

Elektrische Eigenschaften / Electrical properties

Höchstzulässige Werte / Maximum rated values

| | | | | |
|--|--|----------------------------------|-----------------------------------|--|
| Periodische Vorwärts- und Rückwärts-Spitzensperrspannung repetitive peak forward off-state and reverse voltages | $T_{vj} = -40^{\circ}\text{C} \dots T_{vj\text{max}}$ | $V_{\text{DRM}}, V_{\text{RRM}}$ | 1200, 1400 1600, 1800 | V V |
| Vorwärts-Stoßspitzensperrspannung 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-Stoßspitzensperrspannung 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 (pro Element) RMS on-state current (per chip) | | I_{TRMSM} | 75 | A |
| Effektivstrom (pro Phase) RMS current (per arm) | $T_{\text{C}} = 85^{\circ}\text{C}$ $T_{\text{C}} = 72^{\circ}\text{C}$ $T_{\text{A}} = 45^{\circ}\text{C}, \text{KM 11}$ $T_{\text{A}} = 45^{\circ}\text{C}, \text{KM 33}$ $T_{\text{A}} = 35^{\circ}\text{C}, \text{KM 14 } (V_L = 45/\text{s})$ $T_{\text{A}} = 35^{\circ}\text{C}, \text{KM 33 } (V_L = 90/\text{s})$ | I_{RMS} | 85 106 35 49 83 96 | A A A A 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} | 720 620 | A 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 | 2600 1920 | A^2s A^2s |
| Kritische Stromsteilheit critical rate of rise of on-state current | DIN IEC 747-6 $f = 50\text{Hz}, i_{\text{GM}} = 0,6\text{A}, di_{\text{G}}/dt = 0,6\text{A}/\mu\text{s}$ | $(di/dt)_{\text{cr}}$ | 120 | $\text{A}/\mu\text{s}$ |
| Kritische Spannungssteilheit critical rate of rise of off-state voltage | $T_{vj} = T_{vj\text{max}}, V_{\text{D}} = 0,67 V_{\text{DRM}}$ 8. Kennbuchstabe / 8th letter F | $(dv/dt)_{\text{cr}}$ | 1000 | $\text{V}/\mu\text{s}$ |

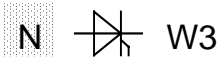
Charakteristische Werte / Characteristic values

| | | | | |
|--|---|------------------------------|----------------------|----------------------------|
| Durchlaßspannung on-state voltage | $T_{vj} = T_{vj\text{max}}, I_{\text{T}} = 100\text{A}$ | V_{T} | max. 1,64 | V |
| Schleusenspannung threshold voltage | $T_{vj} = T_{vj\text{max}}$ | $V_{(\text{T0})}$ | 0,95 | V |
| Ersatzwiderstand slope resistance | $T_{vj} = T_{vj\text{max}}$ | r_{T} | 5,5 | $\text{m}\Omega$ |
| Zündstrom gate trigger current | $T_{vj} = 25^{\circ}\text{C}, V_{\text{D}} = 6\text{V}$ | I_{GT} | max. 150 | mA |
| Zündspannung gate trigger voltage | $T_{vj} = 25^{\circ}\text{C}, V_{\text{D}} = 6\text{V}$ | V_{GT} | max. 2,5 | V |
| Nicht zündender 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. 5,0 max. 2,5 | mA mA |
| Nicht zündende Steuerspannung gate non-trigger voltage | $T_{vj} = T_{vj\text{max}}, V_{\text{D}} = 0,5 V_{\text{DRM}}$ | V_{GD} | max. 0,2 | V |
| Haltestrom holding current | $T_{vj} = 25^{\circ}\text{C}, V_{\text{D}} = 6\text{V}, R_{\text{A}} = 5\Omega$ | I_{H} | max. 200 | mA |
| Einraststrom latching current | $T_{vj} = 25^{\circ}\text{C}, V_{\text{D}} = 6\text{V}, R_{\text{GK}} \geq 20\Omega$ $i_{\text{GM}} = 0,6\text{A}, di_{\text{G}}/dt = 0,6\text{A}/\mu\text{s}, t_{\text{G}} = 10\mu\text{s}$ | I_{L} | max. 600 | 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. 8 | mA |
| Zündverzögerung gate controlled delay time | DIN IEC 747-6 $T_{vj} = 25^{\circ}\text{C}, i_{\text{GM}} = 0,6\text{A}, di_{\text{G}}/dt = 0,6\text{A}/\mu\text{s}$ | t_{gd} | max. 1,2 | μs |

