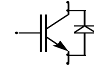
Technische Information / Technical Information

eupec

IGBT-Module
IGBT-Modules

FZ 1200 R 17 KF6 B2



Höchstzulässige Werte / Maximum rated values

Elektrische Eigenschaften / Electrical properties

Kollektor-Emitter-Sperrspannung collector-emitter voltage		V_{CES}	1700	V
Kollektor-Dauergleichstrom DC-collector current	T_C = 80 °C T_C = 25 °C	$I_{C,nom.}$ I_C	1200 2400	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}	9,6	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	tp = 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	440	kA^2s
Isolations-Prüfspannung insulation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}	4	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	$V_{CE\ sat}$		2,6 3,1	3,1 3,6	V V
Gate-Schwellenspannung gate threshold voltage	I_C = 80mA, V_{CE} = V_{GE}, T_{vj} = 25°C	$V_{GE(th)}$	4,5	5,5	6,5	V
Gateladung gate charge	V_{GE} = -15V ... +15V	Q_G		14,5		µC
Eingangskapazität input capacitance	f = 1MHz,T_{vj} = 25°C,V_{CE} = 25V, V_{GE} = 0V	C_{ies}		79		nF
Rückwirkungskapazität reverse transfer capacitance	f = 1MHz,T_{vj} = 25°C,V_{CE} = 25V, V_{GE} = 0V	C_{res}		4		nF
Kollektor-Emitter Reststrom collector-emitter cut-off current	V_{CE} = 1700V, V_{GE} = 0V, T_{vj} = 25°C V_{CE} = 1700V, V_{GE} = 0V, T_{vj} = 125°C	I_{CES}		0,03 16	2,5 120	mA mA
Gate-Emitter Reststrom gate-emitter leakage current	V_{CE} = 0V, V_{GE} = 20V, T_{vj} = 25°C	I_{GES}			400	nA

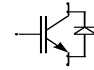
prepared by: Oliver Schilling	date of publication: 4.9.1998
approved by: Chr. Lübke; 08.10.99	revision: 2 (serie)

Technische Information / Technical Information

IGBT-Module
IGBT-Modules

FZ 1200 R 17 KF6 B2

eupec



Charakteristische Werte / Characteristic values

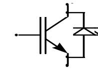
Transistor / Transistor

			min.	typ.	max.	
Einschaltverzögerungszeit (ind. Last) turn on delay time (inductive load)	I_C = 1200A, V_{CE} = 900V V_{GE} = ±15V, R_G = 1,2Ω, T_{vj} = 25°C V_{GE} = ±15V, R_G = 1,2Ω, T_{vj} = 125°C	$t_{d,on}$		0,3 0,3		µs µs
Anstiegszeit (induktive Last) rise time (inductive load)	I_C = 1200A, V_{CE} = 900V V_{GE} = ±15V, R_G = 1,2Ω, T_{vj} = 25°C V_{GE} = ±15V, R_G = 1,2Ω, T_{vj} = 125°C	t_r		0,16 0,16		µs µs
Abschaltverzögerungszeit (ind. Last) turn off delay time (inductive load)	I_C = 1200A, V_{CE} = 900V V_{GE} = ±15V, R_G = 1,2Ω, T_{vj} = 25°C V_{GE} = ±15V, R_G = 1,2Ω, T_{vj} = 125°C	$t_{d,off}$		1,1 1,1		µs µs
Fallzeit (induktive Last) fall time (inductive load)	I_C = 1200A, V_{CE} = 900V V_{GE} = ±15V, R_G = 1,2Ω, T_{vj} = 25°C V_{GE} = ±15V, R_G = 1,2Ω, T_{vj} = 125°C	t_f		0,13 0,14		µs µs
Einschaltverlustenergie pro Puls turn-on energy loss per pulse	I_C = 1200A, V_{CE} = 900V, V_{GE} = 15V R_G = 1,2Ω, T_{vj} = 125°C, L_S = 50nH	E_{on}		330		mWs
Abschaltverlustenergie pro Puls turn-off energy loss per pulse	I_C = 1200A, V_{CE} = 900V, V_{GE} = 15V R_G = 1,2Ω, T_{vj} = 125°C, L_S = 50nH	E_{off}		480		mWs
Kurzschlußverhalten SC Data	$t_P \leq$ 10µsec, $V_{GE} \leq$ 15V $T_{Vj}\leq$125°C, V_{CC}=1000V, $V_{CEmax}=V_{CES} - L_{sCE} \cdot dI/dt$	I_{SC}		4800		A
Modulinduktivität stray inductance module		L_{sCE}		12		nH
Modulleitungswiderstand, Anschlüsse - Chip module lead resistance, terminals - chip	pro Zweig / per arm	$R_{CC'+EE'}$		0,08		mΩ

