Technische Information / Technical Information

IGBT-Module
IGBT-Modules

FZ 1200 R 12 KL4C

vorläufige Daten
preliminary data

Höchstzulässige Werte / Maximum rated values

Elektrische Eigenschaften / Electrical properties

Kollektor-Emitter-Sperrspannung collector-emitter voltage		V_{CES}	1200	V
Kollektor-Dauergleichstrom DC-collector current	T_C = 80 °C T_C = 25 °C	$I_{C,nom.}$ I_C	1200 1900	A A
Periodischer Kollektor Spitzenstrom repetitive peak collector current	t_P = 1 ms, T_C = 80°C	I_{CRM}	2400	A
Gesamt-Verlustleistung total power dissipation	T_C=25°C, Transistor	P_{tot}	7,8	kW
Gate-Emitter-Spitzenspannung gate-emitter peak voltage		V_{GES}	+/- 20V	V
Dauergleichstrom DC forward current		I_F	1200	A
Periodischer Spitzenstrom repetitive peak forw. current	t_P = 1 ms	I_{FRM}	2400	A
Grenzlastintegral der Diode I^2t - value, Diode	V_R = 0V, t_p = 10ms, T_{Vj} = 125°C	I^2t	300	kA^2s
Isolations-Prüfspannung insulation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}	2,5	kV

Charakteristische Werte / Characteristic values

Transistor / Transistor			**min.**	**typ.**	**max.**	
Kollektor-Emitter Sättigungsspannung collector-emitter saturation voltage	I_C = 1200A, V_{GE} = 15V, T_{vj} = 25°C I_C = 1200A, V_{GE} = 15V, T_{vj} = 125°C	$V_{CE\ sat}$	- -	2,1 2,4	2,6	V V
Gate-Schwellenspannung gate threshold voltage	I_C = 48mA, V_{CE} = V_{GE}, T_{vj} = 25°C	$V_{GE(th)}$	4,5	5,5	6,5	V
Eingangskapazität input capacitance	f = 1MHz,T_{vj} = 25°C,V_{CE} = 25V, V_{GE} = 0V	C_{ies}	-	90	-	nF
Kollektor-Emitter Reststrom collector-emitter cut-off current	V_{CE} = 1200V, V_{GE} = 0V, T_{vj} = 25°C V_{CE} = 1200V, V_{GE} = 0V, T_{vj} = 125°C	I_{CES}	- -	0,03 2,5	1	mA mA
Gate-Emitter Reststrom gate-emitter leakage current	V_{CE} = 0V, V_{GE} = 20V, T_{vj} = 25°C	I_{GES}	-	-	600	nA

prepared by: Mark Münzer	date of publication: 12.8.1998
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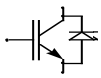


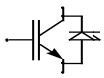
vorläufige Daten
preliminary data

Charakteristische Werte / Characteristic values

Transistor / Transistor			**min.**	**typ.**	**max.**	
Einschaltverzögerungszeit (ind. Last) turn on delay time (inductive load)	I_C = 1200A, V_{CE} = 600V					
	V_{GE} = ±15V, R_G = 0,82Ω, T_{vj} = 25°C	$t_{d,on}$	-	0,54	-	µs
	V_{GE} = ±15V, R_G = 0,82Ω, T_{vj} = 125°C		-	0,57	-	µs
Anstiegszeit (induktive Last) rise time (inductive load)	I_C = 1200A, V_{CE} = 600V					
	V_{GE} = ±15V, R_G = 0,82Ω, T_{vj} = 25°C	t_r	-	0,18	-	µs
	V_{GE} = ±15V, R_G = 0,82Ω, T_{vj} = 125°C		-	0,18	-	µs
Abschaltverzögerungszeit (ind. Last) turn off delay time (inductive load)	I_C = 1200A, V_{CE} = 600V					
	V_{GE} = ±15V, R_G = 0,82Ω, T_{vj} = 25°C	$t_{d,off}$	-	1,03	-	µs
	V_{GE} = ±15V, R_G = 0,82Ω, T_{vj} = 125°C		-	1,14	-	µs
Fallzeit (induktive Last) fall time (inductive load)	I_C = 1200A, V_{CE} = 600V					
	V_{GE} = ±15V, R_G = 0,82Ω, T_{vj} = 25°C	t_f	-	0,13	-	µs
	V_{GE} = ±15V, R_G = 0,82Ω, T_{vj} = 125°C		-	0,14	-	µs
Einschaltverlustenergie pro Puls turn-on energy loss per pulse	I_C = 1200A, V_{CE} = 600V, V_{GE} = 15V					
	R_G = 0,82Ω, T_{vj} = 125°C, L_S = 70nH	E_{on}	-	165	-	mWs
Abschaltverlustenergie pro Puls turn-off energy loss per pulse	I_C = 1200A, V_{CE} = 600V, V_{GE} = 15V					
	R_G = 0,82Ω, T_{vj} = 125°C, L_S = 70nH	E_{off}	-	195	-	mWs
Kurzschlußverhalten SC Data	$t_P \leq$ 10µsec, $V_{GE} \leq$ 15V, R_G = 0,82Ω					
	$T_{vj} \leq$125°C, V_{CC}=900V, $V_{CEmax}=V_{CES}-L_{sCE}\cdot dI/dt$	I_{SC}	-	9000	-	A
Modulinduktivität stray inductance module		L_{sCE}	-	15	-	nH
Modul Leitungswiderstand, Anschlüsse – Chip module lead resistance, terminals – chip	T_C=25°C	$R_{CC'+EE'}$	-	0,10	-	mΩ

