N		Datenblatt / Data sheet	power electronics in motion eupec
Netz-Thyristor **Phase Control Thyristor**		**T4003N**	

Elektrische Eigenschaften / Electrical properties

Höchstzulässige Werte / Maximum rated values

Periodische Rückwärts-Spitzensperrspannung repetitive peak and reverse voltages	T_{vj} = -40°C... $T_{vj\,max}$	V_{RRM}	5200	V V
Periodische Rückwärts-Spitzensperrspannung repetitive peak reverse voltages	T_{vj} = 0°C... $T_{vj\,max}$	V_{RRM}	5400	V V
Durchlaßstrom-Grenzeffektivwert maximum RMS on-state current		I_{TRMSM}	7510	A
Dauergrenzstrom average on-state current	T_C = 85 °C T_C = 60 °C	I_{TAVM}	3410 4780	A A
Stoßstrom-Grenzwert surge current	T_{vj} = 25 °C, t_P = 10 ms T_{vj} = $T_{vj\,max}$, t_P = 10 ms	I_{TSM}	105000 100000	A A
Grenzlastintegral I²t-value	T_{vj} = 25 °C, t_P = 10 ms T_{vj} = $T_{vj\,max}$, t_P = 10 ms	I²t	55000 50000	10³ A²s 10³ A²s
Kritische Stromsteilheit critical rate of rise of on-state current	DIN IEC 60747-6 f = 50 Hz, P_{LM} = 40mW, t_{rise} = 0,5µs	$(di_T/dt)_{cr}$	300	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 H	$(dv_D/dt)_{cr}$	2000	V/µs

Charakteristische Werte / Characteristic values

Schutzzündspannung (statisch) Protective break over voltage	T_{vj} = 0°C … $T_{vj\,max}$ Typischer Degradationsfaktor ist 0,16%/K für Tvj = 0°C..25°C Typical de-rating factor of 0,16%/K is applicable for T_{vj} = 0°C..25°C	V_{BO}	min. 5200	V
Durchlaßspannung on-state voltage	T_{vj} = $T_{vj\,max}$, i_T = 6000A, v_D = 100V	v_T	typ. 1,67 max. 1,80	V V
Schleusenspannung threshold voltage	T_{vj} = $T_{vj\,max}$	$V_{(TO)}$	typ. 0,82 max. 0,92	V V
Ersatzwiderstand slope resistance	T_{vj} = $T_{vj\,max}$	r_T	typ. 0,139 max. 0,142	mΩ mΩ
Durchlaßkennlinie on-state characteristic $v_T = A + B \cdot i_T + C \cdot Ln(i_T + 1) + D \cdot \sqrt{i_T}$	T_{vj} = $T_{vj\,max}$	typ. max.	A 0,2501 B 0,00009213 C 0,0499 D 0,00565 A 1,1919 B 0,0000226 C -0,1375 D 0,02157	
minimale Zündlichtleistung minimum gate trigger light power	T_{vj} = 25°C, v_D = 100V	I_{GT}	max. 40	mW
Haltestrom holding current	T_{vj} = 25°C	I_H	max. 100	mA
Einraststrom latching current	T_{vj} = 25°C, v_D = V, P_{LM} = 40mW, t_{rise} = 0,5µs	I_L	max. 1	A
Rückwärts-Sperrstrom reverse blocking current	T_{vj} = $T_{vj\,max}$ v_R = V_{RRM}	i_R	max. 900	mA
Zündverzug gate controlled delay time	DIN IEC 60747-6 T_{vj} = 25 °C, vD = 1000V , P_{LM} = 40mW, t_{rise} = 0,5µs	t_{gd}	max. 5	µs

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Elektrische Eigenschaften / Electrical properties
Charakteristische Werte / Characteristic values

Freiwerdezeit circuit commutated turn-off time	$T_{vj} = T_{vj\,max}$, $i_{TM} = I_{TAVM}$ v_{RM} = 100 V, 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. 500	µs
Sperrverzögerungsladung recovered charge	$T_{vj} = T_{vj\,max}$ $i_{TM} = I_{TAVM}$, $-di_T/dt$ = 10 A/µs $V_R = 0{,}5V_{RRM}$, $V_{RM} = 0{,}8V_{RRM}$	Q_r	max. 28	mAs
Rückstromspitze peak reverse recovery current	$T_{vj} = T_{vj\,max}$ $i_{TM} = I_{TAVM}$, $-di_T/dt$ = 10 A/µs $V_R = 0{,}5V_{RRM}$, $V_{RM} = 0{,}8V_{RRM}$	I_{RM}	max. 600	A

