



Elektrische Eigenschaften / Electrical properties

Höchstzulässige Werte / Maximum rated values

Gleichrichterdiode, -thyristor / Rectifier diode, -thyristor

Periodische Spitzensperrspannung repetitive peak reverse voltage	$T_{vj} = -40^{\circ}\text{C} \dots T_{vj\text{ max}}$	V_{RRM}	1600	V
Durchlaßstrom-Grenzeffektivwert (pro Element) RMS on-state current (per chip)		I_{TRMSM}	70	A
Ausgangsstrom output current	$T_C = 85^{\circ}\text{C}$	I_d	125	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}	650 550	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	2100 1500	A^2s A^2s
Kritische Stromsteilheit critical rate of rise of on-state current	DIN IEC 747-6 $f = 50\text{Hz}, i_{GM} = 0,6\text{A}, di_G/dt = 0,6\text{A}/\mu\text{s}$	$(di/dt)_{cr}$	120	$\text{A}/\mu\text{s}$
Kritische Spannungssteilheit critical rate of rise of off-state voltage	$T_{vj} = T_{vj\text{ max}}, V_D = 0,67 V_{DRM}$ 8. Kennbuchstabe / 8th letter F	$(dv/dt)_{cr}$	1000	$\text{V}/\mu\text{s}$

IGBT

Kollektor-Emitter-Sperrspannung collector-emitter voltage		V_{CES}	1200	V
Kollektor-Dauergleichstrom DC-collector current	$T_C = 80^{\circ}\text{C}$	I_C	70	A
Periodischer Kollektor-Spitzenstrom repetitive peak collector current	$t_p = 1\text{ms}$	I_{CRM}	150	A
Gesamt-Verlustleistung total power dissipation	$T_C = 25^{\circ}\text{C}$	P_{tot}	400	W
Gate-Emitter Spitzenspannung gate-emitter peak voltage		V_{GE}	± 20	V

Schnelle Diode / Fast diode

Periodische Spitzensperrspannung repetitive peak reverse voltage		V_{RRM}	1200	V
Dauergleichstrom DC forward current	$T_C = 80^{\circ}\text{C}$	I_F	35	A
Periodischer Spitzenstrom repetitive peak forward current	$t_p = 1\text{ms}$	I_{FRM}	70	A

Modul

Isolations-Prüfspannung insulation test voltage	RMS, $f = 50\text{Hz}, t = 1\text{min}$ NTC connected to baseplate	V_{ISOL}	2,5	kV
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prepared by: Ralf Jörke

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Elektrische Eigenschaften / Electrical properties

Charakteristische Werte / Characteristic values

Gleichrichterdiode, -thyristor / Rectifierdiode, -thyristor			min.	typ.	max.	
Durchlaßspannung forward voltage	$T_{vj} = T_{vj\ max}, i_F = 100A$	V_F			1,35	V
Schleusenspannung threshold voltage	$T_{vj} = T_{vj\ max}$	$V_{(TO)}$			0,75	V
Ersatzwiderstand forward slope resistance	$T_{vj} = T_{vj\ max}$	r_T			6,3	mΩ
Zündstrom gate trigger current	$T_{vj} = 25^\circ C, v_D = 6V$	I_{GT}			150	mA
Zündspannung gate trigger voltage	$T_{vj} = 25^\circ C, v_D = 6V$	V_{GT}			2,5	V
Nicht zündender Steuerstrom gate non-trigger current	$T_{vj} = T_{vj\ max}, v_D = 6V$ $T_{vj} = T_{vj\ max}, v_D = 0,5 V_{DRM}$	I_{GD}			5,0 2,5	mA mA
Nicht zündende Steuerspannung gate non-trigger voltage	$T_{vj} = T_{vj\ max}, v_D = 0,5 V_{DRM}$	V_{GD}			0,2	V
Haltestrom holding current	$T_{vj} = 25^\circ C, v_D = 6V, R_A = 5W$	I_H			200	mA
Einraststrom latching current	$T_{vj} = 25^\circ C, v_D = 6V, R_{GK} \geq 20W$ $i_{GM} = 0,6A, di_G/dt = 0,6A/\mu s, t_g = 10\mu s$	I_L			600	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			10	mA
Zündverzug gate controlled delay time	DIN IEC 747-6 $T_{vj} = 25^\circ C, i_{GM} = 0,6A, di_G/dt = 0,6A/\mu s$	t_{gd}			1,2	μs
Freiwerdezeit circuit commutated turn-off time	$T_{vj} = T_{vj\ max}, i_{TM} = 50A$ $v_{RM} = 100V, V_{DM} = 0,67 V_{DRM}$ $d v_D/dt = 20V/\mu s, -di_T/dt = 10A/\mu s$ 7. Kennbuchstabe / 7th letter O	t_q			190	μs
Modul Leitungswiderstand, Anschlüsse-Chip lead resistance, terminals-chip	$T_C = 25^\circ C$	$R_{AA'+KK'}$			1	mΩ
IGBT						
Kollektor-Emitter Sättigungsspannung collector-emitter saturation voltage	$T_{vj} = 25^\circ C, i_C = 70A, v_{GE} = 15V$ $T_{vj} = 125^\circ C, i_C = 70A, v_{GE} = 15V$	$V_{CE\ sat}$		2,05 2,40	2,75	V
Gate-Emitter-Schwellspannung gate-emitter threshold voltage	$T_{vj} = 25^\circ C, i_C = 3mA, v_{GE} = v_{CE}$	$V_{GE(TO)}$	4,5	5,5	6,5	V
Eingangskapazität input capacitance	$T_{vj} = 25^\circ C, f_0 = 1MHz,$ $v_{CE} = 25V, v_{GE} = 0V$	C_{ies}		5,1		nF
Kollektor-Emitter Reststrom collector-emitter cut-off current	$T_{vj} = 25^\circ C, v_{CE} = 1200V, v_{GE} = 0V$ $T_{vj} = 125^\circ C, v_{CE} = 1200V, v_{GE} = 0V$	i_{CES}		10 500	500	μA
Gate-Emitter Reststrom gate leakage current	$T_{vj} = 25^\circ C, v_{CE} = 0V, v_{GE} = 20V$	i_{GES}			400	nA
Emitter-Gate Reststrom gate-leakage current	$T_{vj} = 25^\circ C, v_{CE} = 0V, v_{EG} = 20V$	i_{EGS}			400	nA
Schnelle Diode / Fast diode						
Durchlaßspannung forward voltage	$T_{vj} = 25^\circ C, i_F = 35A$ $T_{vj} = 125^\circ C, i_F = 35A$	v_F		1,85 1,75	2,40	V
Sperrverzögerungsladung recovered charge	$i_{FM} = 35A, -di/dt = 900A/\mu s, v_R = 600V$ $T_{vj} = 25^\circ C$ $T_{vj} = 125^\circ C$	Q_r		3,6 7,6		μAs μAs