Charakteristische Werte / Characteristic values

Diode / Diode			**min.**	**typ.**	**max.**	
Durchlaßspannung forward voltage	I_F = 1200A, V_{GE} = 0V, T_{vj} = 25°C	V_F	-	1,8	2,3	V
	I_F = 1200A, V_{GE} = 0V, T_{vj} = 125°C		-	1,7		V
Rückstromspitze peak reverse recovery current	I_F = 1200A, - di_F/dt = 6800A/µsec					
	V_R = 600V, V_{GE} = -15V, T_{vj} = 25°C	I_{RM}	-	740	-	A
	V_R = 600V, V_{GE} = -15V, T_{vj} = 125°C		-	980	-	A
Sperrverzögerungsladung recovered charge	I_F = 1200A, - di_F/dt = 6800A/µsec					
	V_R = 600V, V_{GE} = -15V, T_{vj} = 25°C	Q_r	-	105	-	µAs
	V_R = 600V, V_{GE} = -15V, T_{vj} = 125°C		-	215	-	µAs
Abschaltenergie pro Puls reverse recovery energy	I_F = 1200A, - di_F/dt = 6800A/µsec					
	V_R = 600V, V_{GE} = -15V, T_{vj} = 25°C	E_{rec}	-	45	-	mWs
	V_R = 600V, V_{GE} = -15V, T_{vj} = 125°C		-	80	-	mWs



vorläufige Daten
preliminary data

Thermische Eigenschaften / Thermal properties

			min.	typ.	max.	
Innerer Wärmewiderstand thermal resistance, junction to case	Transistor / transistor, DC Diode/Diode, DC	R_{thJC}	- -	- -	0,016 0,032	K/W K/W
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	pro Modul / per module $d_{Paste} \leq 100\mu m$ / $d_{grease} \leq 100\mu m$	R_{thCK}	-	-	0,008	K/W
Höchstzulässige Sperrschichttemperatur maximum junction temperature		T_{vj}	-	-	150	°C
Betriebstemperatur operation temperature		T_{op}	-40	-	125	°C
Lagertemperatur storage temperature		T_{stg}	-40	-	125	°C