Technische Information / Technical Information

eupec

Netz-Thyristor-Modul
Phase Control Thyristor Module **TT W3C 85 N 12...18 (ISOPACK)**



Elektrische Eigenschaften / Electrical properties

Charakteristische Werte / Characteristic values

| | | | | | |
|--|---|------------|------|------------|----------|
| Freiwerdezeit circuit commutated turn-off time | $T_{vj} = T_{vjmax}$ $I_{TM} = 50A$ $V_{RM} = 100V$, $V_{DM} = 0,67 V_{DRM}$ $dV_{D}/dt = 20V/\mu s$, $-di_T/dt = 10A/\mu s$ 7. Kennbuchstabe / 7th letter O | t_q | typ. | 190 | μs |
| Isolations-Prüfspannung insulation test voltage | RMS, $f = 50Hz$, $t = 1min$ RMS, $f = 50Hz$, $t = 1sec$ | V_{ISOL} | | 3,0 3,6 | kV kV |

Thermische Eigenschaften / Thermal properties

| | | | | | |
|---|--|-------------|------|----------------------------------|--|
| Innerer Wärmewiderstand thermal resistance, junction to case | pro Modul / per module, $\Theta = 180^\circ sin$ pro Element / per chip, $\Theta = 180^\circ sin$ pro Modul / per module, DC pro Element / per chip, DC | R_{thJC} | max. | 0,117 0,700 0,108 0,650 | $^\circ C/W$ $^\circ C/W$ $^\circ C/W$ $^\circ C/W$ |
| Übergangs-Wärmewiderstand thermal resistance, case to heatsink | pro Modul / per module pro Element / per chip | R_{thCK} | max. | 0,033 0,200 | $^\circ C/W$ $^\circ C/W$ |
| Höchstzulässige Sperrschichttemperatur max. junction temperature | | T_{vjmax} | | 125 | $^\circ C$ |
| Betriebstemperatur operating temperature | | $T_{c,op}$ | | - 40...+125 | $^\circ C$ |
| Lagertemperatur storage temperature | | T_{stg} | | - 40...+130 | $^\circ C$ |

