

62mm C-Serien Modul mit low loss IGBT2 und EmCon Diode  
62mm C-series module with low loss IGBT2 and EmCon diode

**IGBT-Wechselrichter / IGBT-inverter**

**Höchstzulässige Werte / maximum rated values**

Kollektor-Emitter-Sperrspannung collector-emitter voltage	$T_{vj} = 25^{\circ}\text{C}$	$V_{CES}$	1200	V
Kollektor-Dauergleichstrom DC-collector current	$T_C = 80^{\circ}\text{C}, T_{vj} = 150^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}, T_{vj} = 150^{\circ}\text{C}$	$I_{C\ nom}$ $I_C$	200 370	A A
Periodischer Kollektor Spitzenstrom repetitive peak collector current	$t_p = 1\ \text{ms}$	$I_{CRM}$	400	A
Gesamt-Verlustleistung total power dissipation	$T_C = 25^{\circ}\text{C}, T_{vj} = 150^{\circ}\text{C}$	$P_{tot}$	1450	W
Gate-Emitter-Spitzenspannung gate-emitter peak voltage		$V_{GES}$	+/-20	V

**Charakteristische Werte / characteristic values**

			min.	typ.	max.		
Kollektor-Emitter Sättigungsspannung collector-emitter saturation voltage	$I_C = 200\ \text{A}, V_{GE} = 15\ \text{V}$ $I_C = 200\ \text{A}, V_{GE} = 15\ \text{V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$V_{CE\ sat}$	2,10 2,40	2,60 2,90	V V	
Gate-Schwellenspannung gate threshold voltage	$I_C = 8,00\ \text{mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		$V_{GEth}$	4,5	5,5	6,5	V
Gateladung gate charge	$V_{GE} = -15\ \text{V} \dots +15\ \text{V}$		$Q_G$	2,10			$\mu\text{C}$
Interner Gatewiderstand internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		$R_{Gint}$	1,3			$\Omega$
Eingangskapazität input capacitance	$f = 1\ \text{MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\ \text{V}, V_{GE} = 0\ \text{V}$		$C_{ies}$	13,0			nF
Rückwirkungskapazität reverse transfer capacitance	$f = 1\ \text{MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\ \text{V}, V_{GE} = 0\ \text{V}$		$C_{res}$	0,85			nF
Kollektor-Emitter Reststrom collector-emitter cut-off current	$V_{CE} = 1200\ \text{V}, V_{GE} = 0\ \text{V}, T_{vj} = 25^{\circ}\text{C}$		$I_{CES}$			5,0	mA
Gate-Emitter Reststrom gate-emitter leakage current	$V_{CE} = 0\ \text{V}, V_{GE} = 20\ \text{V}, T_{vj} = 25^{\circ}\text{C}$		$I_{GES}$			400	nA
Einschaltverzögerungszeit (ind. Last) turn-on delay time (inductive load)	$I_C = 200\ \text{A}, V_{CE} = 600\ \text{V}$ $V_{GE} = \pm 15\ \text{V}$ $R_{Gon} = 4,7\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$t_{d\ on}$		0,11 0,12		$\mu\text{s}$ $\mu\text{s}$
Anstiegszeit (induktive Last) rise time (inductive load)	$I_C = 200\ \text{A}, V_{CE} = 600\ \text{V}$ $V_{GE} = \pm 15\ \text{V}$ $R_{Gon} = 4,7\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$t_r$		0,06 0,07		$\mu\text{s}$ $\mu\text{s}$
Abschaltverzögerungszeit (ind. Last) turn-off delay time (inductive load)	$I_C = 200\ \text{A}, V_{CE} = 600\ \text{V}$ $V_{GE} = \pm 15\ \text{V}$ $R_{Goff} = 4,7\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$t_{d\ off}$		0,55 0,57		$\mu\text{s}$ $\mu\text{s}$
Fallzeit (induktive Last) fall time (inductive load)	$I_C = 200\ \text{A}, V_{CE} = 600\ \text{V}$ $V_{GE} = \pm 15\ \text{V}$ $R_{Goff} = 4,7\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$t_f$		0,07 0,08		$\mu\text{s}$ $\mu\text{s}$
Einschaltverlustenergie pro Puls turn-on energy loss per pulse	$I_C = 200\ \text{A}, V_{CE} = 600\ \text{V}$ $V_{GE} = \pm 15\ \text{V}, L_s = 90\ \text{nH}$ $R_{Gon} = 4,7\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$E_{on}$		18,0		mJ mJ
Abschaltverlustenergie pro Puls turn-off energy loss per pulse	$I_C = 200\ \text{A}, V_{CE} = 600\ \text{V}$ $V_{GE} = \pm 15\ \text{V}, L_s = 90\ \text{nH}$ $R_{Goff} = 4,7\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$E_{off}$		25,0		mJ mJ
Kurzschlußverhalten SC data	$t_p \leq 10\ \mu\text{s}, V_{GE} \leq 15\ \text{V}$ $T_{vj} = 125^{\circ}\text{C}, V_{CC} = 900\ \text{V}, V_{CEmax} = V_{CES} - L_s \cdot di/dt$		$I_{SC}$		1300		A
Innerer Wärmewiderstand thermal resistance, junction to case	pro IGBT per IGBT		$R_{thJC}$			0,085	K/W
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	pro IGBT / per IGBT $\lambda_{Paste} = 1\ \text{W}/(\text{m}\cdot\text{K})$ / $\lambda_{grease} = 1\ \text{W}/(\text{m}\cdot\text{K})$		$R_{thCH}$		0,016		K/W

