

**Höchstzulässige Werte / Maximum rated values****Elektrische Eigenschaften / Electrical properties**

Kollektor-Emitter-Sperrspannung collector-emitter voltage		V_{CES}	1200	V
Kollektor-Dauergleichstrom DC-collector current	$T_C = 80^\circ\text{C}$ $T_C = 25^\circ\text{C}$	$I_{C,nom.}$ I_C	300 625	A A
Periodischer Kollektor Spitzenstrom repetitive peak collector current	$t_p = 1\text{ ms}$, $T_C = 80^\circ\text{C}$	I_{CRM}	600	A
Gesamt-Verlustleistung total power dissipation	$T_C = 25^\circ\text{C}$, Transistor	P_{tot}	2,5	kW
Gate-Emitter-Spitzenspannung gate-emitter peak voltage		V_{GES}	+/- 20V	V
Dauergleichstrom DC forward current		I_F	300	A
Periodischer Spitzenstrom repetitive peak forw. current	$t_p = 1\text{ ms}$	I_{FRM}	600	A
Grenzlastintegral der Diode I^2t - value, Diode	$V_R = 0\text{V}$, $t_p = 10\text{ms}$, $T_{vj} = 125^\circ\text{C}$	I^2t	19	kA^2s
Isolations-Prüfspannung insulation test voltage	RMS, $f = 50\text{ Hz}$, $t = 1\text{ min.}$	V_{ISOL}	2,5	kV

Charakteristische Werte / Characteristic values**Transistor / Transistor**

min. typ. max.

Kollektor-Emitter Sättigungsspannung collector-emitter saturation voltage	$I_C = 300\text{A}$, $V_{GE} = 15\text{V}$, $T_{vj} = 25^\circ\text{C}$	$V_{CE\text{ sat}}$	-	2,1	2,6	V
	$I_C = 300\text{A}$, $V_{GE} = 15\text{V}$, $T_{vj} = 125^\circ\text{C}$		-	2,4	2,9	V
Gate-Schwellenspannung gate threshold voltage	$I_C = 12\text{mA}$, $V_{CE} = V_{GE}$, $T_{vj} = 25^\circ\text{C}$	$V_{GE(th)}$	4,5	5,5	6,5	V
Gateladung gate charge	$V_{GE} = -15\text{V} \dots +15\text{V}$	Q_G	-	3,2	-	μC
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}	-	21	-	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}	-	1,4	-	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}	-	8	360	μA
	$V_{CE} = 1200\text{V}$, $V_{GE} = 0\text{V}$, $T_{vj} = 125^\circ\text{C}$		-	800	-	μA
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}	-	-	350	nA

