

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	$T_C = 80^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}$	$I_{C\ nom}$ I_C	1200 1900	A A
Periodischer Kollektor Spitzenstrom repetitive peak collector current	$t_p = 1\ \text{ms}, T_C = 80^{\circ}\text{C}$	I_{CRM}	2400	A
Gesamt-Verlustleistung total power dissipation	$T_C = 25^{\circ}\text{C}$	P_{tot}	7,80	kW
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	$I_C = 1200\ \text{A}, V_{GE} = 15\ \text{V}, T_{vj} = 25^{\circ}\text{C}$ $I_C = 1200\ \text{A}, V_{GE} = 15\ \text{V}, T_{vj} = 125^{\circ}\text{C}$	$V_{CE\ sat}$		2,10 2,40	2,60 2,90	V V
Gate-Schwellenspannung gate threshold voltage	$I_C = 48,0\ \text{mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$	V_{GEth}	4,5	5,5	6,5	V
Gateladung gate charge	$V_{GE} = -15\ \text{V} \dots +15\ \text{V}$	Q_G		13,0		μC
Interner Gatewiderstand internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$	R_{Gint}		1,3		Ω
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}		90,0		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}		7,00		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)	$I_C = 1200\ \text{A}, V_{CE} = 600\ \text{V}$ $V_{GE} = \pm 15\ \text{V}, R_{Gon} = 0,82\ \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15\ \text{V}, R_{Gon} = 0,82\ \Omega, T_{vj} = 125^{\circ}\text{C}$	$t_{d\ on}$		0,54 0,57		μs μs
Anstiegszeit (induktive Last) rise time (inductive load)	$I_C = 1200\ \text{A}, V_{CE} = 600\ \text{V}$ $V_{GE} = \pm 15\ \text{V}, R_{Gon} = 0,82\ \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15\ \text{V}, R_{Gon} = 0,82\ \Omega, T_{vj} = 125^{\circ}\text{C}$	t_r		0,18 0,18		μs μs
Abschaltverzögerungszeit (ind. Last) turn-off delay time (inductive load)	$I_C = 1200\ \text{A}, V_{CE} = 600\ \text{V}$ $V_{GE} = \pm 15\ \text{V}, R_{Goff} = 0,82\ \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15\ \text{V}, R_{Goff} = 0,82\ \Omega, T_{vj} = 125^{\circ}\text{C}$	$t_{d\ off}$		1,05 1,15		μs μs
Fallzeit (induktive Last) fall time (inductive load)	$I_C = 1200\ \text{A}, V_{CE} = 600\ \text{V}$ $V_{GE} = \pm 15\ \text{V}, R_{Goff} = 0,82\ \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15\ \text{V}, R_{Goff} = 0,82\ \Omega, T_{vj} = 125^{\circ}\text{C}$	t_f		0,13 0,14		μs μs
Einschaltverlustenergie pro Puls turn-on energy loss per pulse	$I_C = 1200\ \text{A}, V_{CE} = 600\ \text{V}, L_S = 70\ \text{nH}$ $V_{GE} = \pm 15\ \text{V}, R_{Gon} = 0,82\ \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15\ \text{V}, R_{Gon} = 0,82\ \Omega, T_{vj} = 125^{\circ}\text{C}$	E_{on}		165		mJ mJ
Abschaltverlustenergie pro Puls turn-off energy loss per pulse	$I_C = 1200\ \text{A}, V_{CE} = 600\ \text{V}, L_S = 70\ \text{nH}$ $V_{GE} = \pm 15\ \text{V}, R_{Goff} = 0,82\ \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15\ \text{V}, R_{Goff} = 0,82\ \Omega, T_{vj} = 125^{\circ}\text{C}$	E_{off}		195		mJ mJ
Kurzschlußverhalten SC data	$t_p \leq 10\ \mu\text{s}, V_{GE} \leq 15\ \text{V}$ $T_{vj} \leq 125^{\circ}\text{C}, V_{CC} = 900\ \text{V}, V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$	I_{SC}		9000		A
Innerer Wärmewiderstand thermal resistance, junction to case	pro IGBT per IGBT	R_{thJC}			16,0	K/kW

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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	1200	A
Periodischer Spitzenstrom repetitive peak forward current	$t_p = 1\text{ ms}$	I_{FRM}	2400	A
Grenzlastintegral I^2t - value	$V_R = 0\text{ V}, t_p = 10\text{ ms}, T_{vj} = 125^{\circ}\text{C}$	I^2t	300	kA^2s