Mechanische Eigenschaften / Mechanical properties

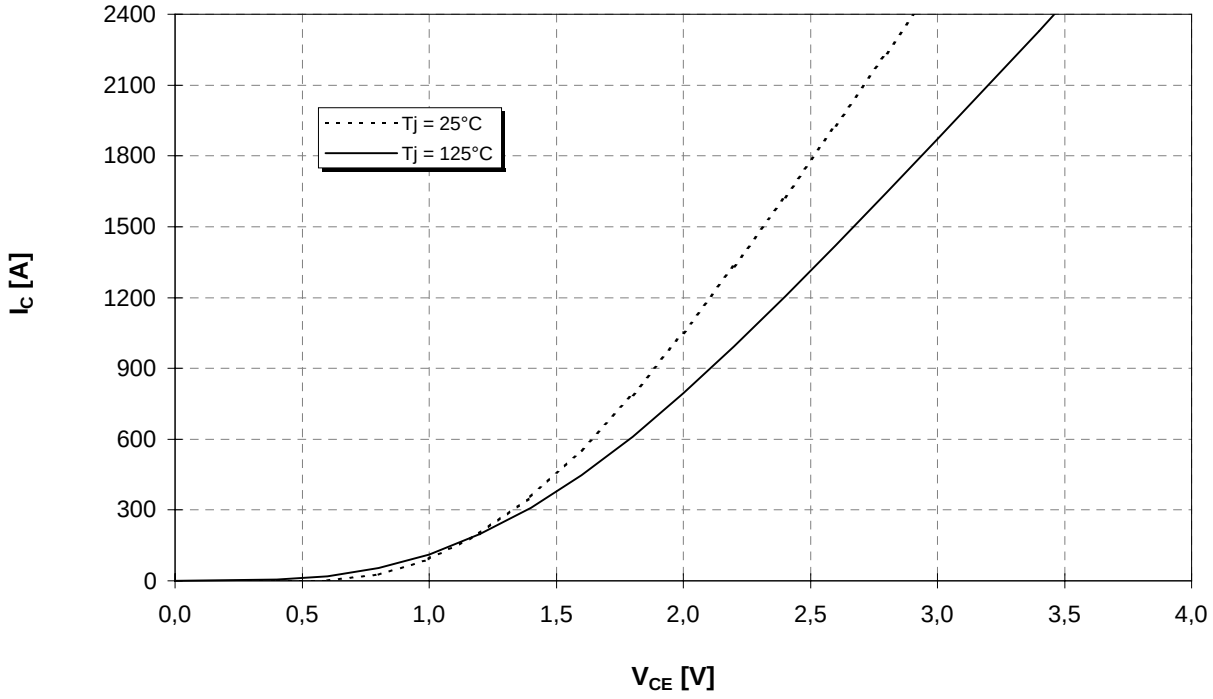
Gehäuse, siehe Anlage case, see appendix						
Innere Isolation internal insulation				Al_2O_3		
Kriechstrecke creepage distance				17		mm
Luftstrecke clearance				10		mm
CTI comperative tracking index				275		
Anzugsdrehmoment f. mech. Befestigung mounting torque		M1	4,25	5	5,75	Nm
Anzugsdrehmoment f. elektr. Anschlüsse terminal connection torque	terminals M4 terminals M8	M2	1,7 8	2	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.

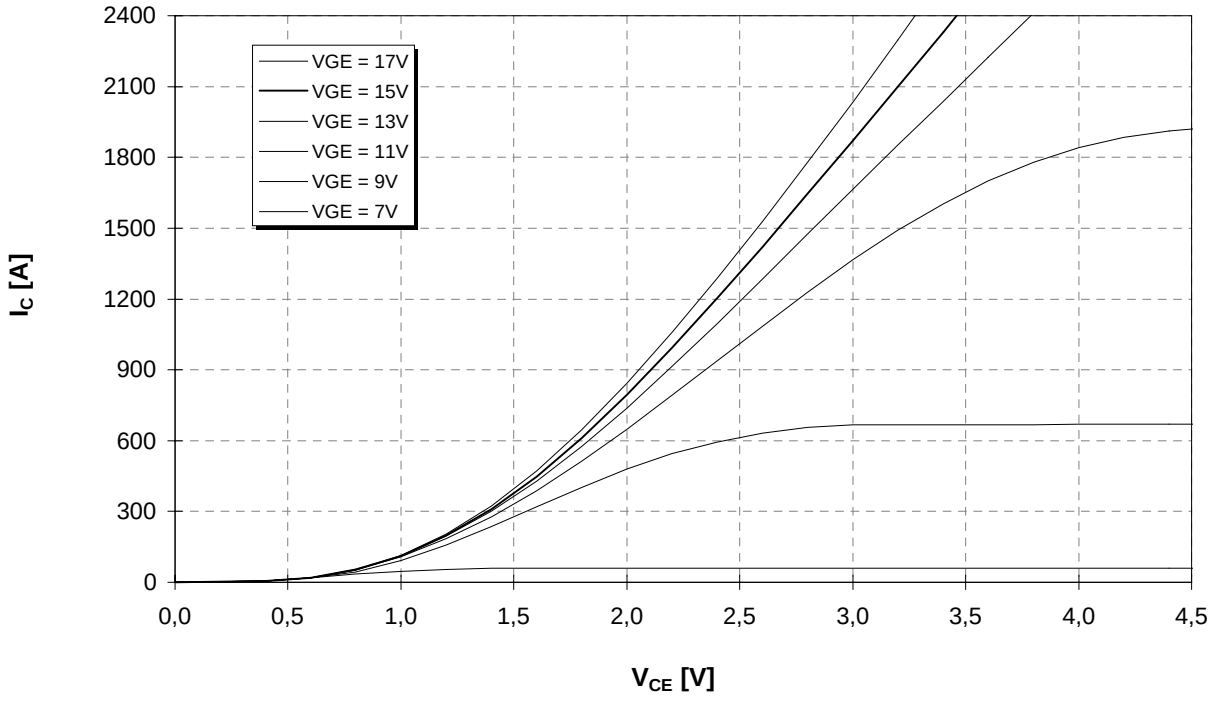
This technical information specifies semiconductor devices but promises no characteristics. It is valid in combination with the belonging technical notes.