prepared by: Mark Münzer

date of publication: 2001-11-01

approved by: Martin Hierholzer

revision: 4

Technische Information / Technical Information

eupec

IGBT-Module
IGBT-Modules

BSM300GB120DLC



Charakteristische Werte / Characteristic values

Transistor / Transistor

			min.	typ.	max.	
Einschaltverzögerungszeit (ind. Last) turn on delay time (inductive load)	$I_C = 300A, V_{CE} = 600V$	$t_{d,on}$	-	0,05	-	μs
	$V_{GE} = \pm 15V, R_G = 3,3\Omega, T_{vj} = 25^\circ C$					
	$V_{GE} = \pm 15V, R_G = 3,3\Omega, T_{vj} = 125^\circ C$					
Anstiegszeit (induktive Last) rise time (inductive load)	$I_C = 300A, V_{CE} = 600V$	t_r	-	0,05	-	μs
	$V_{GE} = \pm 15V, R_G = 3,3\Omega, T_{vj} = 25^\circ C$					
	$V_{GE} = \pm 15V, R_G = 3,3\Omega, T_{vj} = 125^\circ C$					
Abschaltverzögerungszeit (ind. Last) turn off delay time (inductive load)	$I_C = 300A, V_{CE} = 600V$	$t_{d,off}$	-	0,57	-	μs
	$V_{GE} = \pm 15V, R_G = 3,3\Omega, T_{vj} = 25^\circ C$					
	$V_{GE} = \pm 15V, R_G = 3,3\Omega, T_{vj} = 125^\circ C$					
Fallzeit (induktive Last) fall time (inductive load)	$I_C = 300A, V_{CE} = 600V$	t_f	-	0,04	-	μs
	$V_{GE} = \pm 15V, R_G = 3,3\Omega, T_{vj} = 25^\circ C$					
	$V_{GE} = \pm 15V, R_G = 3,3\Omega, T_{vj} = 125^\circ C$					
Einschaltverlustenergie pro Puls turn-on energy loss per pulse	$I_C = 300A, V_{CE} = 600V, V_{GE} = 15V$ $R_G = 3,3\Omega, T_{vj} = 125^\circ C, L_S = 60nH$	E_{on}	-	35	-	mWs
Abschaltverlustenergie pro Puls turn-off energy loss per pulse	$I_C = 300A, V_{CE} = 600V, V_{GE} = 15V$ $R_G = 3,3\Omega, T_{vj} = 125^\circ C, L_S = 60nH$	E_{off}	-	36	-	mWs
Kurzschlußverhalten SC Data	$t_p \leq 10\mu sec, V_{GE} \leq 15V, R_G = 3,3\Omega$ $T_{vj} \leq 125^\circ C, V_{CC} = 900V, V_{CEmax} = V_{CES} - L_{SCE} \cdot di/dt$	I_{SC}	-	1800	-	A
Modulinduktivität stray inductance module		L_{SCE}	-	25	-	nH
Modul Leitungswiderstand, Anschlüsse – Chip module lead resistance, terminals – chip	$T_C = 25^\circ C$	R_{CC+EE}	-	0,20	-	m Ω

Charakteristische Werte / Characteristic values

Diode / Diode

			min.	typ.	max.	
Durchlaßspannung forward voltage	$I_F = 300A, V_{GE} = 0V, T_{vj} = 25^\circ C$	V_F	-	1,8	2,3	V
	$I_F = 300A, V_{GE} = 0V, T_{vj} = 125^\circ C$					
Rückstromspitze peak reverse recovery current	$I_F = 300A, -di_F/dt = 5400A/\mu sec$	I_{RM}	-	348	-	A
	$V_R = 600V, V_{GE} = -15V, T_{vj} = 25^\circ C$					
	$V_R = 600V, V_{GE} = -15V, T_{vj} = 125^\circ C$					
Sperrverzögerungsladung recovered charge	$I_F = 300A, -di_F/dt = 5400A/\mu sec$	Q_r	-	28	-	μAs
	$V_R = 600V, V_{GE} = -15V, T_{vj} = 25^\circ C$					
	$V_R = 600V, V_{GE} = -15V, T_{vj} = 125^\circ C$					
Abschaltenergie pro Puls reverse recovery energy	$I_F = 300A, -di_F/dt = 5400A/\mu sec$	E_{rec}	-	9	-	mWs
	$V_R = 600V, V_{GE} = -15V, T_{vj} = 25^\circ C$					
	$V_R = 600V, V_{GE} = -15V, T_{vj} = 125^\circ C$					

**Thermische Eigenschaften / Thermal properties**

			min.	typ.	max.	
Innerer Wärmewiderstand thermal resistance, junction to case	Transistor / transistor, DC	R_{thJC}	-	-	0,05	K/W
	Diode/Diode, DC		-	-	0,125	K/W
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	pro Modul / per module $\lambda_{TIOSTE} = 1 \text{ W/m} \cdot \text{K}$ / $\lambda_{grease} = 1 \text{ W/m} \cdot \text{K}$	R_{thCK}	-	0,01	-	K/W
Höchstzulässige Sperrschichttemperatur maximum junction temperature		$T_{vj \text{ max}}$	-	-	150	°C
Betriebstemperatur operation temperature		T_{vjop}	-40	-	125	°C
Lagertemperatur storage temperature		T_{stg}	-40	-	150	°C

Mechanische Eigenschaften / Mechanical properties

Gehäuse, siehe Anlage case, see appendix				
Innere Isolation internal insulation			AL ₂ O ₃	
Kriechstrecke creepage distance			20	mm
Luftstrecke clearance			11	mm
CTI comperative tracking index			275	
Anzugsdrehmoment f. mech. Befestigung mounting torque		M1	3	6 Nm
Anzugsdrehmoment f. elektr. Anschlüsse terminal connection torque	terminals M6	M2	2,5	5 Nm
Gewicht weight		G	420	g

