



### Elektrische Eigenschaften / Electrical properties

Höchstzulässige Werte / Maximum rated values

<b>Gleichrichterdiode / Rectifierdiode</b>				
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 forward current (per chip)		$I_{FRMSM}$	60	A
Ausgangsstrom output current	$T_C = 100^{\circ}\text{C}$	$I_d$	105	A
Stoßstrom-Grenzwert surge forward current	$T_{vj} = 25^{\circ}\text{C}, t_p = 10\text{ms}$ $T_{vj} = T_{vj\text{max}}, t_p = 10\text{ms}$	$I_{FSM}$	650	A
			550	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	$\text{A}^2\text{s}$
			1500	$\text{A}^2\text{s}$
<b>IGBT</b>				
Kollektor-Emitter-Sperrspannung collector-emitter voltage		$V_{CES}$	1200	V
Kollektor-Dauergleichstrom DC-collector current	$T_C = 80^{\circ}\text{C}$	$I_C$	50	A
Periodischer Kollektor-Spitzenstrom repetitive peak collector current	$t_p = 1\text{ms}$	$I_{CRM}$	100	A
Gesamt-Verlustleistung total power dissipation	$T_C = 25^{\circ}\text{C}$	$P_{tot}$	350	W
Gate-Emitter Spitzenspannung gate-emitter peak voltage		$V_{GE}$	$\pm 20$	V
<b>Schnelle Diode / Fast diode</b>				
Periodische Spitzensperrspannung repetitive peak reverse voltage		$V_{RRM}$	1200	V
Dauergleichstrom DC forward current	$T_C = 80^{\circ}\text{C}$	$I_F$	25	A
Periodischer Spitzenstrom repetitive peak forward current	$t_p = 1\text{ms}$	$I_{FRM}$	50	A
<b>Modul</b>				
Isolations-Prüfspannung insulation test voltage	RMS, $f = 50\text{Hz}, t = 1\text{min}$ NTC connected to baseplate	$V_{ISOL}$	2,5	kV

Charakteristische Werte / Characteristic values

<b>Gleichrichterdiode / Rectifierdiode</b>			min.	typ.	max.	
Durchlaßspannung forward voltage	$T_{vj} = T_{vj\text{max}}, I_F = 100\text{A}$	$V_F$			1,30	V
Schleusenspannung threshold voltage	$T_{vj} = T_{vj\text{max}}$	$V_{(TO)}$			0,75	V
Ersatzwiderstand forward slope resistance	$T_{vj} = T_{vj\text{max}}$	$r_T$			5,5	$\text{m}\Omega$
Sperrstrom reverse current	$T_{vj} = T_{vj\text{max}}, V_R = V_{RRM}$	$i_R$			5	mA
Modul Leitungswiderstand, Anschlüsse-Chip lead resistance, terminals-chip	$T_C = 25^{\circ}\text{C}$	$R_{AA'+KK'}$			1	$\text{m}\Omega$

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**Elektrische Eigenschaften / Electrical properties**

Charakteristische Werte / Characteristic values

IGBT			min.	typ.	max.	
Kollektor-Emitter Sättigungsspannung collector-emitter saturation voltage	$T_{vj} = 25^{\circ}\text{C}, i_c = 50\text{A}, v_{GE} = 15\text{V}$ $T_{vj} = 125^{\circ}\text{C}, i_c = 50\text{A}, v_{GE} = 15\text{V}$	$V_{CE\text{ sat}}$		2,10 2,5	2,80	V
Gate-Emitter-Schwellspannung gate-emitter threshold voltage	$T_{vj} = 25^{\circ}\text{C}, i_c = 2\text{mA}, v_{GE} = v_{CE}$	$V_{GE(TO)}$	4,5	5,5	6,5	V
Eingangskapazität input capacitance	$T_{vj} = 25^{\circ}\text{C}, f_0 = 1\text{MHz},$ $v_{CE} = 25\text{V}, v_{GE} = 0\text{V}$	$C_{ies}$		3,3		nF
Kollektor-Emitter Reststrom collector-emitter cut-off current	$T_{vj} = 25^{\circ}\text{C}, v_{CE} = 1200\text{V}, v_{GE} = 0\text{V}$ $T_{vj} = 125^{\circ}\text{C}, v_{CE} = 1200\text{V}, v_{GE} = 0\text{V}$	$i_{CES}$		0,8 4,0	1	mA
Gate-Emitter Reststrom gate leakage current	$T_{vj} = 25^{\circ}\text{C}, v_{CE} = 0\text{V}, v_{GE} = 20\text{V}$	$i_{GES}$			500	nA
Emitter-Gate Reststrom gate-leakage current	$T_{vj} = 25^{\circ}\text{C}, v_{CE} = 0\text{V}, v_{EG} = 20\text{V}$	$i_{EGS}$			500	nA
<b>Schnelle Diode / Fast diode</b>						
Durchlaßspannung forward voltage	$T_{vj} = 25^{\circ}\text{C}, i_F = 25\text{A}$ $T_{vj} = 125^{\circ}\text{C}, i_F = 25\text{A}$	$V_F$		1,7 1,6	2,20	V
Sperrverzögerungsladung recovered charge	$i_{FM} = 25\text{A}, -di/dt = 800\text{A}/\mu\text{s}, v_R = 600\text{V}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$Q_r$		2,3 6,0		$\mu\text{As}$ $\mu\text{As}$