vorläufige Daten
preliminary data

Ausgangskennlinie (typisch) $I_C = f(V_{CE})$
Output characteristic (typical) $V_{GE} = 15V$

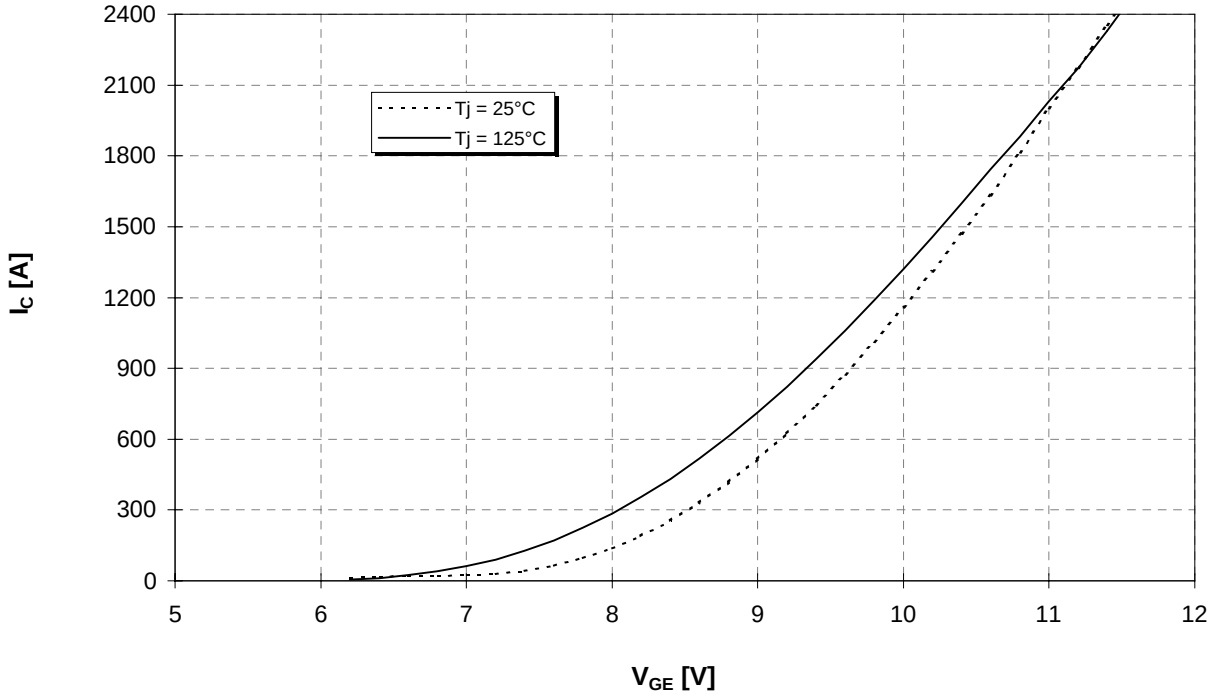


Ausgangskennlinienfeld (typisch) $I_C = f(V_{CE})$
Output characteristic (typical) $T_{vj} = 125°C$