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

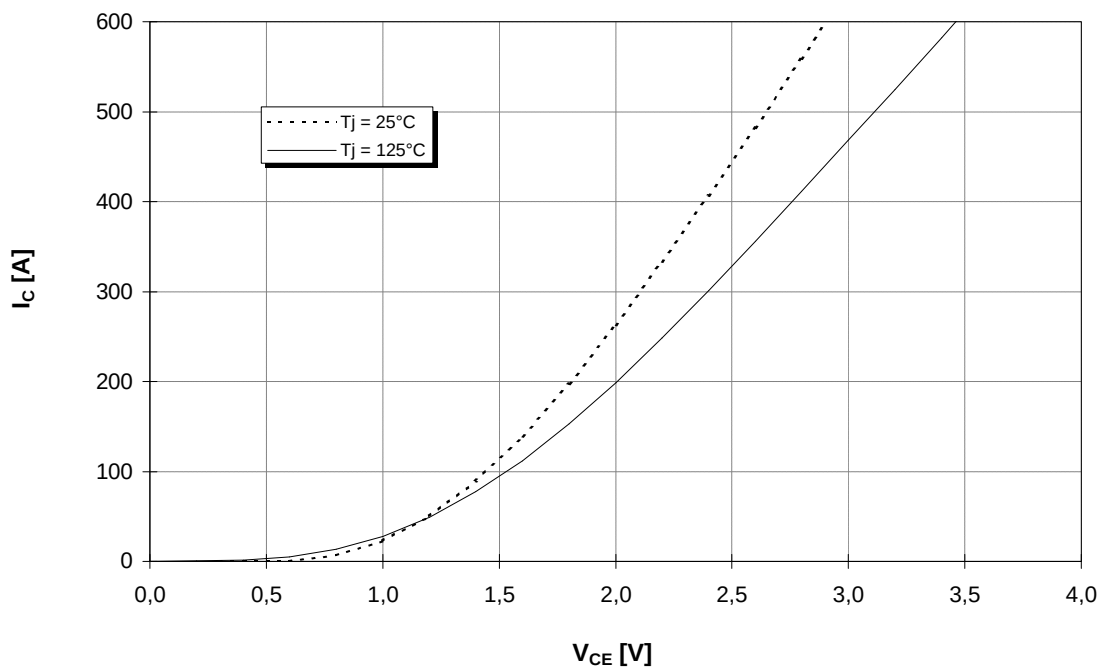
This technical information specifies semiconductor devices but promises no characteristics. It is
valid in combination with the belonging technical notes.



Ausgangskennlinie (typisch)
Output characteristic (typical)

