Netz-Thyristor
Phase Control Thyristor

T 1451N

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°C... $T_{vj\,max}$	V_{DRM},V_{RRM}	4800 5000 5200	V V
Periodische Vorwärts- und Rückwärts-Spitzensperrspannung repetitive peak forward off-state and reverse voltages	T_{vj} = 0°C... $T_{vj\,max}$	V_{DRM},V_{RRM}	4950 5150 5350	V V
Durchlaßstrom-Grenzeffektivwert maximum RMS on-state current		I_{TRMSM}	3550	A
Dauergrenzstrom average on-state current	T_C = 85 °C T_C = 60 °C	I_{TAVM}	1680 2260	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}	44000 43000	A A
Grenzlastintegral I²t-value	T_{vj} = 25 °C, t_p = 10 ms T_{vj} = $T_{vj\,max}$, t_p = 10 ms	I²t	4800 4000	10^3 A²s 10^3 A²s
Kritische Stromsteilheit critical rate of rise of on-state current	DIN IEC 60747-6 f = 50 Hz, I_{GM} = 3 A, dI_G/dt = 6 A/µs	$(dI_T/dt)_{cr}$	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

Durchlaßspannung on-state voltage	T_{vj} = $T_{vj\,max}$, I_T = 2000A	v_T	typ. max.	1,57 1,70	V V
Schleusenspannung threshold voltage	T_{vj} = $T_{vj\,max}$	$V_{(TO)}$	typ. max.	0,88 0,92	V V
Ersatzwiderstand slope resistance	T_{vj} = $T_{vj\,max}$	r_T	typ. max.	0,34 0,37	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.	A 0,497 B 0,000137 C -0,0127 D 0,02		
		max.	A 0,539 B 0,000193 C 0,00534 D 0,0164		
Zündstrom gate trigger current	T_{vj} = 25°C, v_D = 6 V	I_{GT}	max.	350	mA
Zündspannung gate trigger voltage	T_{vj} = 25°C, v_D = 6 V	V_{GT}	max.	2,5	V
Nicht zündender Steuerstrom gate non-trigger current	T_{vj} = $T_{vj\,max}$, v_D = 6 V T_{vj} = $T_{vj\,max}$, v_D = 0,5 V_{DRM}	I_{GD}	max. max.	20 10	mA mA
Nicht zündende Steuerspannung gate non-trigger voltage	T_{vj} = $T_{vj\,max}$, v_D = 0,5 V_{DRM}	V_{GD}	max.	0,4	V
Haltestrom holding current	T_{vj} = 25°C, v_D = 6 V, R_A = 5 Ω	I_H	max.	350	mA
Einraststrom latching current	T_{vj} = 25°C, v_D = 6 V, R_{GK} ≥ 10 Ω I_{GM} = 3 A, dI_G/dt = 6 A/µs, t_g = 20 µs	I_L	max.	3	A
Vorwärts- und Rückwärts-Sperrstrom forward off-state and reverse current	T_{vj} = $T_{vj\,max}$ v_D = V_{DRM}, v_R = V_{RRM}	I_D, I_R	max.	400	mA
Zündverzug gate controlled delay time	DIN IEC 60747-6 T_{vj} = 25 °C,I_{GM} = 3 A, dI_G/dt = 6 A/µs	t_{gd}	max.	2	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.	450	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.	15	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.	320	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. 0,0097 max. 0,009 max. 0,014 max. 0,0250	°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. 0,0025 max. 0,005	°C/W °C/W
Höchstzulässige Sperrschichttemperatur maximum junction temperature		$T_{vj\,max}$	125	°C
Betriebstemperatur operating temperature		$T_{c\,op}$	-40...+125	°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	36...52	kN
Steueranschlüsse control terminals	DIN 46244 Gate Kathode /Cathode		A 4,8x0,8 A 6,3x0,8	
Gewicht weight		G	typ. 1500	g
Kriechstrecke creepage distance			33	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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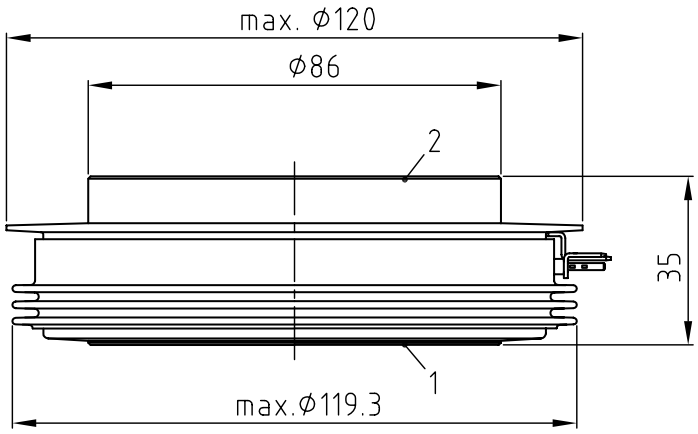