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**Diode-Wechselrichter / diode-inverter****Höchstzulässige Werte / maximum rated values**

Periodische Spitzensperrspannung repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	$V_{RRM}$	1200	V
Dauergleichstrom DC forward current		$I_F$	200	A
Periodischer Spitzenstrom repetitive peak forward current	$t_p = 1\text{ ms}$	$I_{FRM}$	400	A
Grenzlastintegral $I^2t$ - value	$V_R = 0\text{ V}, t_p = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$	$I^2t$	6850	$\text{A}^2\text{s}$

**Charakteristische Werte / characteristic values**

			min.	typ.	max.	
Durchlassspannung forward voltage	$I_F = 200\text{ A}, V_{GE} = 0\text{ V}$ $I_F = 200\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$V_F$	1,80 1,70	2,30 2,20	V V
Rückstromspitze peak reverse recovery current	$I_F = 200\text{ A}, -di_F/dt = 2100\text{ A}/\mu\text{s}$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$I_{RM}$	180 240		A A
Sperrverzögerungsladung recovered charge	$I_F = 200\text{ A}, -di_F/dt = 2100\text{ A}/\mu\text{s}$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$Q_r$	24,0 43,0		$\mu\text{C}$ $\mu\text{C}$
Abschaltenergie pro Puls reverse recovery energy	$I_F = 200\text{ A}, -di_F/dt = 2100\text{ A}/\mu\text{s}$ $V_R = 600\text{ V}$ $V_{GE} = -15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$	$E_{rec}$	7,00 16,0		mJ mJ
Innerer Wärmewiderstand thermal resistance, junction to case	pro Diode per diode		$R_{thJC}$		0,15	K/W
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	pro Diode / per diode $\lambda_{paste} = 1\text{ W}/(\text{m}\cdot\text{K})$ / $\lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$		$R_{thCH}$	0,028		K/W