$$I_C = f(V_{CE})$$

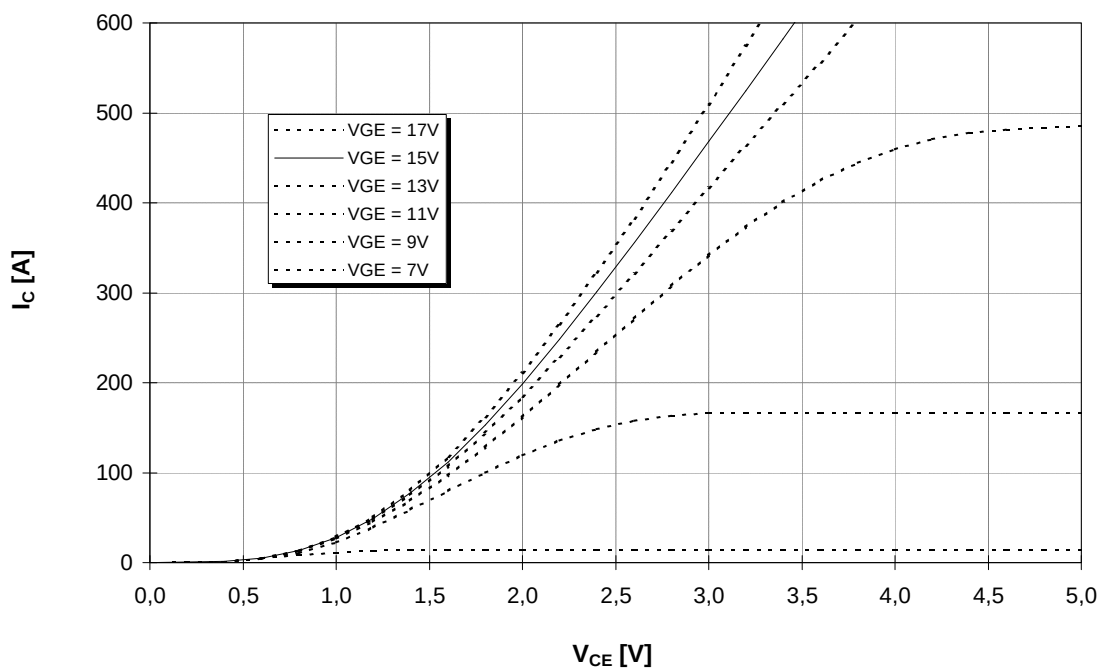
$$V_{GE} = 15V$$



Ausgangskennlinienfeld (typisch)
Output characteristic (typical)

$$I_C = f(V_{CE})$$

$$T_{vj} = 125^\circ\text{C}$$

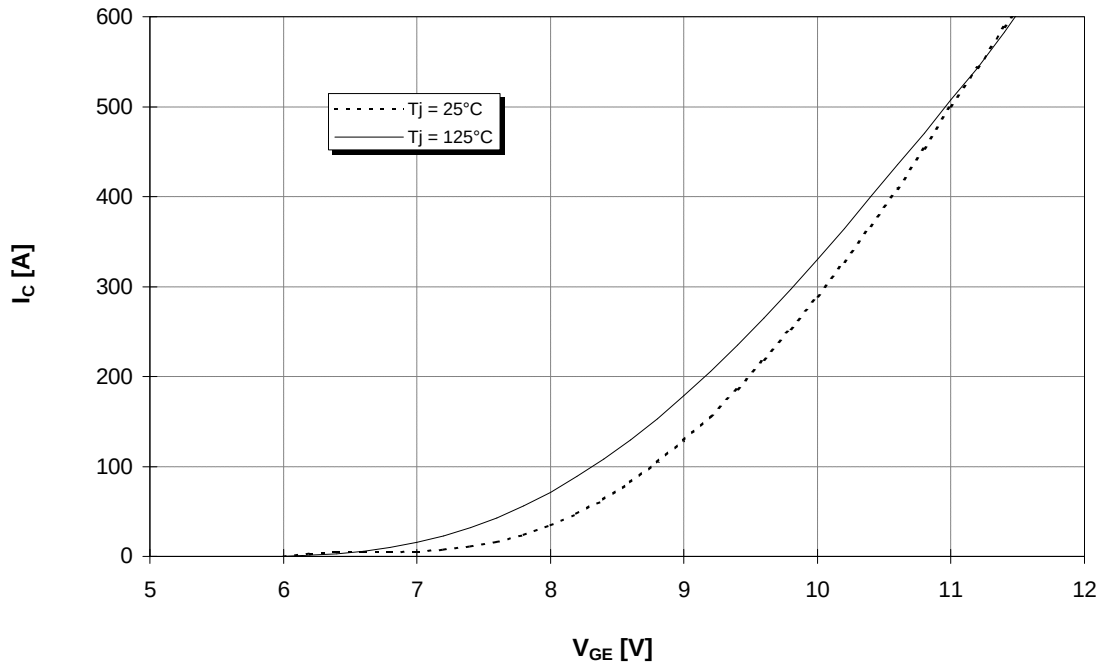




Übertragungscharakteristik (typisch)
Transfer characteristic (typical)

