Technische Information / Technical Information

eupec

IGBT-Module
IGBT-Modules

FZ 1200 R 33 KF2_B5

vorläufige Daten
preliminary data

Höchstzulässige Werte / Maximum rated values

Elektrische Eigenschaften / Electrical properties

Kollektor-Emitter-Sperrspannung collector-emitter voltage	T_{vj} = 25°C T_{vj} = -25°C	V_{CES} V_{CES}	3300 3300	V V
Kollektor-Dauergleichstrom DC-collector current	T_C = 80°C T_C = 25 °C	$I_{C,nom.}$ I_C	1200 2000	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}	14,7	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	444	k A^2s
Spitzenverlustleistung der Diode maximum power dissipation diode	T_{vj} = 125°C	P_{RQM}	1200	kW
Isolations-Prüfspannung insulation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}	10,2	kV
Teilentladungs-Aussetzspannung partial discharge extinction voltage	RMS, f = 50 Hz, Q_{PD} typ. 10pC (acc. To IEC 1287)	V_{ISOL}	5,1	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	$V_{CE\ sat}$	- -	3,40 4,30	4,25 5,00	V V
Gate-Schwellenspannung gate threshold voltage	I_C = 120 mA, V_{CE} = V_{GE}, T_{vj} = 25°C	$V_{GE(th)}$	4,2	5,1	6,0	V
Eingangskapazität input capacitance	f = 1MHz, T_{vj} = 25°C, V_{CE} = 25V, V_{GE} = 0V	C_{ies}	-	150	-	nF
Rückwirkungskapazität reverse transfer capacitance	f = 1MHz, T_{vj} = 25°C, V_{CE} = 25V, V_{GE} = 0V	C_{res}	-	8	-	nF
Gateladung gate charge	V_{GE} = -15V ... + 15V	Q_G	-	22	-	µC
Kollektor-Emitter Reststrom collector-emitter cut-off current	V_{CE} = 3300V, V_{GE} = 0V, T_{vj} = 25°C	I_{CES}	-	-	5	mA
Gate-Emitter Reststrom gate-emitter leakage current	V_{CE} = 0V, V_{GE} = 20V, T_{vj} = 25°C	I_{GES}	-	-	400	nA

prepared by: Alfons Wiesenthal	date of publication : 2002-10-31
approved by: Christoph Lübke	revision: 2.0

vorläufige Daten
preliminary data

Charakteristische Werte / Characteristic values

Transistor / Transistor			min.	typ.	max.	
Einschaltverzögerungszeit (ind. Last) turn on delay time (inductive load)	I_C = 1200 A, V_{CE} = 1800V					
	V_{GE} = ±15V, R_G = 2,7 Ω, C_{GE} = 220nF, T_{vj} = 25°C	$t_{d,on}$	-	0,70	-	µs
	V_{GE} = ±15V, R_G = 2,7 Ω, C_{GE} = 220nF, T_{vj} = 125°C		-	0,65	-	µs
Anstiegszeit (induktive Last) rise time (inductive load)	I_C = 1200 A, V_{CE} = 1800V					
	V_{GE} = ±15V, R_G = 2,7 Ω, C_{GE} = 220nF, T_{vj} = 25°C	t_r	-	0,45	-	µs
	V_{GE} = ±15V, R_G = 2,7 Ω, C_{GE} = 220nF, T_{vj} = 125°C		-	0,48	-	µs
Abschaltverzögerungszeit (ind. Last) turn off delay time (inductive load)	I_C = 1200 A, V_{CE} = 1800V					
	V_{GE} = ±15V, R_G = 1,8 Ω, C_{GE} = 220nF, T_{vj} = 25°C	$t_{d,off}$	-	1,90	-	µs
	V_{GE} = ±15V, R_G = 1,8 Ω, C_{GE} = 220nF, T_{vj} = 125°C		-	2,10	-	µs
Fallzeit (induktive Last) fall time (inductive load)	I_C = 1200 A, V_{CE} = 1800V					
	V_{GE} = ±15V, R_G = 1,8 Ω, C_{GE} = 220nF, T_{vj} = 25°C	t_f	-	0,20	-	µs
	V_{GE} = ±15V, R_G = 1,8 Ω, C_{GE} = 220nF, T_{vj} = 125°C		-	0,20	-	µs
Einschaltverlustenergie pro Puls turn-on energy loss per pulse	I_C = 1200 A, V_{CE} = 1800V, V_{GE} = 15V					
	R_G = 1,5 Ω, C_{GE} = 220 nF, T_{vj} = 125°C, L_S = 40nH	E_{on}	-	2900	-	mWs
Abschaltverlustenergie pro Puls turn-off energy loss per pulse	I_C = 1200 A, V_{CE} = 1800V, V_{GE} = 15V					
	R_G = 1,8 Ω, C_{GE} = 220 nF, T_{vj} = 125°C, L_S = 40nH	E_{off}	-	1600	-	mWs
Kurzschlußverhalten SC Data	$t_P \le$ 10µsec, $V_{GE} \le$ 15V					
	$T_{Vj} \le$125°C, V_{CC}=2500V, V_{CEmax}=V_{CES} -L_{sCE} ·dI/dt	I_{SC}	-	6000	-	A
Modulinduktivität stray inductance module		L_{sCE}	-	18	-	nH
Modul-Leitungswiderstand, Anschlüsse - Chip lead resistance, terminals - chip	T_C = 25°C	$R_{CC'+EE'}$	-	0,12	-	mΩ