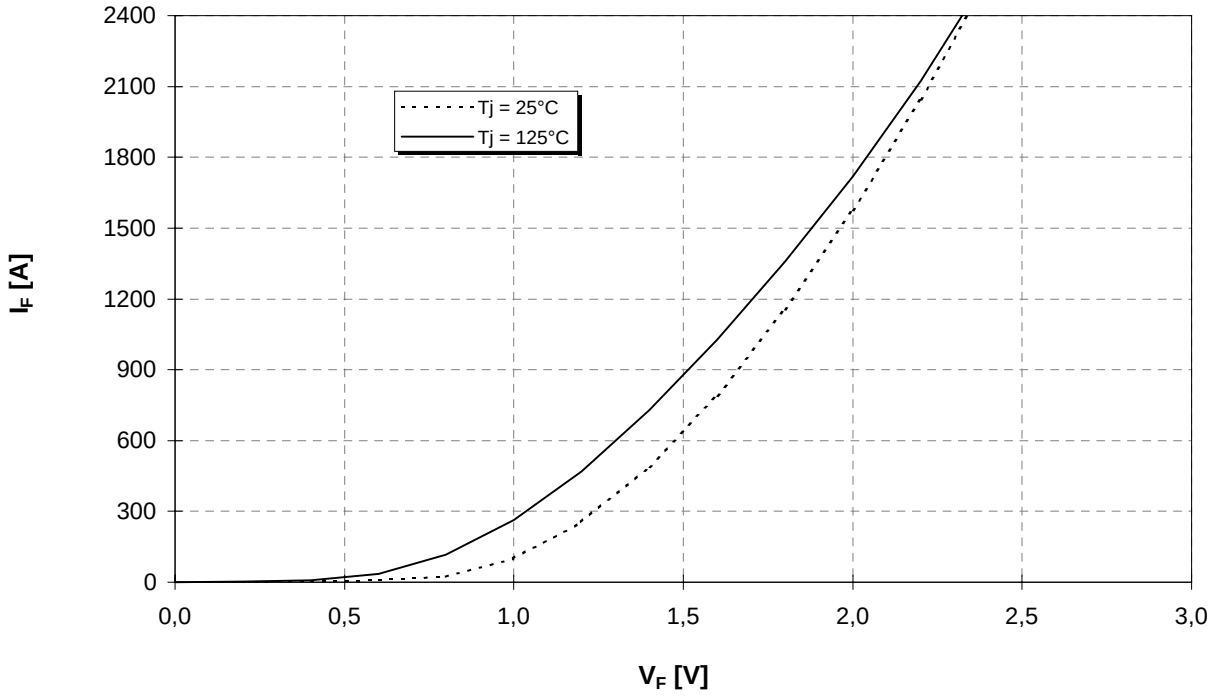


vorläufige Daten
preliminary data

Übertragungscharakteristik (typisch) $I_C = f(V_{GE})$
Transfer characteristic (typical) $V_{CE} = 20V$

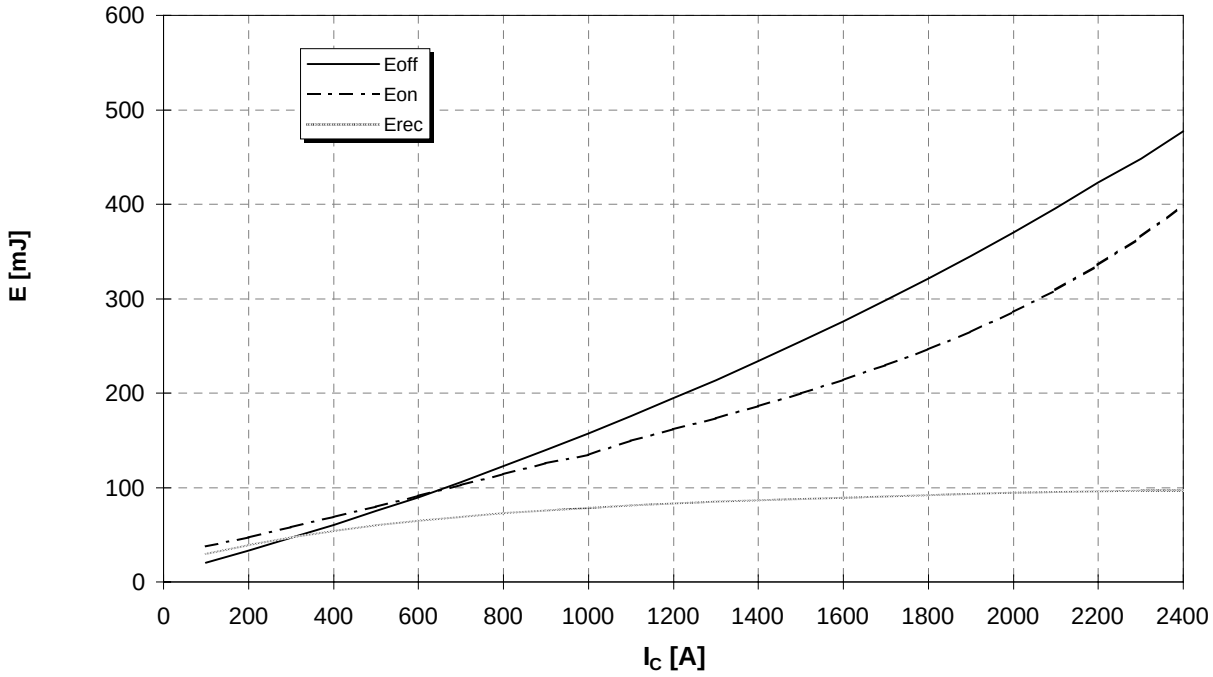


Durchlaßkennlinie der Inversdiode (typisch) $I_F = f(V_F)$
Forward characteristic of inverse diode (typical)