**Modul / module**

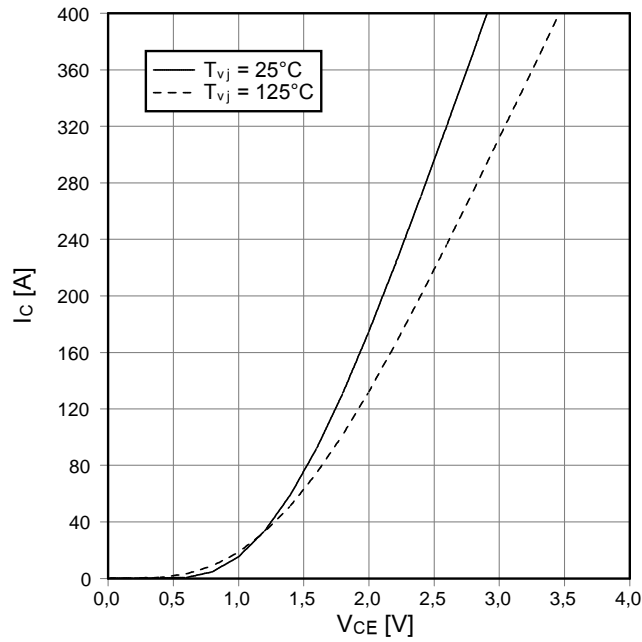
Isolations-Prüfspannung insulation test voltage	RMS, f = 50 Hz, t = 1 min.	V <sub>ISOL</sub>	2,5		kV
Material Modulgrundplatte material of module baseplate			Cu		
Material für innere Isolation material for internal insulation			Al <sub>2</sub> O <sub>3</sub>		
Kriechstrecke creepage distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal		20,0		mm
Luftstrecke clearance distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal		11,0		mm
Vergleichszahl der Kriechwegbildung comparative tracking index		CTI	> 425		
			min.	typ.	max.
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	pro Modul / per module $\lambda_{\text{Paste}} = 1 \text{ W}/(\text{m}\cdot\text{K}) / \lambda_{\text{grease}} = 1 \text{ W}/(\text{m}\cdot\text{K})$	R <sub>thCH</sub>		0,01	K/W
Modulinduktivität stray inductance module		L <sub>sCE</sub>		16	nH
Modulleitungswiderstand, Anschlüsse - Chip module lead resistance, terminals - chip	T <sub>C</sub> = 25°C, pro Schalter / per switch	R <sub>CC'+EE'</sub>		0,50	mΩ
Höchstzulässige Sperrschichttemperatur maximum junction temperature	Wechselrichter, Brems-Chopper / Inverter, Brake-Chopper	T <sub>vj max</sub>			150 °C
Temperatur im Schaltbetrieb temperature under switching conditions	Wechselrichter, Brems-Chopper / Inverter, Brake-Chopper	T <sub>vj op</sub>	-40		125 °C
Lagertemperatur storage temperature		T <sub>stg</sub>	-40		125 °C
Anzugsdrehmoment f. mech. Befestigung mounting torque	Schraube / screw M6	M	3,00	-	6,00 Nm
Anzugsdrehmoment f. elektr. Anschlüsse terminal connection torque	Schraube / screw M4 Schraube / screw M6	M	1,1 2,5	- -	2,0 5,0 Nm
Gewicht weight		G		340	g

**Mit dieser technischen Information werden Halbleiterbauelemente spezifiziert, jedoch keine Eigenschaften zugesichert. Sie gilt in Verbindung mit den zugehörigen technischen Erläuterungen.**