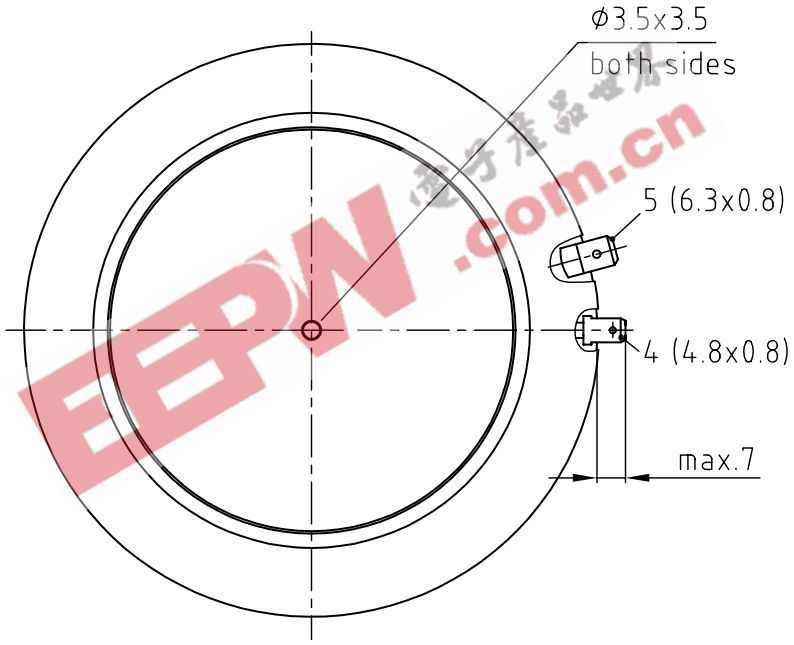

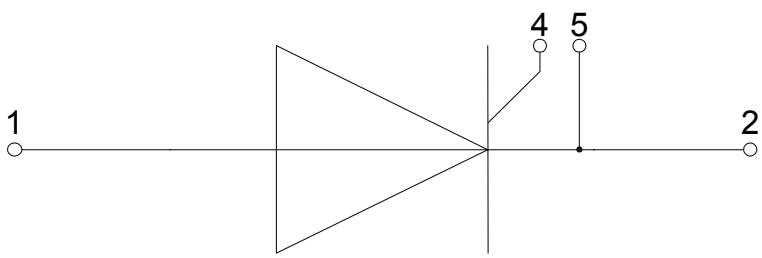

1: Anode/Anode

2: Kathode/Cathode

4: Gate

5: Hilfskathode/
Cathode (control terminal)