Charakteristische Werte / Characteristic values

Diode / Diode

			min.	typ.	max.	
Durchlaßspannung forward voltage	I_F = 1200A, V_{GE} = 0V, T_{vj} = 25°C I_F = 1200A, V_{GE} = 0V, T_{vj} = 125°C	V_F		2,1 1,95	2,5 2,3	V V
Rückstromspitze peak reverse recovery current	I_F = 1200A, - di_F/dt = 7200A/µsec V_R = 900V, VGE = -10V, T_{vj} = 25°C V_R = 900V, VGE = -10V, T_{vj} = 125°C	I_{RM}		700 1000		A A
Sperrverzögerungsladung recovered charge	I_F = 1200A, - di_F/dt = 7200A/µsec V_R = 900V, VGE = -10V, T_{vj} = 25°C V_R = 900V, VGE = -10V, T_{vj} = 125°C	Q_r		160 350		µAs µAs
Abschaltenergie pro Puls reverse recovery energy	I_F = 1200A, - di_F/dt = 7200A/µsec V_R = 900V, VGE = -10V, T_{vj} = 25°C V_R = 900V, VGE = -10V, T_{vj} = 125°C	E_{rec}		90 180		mWs mWs



Thermische Eigenschaften / Thermal properties

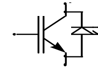
			min.	typ.	max.	
Innerer Wärmewiderstand thermal resistance, junction to case	Transistor / transistor, DC Diode/Diode, DC	R_{thJC}			0,013 0,025	K/W K/W
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	pro Modul / per module λ_{Paste} = 1 W/m*K / λ_{grease} = 1 W/m*K	R_{thCK}		0,008		K/W
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			AlN	
Kriechstrecke creepage distance			17	mm
Luftstrecke clearance			10	mm
CTI comperative tracking index			275	
Anzugsdrehmoment f. mech. Befestigung mounting torque		M1	5	Nm
Anzugsdrehmoment f. elektr. Anschlüsse terminal connection torque	terminals M4 terminals M8	M2	2 8 - 10	Nm Nm
Gewicht weight		G	1050	g