Mechanische Eigenschaften / Mechanical properties

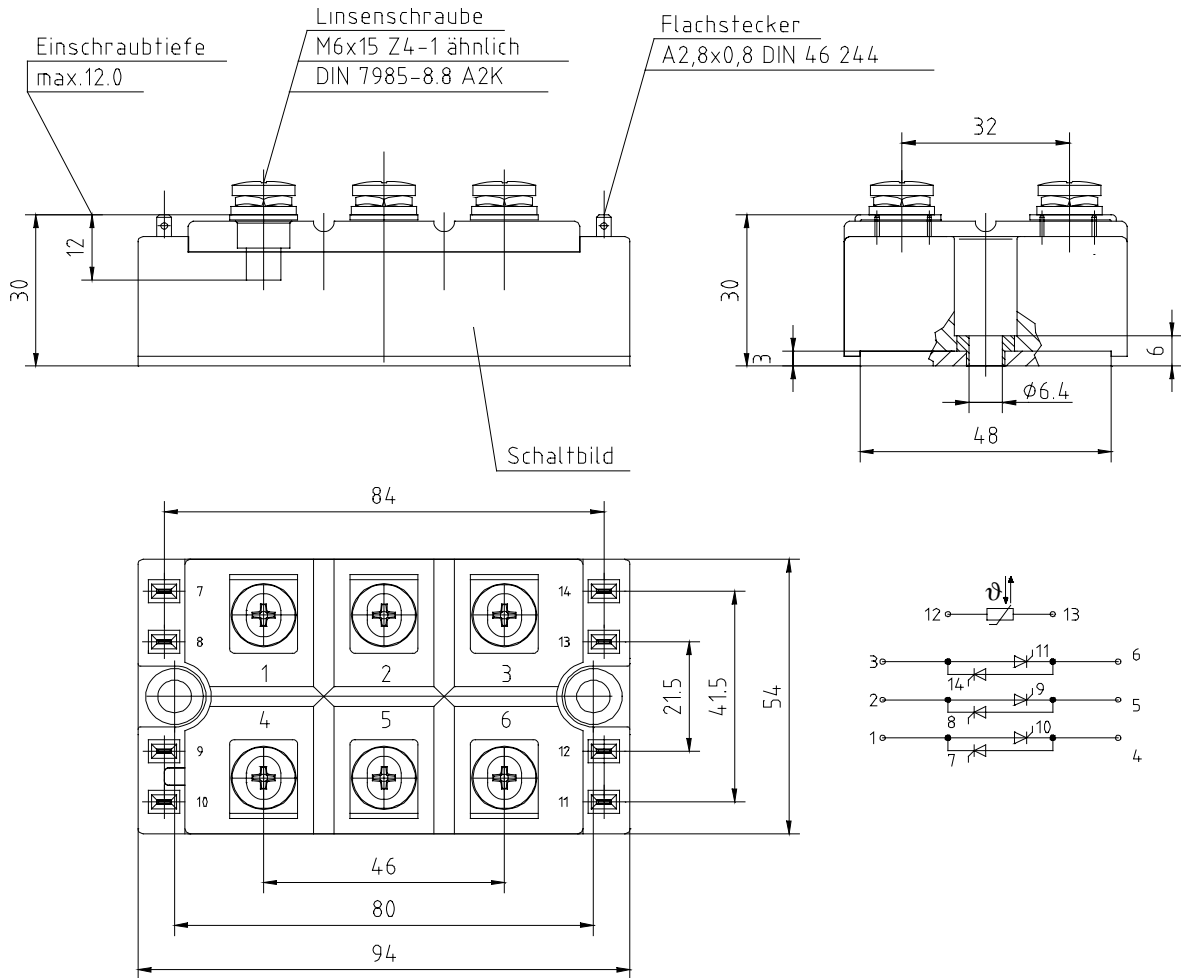
| | | | | | |
|--|-------------------------------------|----|------|-------------------|---------|
| Gehäuse, siehe Anlage case, see appendix | | | | Seite 3 page 3 | |
| Si-Elemente mit Lötkontakt, glaspassiviert Si-pellets with soldered contact, glass-passivated | | | | | |
| Innere Isolation internal insulation | | | | Al_2O_3 | |
| Anzugsdrehmoment für mechanische Befestigung mounting torque | Toleranz / tolerance $\pm 15\%$ | M1 | | 6 | Nm |
| Anzugsdrehmoment für elektrische Anschlüsse terminal connection torque | Toleranz / tolerance $+5\% / -10\%$ | M2 | | 6 | Nm |
| Gewicht weight | | G | typ. | 300 | g |
| Kriechstrecke creepage distance | | | | 12,5 | mm |
| Schwingfestigkeit vibration resistance | $f = 50Hz$ | | | 50 | m/s^2 |

Temperatursensor / Temperature sensor

| | | | | | |
|--------------------------------------|---|----------|------|----|-----------|
| Nennwiderstand rated resistance | $T_C = 25^\circ C$ $R_{100} = 493\Omega \pm 5\%$ | R_{25} | | 5 | $k\Omega$ |
| Verlustleistung power dissipation | $T_C = 25^\circ C$ | P_{25} | max. | 20 | mW |

Kühlkörper / heatsinks : KM 11; KM 14; KM 17; KM 33

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.