Thermische Eigenschaften / Thermal properties

Innerer Wärmewiderstand thermal resistance, junction to case	Kühlfläche / cooling surface beidseitig / two-sided, θ = 180°sin beidseitig / two-sided, DC Anode / anode, DC Kathode / cathode, DC	R_{thJC}	max. 0,0048 max. 0,0045 max. 0,0083 max. 0,0101	°C/W °C/W °C/W °C/W
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	Kühlfläche / cooling surface beidseitig / two-sided einseitig / single-sided	R_{thCH}	max. 0,001 max. 0,002	°C/W °C/W
Höchstzulässige Sperrschichttemperatur maximum junction temperature		$T_{vj\,max}$	120	°C
Betriebstemperatur operating temperature		$T_{c\,op}$	-40...+120	°C
Lagertemperatur storage temperature		T_{stg}	-40...+150	°C

Mechanische Eigenschaften / Mechanical properties

Gehäuse, siehe Anlage case, see annex			Seite 3 page 3	
Si-Element mit Druckkontakt Si-pellet with pressure contact				
Anpresskraft clamping force		F	90...130	kN
Gewicht weight		G	typ. 4000	g
Kriechstrecke creepage distance			49	mm
Schwingfestigkeit vibration resistance	f = 50 Hz		50	m/s²

Mit diesem Datenblatt werden Halbleiterbauelemente spezifiziert, jedoch keine Eigenschaften zugesichert. Sie gilt in Verbindung mit den zugehörigen technischen Erläuterungen.

This data sheet specifies semiconductor devices, but promises no characteristics. It is valid in combination with the belonging technical notes.

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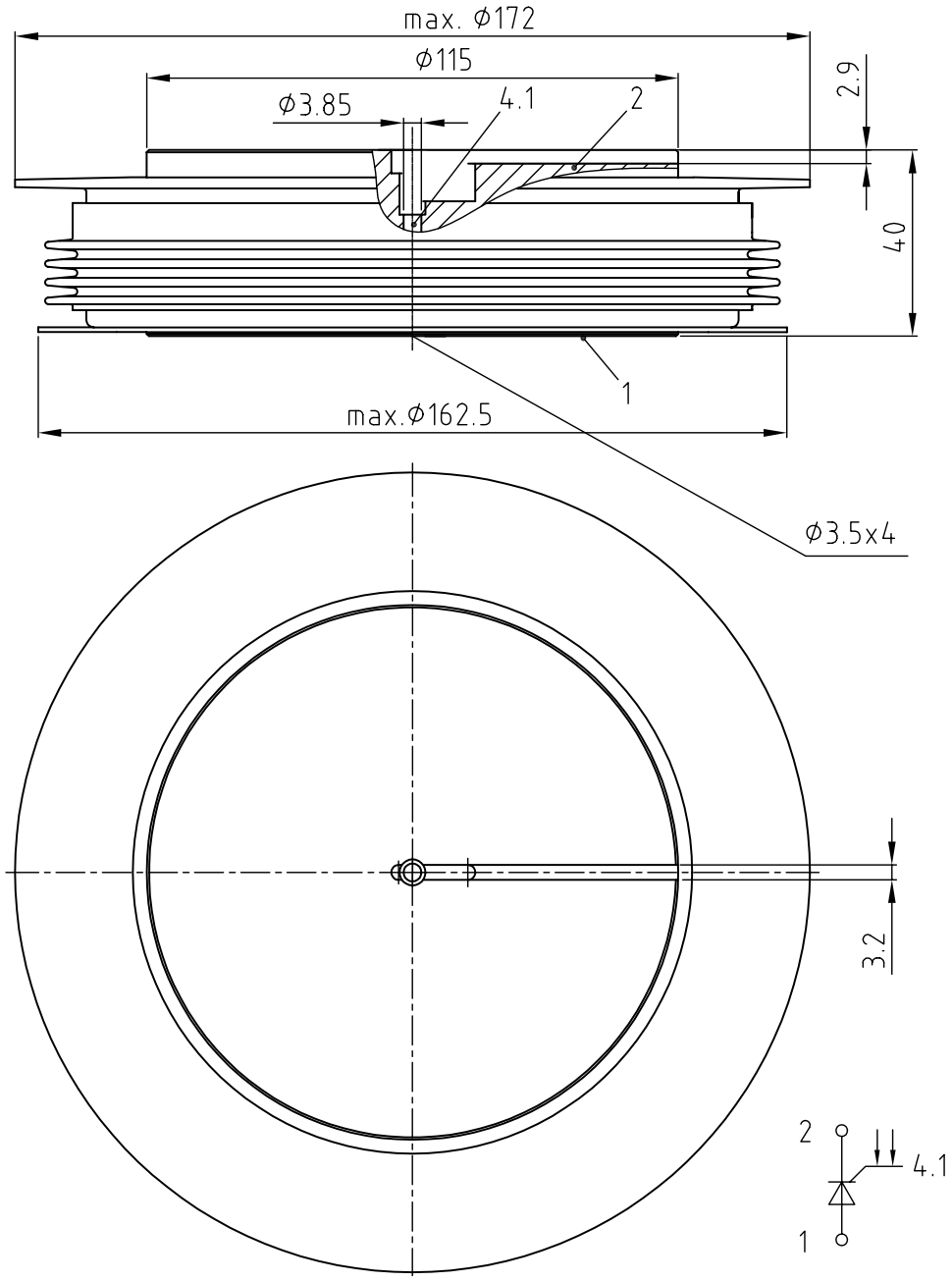
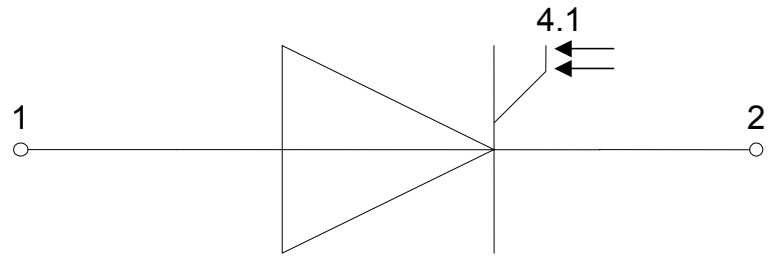