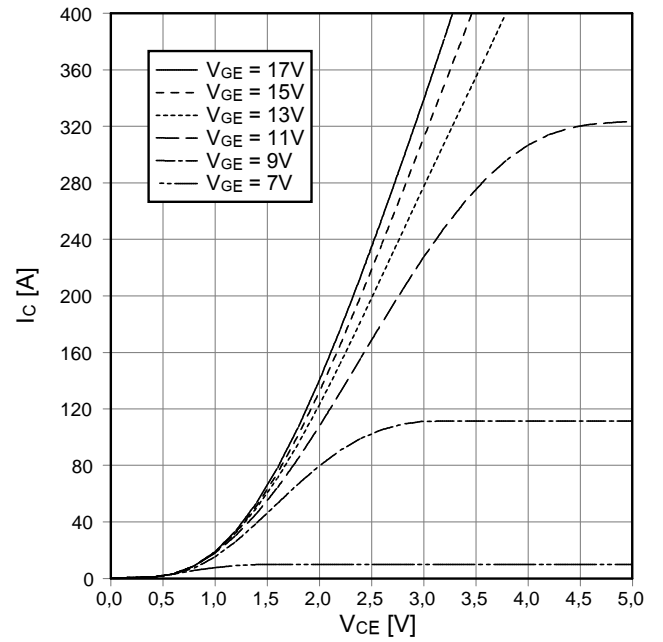
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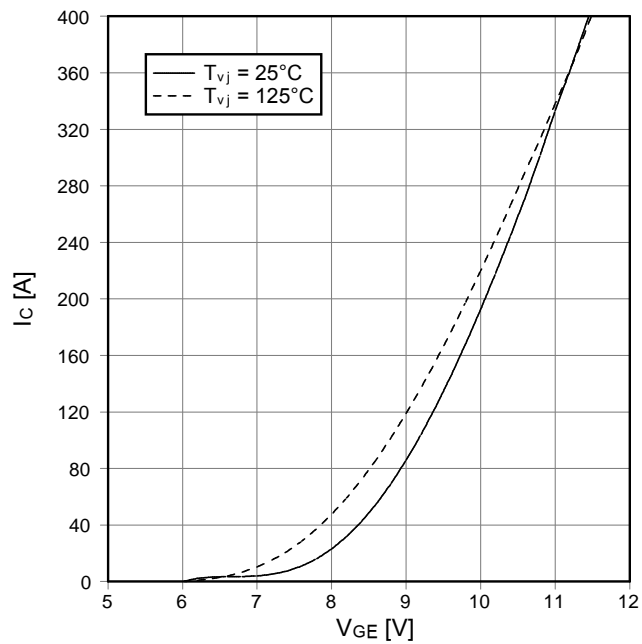
**Ausgangskennlinie IGBT-Wechselr. (typisch)**  
**output characteristic IGBT-inverter (typical)**  
 $I_c = f(V_{CE})$   
 $V_{GE} = 15\text{ V}$



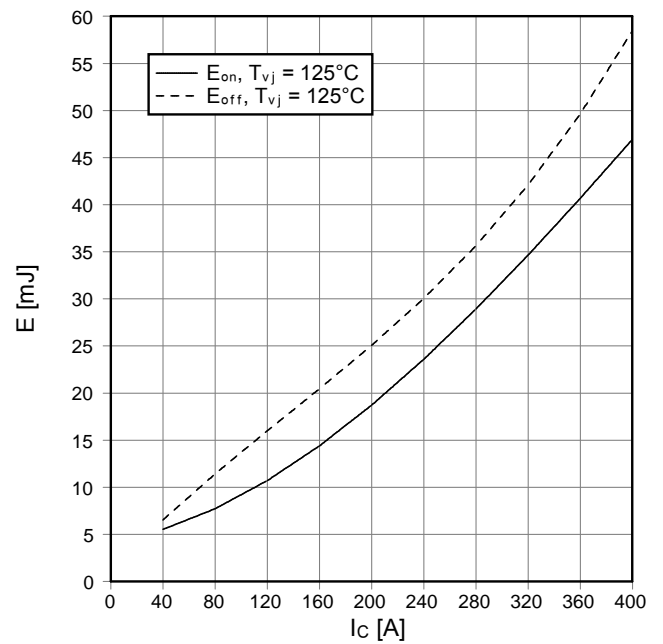
**Ausgangskennlinienfeld IGBT-Wechselr. (typisch)**  
**output characteristic IGBT-inverter (typical)**  
 $I_c = f(V_{CE})$   
 $T_{vj} = 125^\circ\text{C}$