Thermische Eigenschaften / Thermal properties

Innerer Wärmewiderstand thermal resistance, junction to case	Gleichrichter / Rectifier , $\Theta = 120^{\circ}\text{rect}$ Transistor / Transistor, DC Schnelle Diode / Fast diode, DC	R_{thJC}	max. 0,63 max. 0,25 max. 0,80	$^{\circ}\text{C/W}$ $^{\circ}\text{C/W}$ $^{\circ}\text{C/W}$
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	Gleichrichter / Rectifier Transistor / Transistor Schnelle Diode / Fast diode	R_{thCK}	max. 0,25 max. 0,16 max. 0,24	$^{\circ}\text{C/W}$ $^{\circ}\text{C/W}$ $^{\circ}\text{C/W}$
Höchstzulässige Sperrschichttemperatur max. junction temperature		$T_{vj\max}$	125	$^{\circ}\text{C}$
Betriebstemperatur operating temperature		$T_{c\text{ op}}$	- 40...+125	$^{\circ}\text{C}$
Lagertemperatur storage temperature		T_{stg}	- 40...+130	$^{\circ}\text{C}$

Mechanische Eigenschaften / Mechanical properties

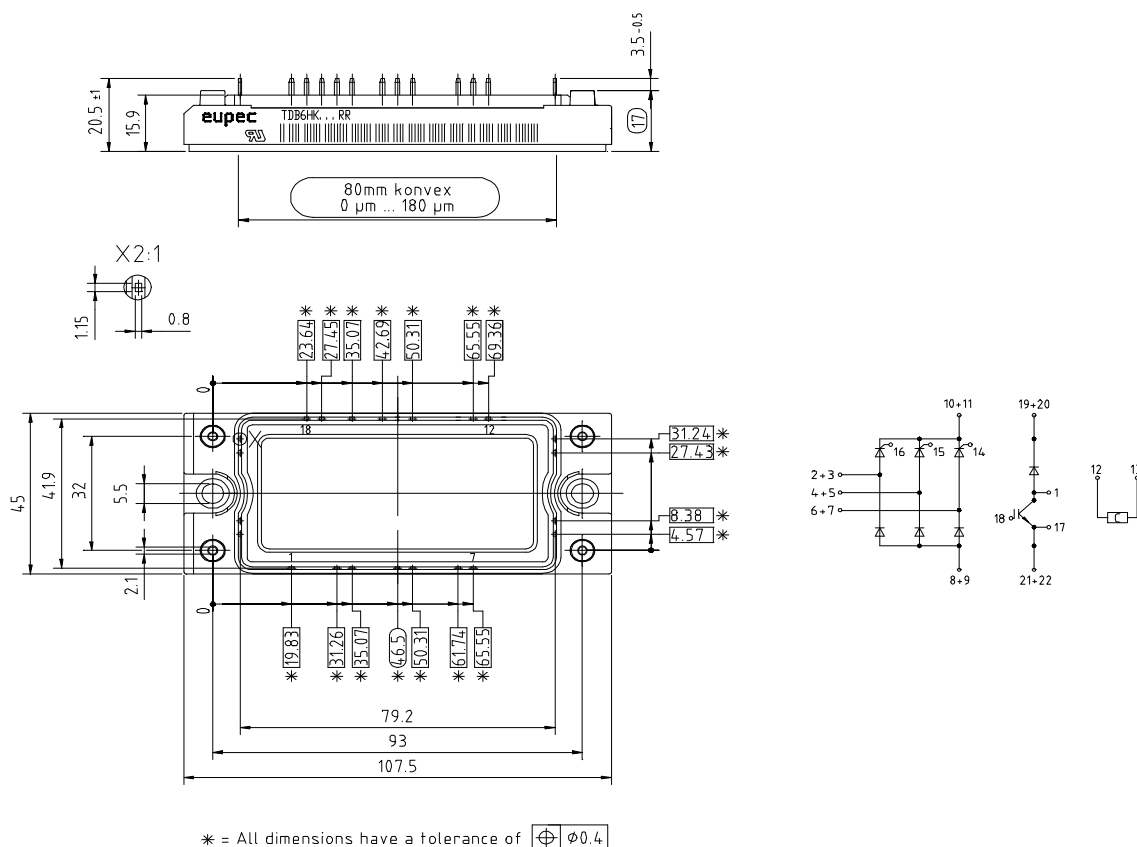
Gehäuse, siehe Anlage case, see appendix			Seite 4 page 4	
Innere Isolation internal insulation			Al_2O_3	
CTI comperative tracking index			225	V
Anzugsdrehmoment für mechanische Befestigung mounting torque	Toleranz / tolerance $\pm 15\%$	M1	4	Nm
Gewicht weight		G	typ. 185	g
Kriechstrecke creepage distance			12,5	mm
Schwingfestigkeit vibration resistance	$f = 50\text{Hz}$		50	m/s^2

