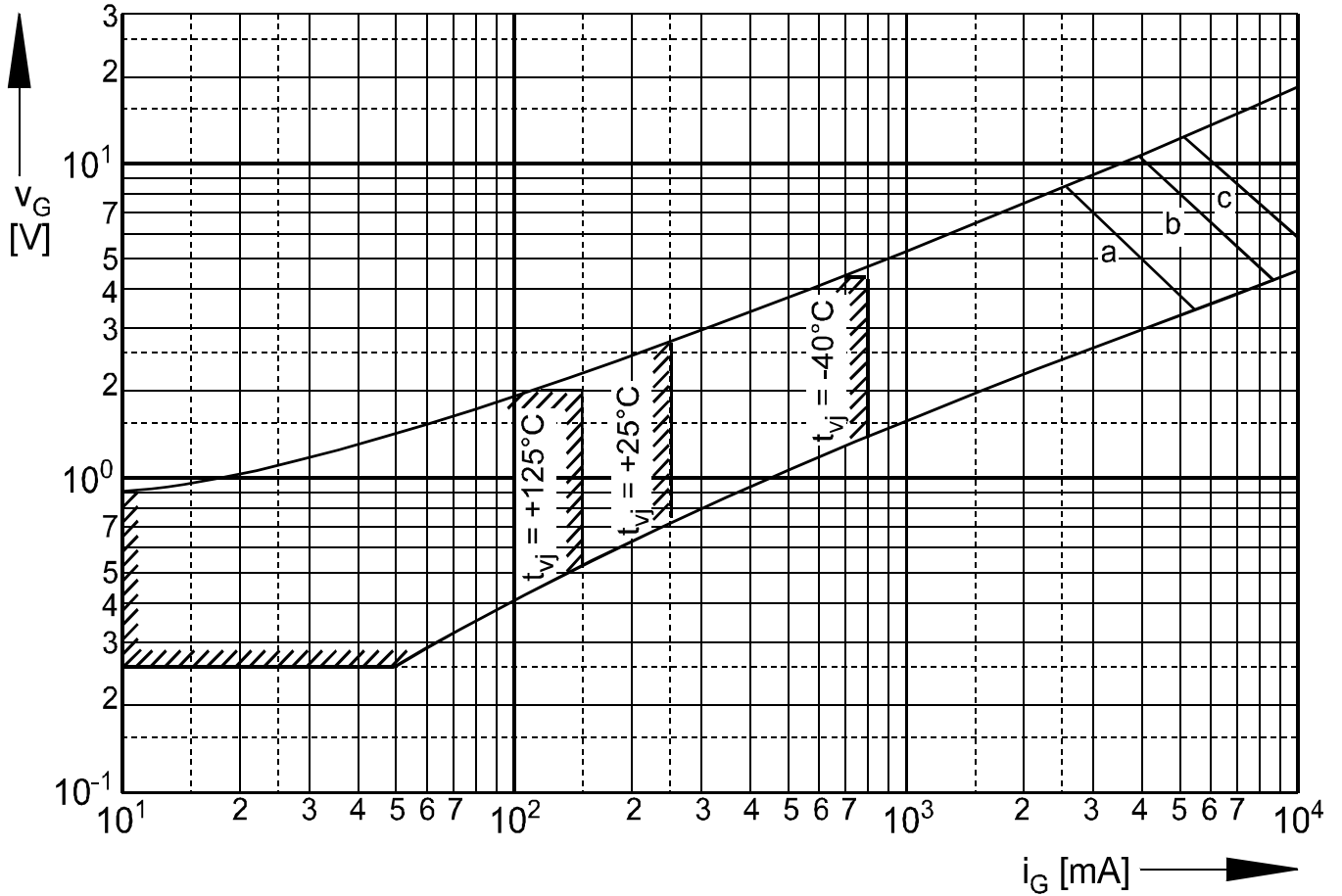
Durchlaßverlustleistung / On-state power loss $P_{TAV} = f(I_{TAV})$
Parameter: Stromflußwinkel θ / current conduction angle θ