**Übertragungscharakteristik IGBT-Wechselr. (typisch)**  
**transfer characteristic IGBT-inverter (typical)**  
 $I_c = f(V_{GE})$   
 $V_{CE} = 20\text{ V}$

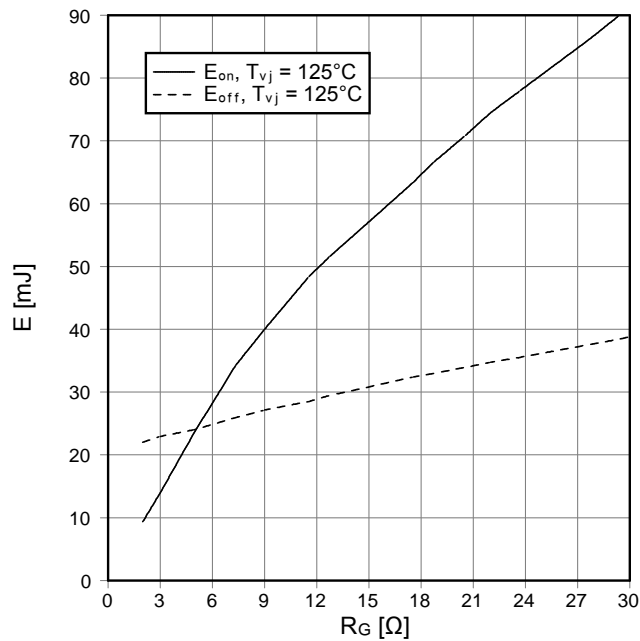


**Schaltverluste IGBT-Wechselr. (typisch)**  
**switching losses IGBT-inverter (typical)**  
 $E_{on} = f(I_c), E_{off} = f(I_c)$   
 $V_{GE} = \pm 15\text{ V}, R_{Gon} = 4,7\ \Omega, R_{Goff} = 4,7\ \Omega, V_{CE} = 600\text{ V}$