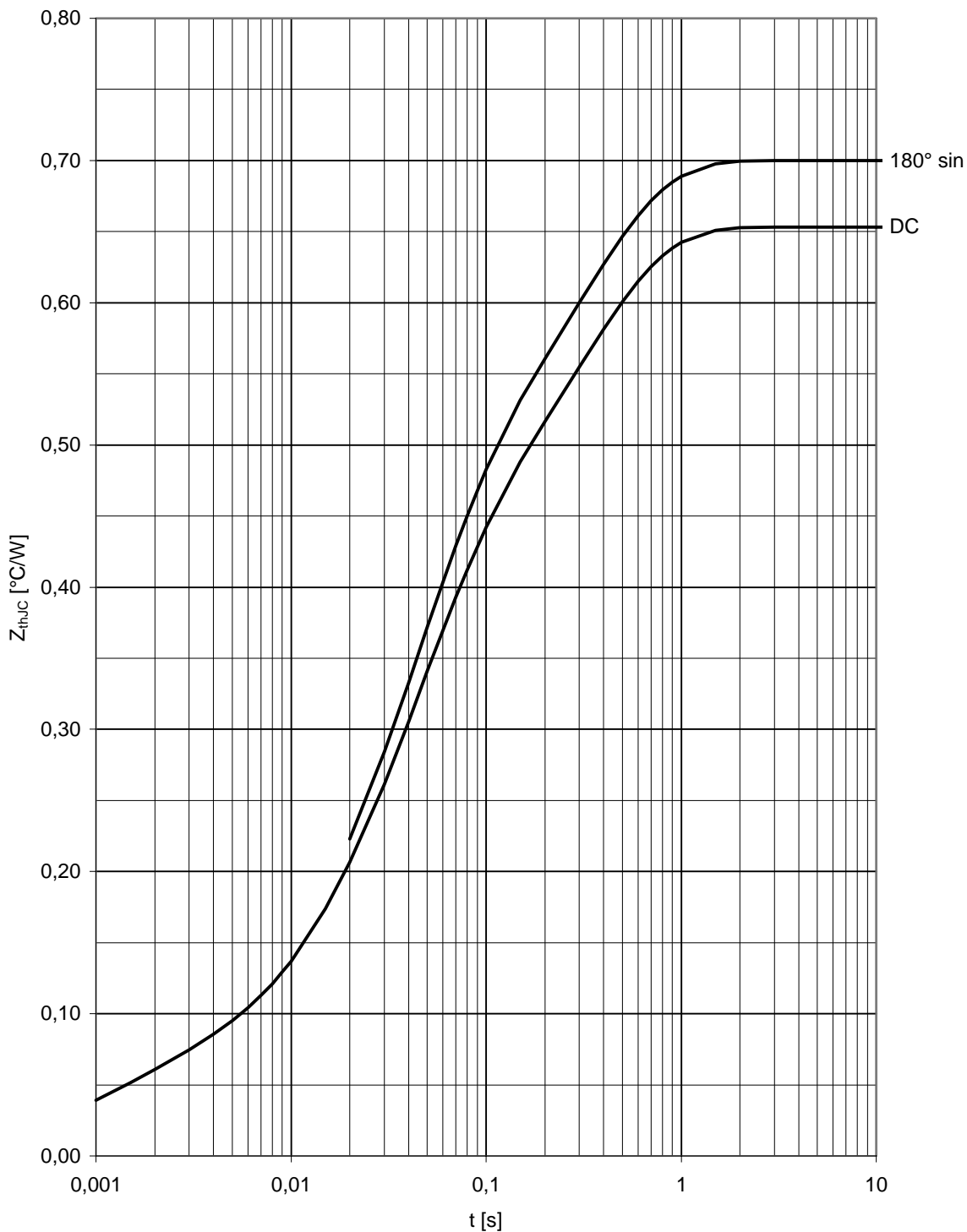


Analytische Elemente des transienten Wärmewiderstandes Z_{thJC} für DC

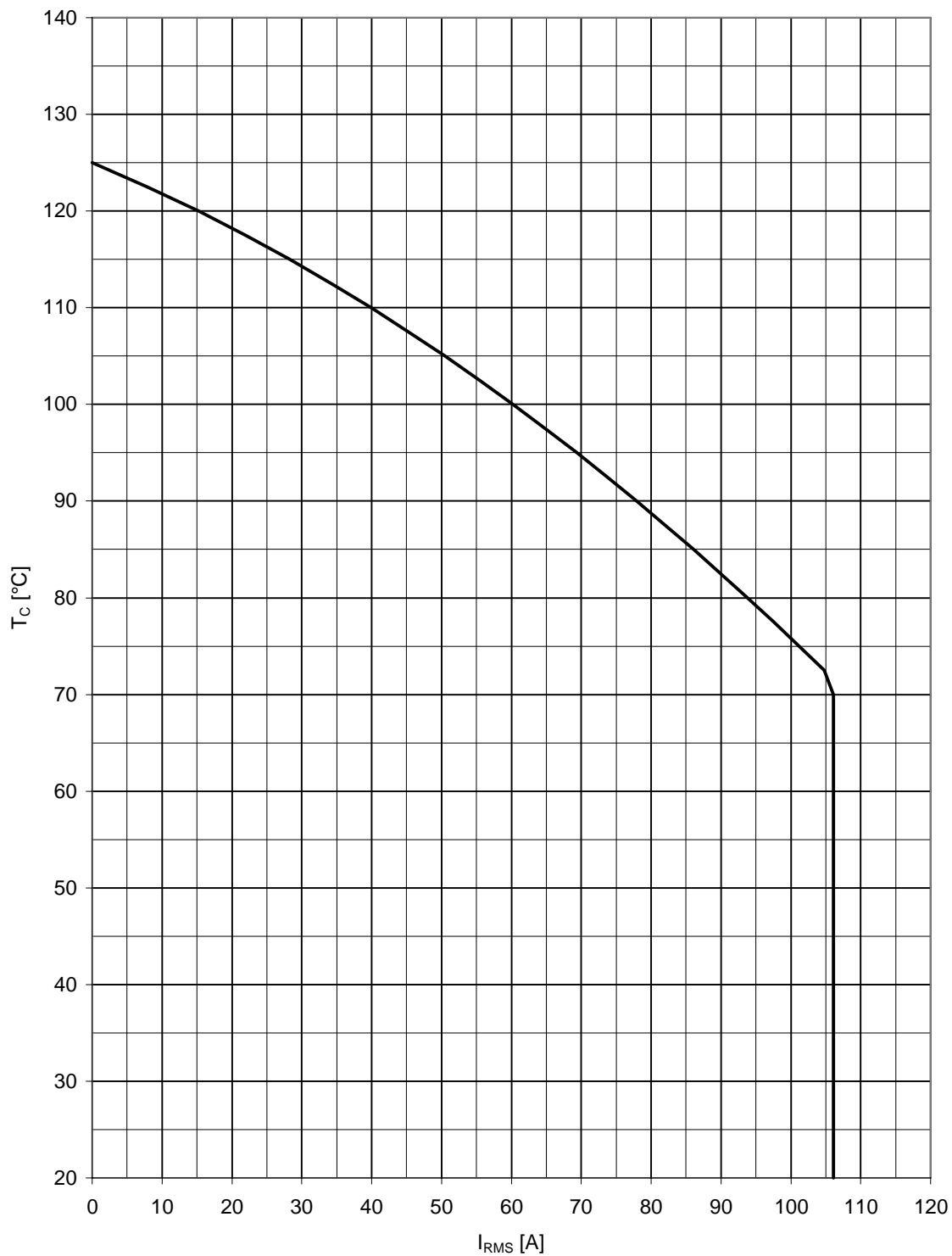
Analytical elements of transient thermal impedance Z_{thJC} for DC

| Pos. n | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---------------------------|---------|---------|---------|---|---|---|---|
| $R_{thn} [^{\circ}C / W]$ | 0,25300 | 0,35100 | 0,04930 | | | | |
| $\tau_n [s]$ | 0,31800 | 0,03870 | 0,00109 | | | | |