Charakteristische Werte / characteristic values

			min.	typ.	max.	
Durchlassspannung forward voltage	$I_F = 1200\text{ A}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$ $I_F = 1200\text{ A}, V_{GE} = 0\text{ V}, T_{vj} = 125^{\circ}\text{C}$	V_F		1,80 1,70	2,30 2,20	V V
Rückstromspitze peak reverse recovery current	$I_F = 1200\text{ A}, -di_F/dt = 6800\text{ A}/\mu\text{s}$ $V_R = 600\text{ V}, V_{GE} = -15\text{ V}, T_{vj} = 25^{\circ}\text{C}$ $V_R = 600\text{ V}, V_{GE} = -15\text{ V}, T_{vj} = 125^{\circ}\text{C}$	I_{RM}		740 980		A A
Sperrverzögerungsladung recovered charge	$I_F = 1200\text{ A}, -di_F/dt = 6800\text{ A}/\mu\text{s}$ $V_R = 600\text{ V}, V_{GE} = -15\text{ V}, T_{vj} = 25^{\circ}\text{C}$ $V_R = 600\text{ V}, V_{GE} = -15\text{ V}, T_{vj} = 125^{\circ}\text{C}$	Q_r		105 215		μC μC
Abschaltenergie pro Puls reverse recovery energy	$I_F = 1200\text{ A}, -di_F/dt = 6800\text{ A}/\mu\text{s}$ $V_R = 600\text{ V}, V_{GE} = -15\text{ V}, T_{vj} = 25^{\circ}\text{C}$ $V_R = 600\text{ V}, V_{GE} = -15\text{ V}, T_{vj} = 125^{\circ}\text{C}$	E_{rec}		45,0 80,0		mJ mJ
Innerer Wärmewiderstand thermal resistance, junction to case	pro Diode per diode	R_{thJC}			32,0	K/kW

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Modul / module

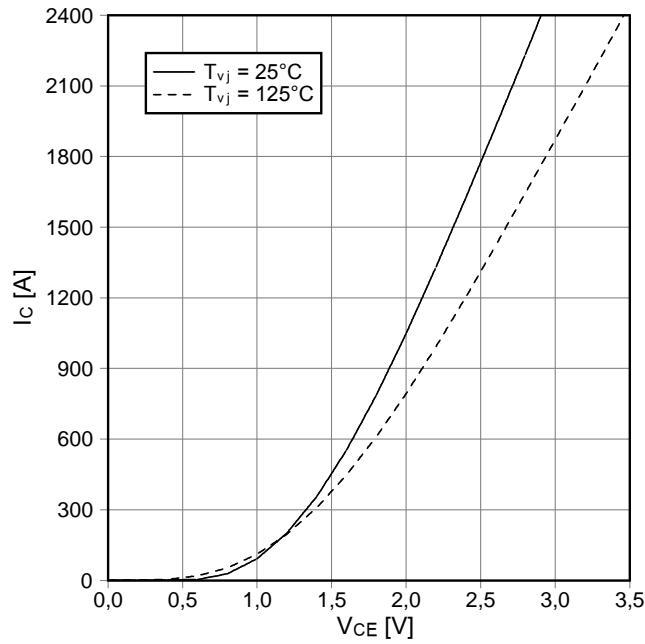
Isolations-Prüfspannung insulation test voltage	RMS, f = 50 Hz, t = 1 min	V _{ISO}	2,5			kV
Material für innere Isolation material for internal insulation			Al ₂ O ₃			
Kriechstrecke creepage distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal		17,0			mm
Luftstrecke clearance distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal		10,0			mm
Vergleichszahl der Kriechwegbildung comparative tracking index		CTI	> 275			
			min.	typ.	max.	
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	pro Modul / per module $\lambda_{\text{Paste}} = 1 \text{ W/(m}\cdot\text{K)} / \lambda_{\text{grease}} = 1 \text{ W/(m}\cdot\text{K)}$	R _{thCH}		6,00		K/kW
Modulinduktivität stray inductance module		L _{sCE}		15		nH
Modulleitungswiderstand, Anschlüsse - Chip module lead resistance, terminals - chip	T _C = 25°C, pro Schalter / per switch	R _{CC'+EE'}		0,10		mΩ
Höchstzulässige Sperrschichttemperatur maximum junction temperature		T _{vj max}			150	°C
Temperatur im Schaltbetrieb temperature under switching conditions		T _{vj op}	-40		125	°C
Lagertemperatur storage temperature		T _{stg}	-40		125	°C
Anzugsdrehmoment f. mech. Befestigung mounting torque	Schraube / screw M6	M	4,25	-	5,75	Nm
Anzugsdrehmoment f. elektr. Anschlüsse terminal connection torque	Schraube / screw M4 Schraube / screw M8	M	1,7 8,0	- -	2,3 10	Nm Nm
Gewicht weight		G		1500		g