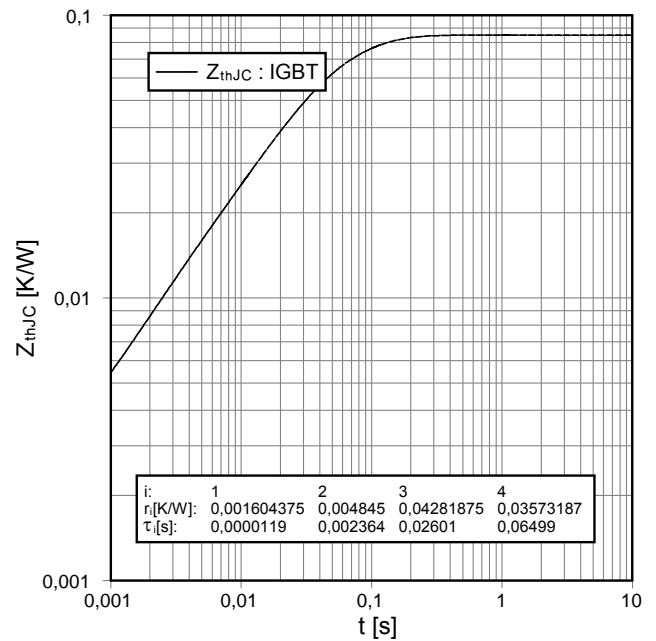


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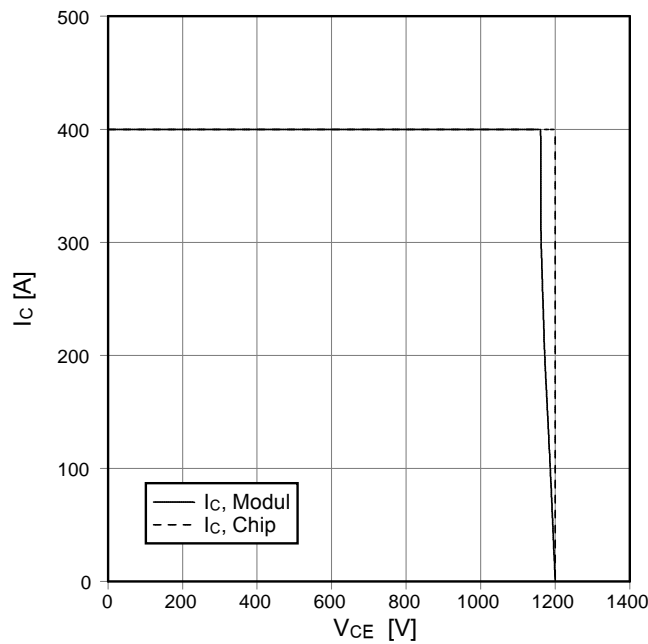
Schaltverluste IGBT-Wechsel. (typisch)  
switching losses IGBT-inverter (typical)  
 $E_{on} = f(R_G)$ ,  $E_{off} = f(R_G)$   
 $V_{GE} = \pm 15\text{ V}$ ,  $I_C = 200\text{ A}$ ,  $V_{CE} = 600\text{ V}$



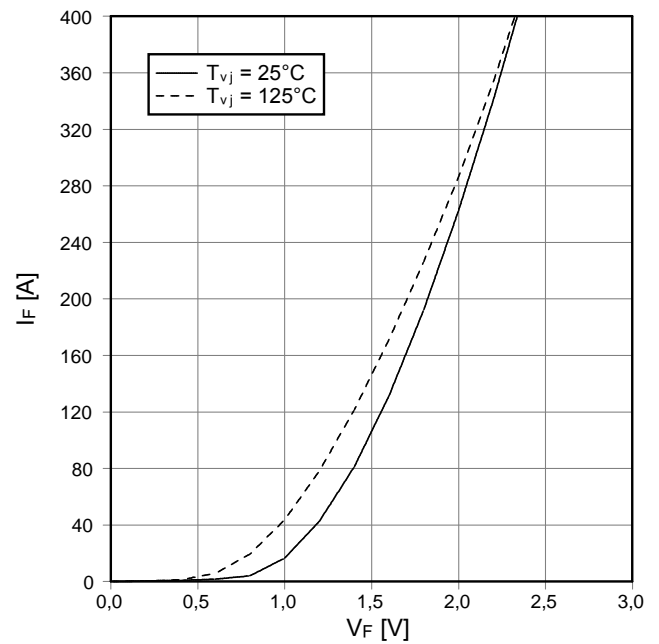
Transienter Wärmewiderstand IGBT-Wechsel.  
transient thermal impedance IGBT-inverter  
 $Z_{thJC} = f(t)$



Sicherer Rückwärts-Arbeitsbereich IGBT-Wr. (RBSOA)  
reverse bias safe operating area IGBT-inv. (RBSOA)  
 $I_C = f(V_{CE})$   
 $V_{GE} = \pm 15\text{ V}$ ,  $R_{Goff} = 4,7\ \Omega$ ,  $T_{vj} = 125^\circ\text{C}$



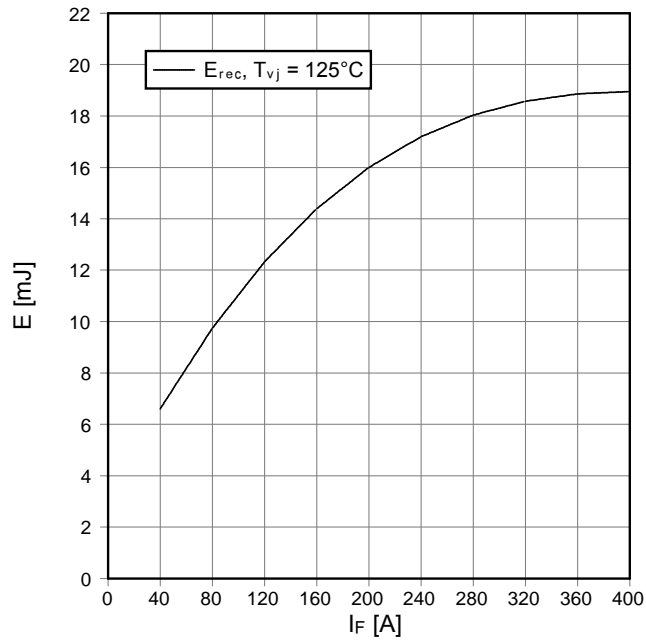
Durchlaßkennlinie der Diode-Wechsel. (typisch)  
forward characteristic of diode-inverter (typical)  
 $I_F = f(V_F)$