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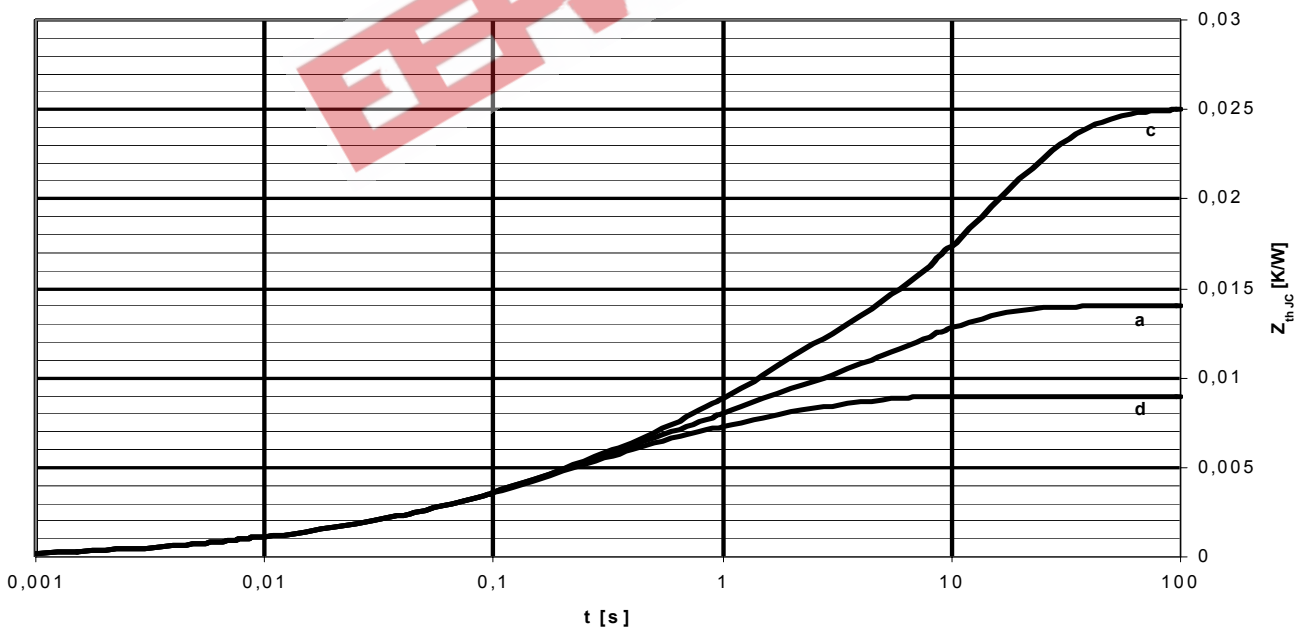
Analytische Elemente des transienten Wärmewiderstandes Z_{thJC}
Analytical elements of transient thermal impedance Z_{thJC}

	Pos. n	1	2	3	4	5	6	7
beidseitig two-sided	R_{thn} [°C/W]	0,00223	0,0027	0,0028	0,0008	0,00047		
	τ_n [s]	2,18	0,44	0,11	0,015	0,0041		
anodenseitg anode-sided	R_{thn} [°C/W]	0,00623	0,0037	0,0028	0,0008	0,00047		
	τ_n [s]	6,1	0,6	0,11	0,015	0,0041		
kathodenseitig cathode-sided	R_{thn} [°C/W]	0,01503	0,0059	0,0028	0,0008	0,00047		
	τ_n [s]	14,7	0,96	0,11	0,015	0,0041		

Analytische Funktion / Analytical function:

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

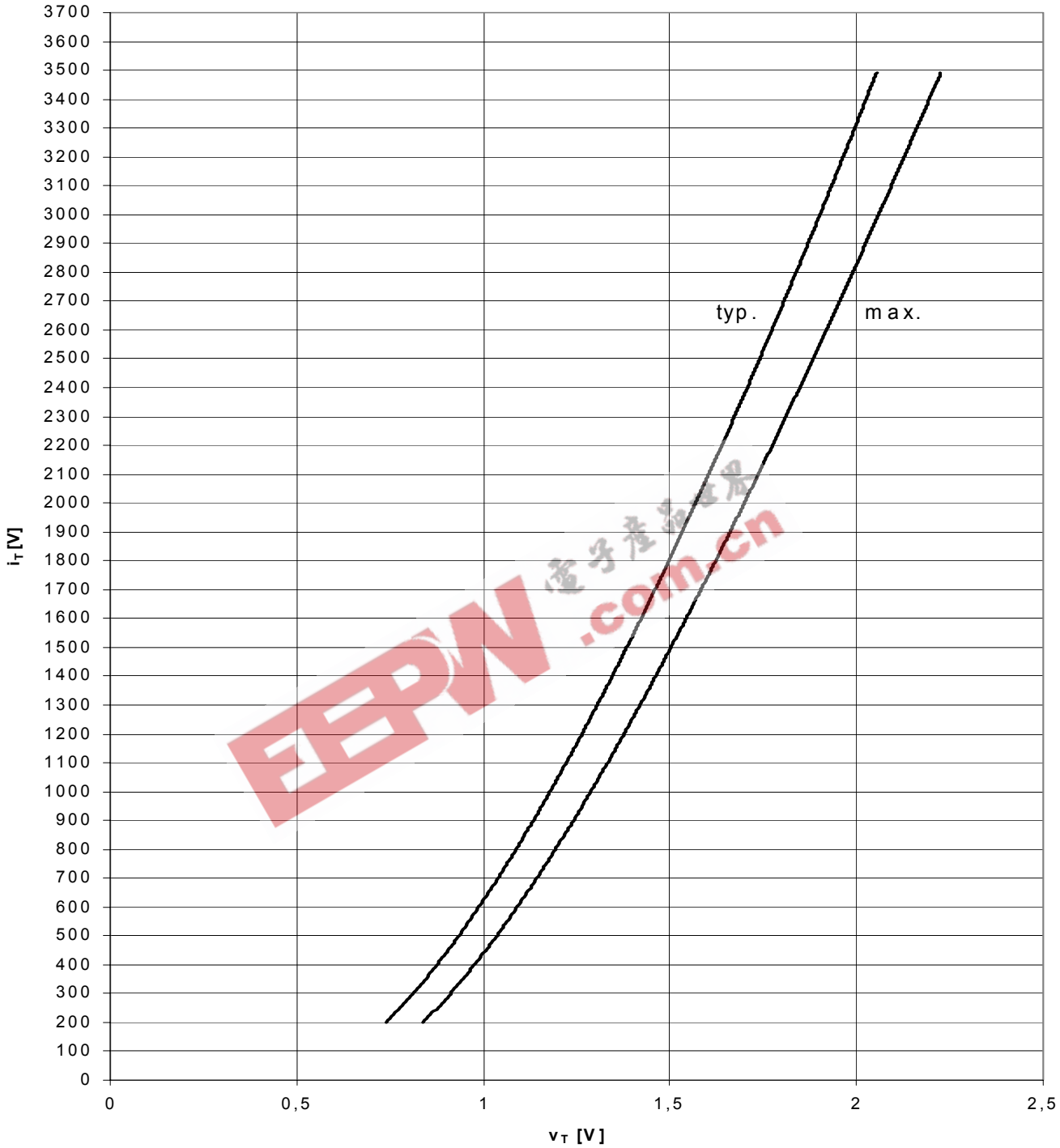


Transienter innerer Wärmewiderstand für DC/ Transient thermal impedance Z_{thJC} = f(t) for DC