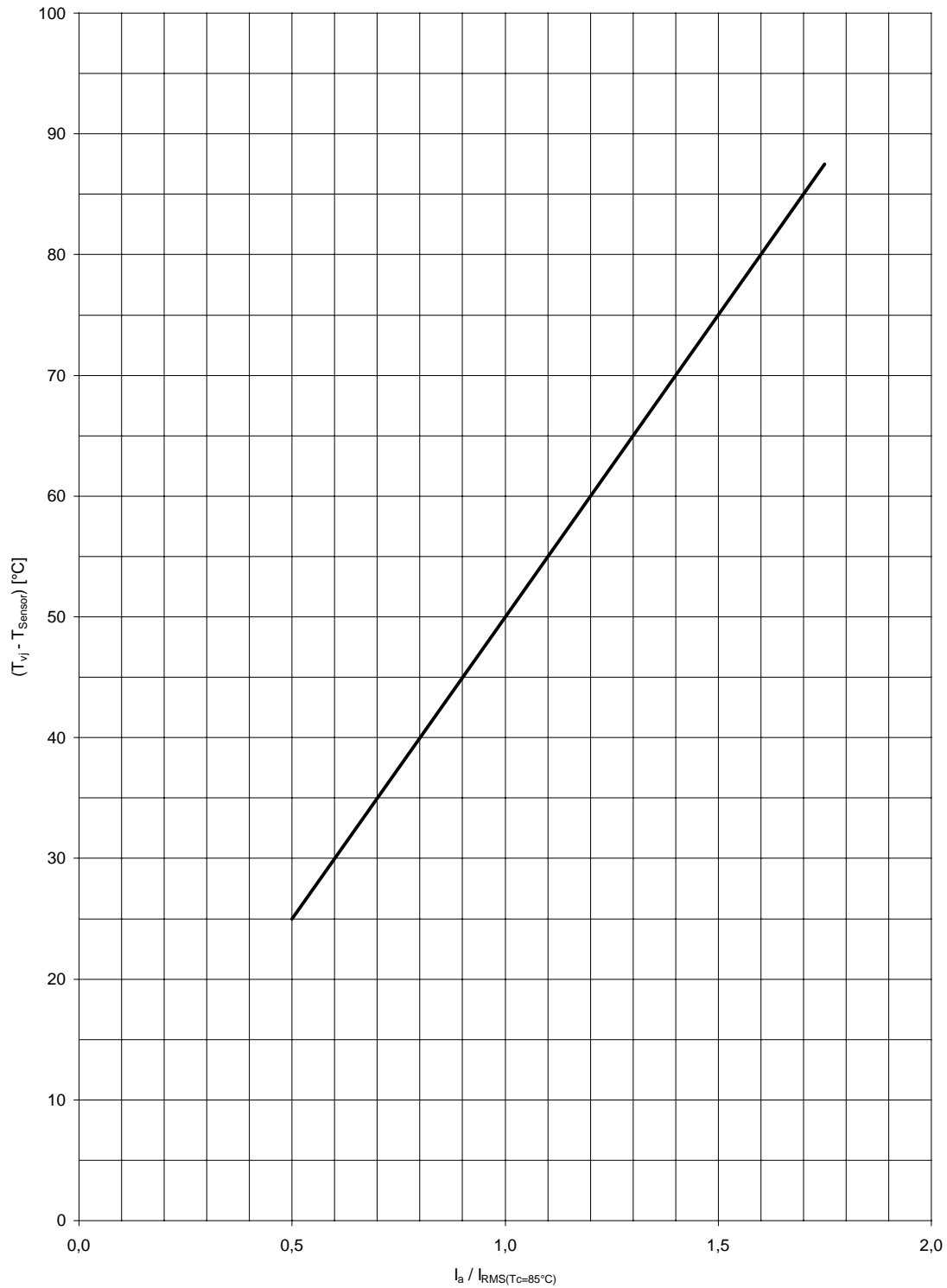
Analytische Funktion:
$$Z_{thJC} = \sum_{n=1}^{n_{max}} R_{thn} \left(1 - e^{-\frac{t}{\tau_n}} \right)$$



Transienter innerer Wärmewiderstand je Zweig / Transient thermal impedance per arm, $Z_{thjC} = f(t)$
Parameter: Stromflußwinkel / Current conduction angle α