**Thermische Eigenschaften / Thermal properties**

Innerer Wärmewiderstand	Gleichrichter / Rectifier, $\Theta = 120^{\circ}\text{rect}$ Transistor / Transistor, DC Schnelle Diode / Fast diode, DC	$R_{thJC}$	max.	1,08	$^{\circ}\text{C}/\text{W}$
			max.	0,38	$^{\circ}\text{C}/\text{W}$
			max.	1,00	$^{\circ}\text{C}/\text{W}$
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	Gleichrichter / Rectifier Transistor / Transistor Schnelle Diode / Fast diode	$R_{thCK}$	max.	0,25	$^{\circ}\text{C}/\text{W}$
			max.	0,24	$^{\circ}\text{C}/\text{W}$
			max.	0,30	$^{\circ}\text{C}/\text{W}$
Höchstzulässige Sperrschichttemperatur max. junction temperature		$T_{vj\text{ max}}$		150	$^{\circ}\text{C}$
Betriebstemperatur operating temperature		$T_{c\text{ op}}$		- 40...+150	$^{\circ}\text{C}$
Lagertemperatur storage temperature		$T_{stg}$		- 40...+150	$^{\circ}\text{C}$

Dioden-Modul mit Chopper-IGBT  
Diode Module with Chopper-IGBT

DD B6U 104 N 16 RR

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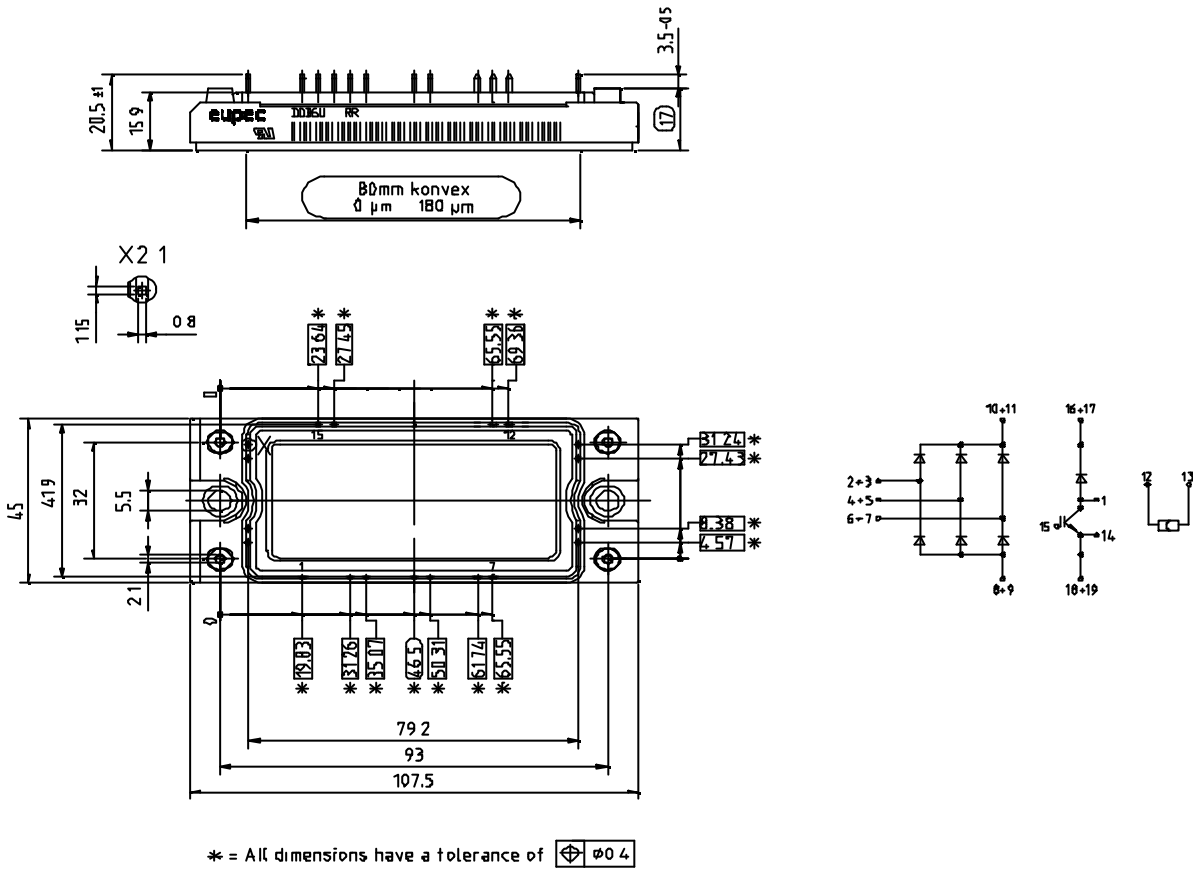
**Mechanische Eigenschaften / Mechanical properties**