Charakteristische Werte / Characteristic values

Diode / Diode			min.	typ.	max.	
Durchlaßspannung forward voltage	I_F = 1200 A, V_{GE} = 0V, T_{vj} = 25°C	V_F	-	2,80	3,50	V
	I_F = 1200 A, V_{GE} = 0V, T_{vj} = 125°C		-	2,80	3,50	V
Rückstromspitze peak reverse recovery current	I_F = 1200 A, - di_F/dt = 4600 A/µsec					
	V_R = 1800V, V_{GE} = -10V, T_{vj} = 25°C	I_{RM}	-	1250	-	A
	V_R = 1800V, V_{GE} = -10V, T_{vj} = 125°C		-	1350	-	A
Sperrverzögerungsladung recovered charge	I_F = 1200 A, - di_F/dt = 4600 A/µsec					
	V_R = 1800V, V_{GE} = -10V, T_{vj} = 25°C	Q_r	-	710	-	µAs
	V_R = 1800V, V_{GE} = -10V, T_{vj} = 125°C		-	1320	-	µAs
Abschaltenergie pro Puls reverse recovery energy	I_F = 1200 A, - di_F/dt = 4600 A/µsec					
	V_R = 1800V, V_{GE} = -10V, T_{vj} = 25°C	E_{rec}	-	680	-	mWs
	V_R = 1800V, V_{GE} = -10V, T_{vj} = 125°C		-	1400	-	mWs

vorläufige Daten
preliminary data

Thermische Eigenschaften / Thermal properties

			min.	typ.	max.	
Innerer Wärmewiderstand thermal resistance, junction to case	Transistor / transistor, DC	R_{thJC}	-	-	0,0085	K/W
	Diode/Diode, DC		-	-	0,0170	K/W
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	pro Modul / per module λ_{Paste} = 1 W/m*K / λ_{grease} = 1 W/m*K	R_{thCK}	-	0,006	-	K/W
Höchstzulässige Sperrschichttemperatur maximum junction temperature		$T_{vj\ max}$	-	-	150	°C
Betriebstemperatur operation temperature		$T_{vj\ op}$	-40	-	125	°C
Lagertemperatur storage temperature		T_{stg}	-40	-	125	°C