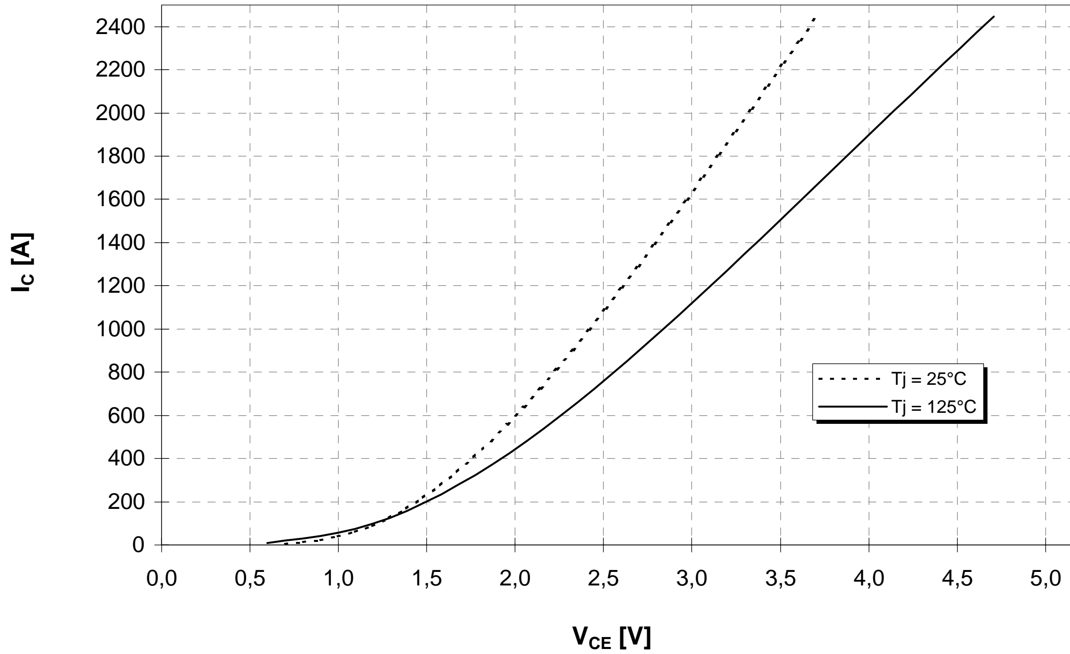
Mit dieser technischen Information werden Halbleiterbauelemente spezifiziert, jedoch keine Eigenschaften zugesichert. Sie gilt in Verbindung mit den zugehörigen Technischen Erläuterungen.

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



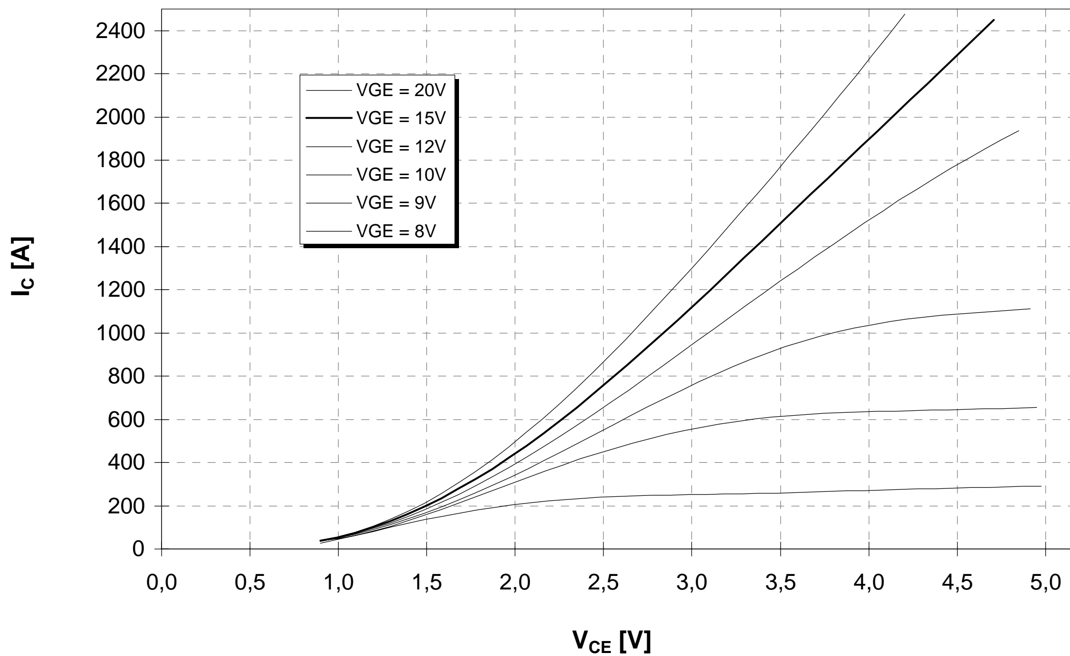
Ausgangskennlinie (typisch)
Output characteristic (typical)