Gehäuse, siehe Anlage case, see appendix			Seite 4 page 4	
Innere Isolation internal insulation			Al <sub>2</sub> O <sub>3</sub>	
CTI comperative tracking index			225	V
Anzugsdrehmoment für mechanische Befestigung mounting torque	Toleranz / tolerance ±15%	M1	4	Nm
Gewicht weight		G	typ. 185	g
Kriechstrecke creepage distance			12,5	mm
Schwingfestigkeit vibration resistance	f = 50Hz		50	m/s <sup>2</sup>

**Temperatursensor / Temperature sensor**

Nennwiderstand rated resistance	T <sub>C</sub> = 25°C R <sub>100</sub> = 493Ω ± 5%	R <sub>25</sub>	5	kW
Verlustleistung power dissipation	T <sub>C</sub> = 25°C	P <sub>25</sub>	max. 20	mW
B-Wert B-value	R <sub>2</sub> = R <sub>1</sub> exp [B(1/T <sub>1</sub> - 1/T <sub>2</sub> )]	B <sub>25/50</sub>	3375	K

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.



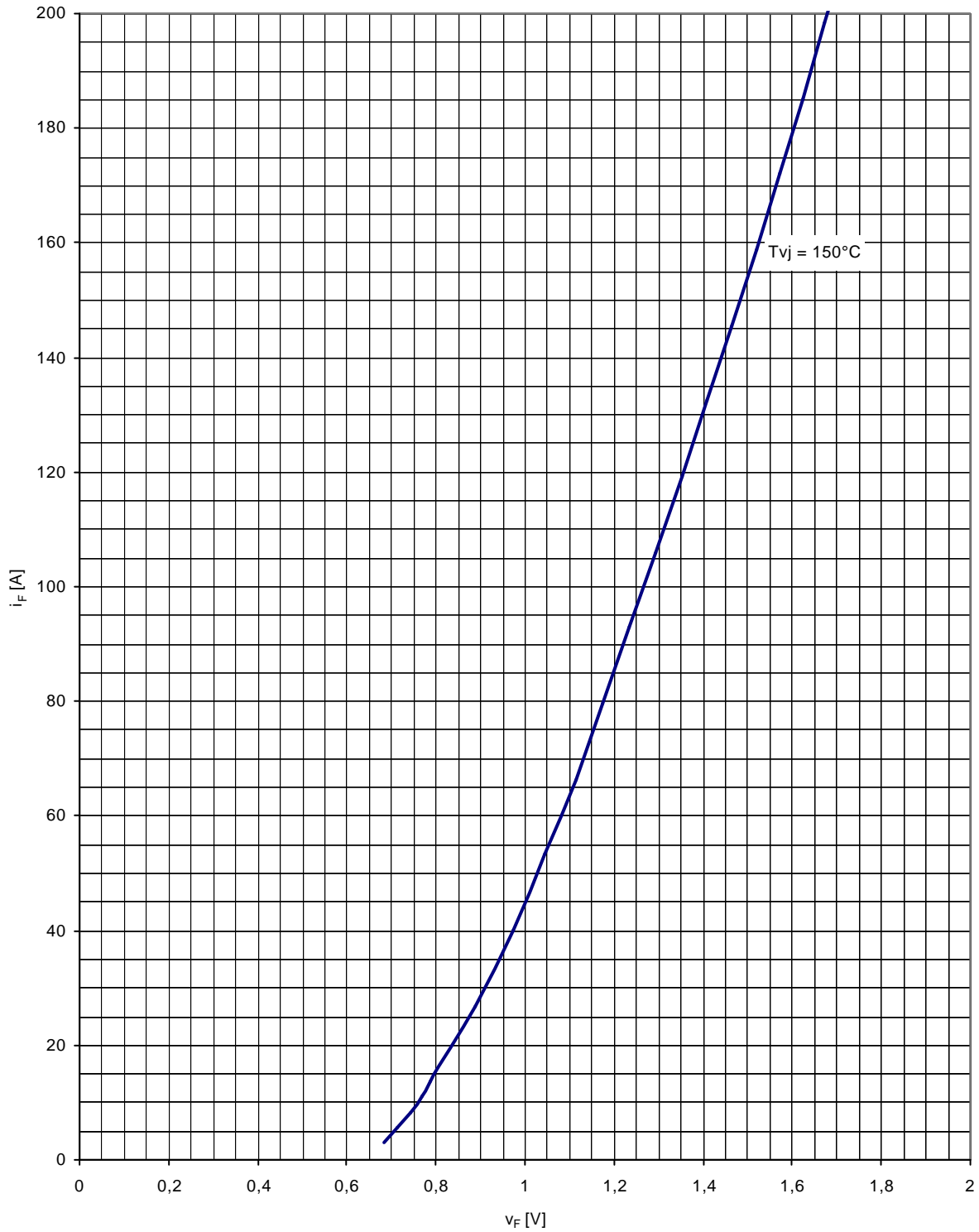


Analytische Elemente des transienten Wärmewiderstandes  $Z_{thJC}$  für DC, Netz-Diode