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

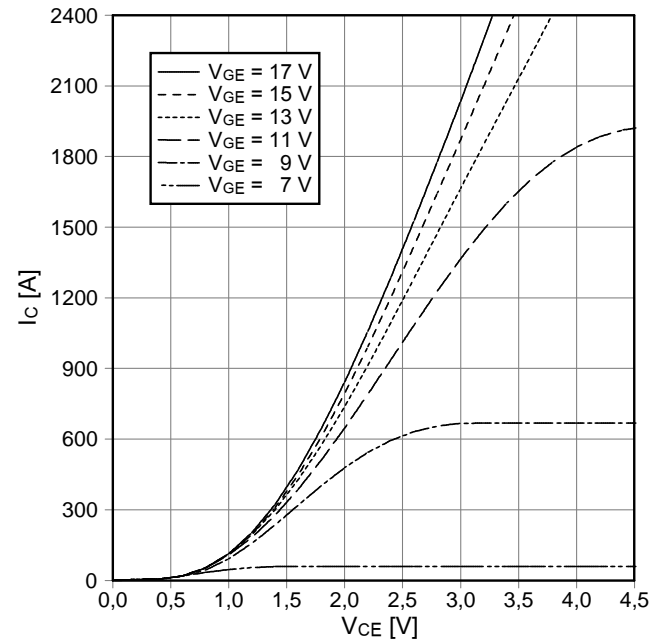
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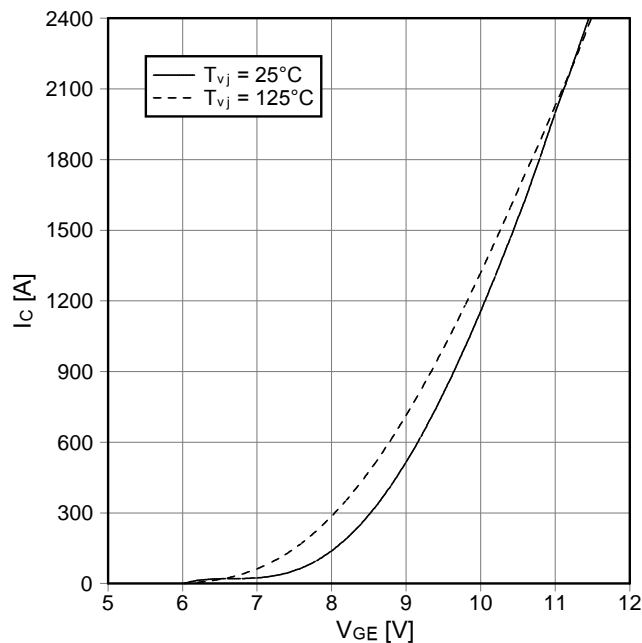
Ausgangskennlinie IGBT-Wechselr. (typisch)
output characteristic IGBT-inverter (typical)
 $I_c = f(V_{CE})$
 $V_{GE} = 15\text{ V}$