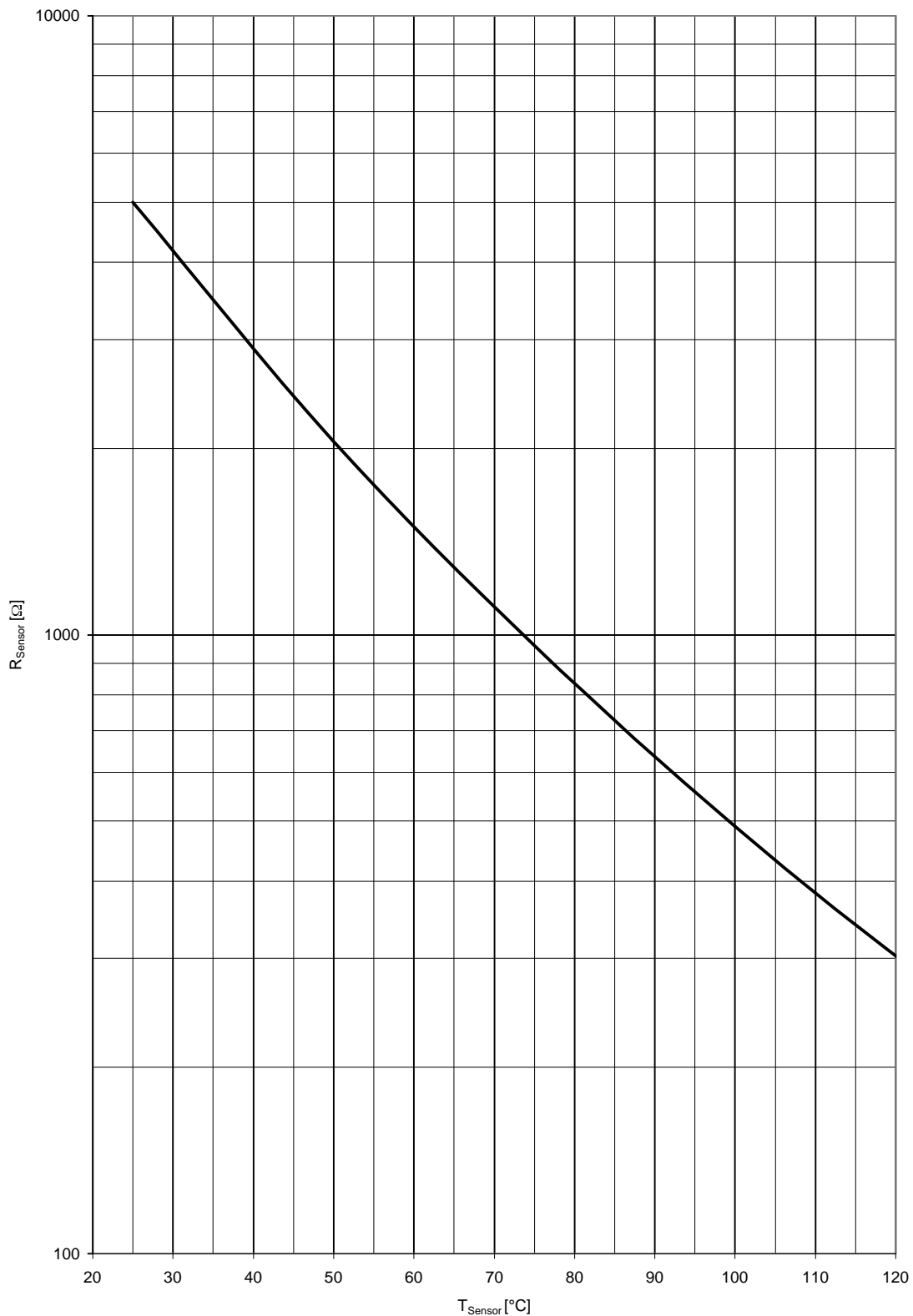
Höchstzulässige Gehäusetemperatur / Maximum allowable case temperature $T_c = f(I_{RMS})$