Temperatursensor / Temperature sensor

Nennwiderstand rated resistance	$T_c = 25^{\circ}\text{C}$ $R_{100} = 493\Omega \pm 5\%$	R_{25}	5	kW
Verlustleistung power dissipation	$T_c = 25^{\circ}\text{C}$	P_{25}	max. 20	mW
B-Wert B-value	$R_2 = R_1 \exp [B(1/T_1 - 1/T_2)]$	$B_{25/50}$	3375	K

Kühlkörper / heatsinks :

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.

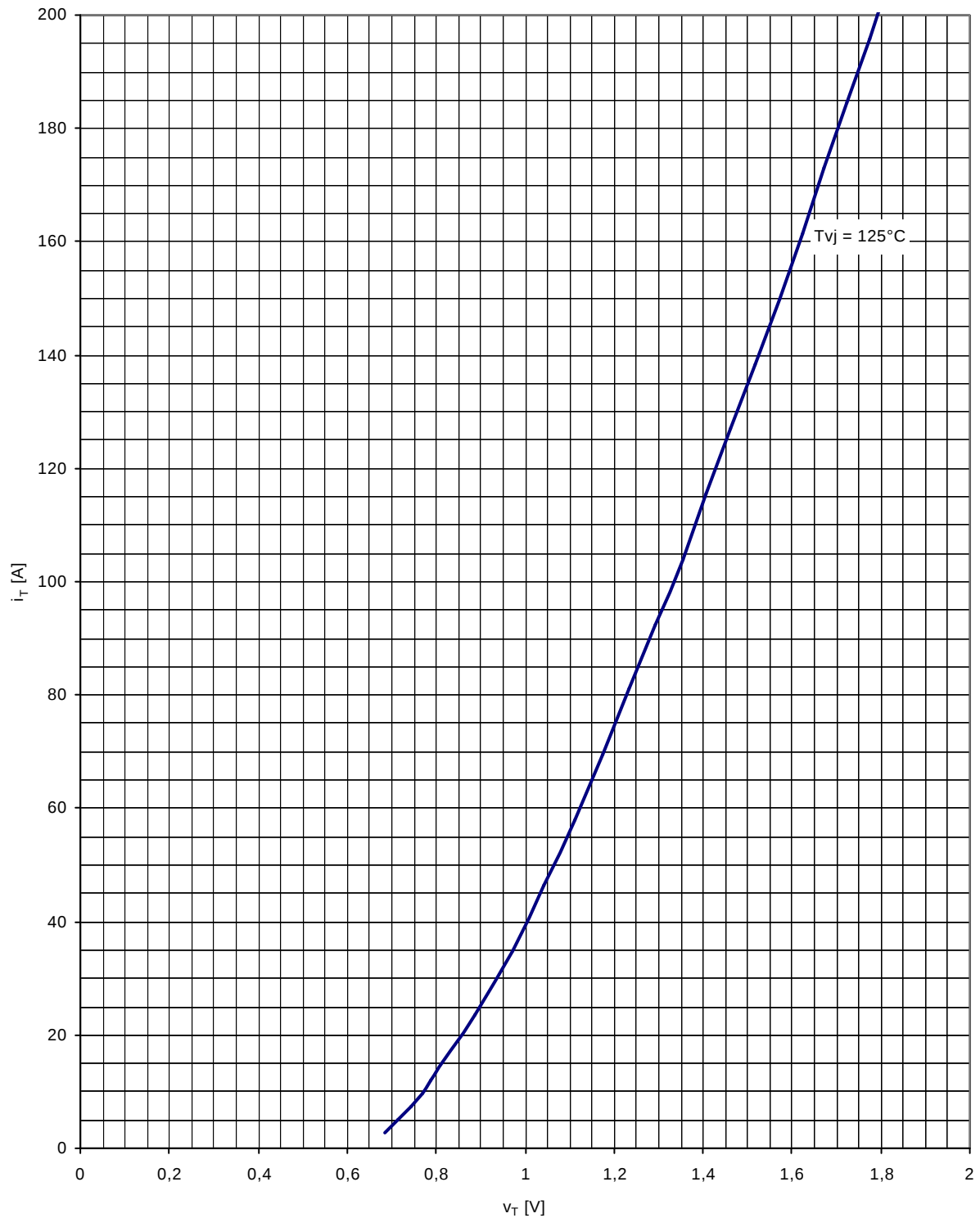


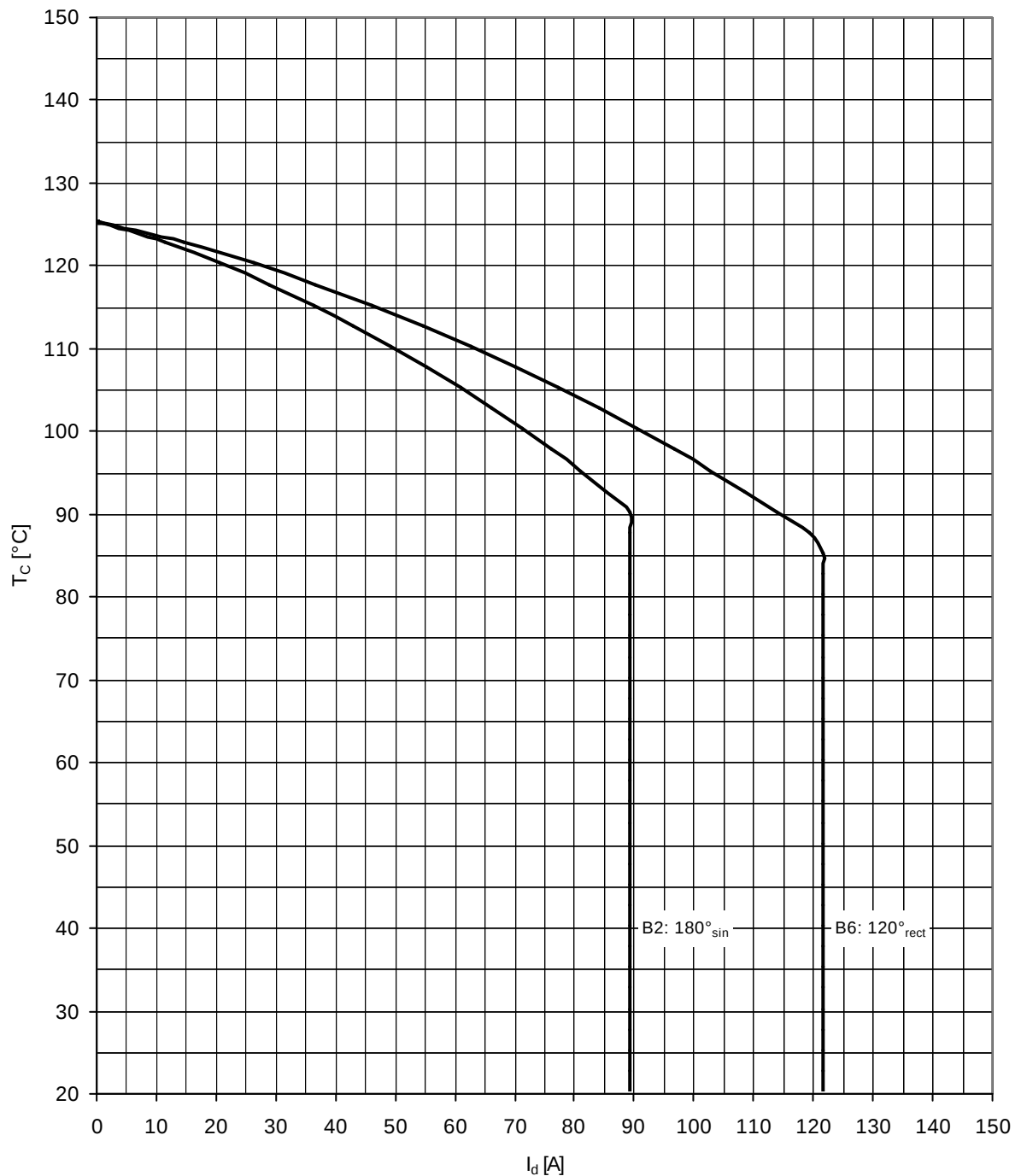
Analytische Elemente des transienten Wärmewiderstandes Z_{thJC} für DC, GleichrichterAnalytical elements of transient thermal impedance Z_{thJC} for DC, rectifier

Pos. n	1	2	3	4	5	6	7
$R_{thn} [^{\circ}\text{C} / \text{W}]$	0,2370	0,1770	0,0290	0,0180			
$\tau_n [\text{s}]$	0,0300	0,0190	0,0140	0,0003			