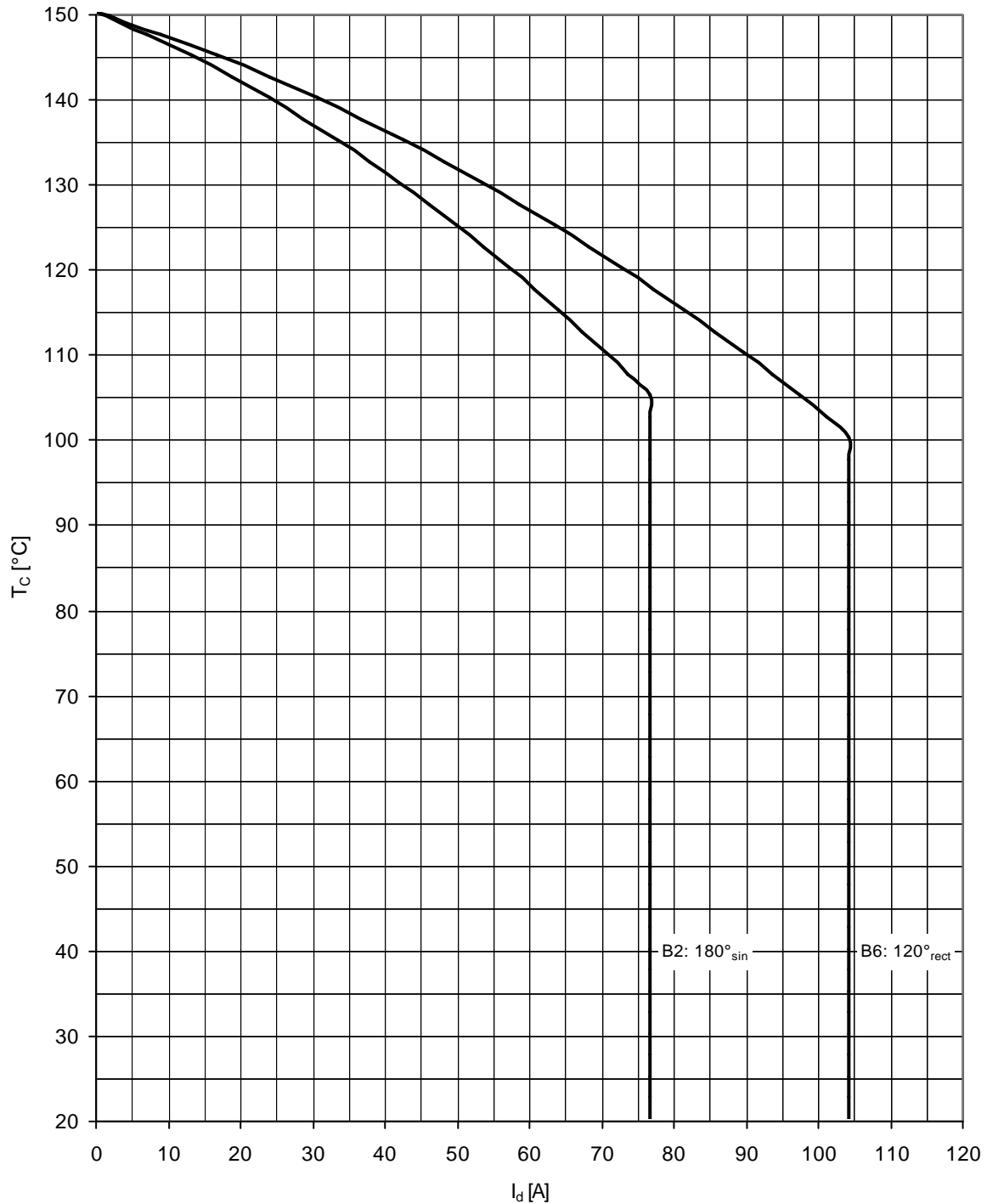
Analytical elements of transient thermal impedance  $Z_{thJC}$  for DC, rectifier diode

Pos. n	1	2	3	4	5	6	7
$R_{thn} [^{\circ}C / W]$	0,4063	0,3034	0,0497	0,0309			
$\tau_n [s]$	0,0300	0,0190	0,0140	0,0003			