Mechanische Eigenschaften / Mechanical properties

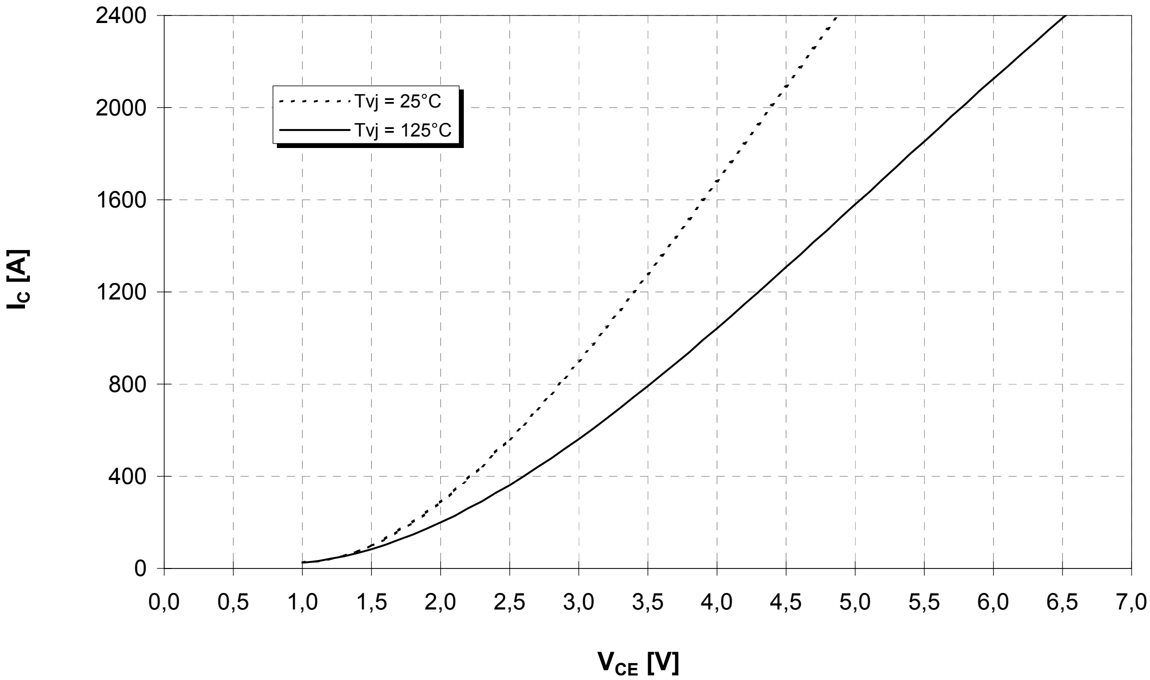
Gehäuse, siehe Anlage case, see appendix						
Material Modulgrundplatte material of module baseplate				AlSiC		
Innere Isolation internal insulation				AlN		
Kriechstrecke creepage distance				56		mm
Luftstrecke clearance				26		mm
CTI comperative tracking index				> 600		
Anzugsdrehmoment f. mech. Befestigung mounting torque	Schraube M6 / screw M6	M	4,25	-	5,75	Nm
Anzugsdrehmoment f. elektr. Anschlüsse terminal connection torque	Anschlüsse / terminals M4	M	1,8		2,1	Nm
	Anschlüsse / terminals M8	M	8		10	Nm
Gewicht weight		G		1400		g

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

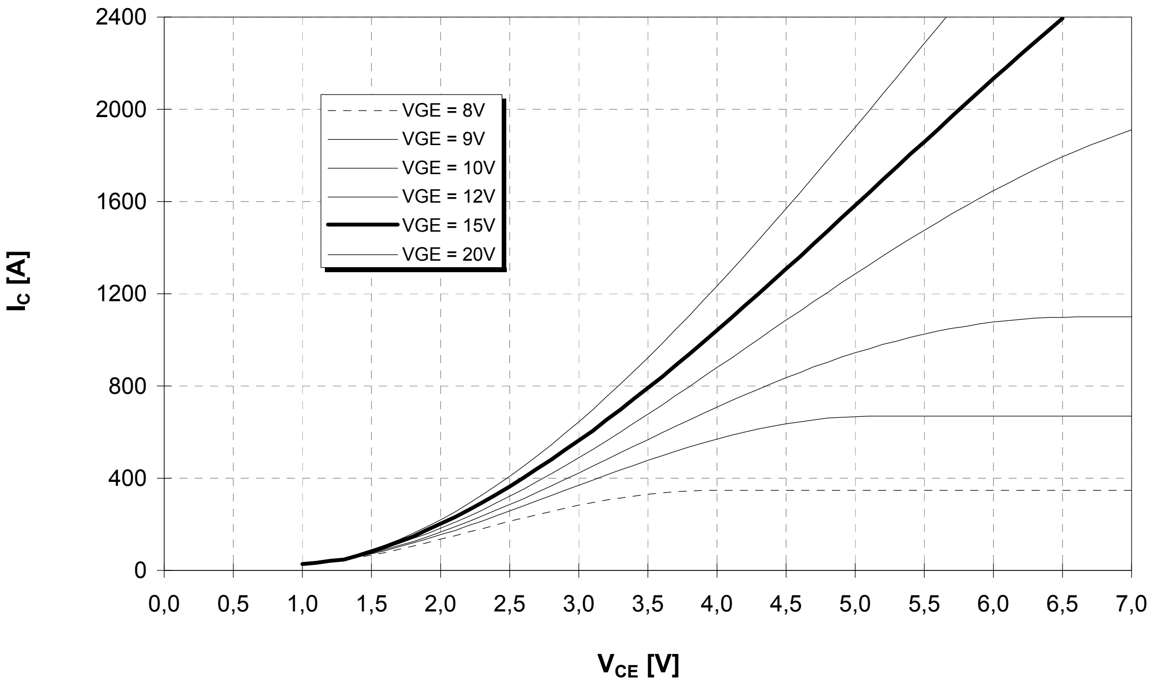
This technical information specifies semiconductor devices but promises no characteristics. It is valid in combination with the belonging technical notes.