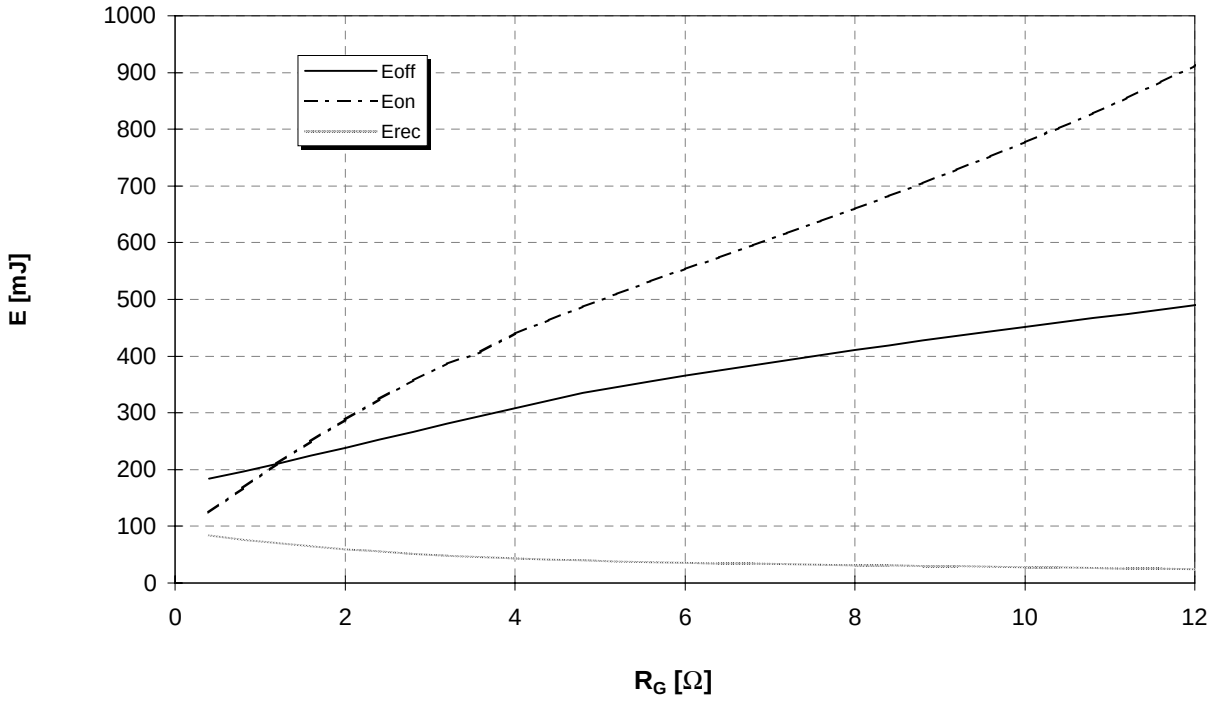


vorläufige Daten
preliminary data

Schaltverluste (typisch) $E_{on} = f(I_C)$, $E_{off} = f(I_C)$, $E_{rec} = f(I_C)$
Switching losses (typical) $V_{GE} = \pm 15V$, $R_{gon} = R_{goff} = 0{,}82\ \Omega$, $V_{CE} = 600V$, $T_j = 125°C$