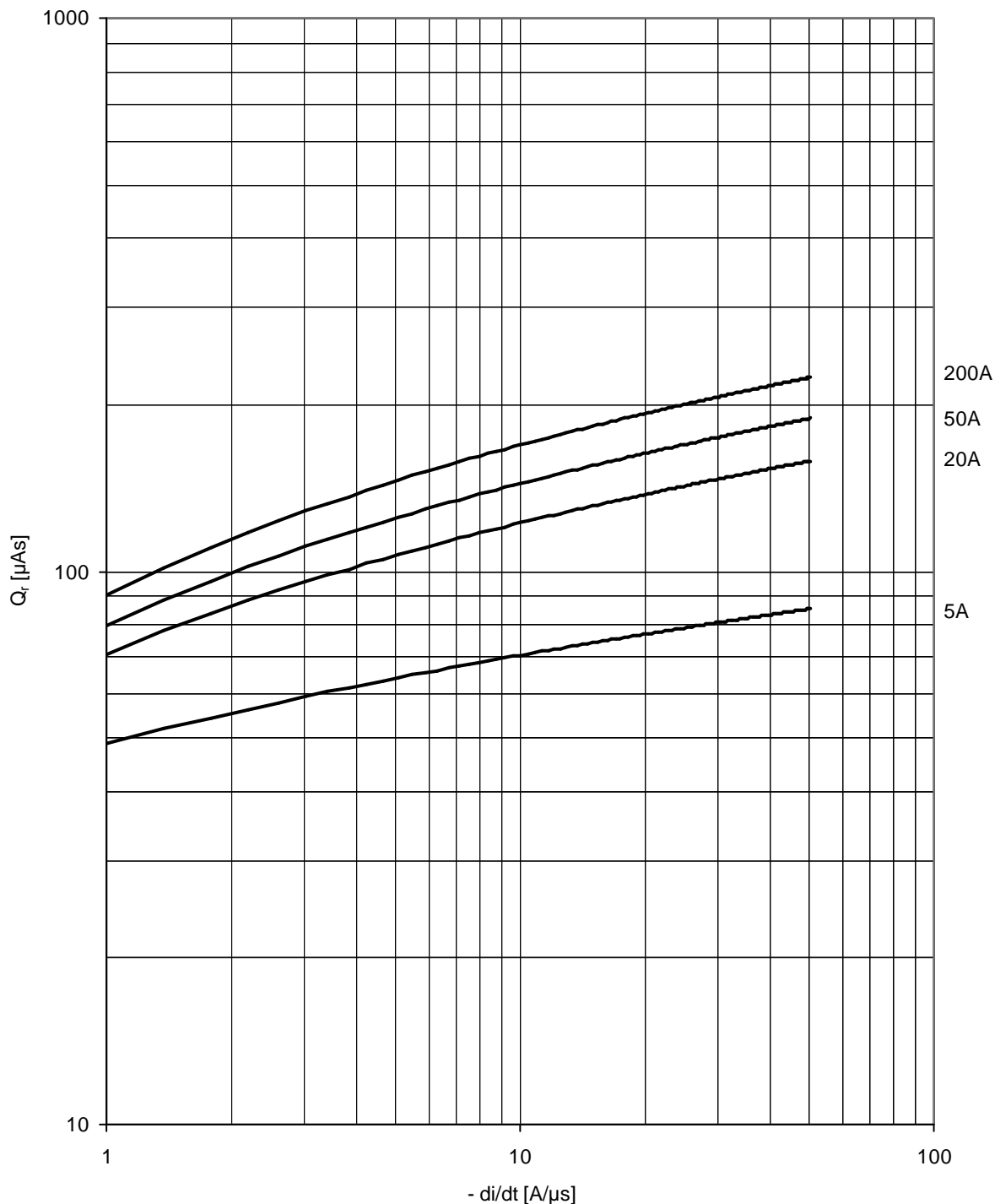
*Analytische Funktion:* 
$$Z_{thJC} = \sum_{n=1}^{n_{max}} R_{thn} \left( 1 - e^{-\frac{t}{\tau_n}} \right)$$