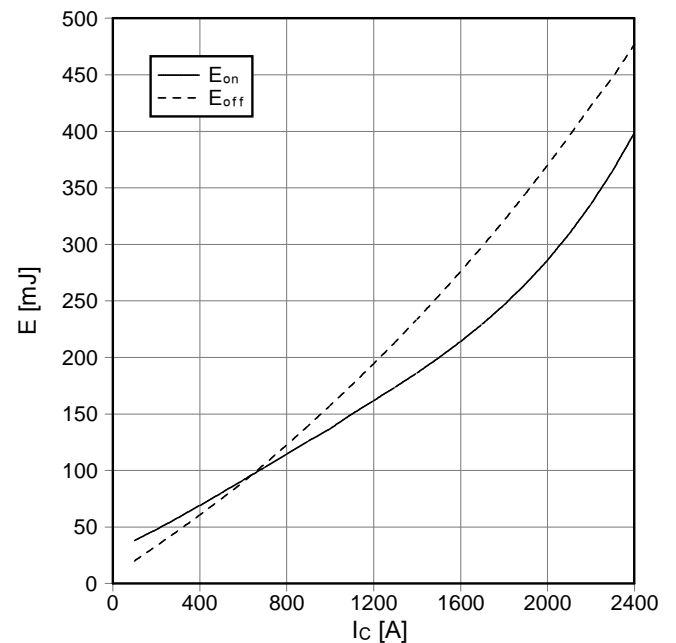
Ausgangskennlinienfeld IGBT-Wechselr. (typisch)
output characteristic IGBT-inverter (typical)
 $I_c = f(V_{CE})$
 $T_{vj} = 125^\circ\text{C}$



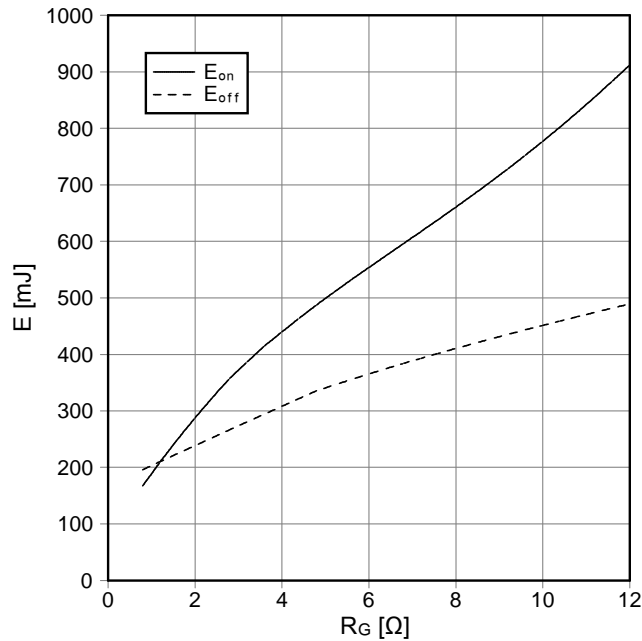
Übertragungscharakteristik IGBT-Wechselr. (typisch)
transfer characteristic IGBT-inverter (typical)
 $I_c = f(V_{GE})$
 $V_{CE} = 20\text{ V}$



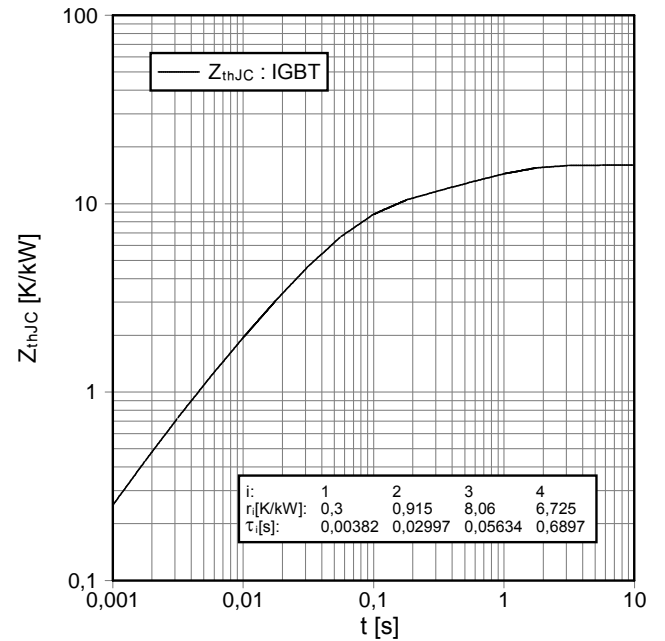
Schaltverluste IGBT-Wechselr. (typisch)
switching losses IGBT-inverter (typical)
 $E_{on} = f(I_c)$, $E_{off} = f(I_c)$
 $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 0,82\ \Omega$, $R_{Goff} = 0,82\ \Omega$, $V_{CE} = 600\text{ V}$, $T_{vj} = 125^\circ\text{C}$