NETZ-1 thyristor
Phase Control Thyristor

T 3159 N 12...18



Höchstzulässige Gehäusetemperatur / Maximum allowable case temperature $T_c = f(I_{TAVM})$
 Beidseitige Kühlung / two sided cooling
 Parameter: Stromflußwinkel / current conduction angle θ

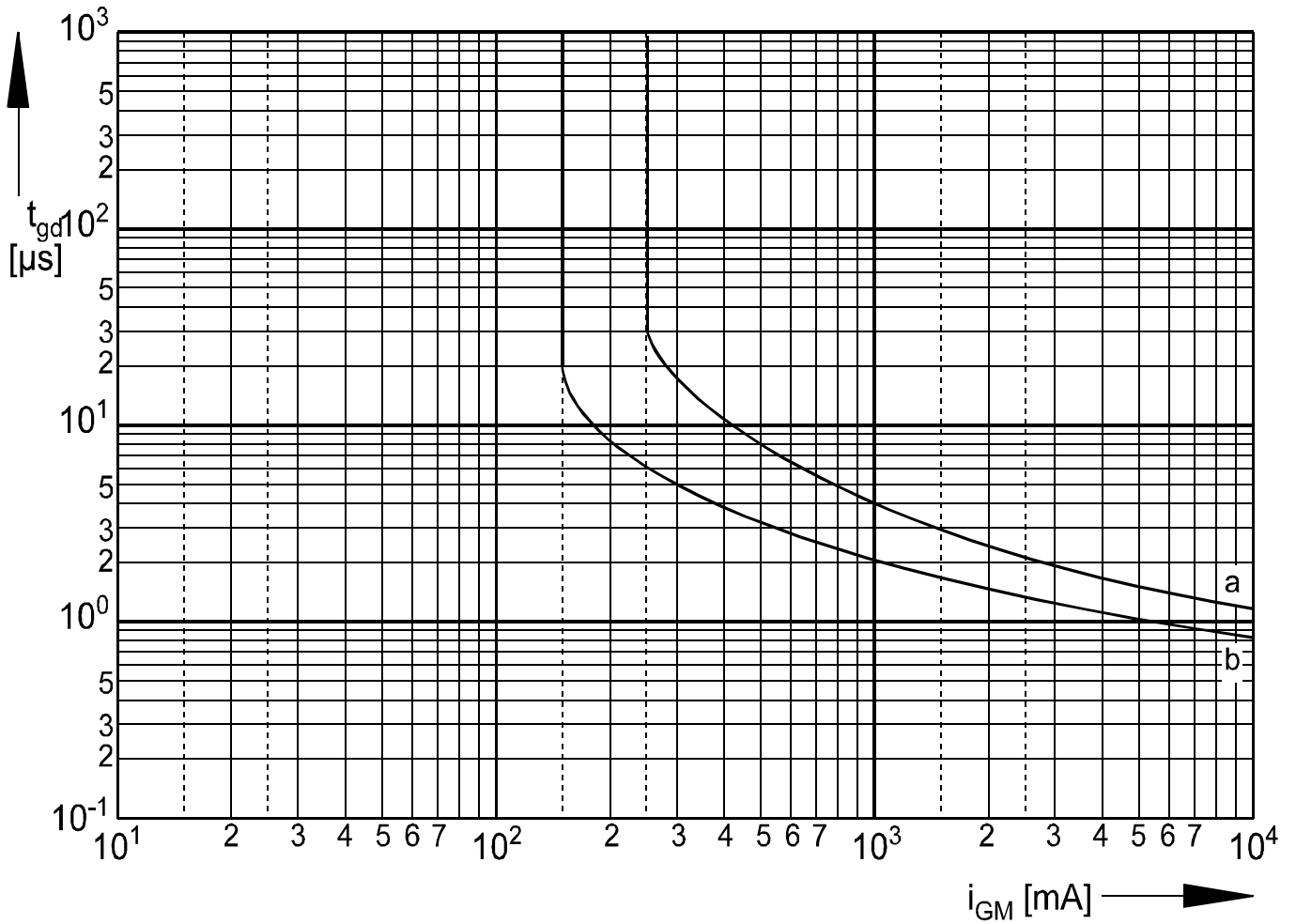


Steuercharakteristik $v_G = f(i_G)$ mit Zündbereichen für $V_D = 6\text{ V}$

Gate characteristic $v_G = f(i_G)$ with triggering area for $V_D = 6\text{ V}$

Höchstzulässige Spitzensteuerverlustleistung / Maximum rated peak gate power dissipation PGM = $f(t_g)$:

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

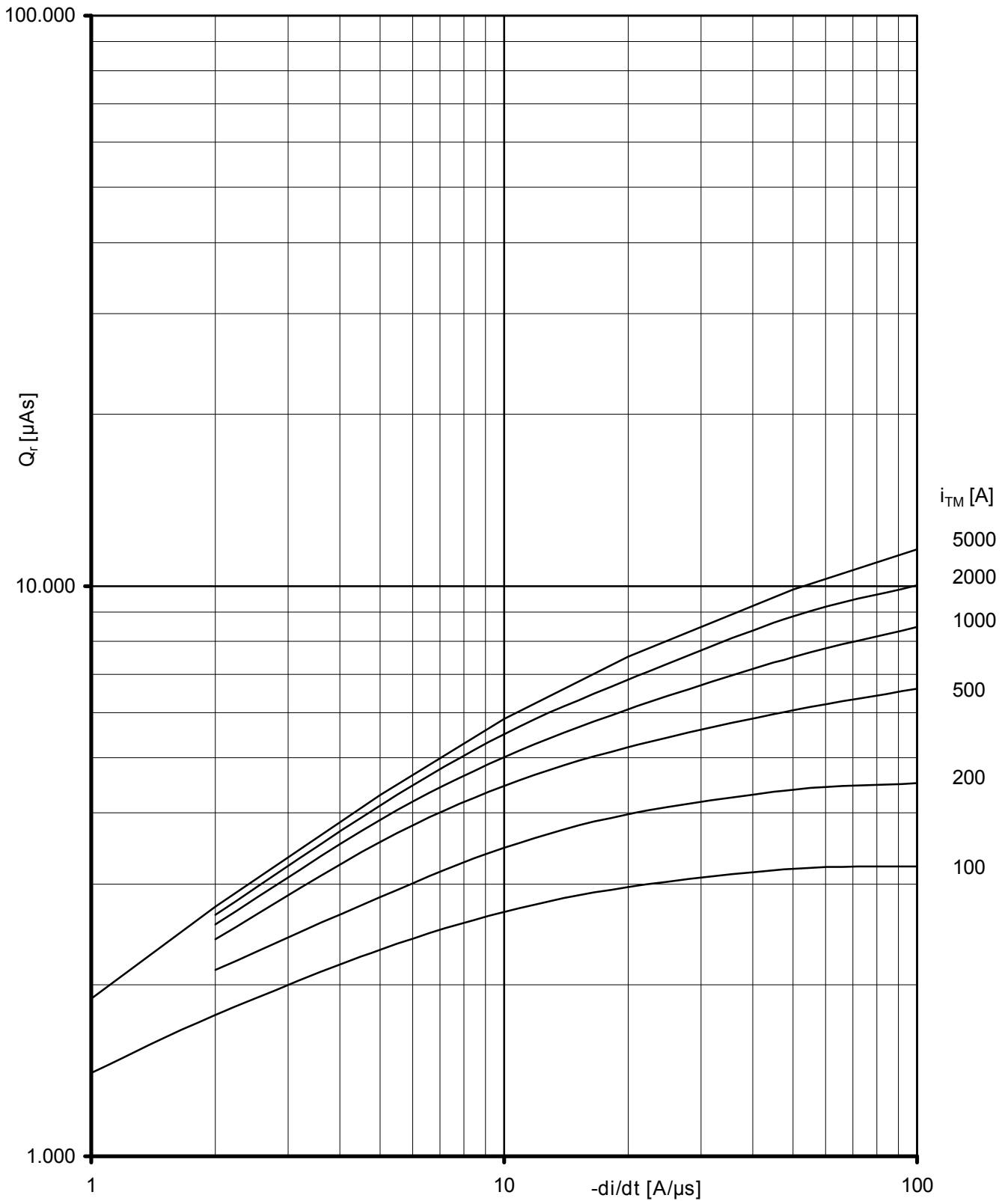


Zündverzug / Gate controlled delay time $t_{gd} = f(i_G)$