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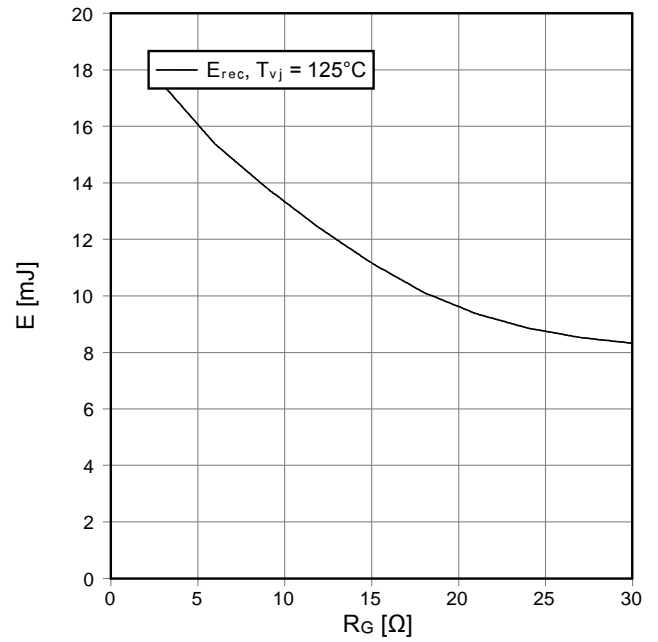
Schaltverluste Diode-Wechselr. (typisch)  
switching losses diode-inverter (typical)

$E_{rec} = f(I_F)$   
 $R_{Gon} = 4,7 \Omega$ ,  $V_{CE} = 600 V$



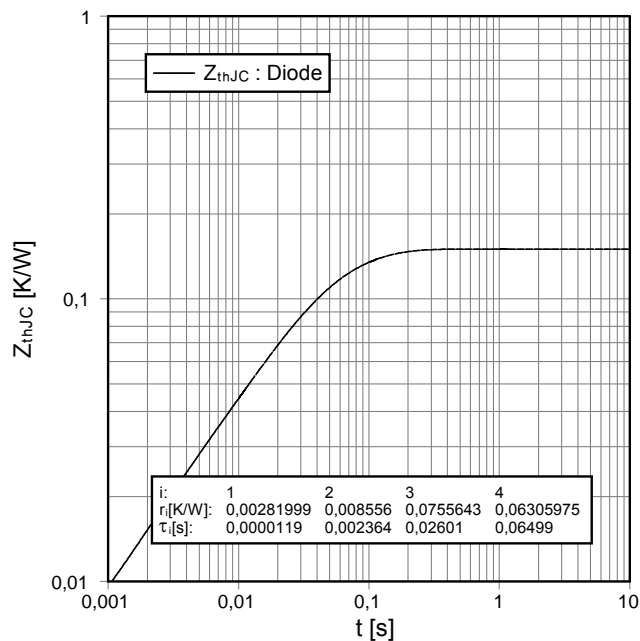
Schaltverluste Diode-Wechselr. (typisch)  
switching losses diode-inverter (typical)

$E_{rec} = f(R_G)$   
 $I_F = 200 A$ ,  $V_{CE} = 600 V$



Transienter Wärmewiderstand Diode-Wechselr.  
transient thermal impedance diode-inverter