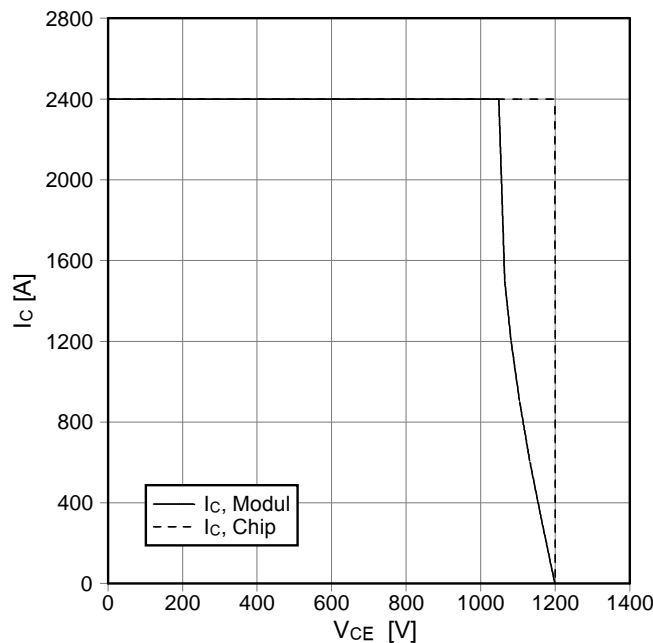
Schaltverluste IGBT-Wechselr. (typisch)
switching losses IGBT-Inverter (typical)
 $E_{on} = f(R_G)$, $E_{off} = f(R_G)$
 $V_{GE} = \pm 15\text{ V}$, $I_C = 1200\text{ A}$, $V_{CE} = 600\text{ V}$, $T_{vj} = 125^\circ\text{C}$



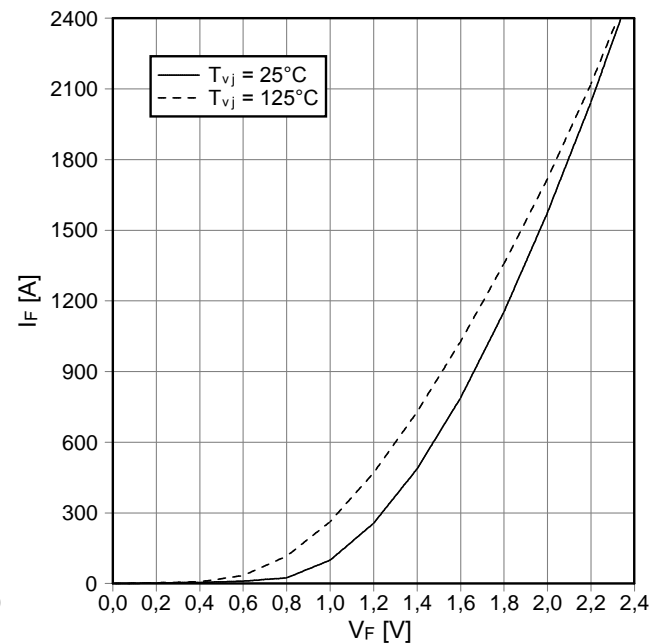
Transienter Wärmewiderstand IGBT-Wechselr.
transient thermal impedance IGBT-inverter
 $Z_{thJC} = f(t)$



Sicherer Rückwärts-Arbeitsbereich IGBT-Wr. (RBSOA)
reverse bias safe operating area IGBT-inv. (RBSOA)
 $I_C = f(V_{CE})$
 $V_{GE} = \pm 15\text{ V}$, $R_{Goff} = 0,82\ \Omega$, $T_{vj} = 125^\circ\text{C}$