vorläufige Daten
preliminary data

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

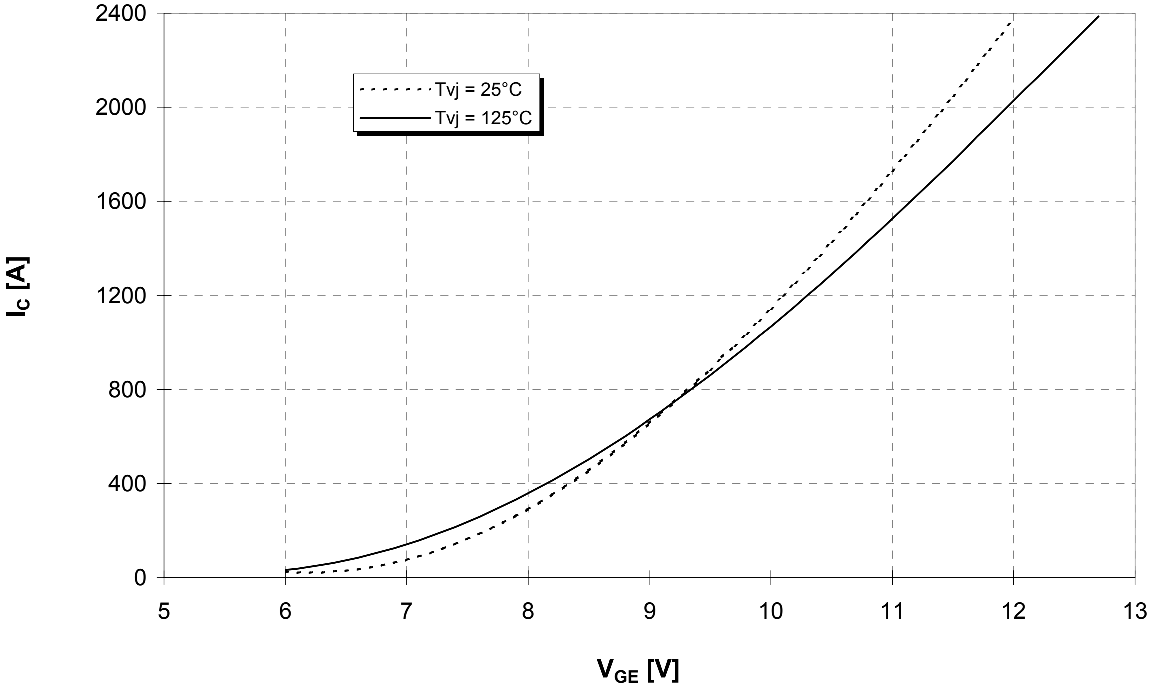


Ausgangskennlinienfeld (typisch) $I_C = f(V_{CE})$
Output characteristic (typical) $T_{vj} = 125°C$