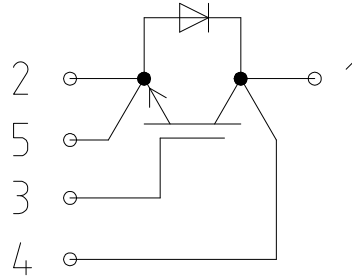
$Z_{thJC} = f(t)$



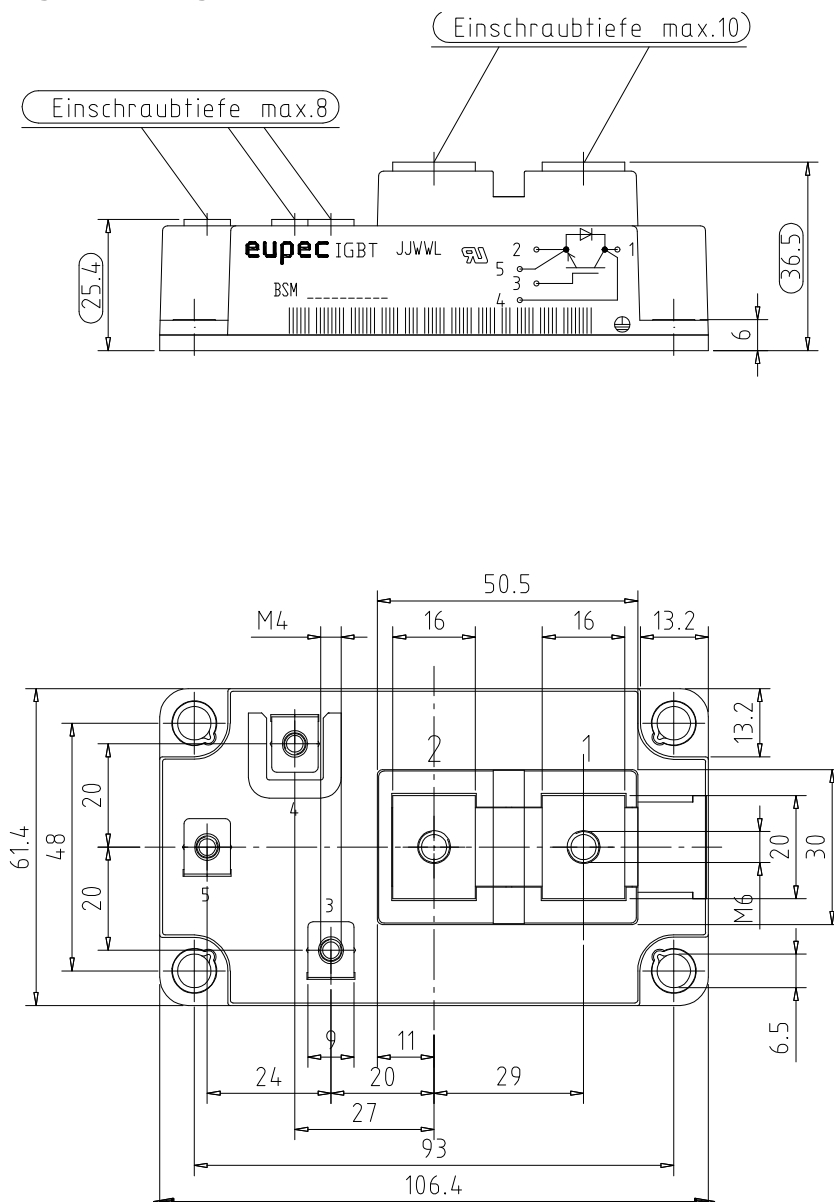
i:	1	2	3	4
$r_i$ [K/W]:	0,00281999	0,008556	0,0755643	0,06305975
$\tau_i$ [s]:	0,0000119	0,002364	0,02601	0,06499

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**Schaltplan / circuit diagram**



**Gehäuseabmessungen / package outlines**



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