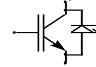
$I_C = f(V_{CE})$
$V_{GE} = 15V$



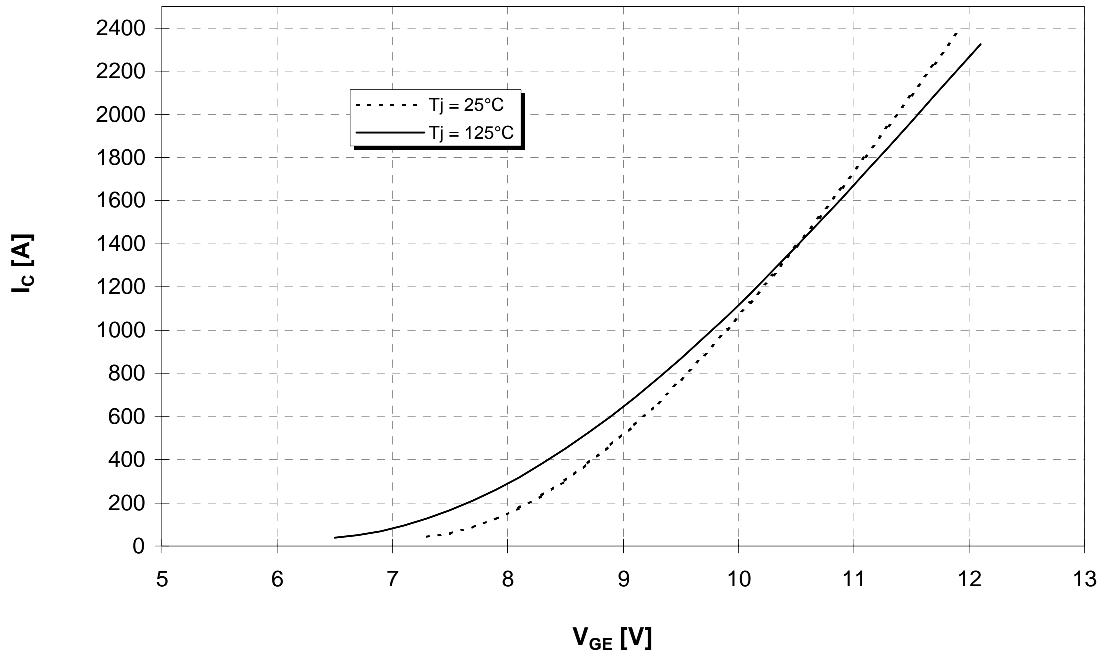
Ausgangskennlinienfeld (typisch)
Output characteristic (typical)