1: Anode/Anode

2: Kathode/Cathode

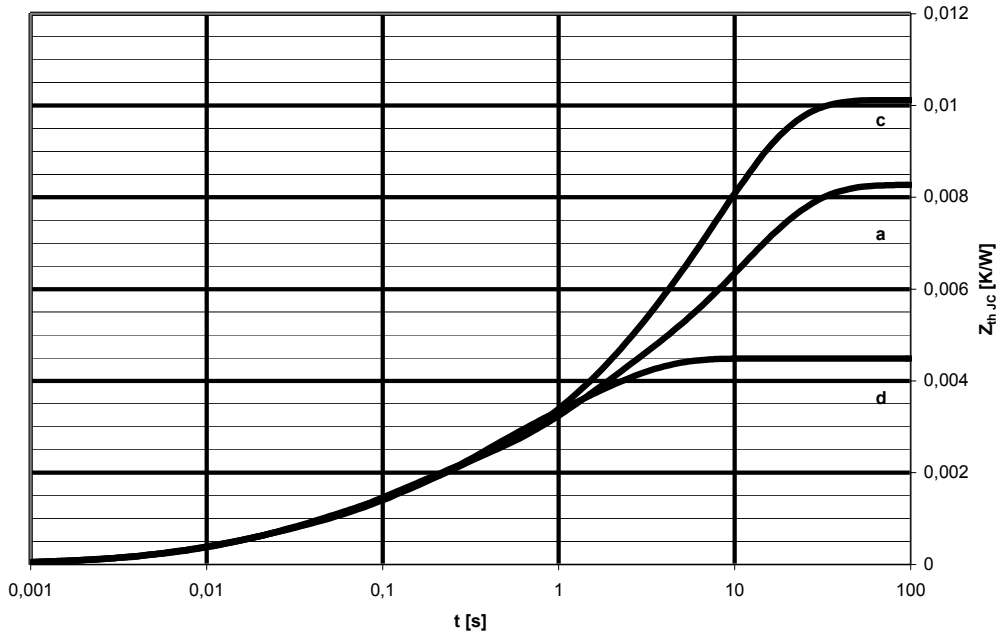
4.1: Gate

Analytische Elemente des transienten Wärmewiderstandes Z_{thJC}
Analytical elements of transient thermal impedance Z_{thJC}