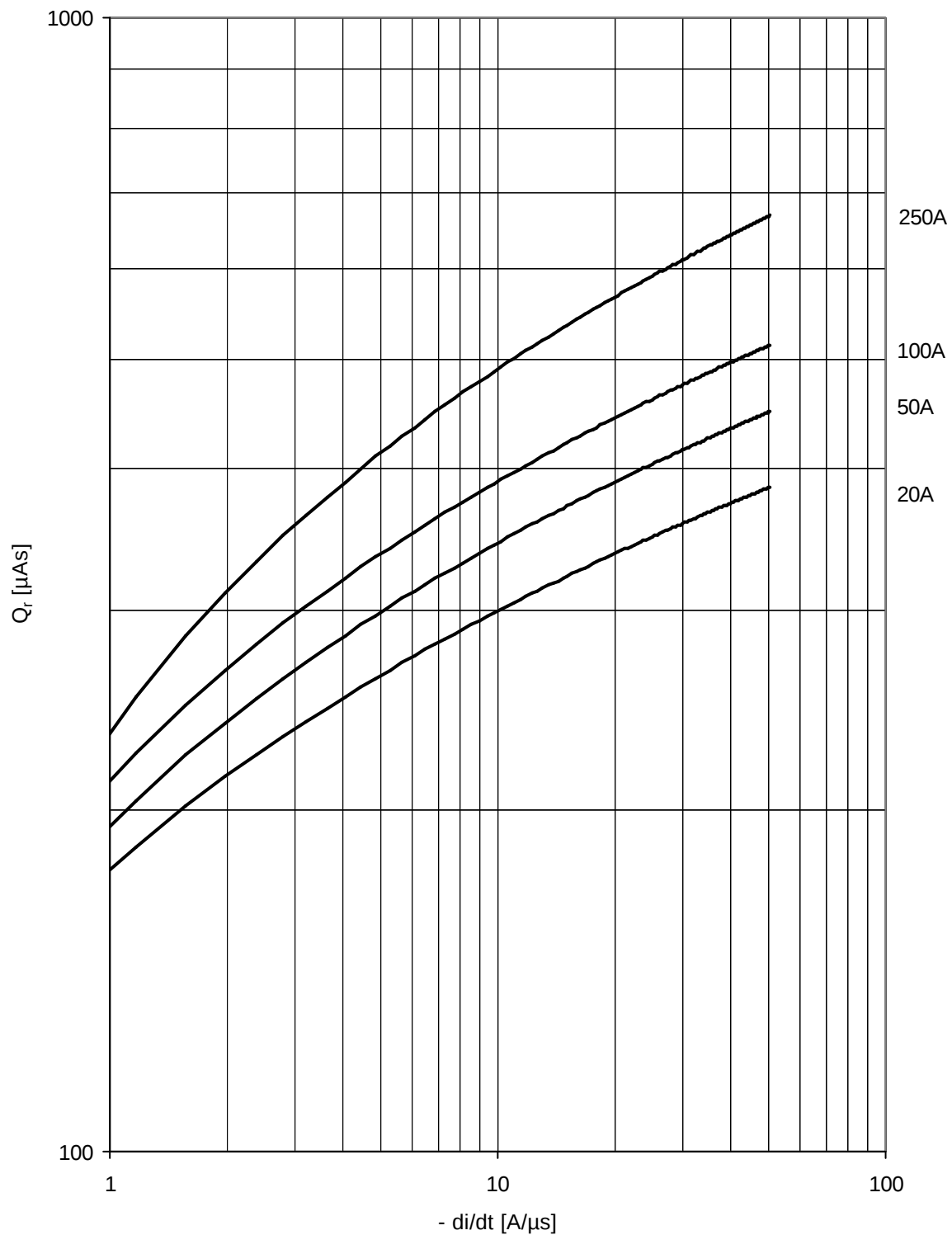
Analytische Funktion:

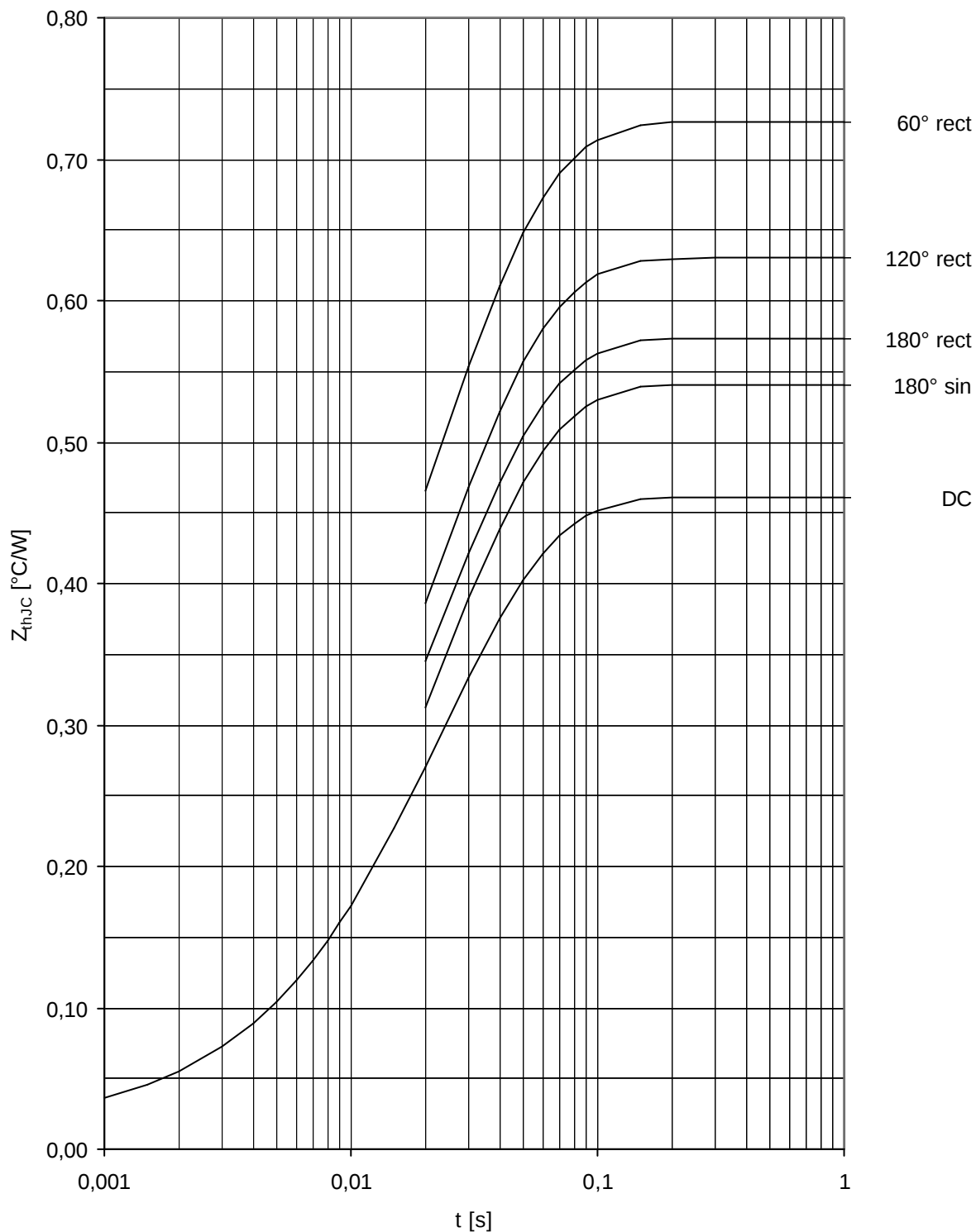
$$Z_{thJC} = \sum_{n=1}^{n_{\max}} R_{thn} \left(1 - e^{-\frac{t}{\tau_n}} \right)$$