Grenzdurchlaßkennlinie / Limiting on-state characteristic  $i_F = f(v_F)$



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

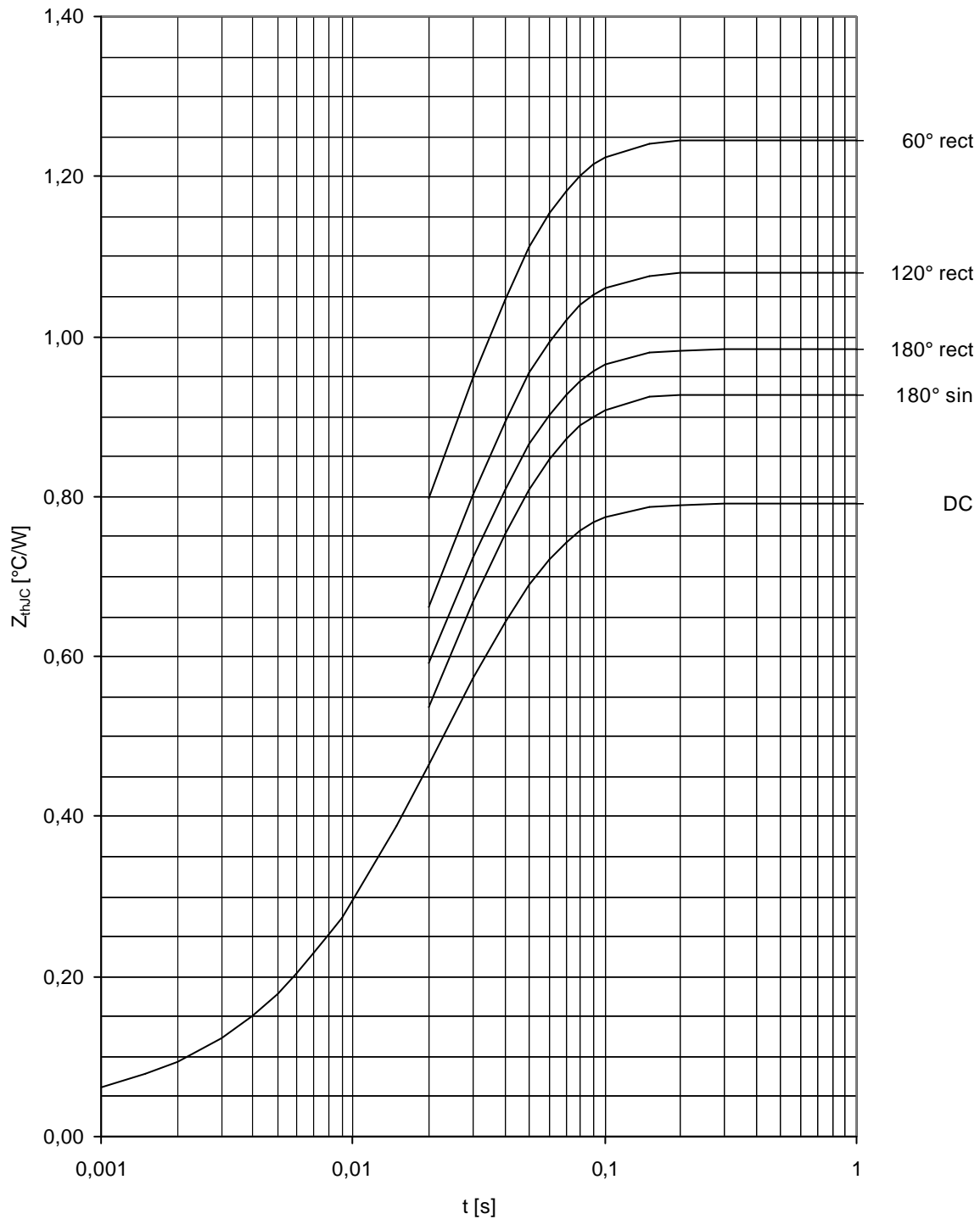