$I_C = f(V_{CE})$
$T_{vj} = 125°C$

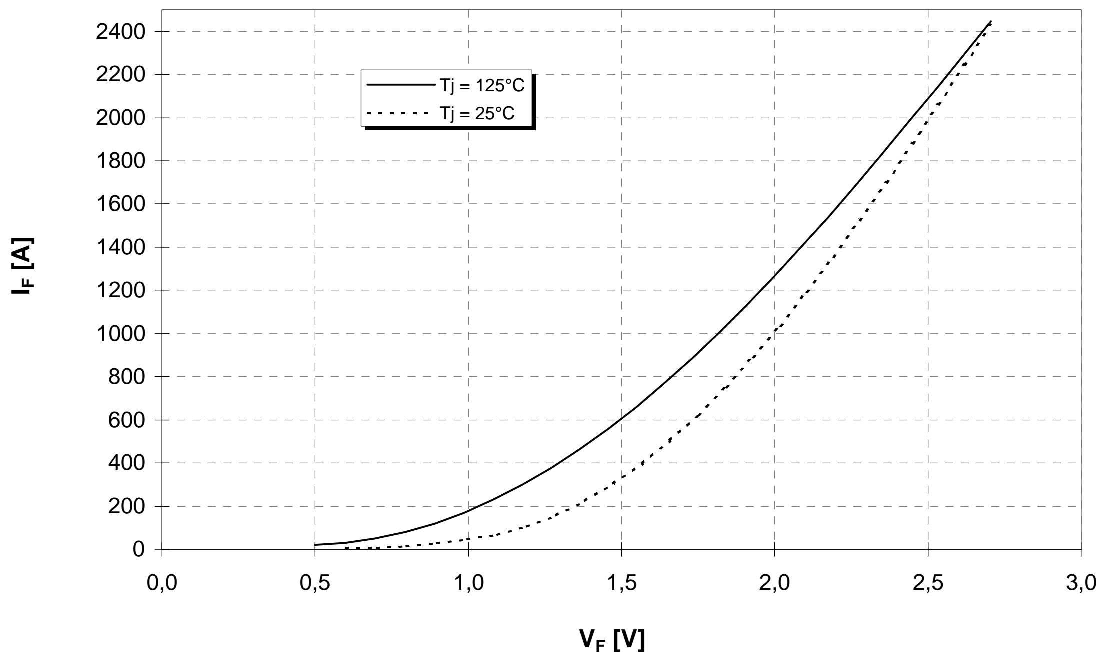


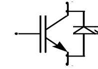


Übertragungscharakteristik (typisch) **$I_C = f(V_{GE})$**
Transfer characteristic (typical) $V_{CE} = 20V$

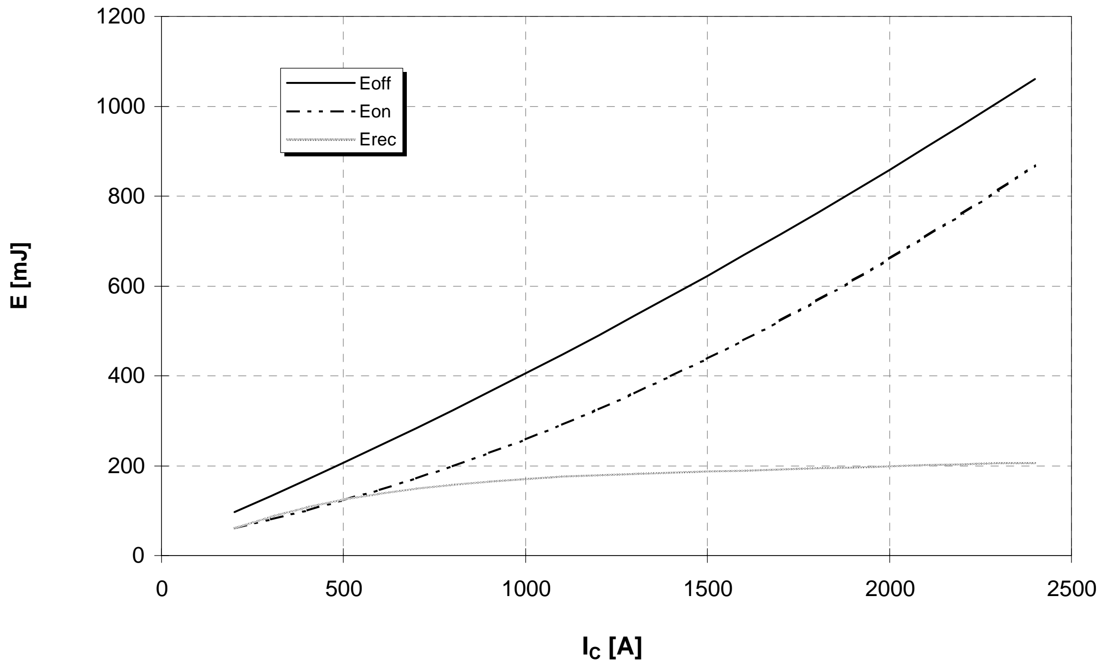


Durchlaßkennlinie der Inversdiode (typisch) **$I_F = f(V_F)$**
Forward characteristic of inverse diode (typical)