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

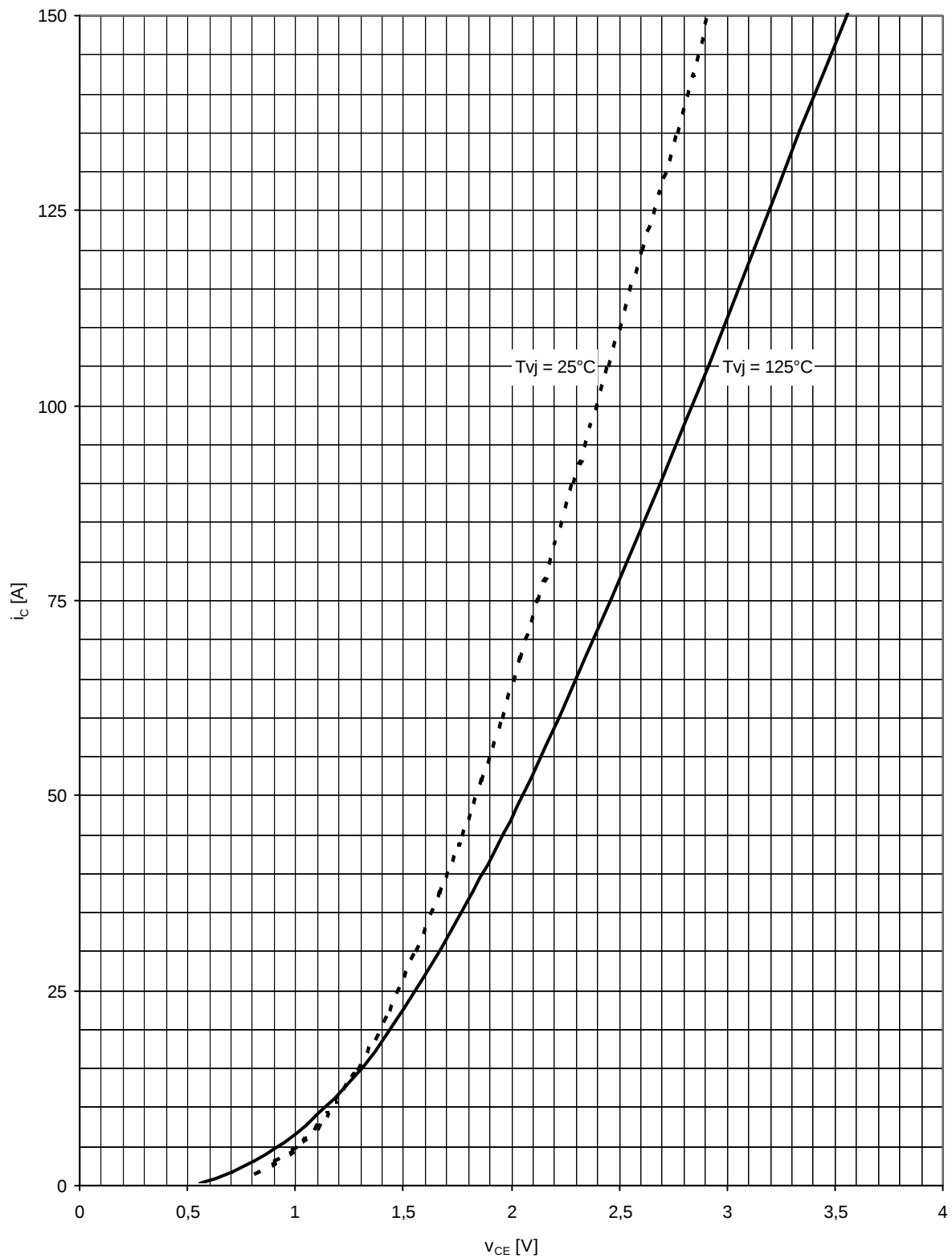


Höchstzulässige Gehäusetemperatur / Maximum allowable case temperatur $T_c = f(I_d)$
Parameter: Stromrichterschaltung / converter circuit

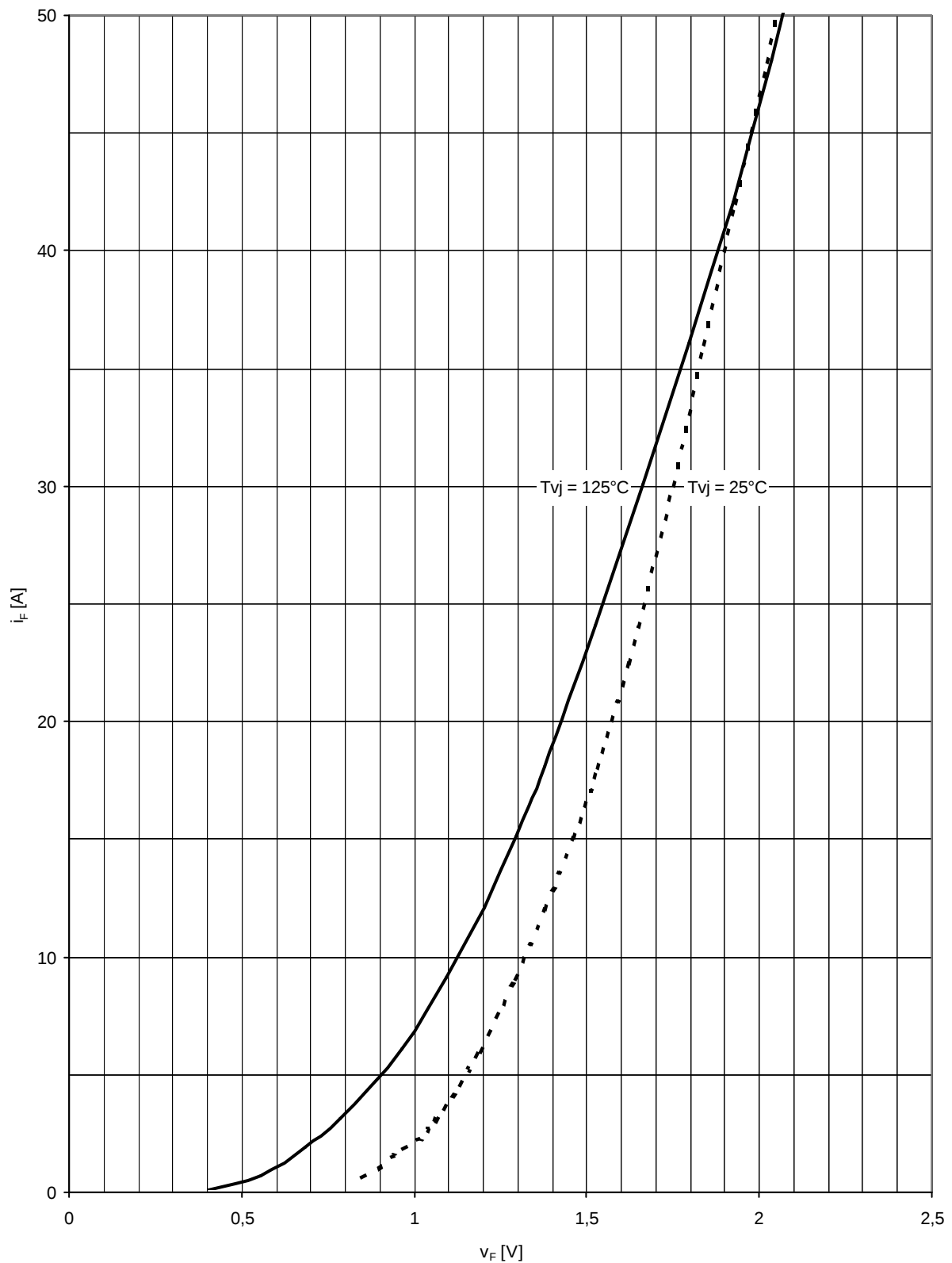
Sperrverzögerungsladung / Recovered charge $Q_r = f(-di/dt)$ $T_{vi} = T_{vi\max}$; $v_R = 0,5V_{RRM}$; $v_{RM} = 0,8V_{RRM}$ Parameter: Durchlaßstrom / On-state current i_{TM}