Sperrverzögerungsladung / Recovered charge  $Q_r = f(-di/dt)$

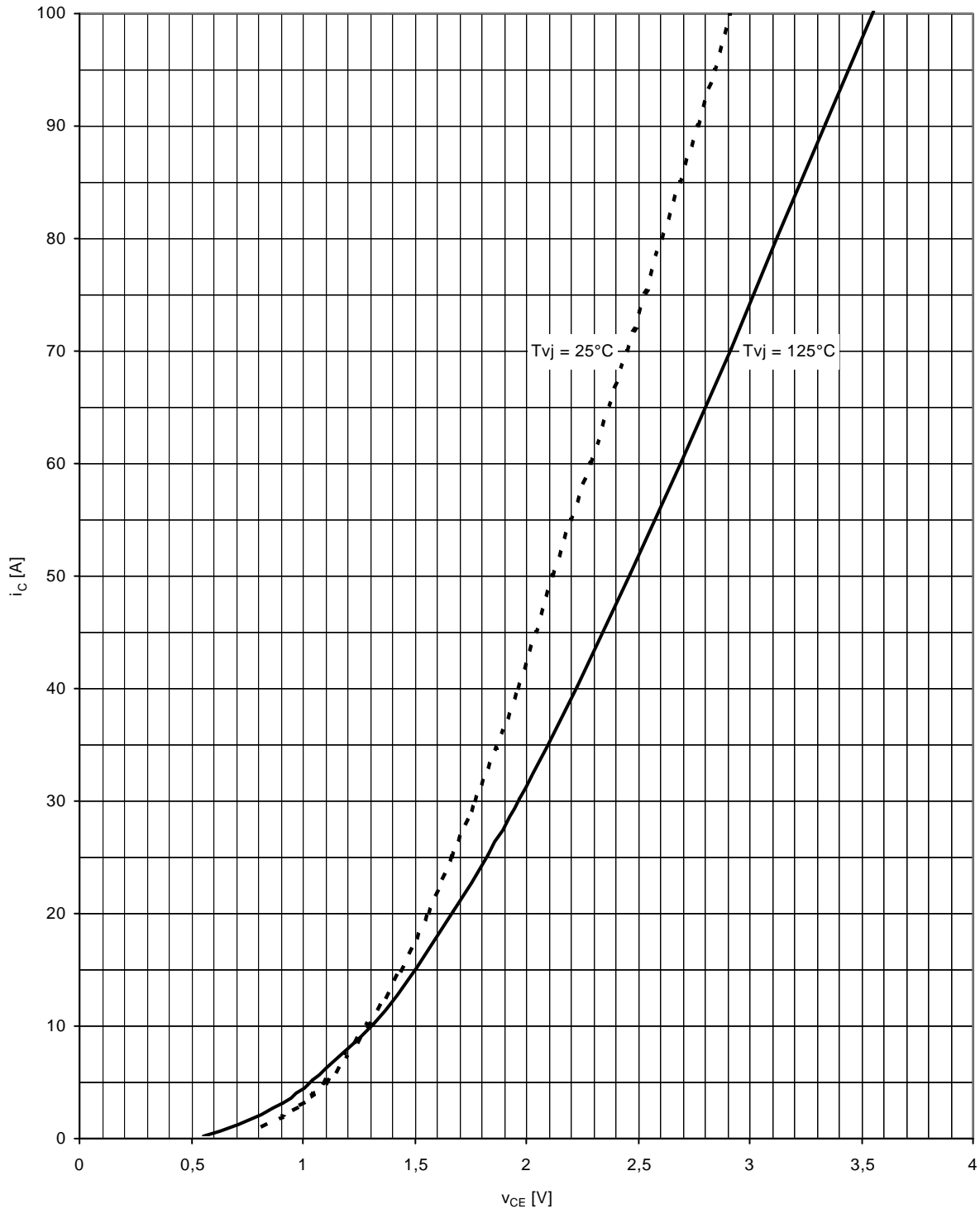
$T_{vj} = T_{vjmax}$ ;  $V_R = 0,5V_{RRM}$ ;  $V_{RM} = 0,8V_{RRM}$