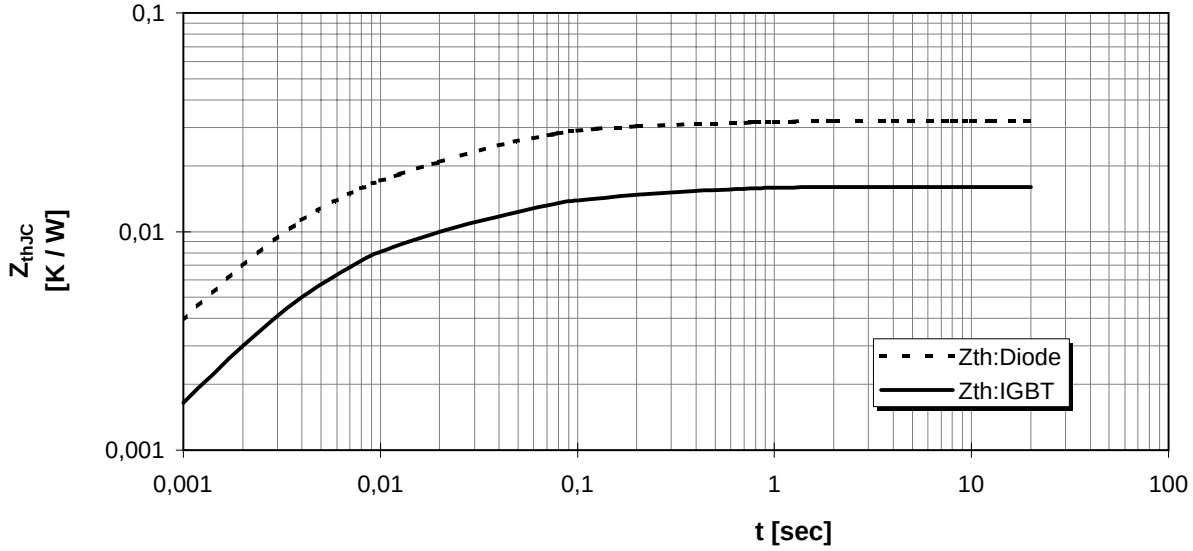
Schaltverluste (typisch) $E_{on} = f(R_G)$, $E_{off} = f(R_G)$, $E_{rec} = f(R_G)$
Switching losses (typical) $V_{GE} = \pm 15V$, $I_C = 1200A$, $V_{CE} = 600V$, $T_j = 125°C$