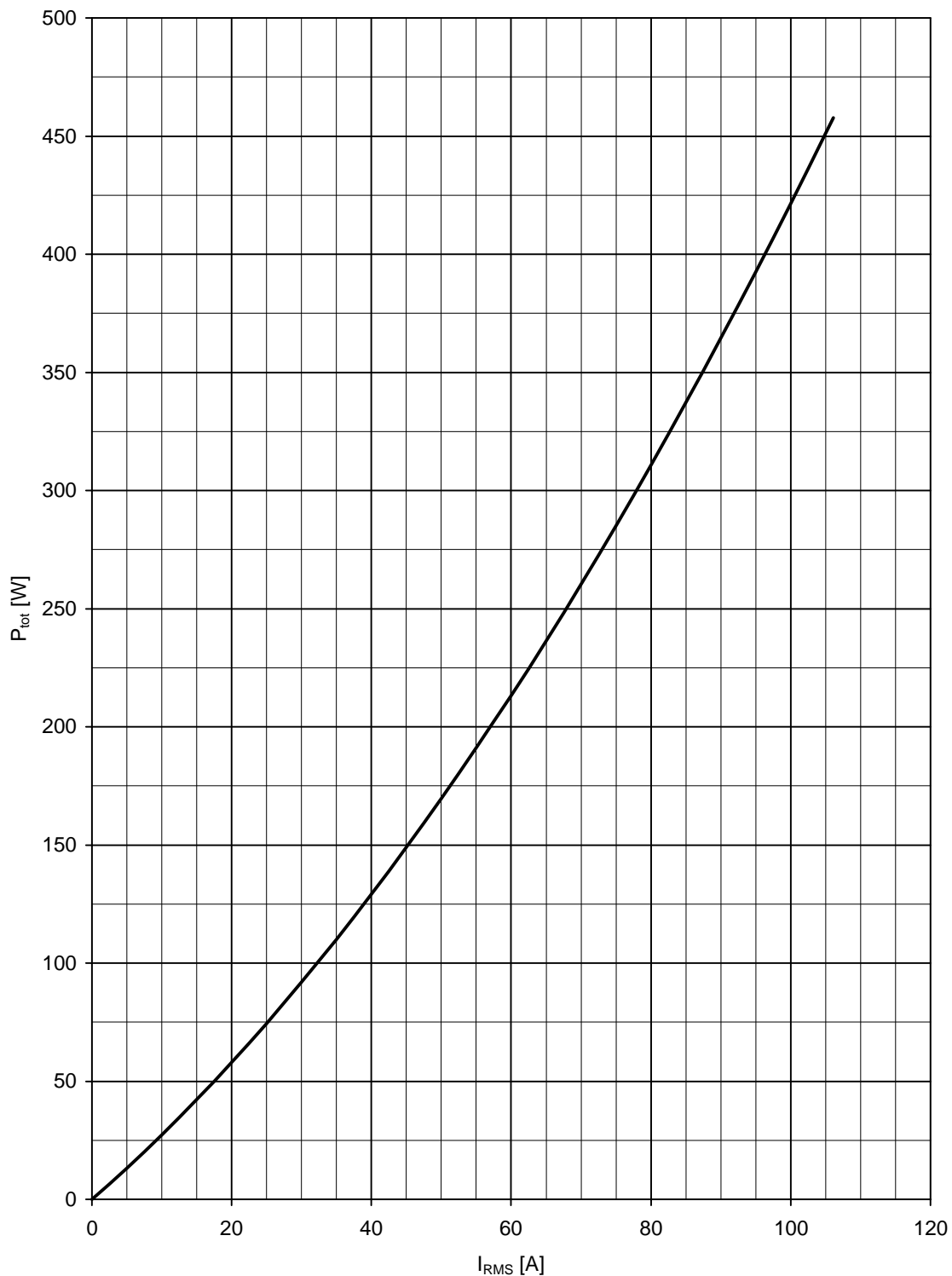
Differenz zwischen Sperrschicht- und Sensortemperatur / Difference between the values of junction and sensor temperature $(T_j - T_{Sensor}) = f(I_a / I_{RMS(T_c=85^\circ C)})$

I_a : Anlaufstrom / Starting current

I_{RMS} : Effektivstrom (pro Phase) / RMS current (per arm)



Sensorwiderstand / Sensor resistance $R_{Sensor} = f(T_{Sensor})$



Gesamtverlustleistung pro Modul / Total power dissipation per module $P_{tot} = f(I_{RMS})$
 I_{RMS} : Effektivstrom (pro Phase) / RMS current (per arm)