Parameter: Durchlaßstrom / On-state current  $i_{FM}$

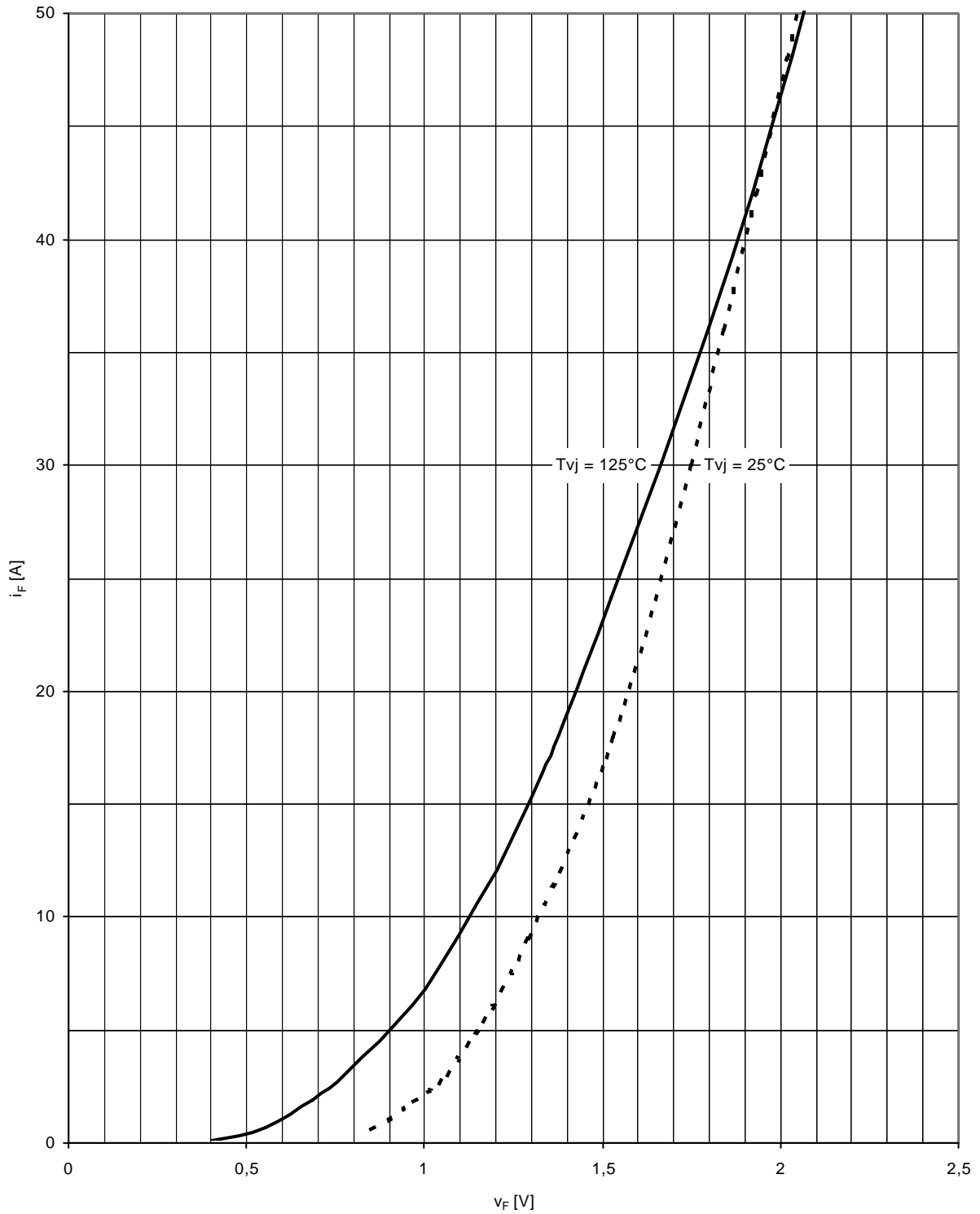




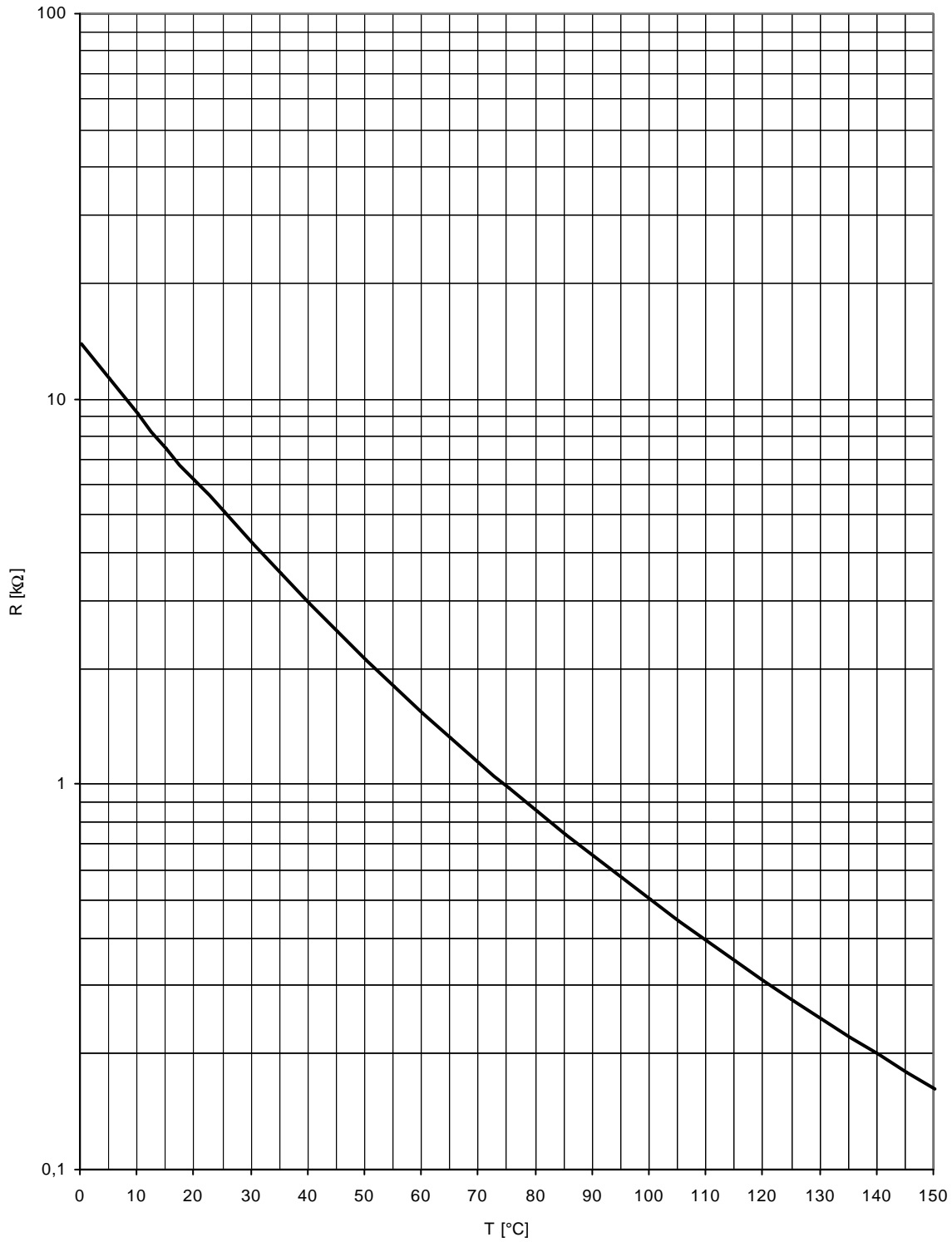
Transienter innerer Wärmewiderstand Gleichrichter / Transient thermal impedance converter  $Z_{thJC} = f(t)$   
Parameter: Stromflußwinkel / Current conduction angle  $Q$



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



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)  $R = f(T)$

## **Terms & Conditions of Usage**

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