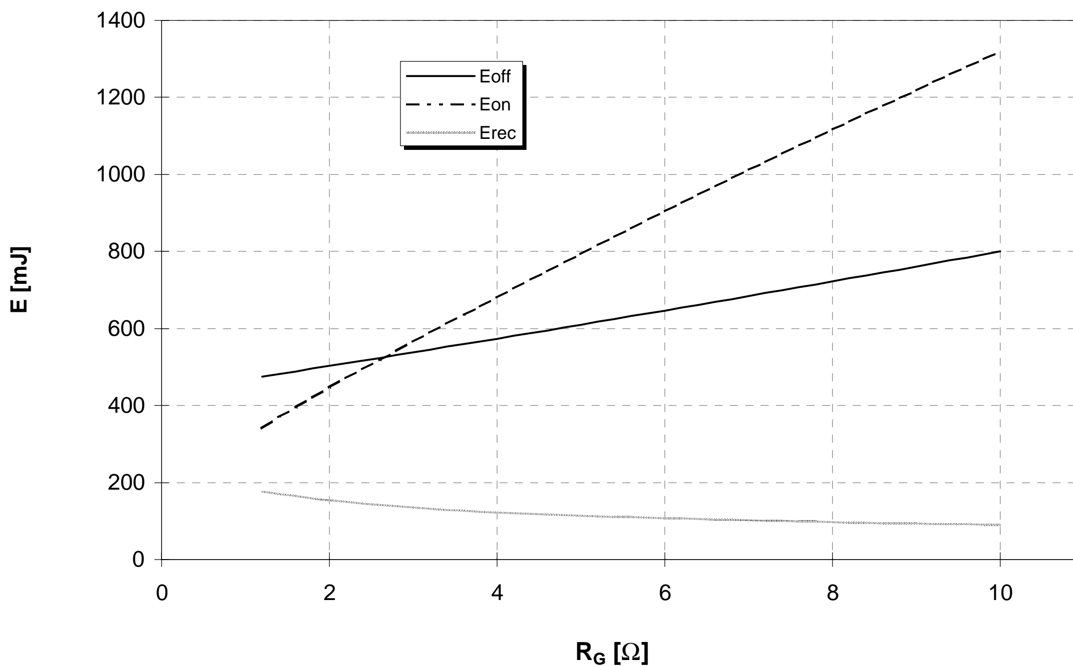


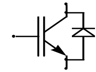


Schaltverluste (typisch) $E_{on} = f(I_C)$, $E_{off} = f(I_C)$, $E_{rec} = f(I_C)$
Switching losses (typical) $R_{gon} = R_{goff} = 1,2\ \Omega$, $V_{CE} = 900V$, $T_j = 125°C$, $V_{GE} = \pm 15V$