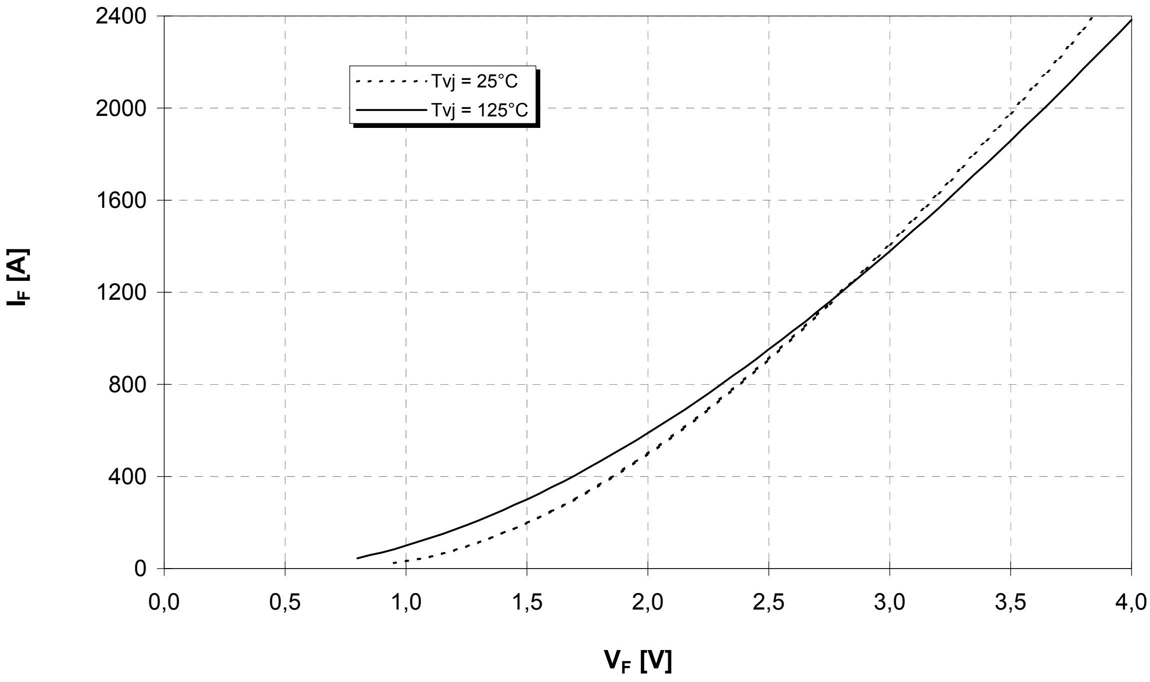


vorläufige Daten
preliminary data

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

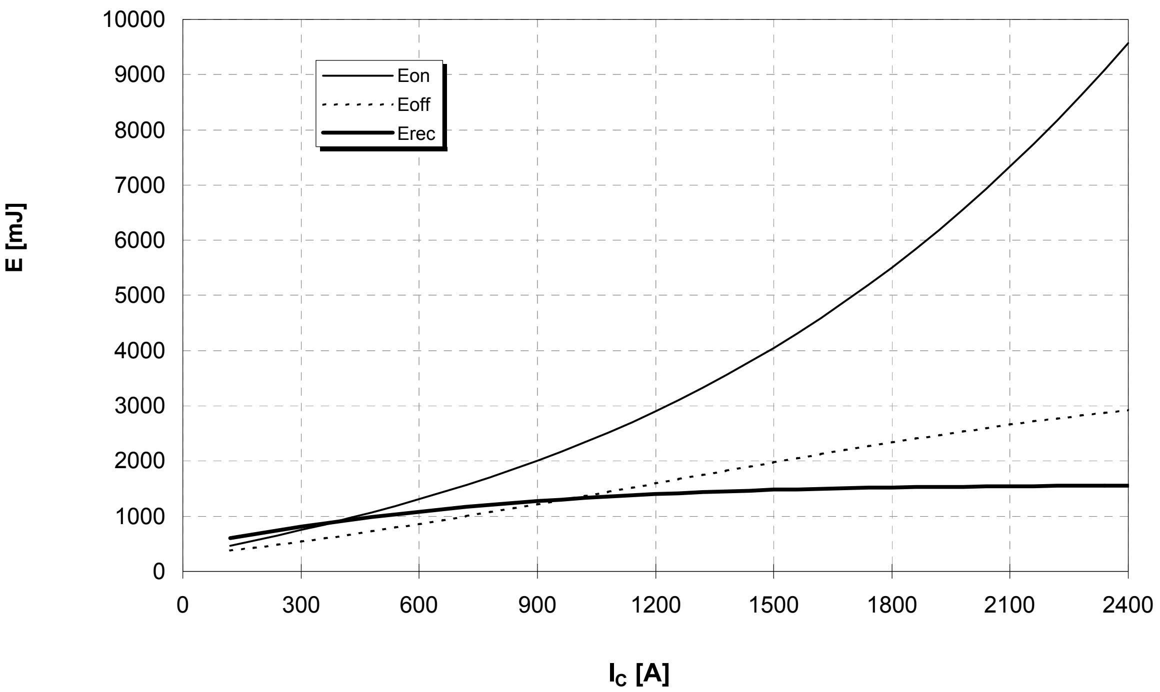


Durchlaßkennlinie der Inversdiode (typisch) **I_F = f (V_F)**
Forward characteristic of inverse diode (typical)