vorläufige Daten

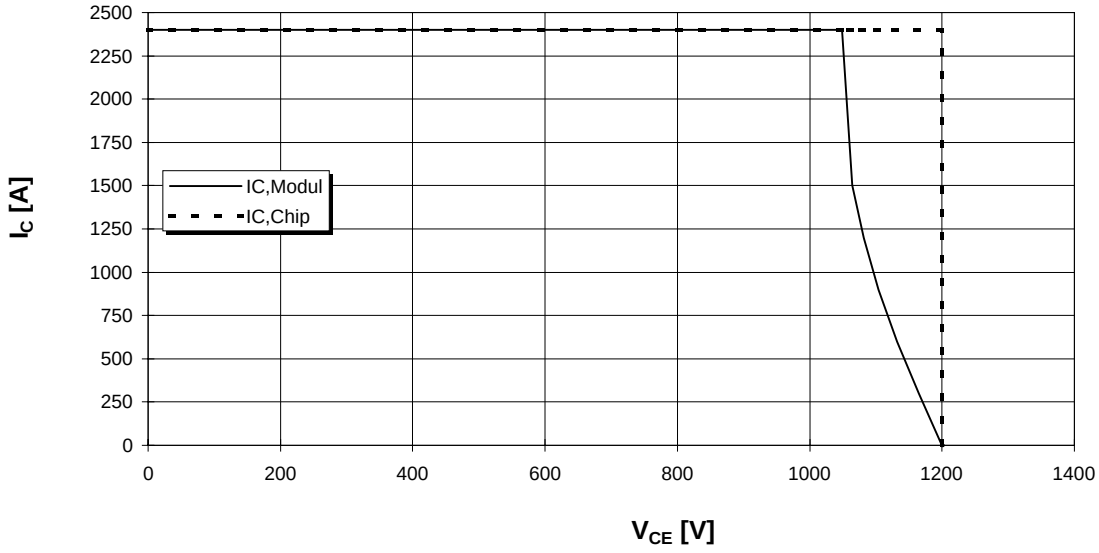
preliminary data

Transienter Wärmewiderstand $Z_{thJC} = f(t)$
Transient thermal impedance

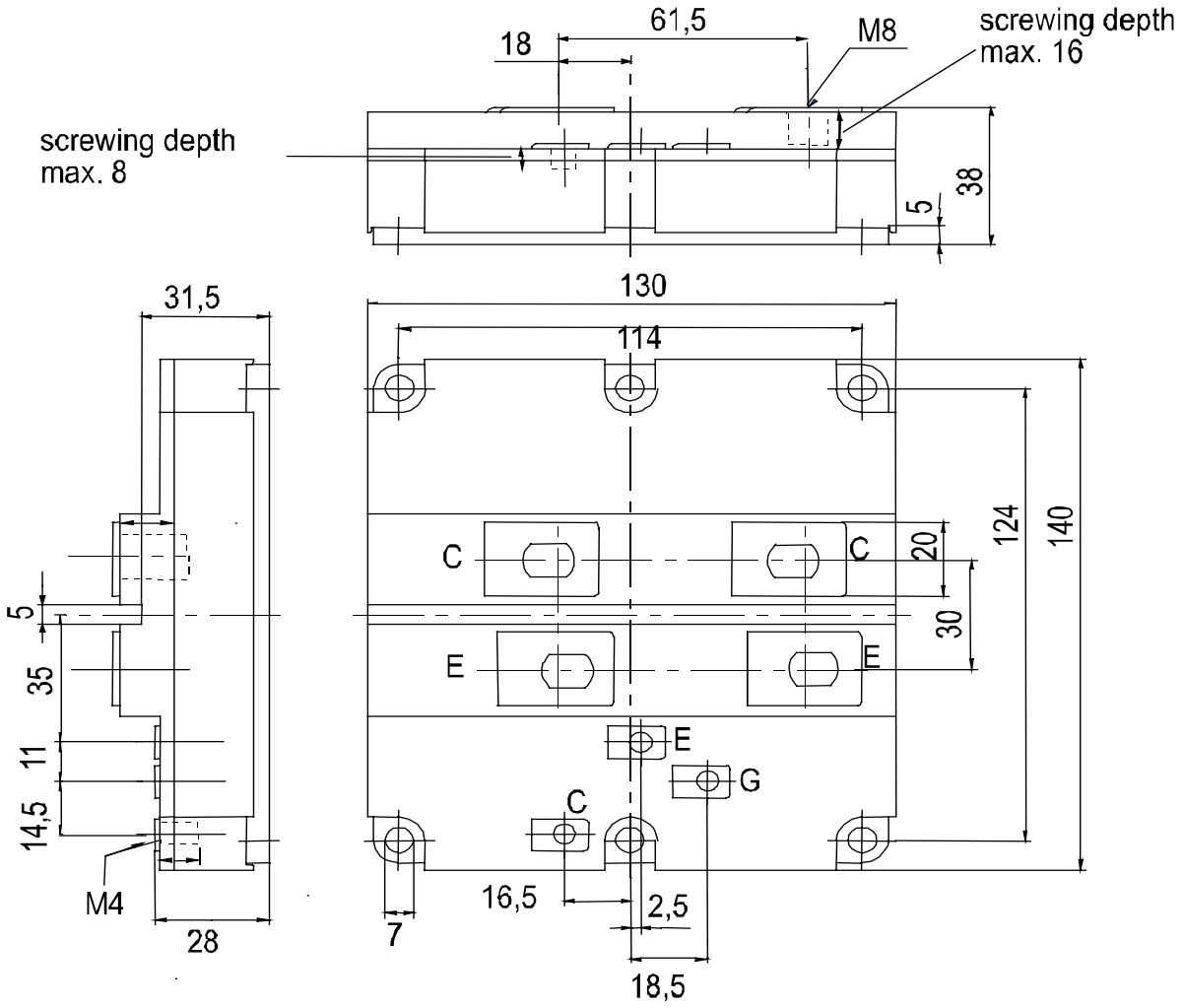


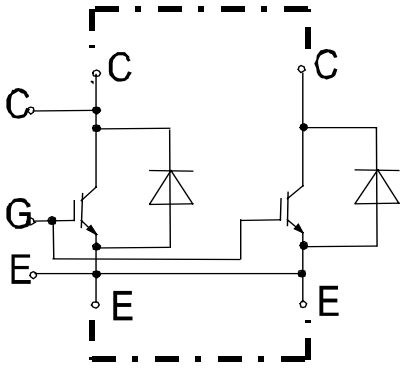
i		1	2	3	4
r_i [K/kW]	: IGBT	7,3	6,3	1,1	1,2
τ_i [sec]	: IGBT	0,004	0,04	0,19	0,5
r_i [K/kW]	: Diode	13,6	7,5	8,6	2,3
τ_i [sec]	: Diode	0,003	0,03	0,05	0,5

Sicherer Arbeitsbereich (RBSOA)
Reverse bias safe operation area (RBSOA) R_g = 0,82Ohm, T_{vj}= 125°C



preliminary data **vorläufige Daten**





external connections (to be done)

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