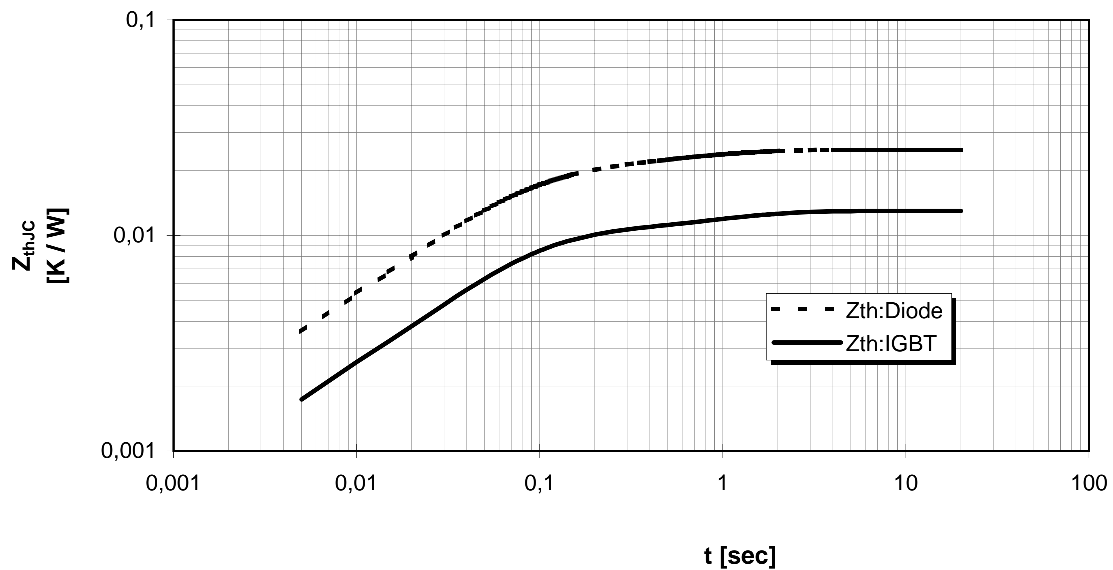


Schaltverluste (typisch) $E_{on} = f(R_G)$, $E_{off} = f(R_G)$, $E_{rec} = f(R_G)$
Switching losses (typical) $I_C = 1200A$, $V_{CE} = 900V$, $T_j = 125°C$, $V_{GE} = \pm 15V$



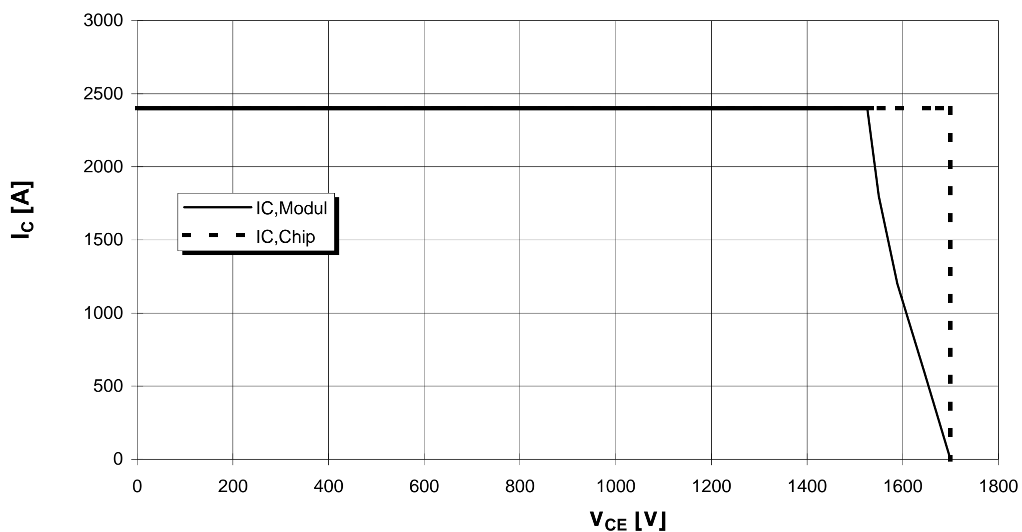


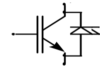
Transienter Wärmewiderstand **Z_{thJC} = f (t)**
Transient thermal impedance



i		1	2	3	4
r_i [K/kW]	: IGBT	1,25	6,15	2,6	3
τ_i [sec]	: IGBT	0,003	0,05	0,1	0,95
r_i [K/kW]	: Diode	2,46	13,4	4,57	4,57
τ_i [sec]	: Diode	0,003	0,045	0,45	0,75

Sicherer Arbeitsbereich (RBSOA)
Reverse bias safe operation area (RBSOA) **R_g = 1,2 Ohm, T_{vj}= 125°C**





Äußere Abmessungen / external dimensions