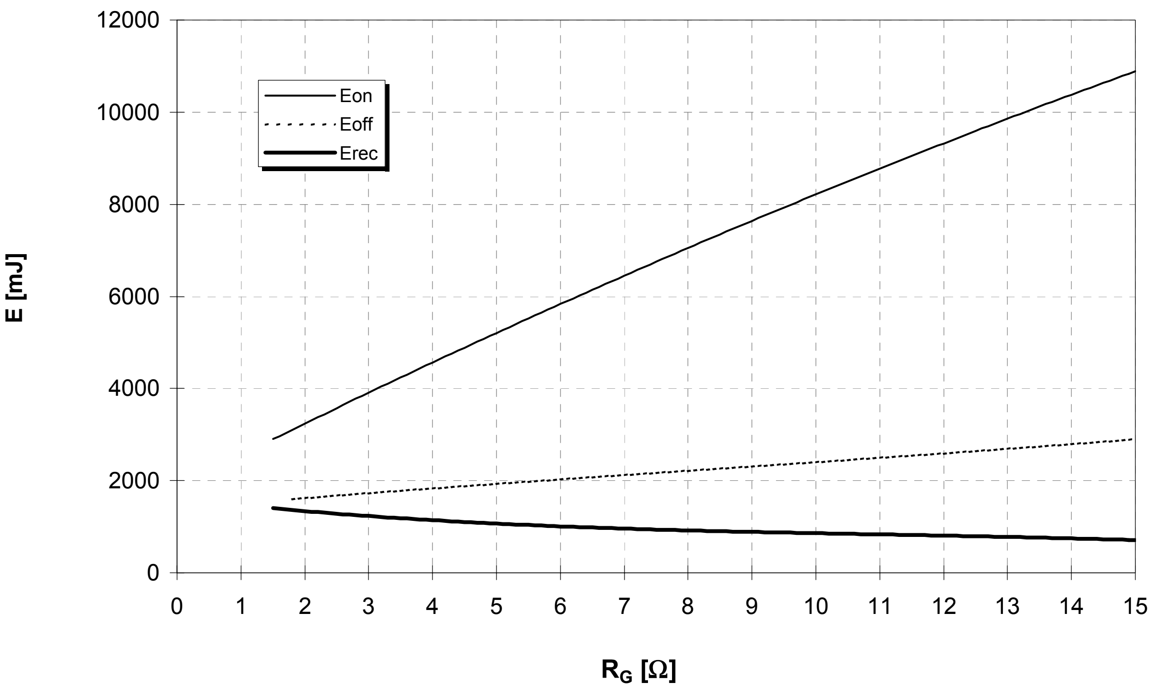


vorläufige Daten
preliminary data

Schaltverluste (typisch) $E_{on} = f(I_C)$, $E_{off} = f(I_C)$, $E_{rec} = f(I_C)$
Switching losses (typical) T_{vj}=125°C, V_{CE} = 1800V, V_{GE}=±15V, $R_G$on = 1,5 Ω, $R_G$off = 1,8 Ω, C_{GE} = 220 nF