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

a - maximaler Verlauf / limiting characteristic

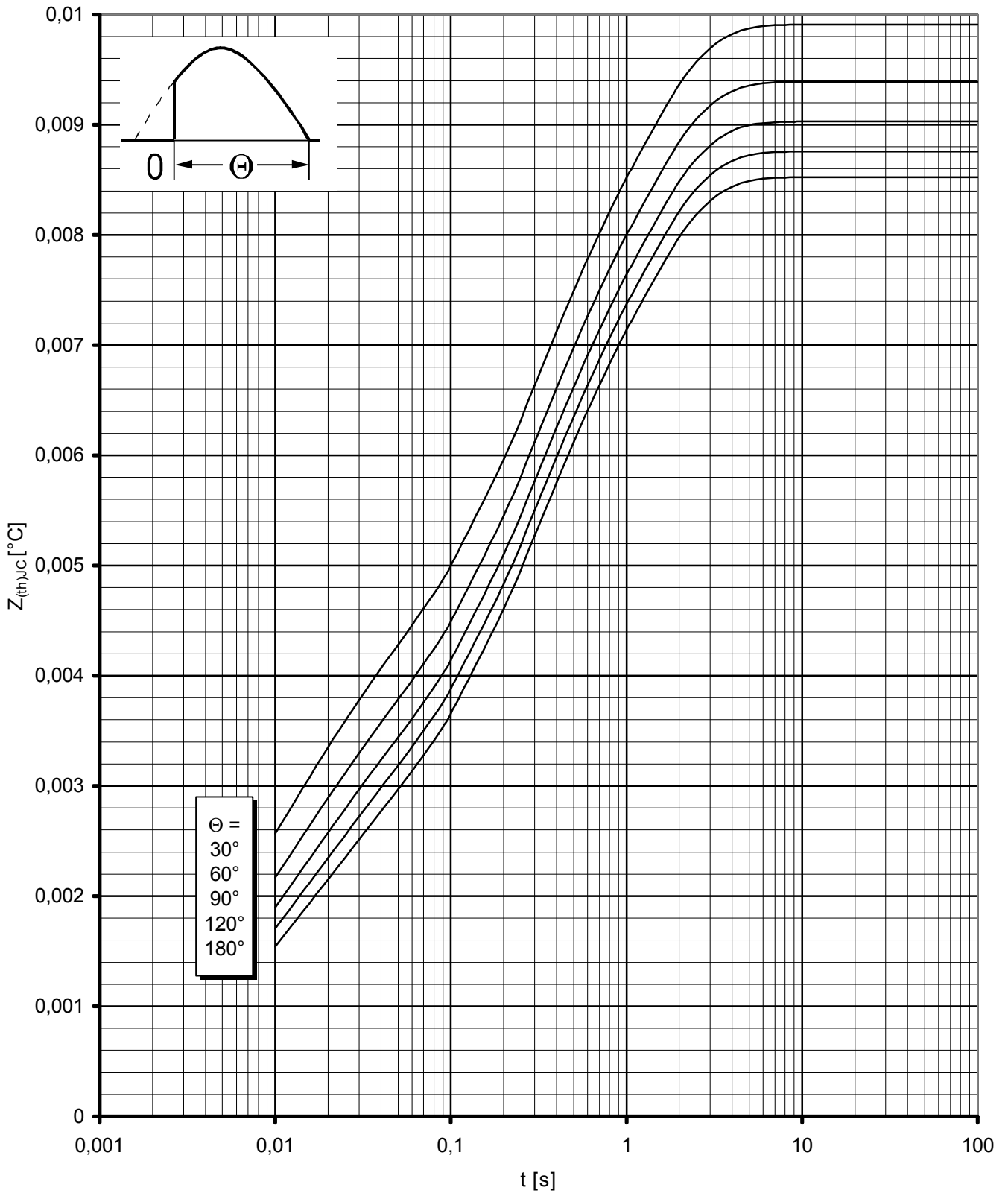
b - typischer Verlauf / typical characteristic