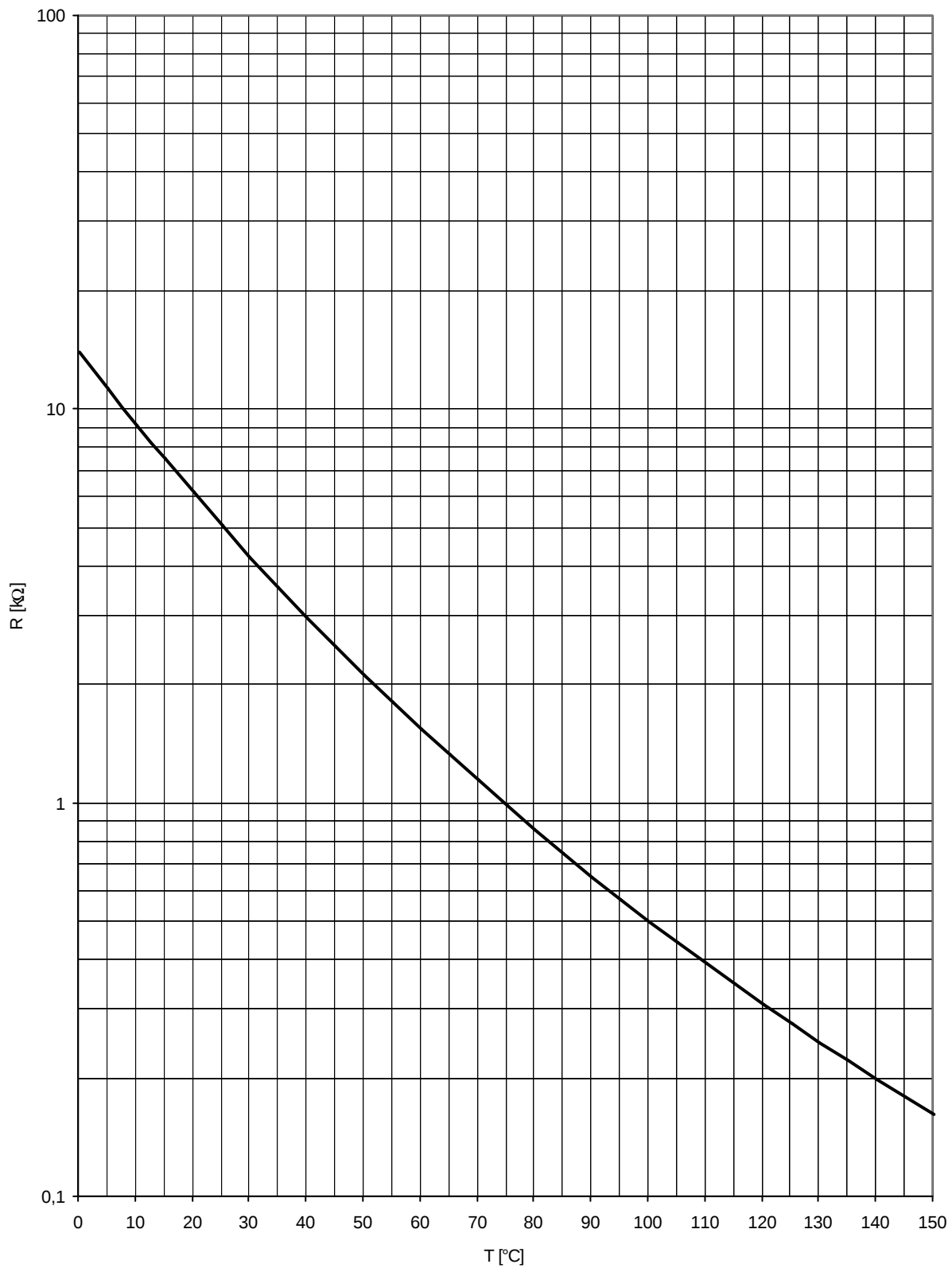
Transienter innerer Wärmewiderstand Gleichrichter / Transient thermal impedance converter $Z_{thJC} = f(t)$
Parameter: Stromflußwinkel / Current conduction angle α



Ausgangskennlinienfeld Brems-Chopper-IGBT (typisch) / Output characteristic brake-chopper-IGBT (typical)
 $V_{GE} = 15\text{V}$, $I_c = f(V_{CE})$



Durchlaßkennlinie der Brems-Chopper-Diode (typisch) / On-state characteristic of brake-chopper-FWD (typical)
 $i_F = f(v_F)$

NTC-Temperaturkennlinie (typisch) / NTC-temperature characteristic (typical) $R = f(T)$

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