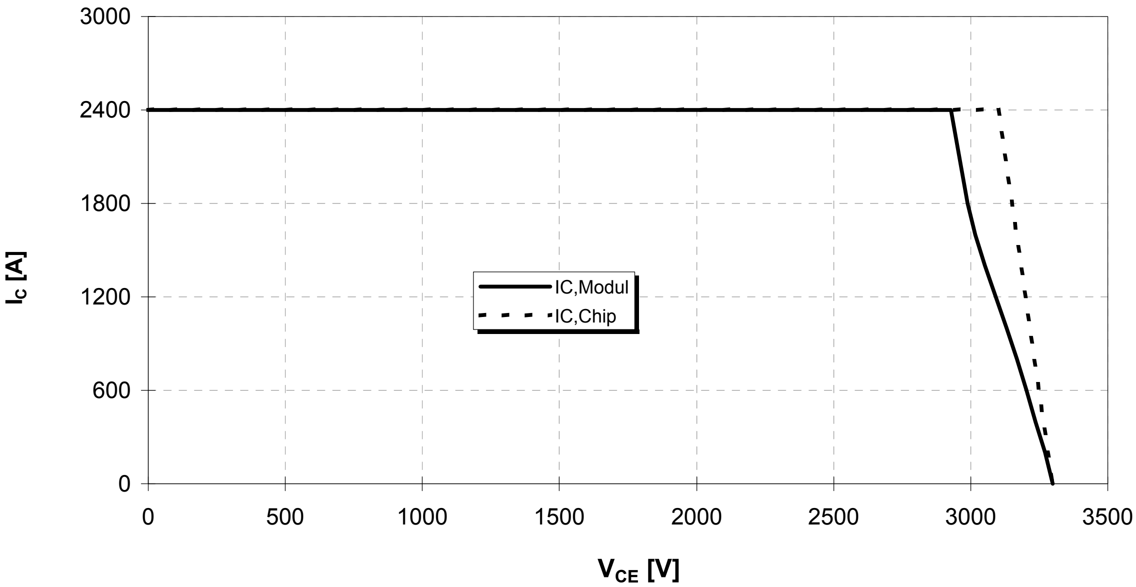
Schaltverluste (typisch) $E_{on} = f(R_G)$, $E_{off} = f(R_G)$, $E_{rec} = f(R_G)$
Switching losses (typical) T_{vj} = 125°C, I_C = 1200 A , V_{CE} = 1800V , V_{GE} = ±15V, C_{GE} = 220nF



vorläufige Daten
preliminary data

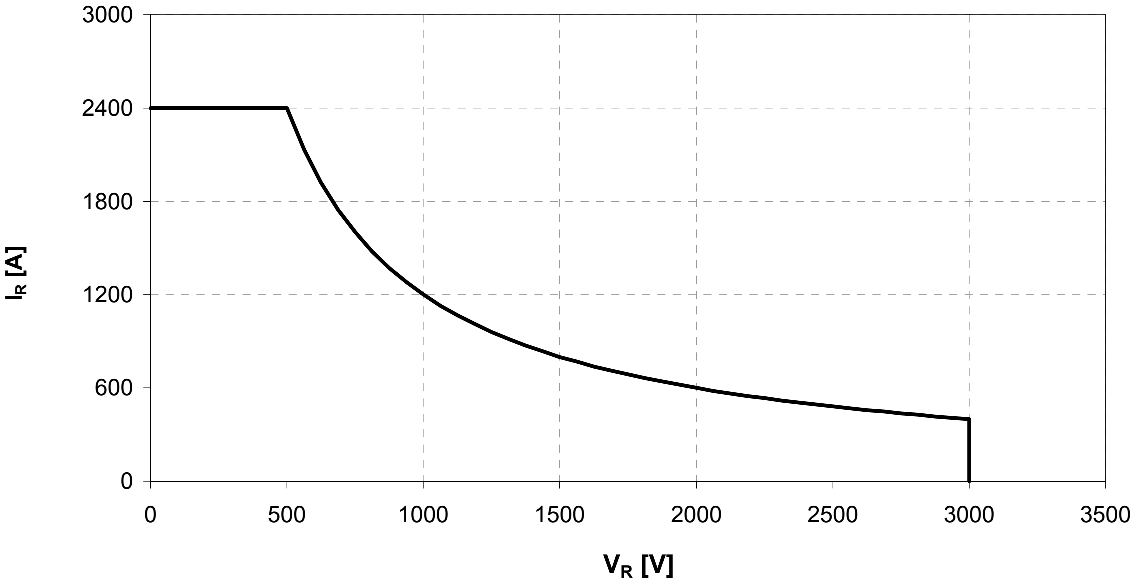
Sicherer Arbeitsbereich IGBT (RBSOA)
Reverse bias safe operation area IGBT (RBSOA)

V_{GE} = ±15V, $R_{G,off}$ = 1,8Ω, C_{GE} = 220 nF
T_{vj}= 125°C



Sicherer Arbeitsbereich Diode (SOA)
safe operation area Diode (SOA)