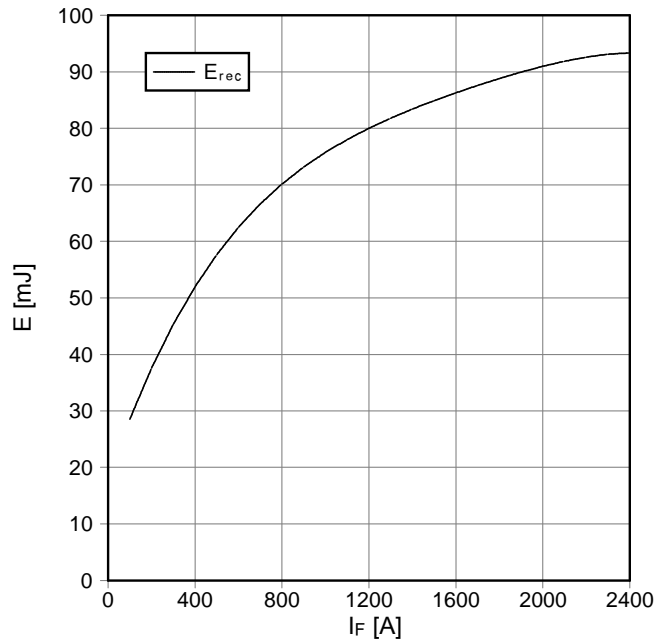


Durchlaßkennlinie der Diode-Wechselr. (typisch)
forward characteristic of diode-inverter (typical)
 $I_F = f(V_F)$

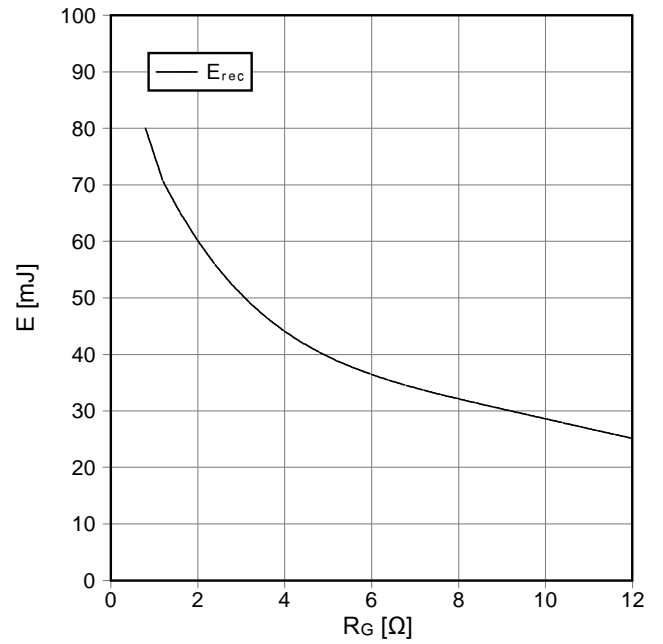


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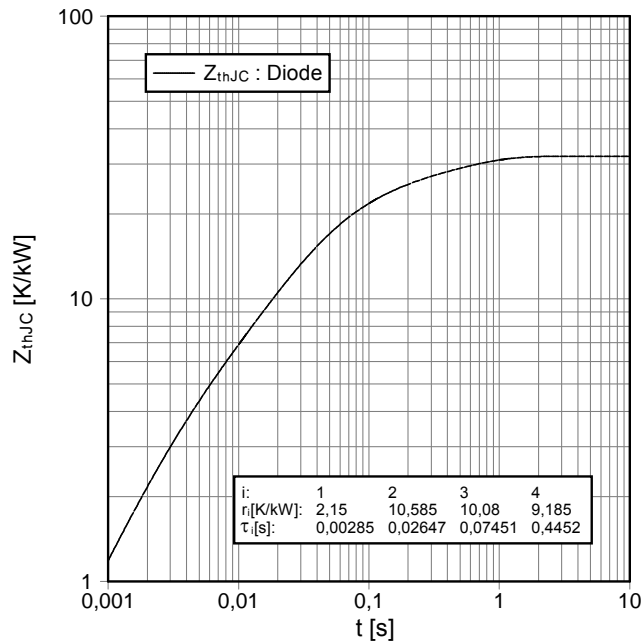
Schaltverluste Diode-Wechselr. (typisch)
switching losses diode-inverter (typical)
 $E_{rec} = f(I_F)$
 $R_{Gon} = 0,82 \Omega$, $V_{CE} = 600 V$, $T_{vj} = 125^\circ C$



Schaltverluste Diode-Wechselr. (typisch)
switching losses diode-inverter (typical)
 $E_{rec} = f(R_G)$
 $I_F = 1200 A$, $V_{CE} = 600 V$, $T_{vj} = 125^\circ C$



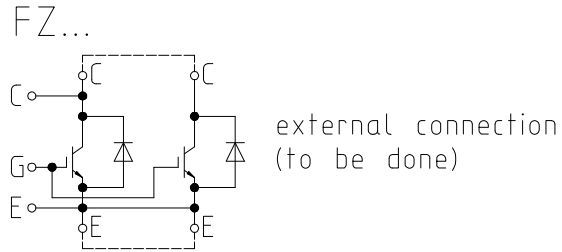
Transienter Wärmewiderstand Diode-Wechselr.
transient thermal impedance diode-inverter
 $Z_{thJC} = f(t)$