	Pos. n	1	2	3	4	5	6	7
beidseitig two-sided	R_{thn} [°C/W]	0,00206	0,0016	0,00076	0,00007			
	τ_n [s]	1,6	0,27	0,026	0,0047			
anodenseitg anode-sided	R_{thn} [°C/W]	0,0047	0,00188	0,00131	0,00038			
	τ_n [s]	11,2	1,0565	0,09265	0,01079			
kathodenseitig cathode-sided	R_{thn} [°C/W]	0,00674	0,00168	0,00124	0,00046			
	τ_n [s]	8,35	1,242	0,1124	0,0119			

Analytische Funktion / Analytical function:

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



Transienter innerer Wärmewiderstand für DC/ Transient thermal impedance Z_{thJC} = f(t) for DC

Beidseitige Kühlung / Two-sided cooling

Anodenseitige Kühlung / Anode-sided cooling

Kathodenseitige Kühlung / Cathode-sided cooling

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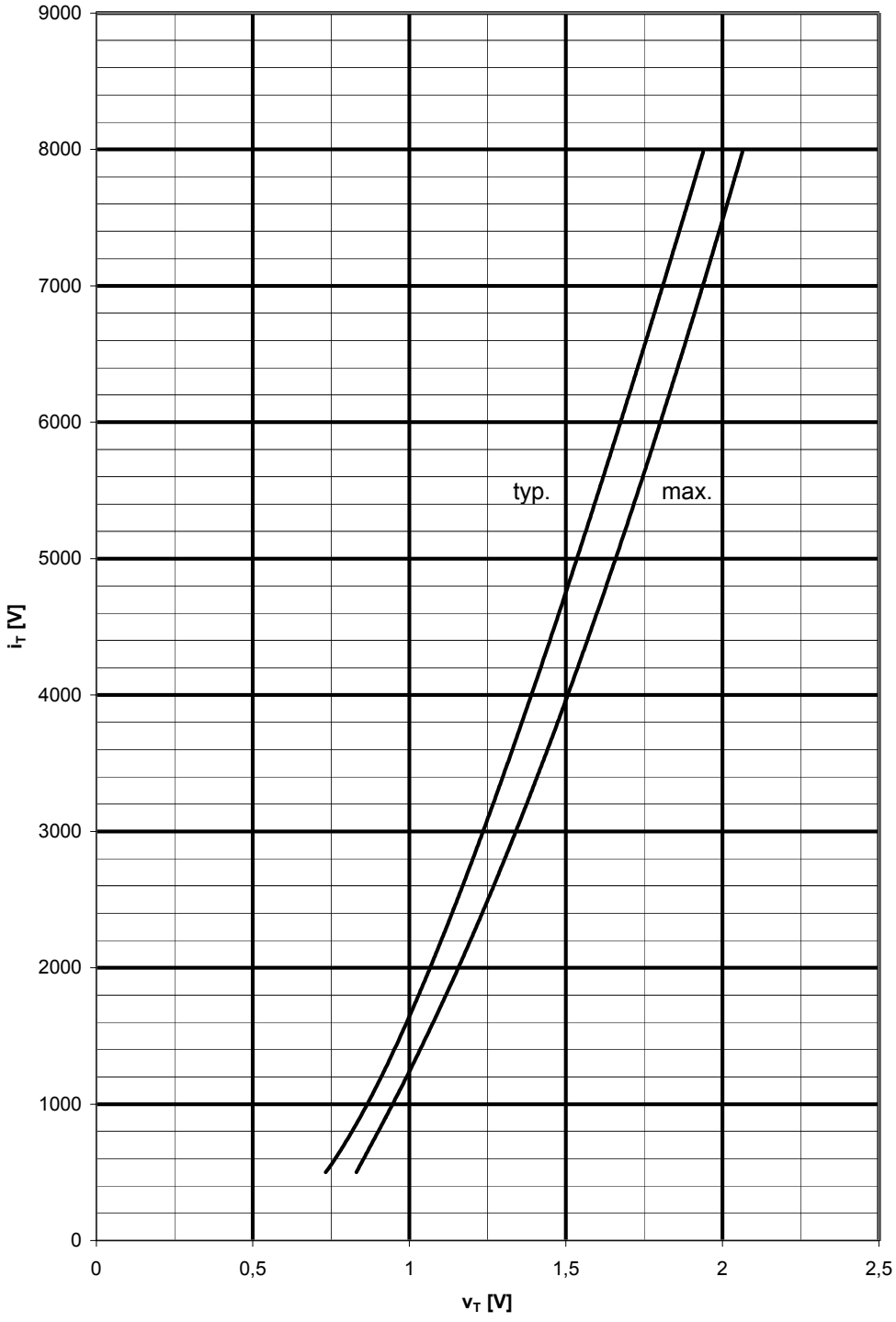