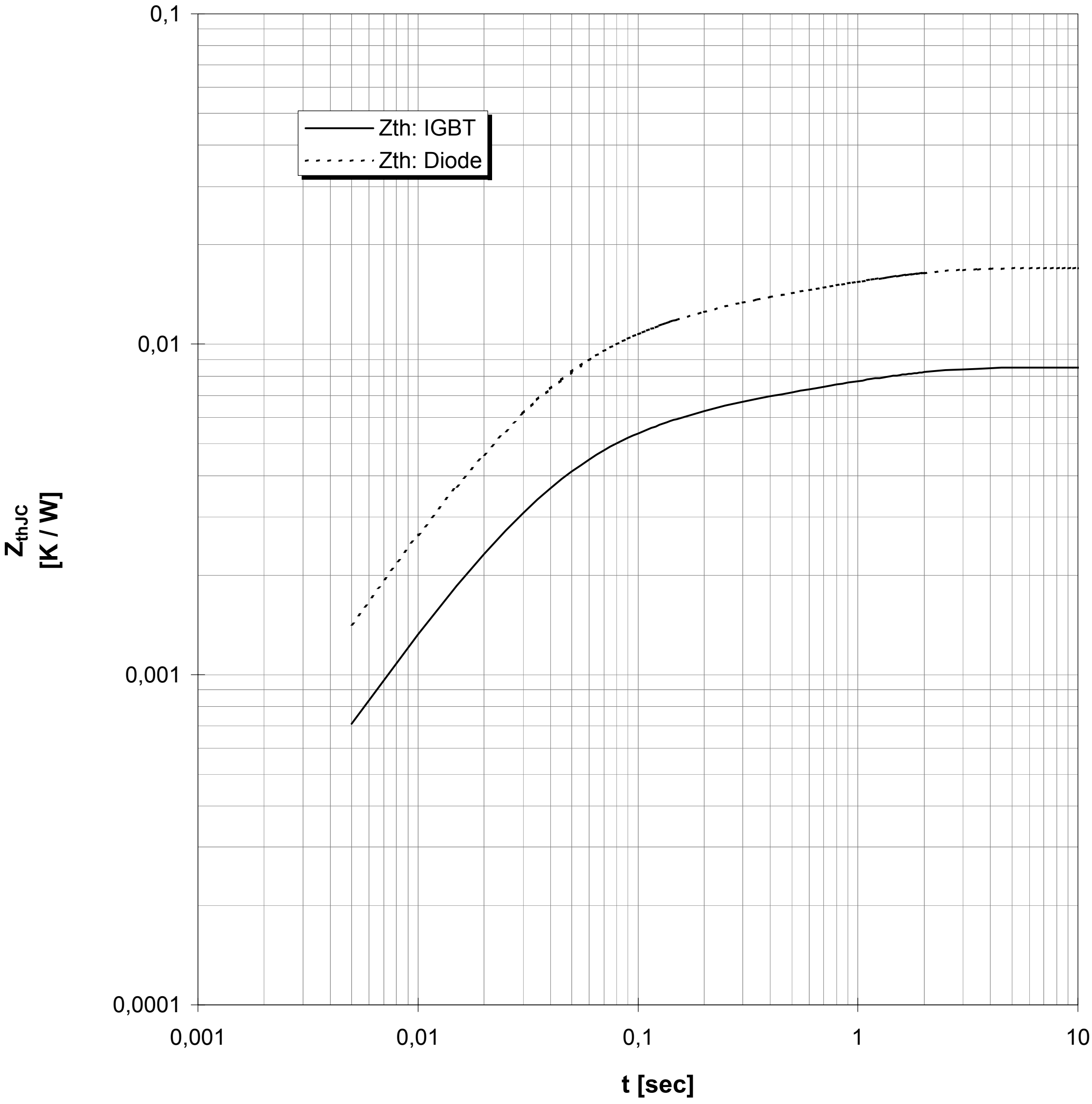
T_{vj}= 125°C



vorläufige Daten
preliminary data

Transienter Wärmewiderstand
Transient thermal impedance

Z_{thJC} = f (t)



i		1	2	3	4
r_i [K/kW]	: IGBT	3,83	2,13	0,51	2,04
τ_i [sec]	: IGBT	0,03	0,10	0,30	1,00
r_i [K/kW]	: Diode	7,65	4,25	1,02	4,08
τ_i [sec]	: Diode	0,03	0,10	0,30	1,00