Beidseitige Kühlung / Two-sided cooling

Anodenseitige Kühlung / Anode-sided cooling

Kathodenseitige Kühlung / Cathode-sided cooling



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

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

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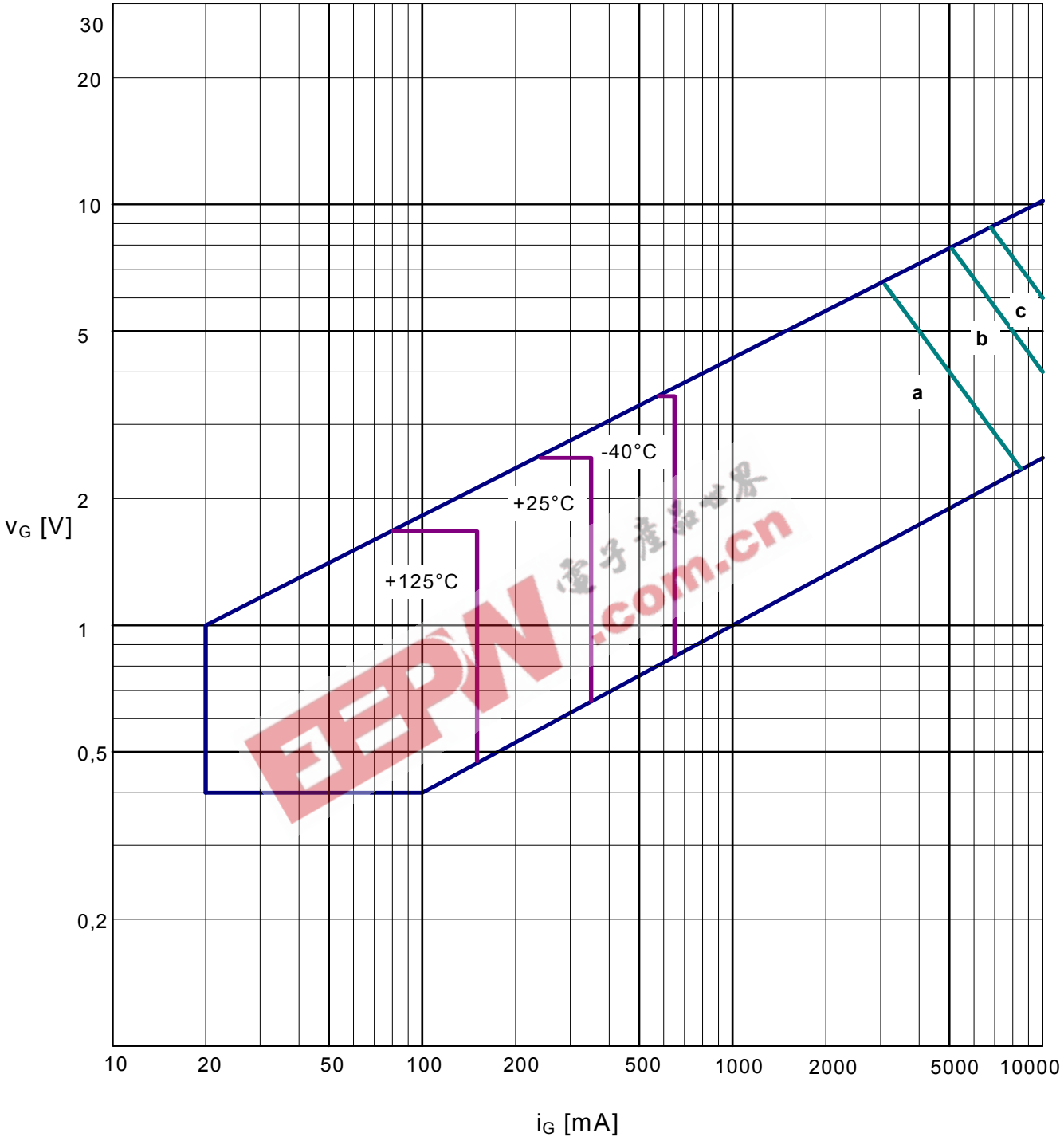
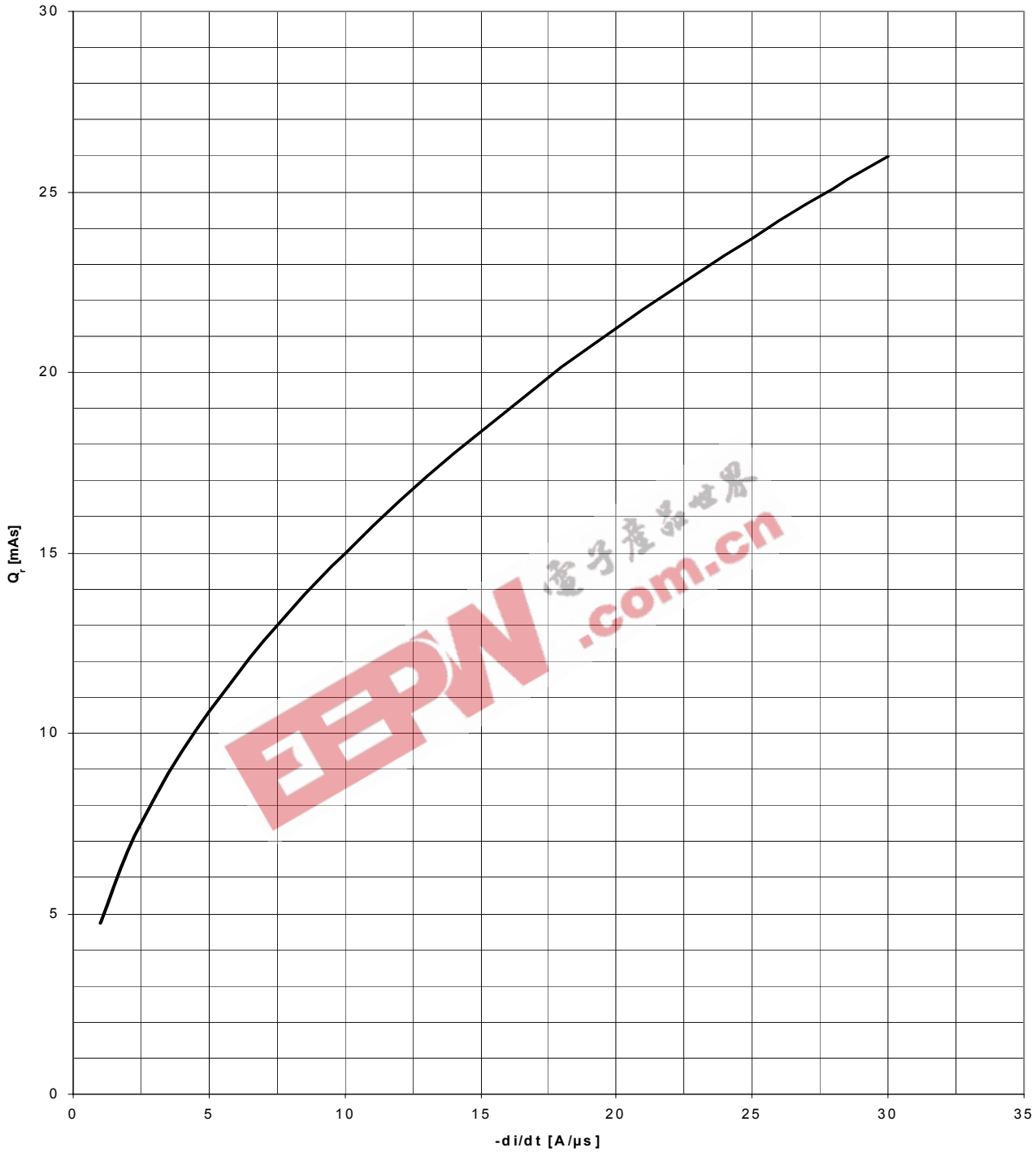


Steuercharakteristik $v_G = f(i_G)$ mit Zündbereichen für $V_D = 6$ V
Gate characteristic $v_G = f(i_G)$ with triggering area for $V_D = 6$ V

Höchstzulässige Spitzensteuerverlustleistung / Maximum rated peak gate power dissipation $P_{GM} = f(t_g)$:

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



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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