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

$T_{vj} = T_{vj\ max}$, $V_R \leq 0,5 V_{RRM}$, $V_{RM} \leq 0,8 V_{RRM}$

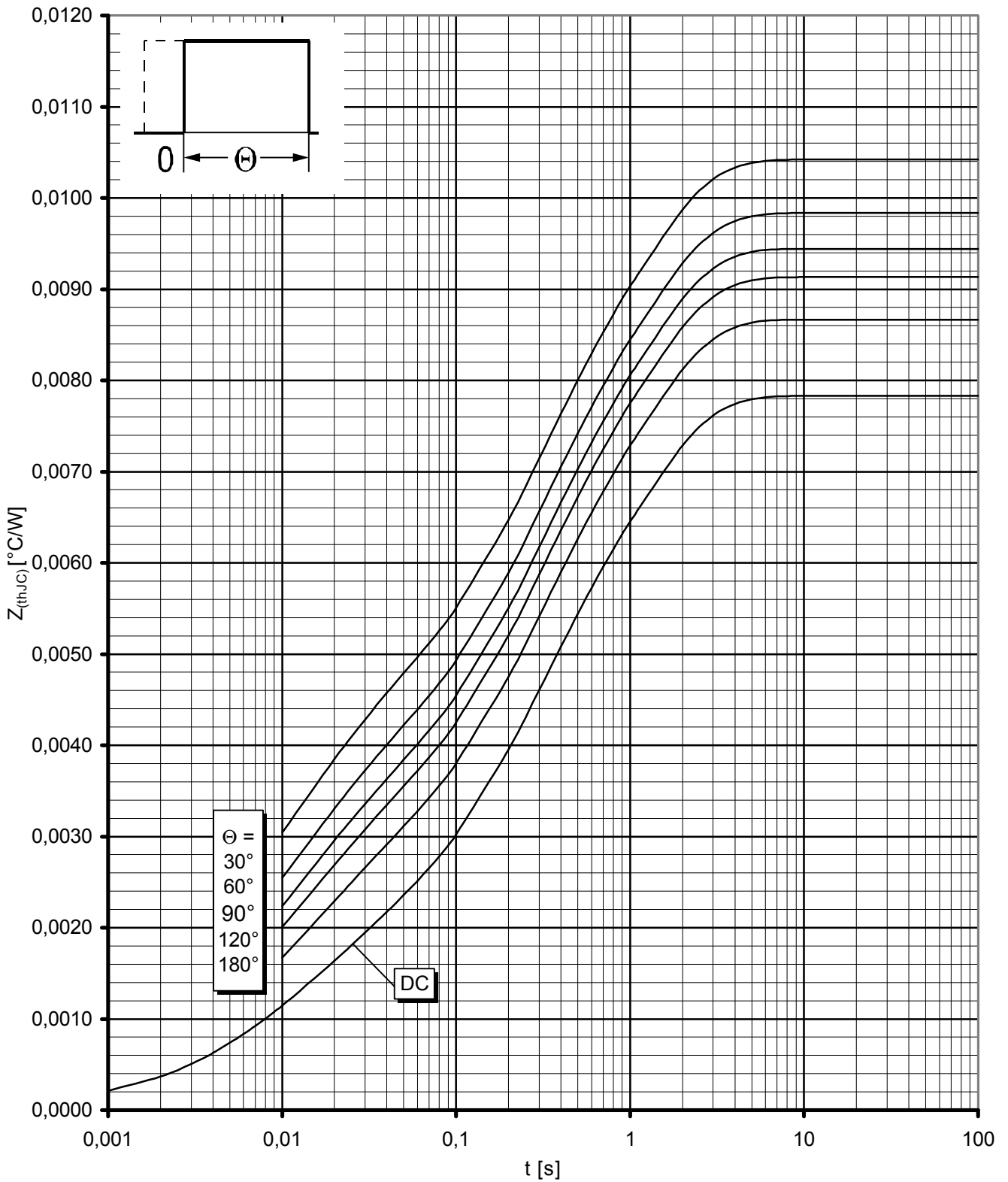
Parameter: Durchlaßstrom / On-state current i_{TM}



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

Beidseitige Kühlung / two sided cooling

Parameter: Stromflußwinkel / current conduction angle Θ



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

Beidseitige Kühlung / two sided cooling

Parameter: Stromflußwinkel / current conduction angle Θ