Grenzdurchlaßkennlinie / Limiting on-state characteristic $i_T = f(v_T)$

$T_{vj} = T_{vj\ max}$

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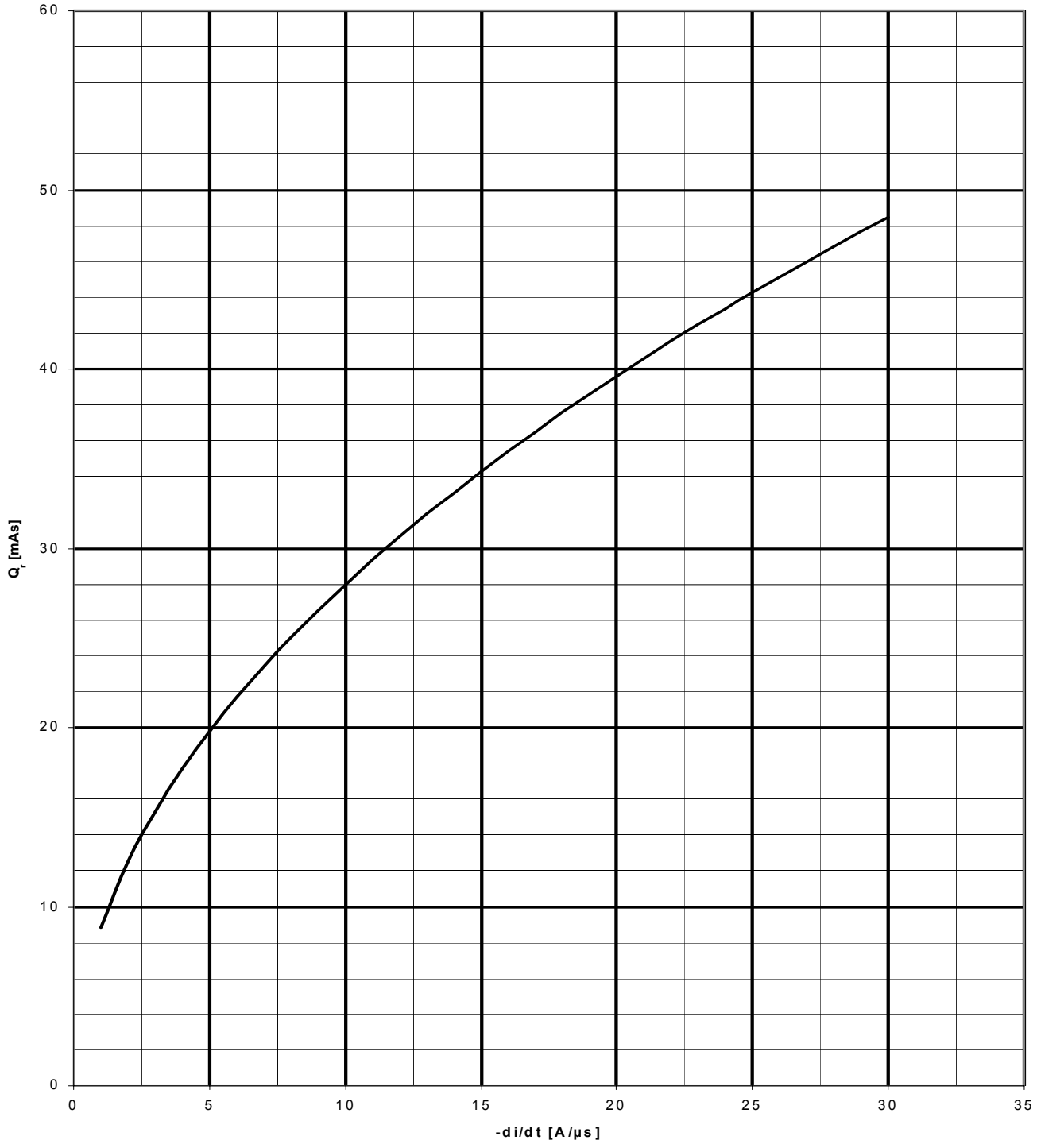
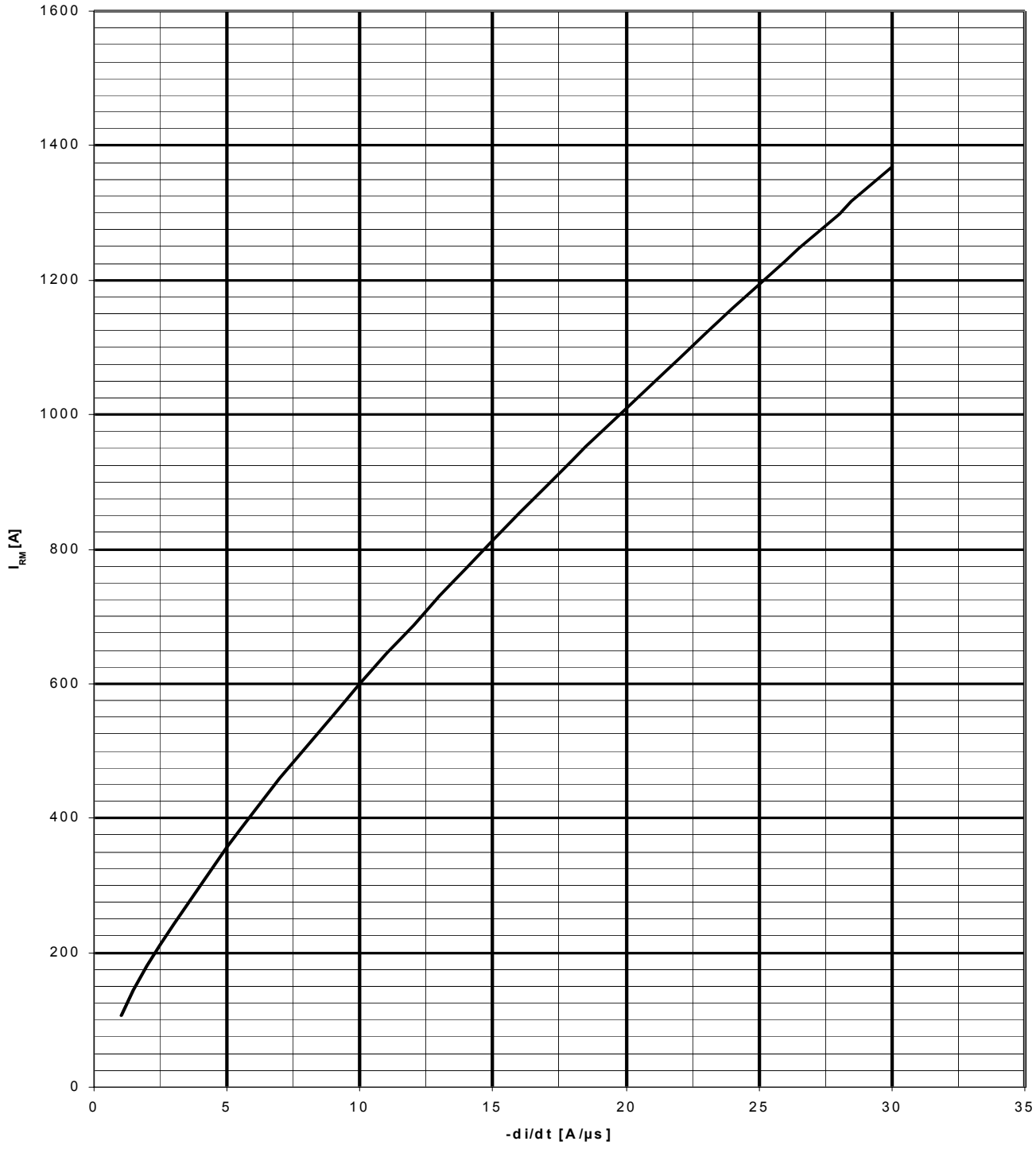


Sperrverzögerungsladung / Recovered charge Q_r = f(-di/dt)

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



Rückstromspitze / Peak reverse recovery current I_{RM} = f(-di/dt)

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

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