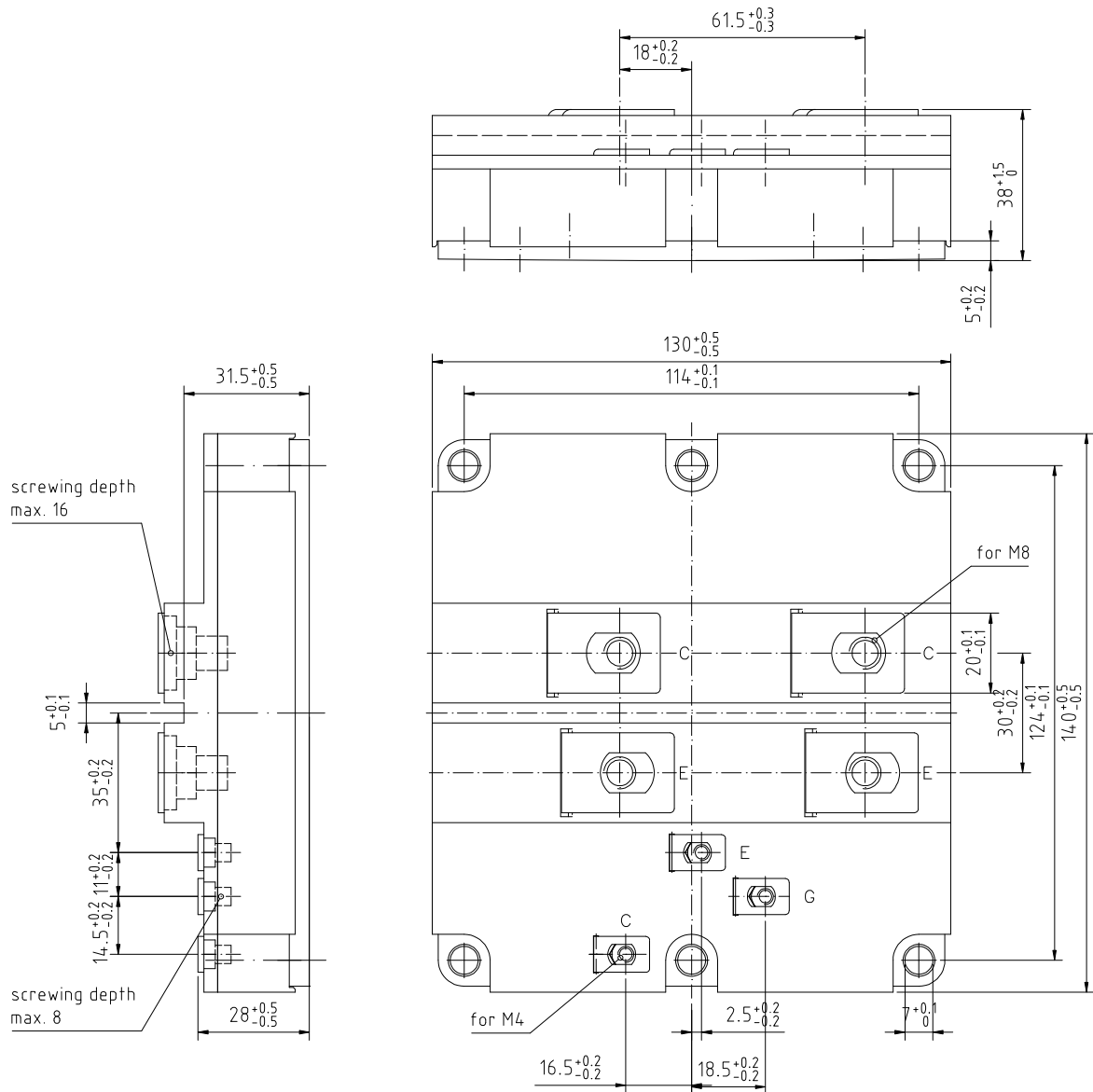
i:	1	2	3	4
r_i [K/kW]:	2,15	10,585	10,08	9,185
τ_i [s]:	0,00285	0,02647	0,07451	0,4452

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Schaltplan / circuit diagram



Gehäuseabmessungen / package outlines



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