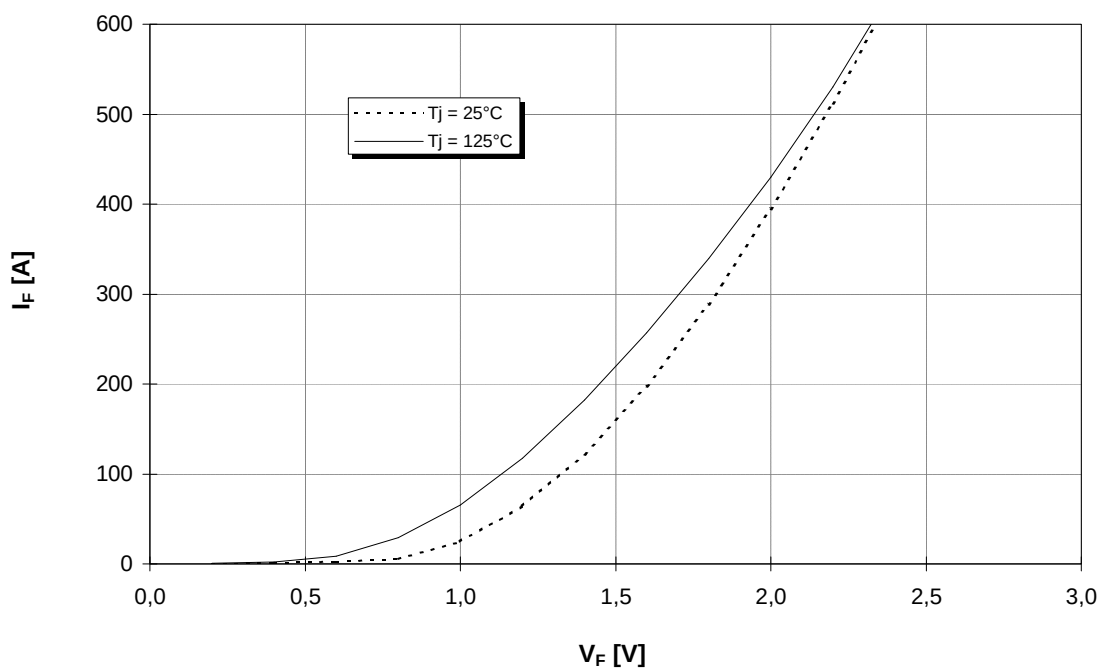
$$I_C = f(V_{GE})$$

$V_{CE} = 20V$



Durchlaßkennlinie der Inversdiode (typisch)
Forward characteristic of inverse diode (typical)

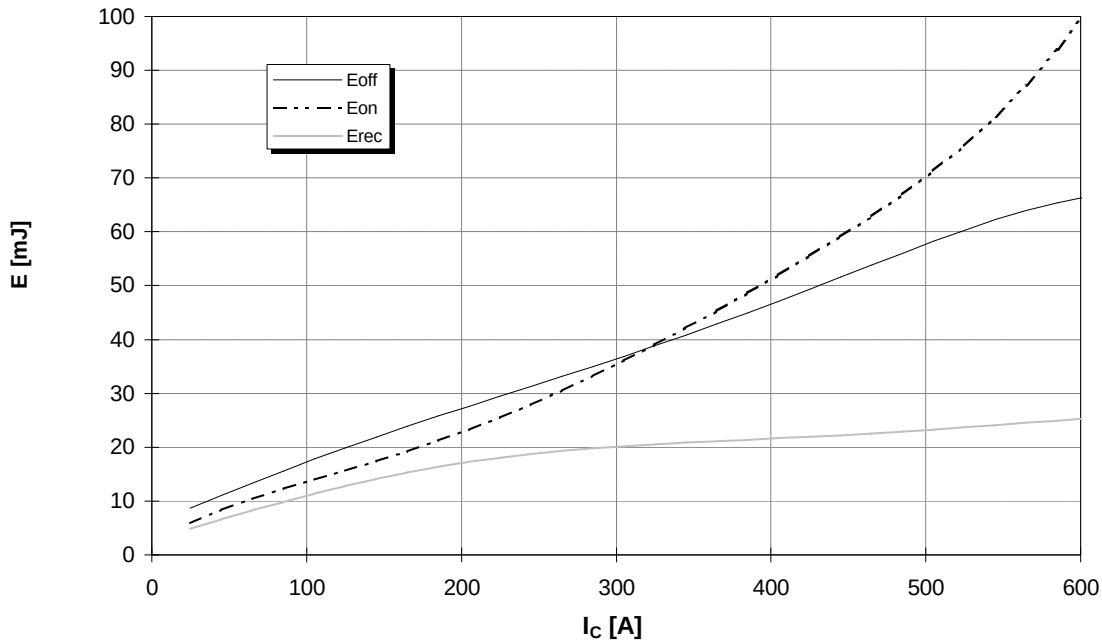
$$I_F = f(V_F)$$





Schaltverluste (typisch) $E_{on} = f(I_C)$, $E_{off} = f(I_C)$, $E_{rec} = f(I_C)$

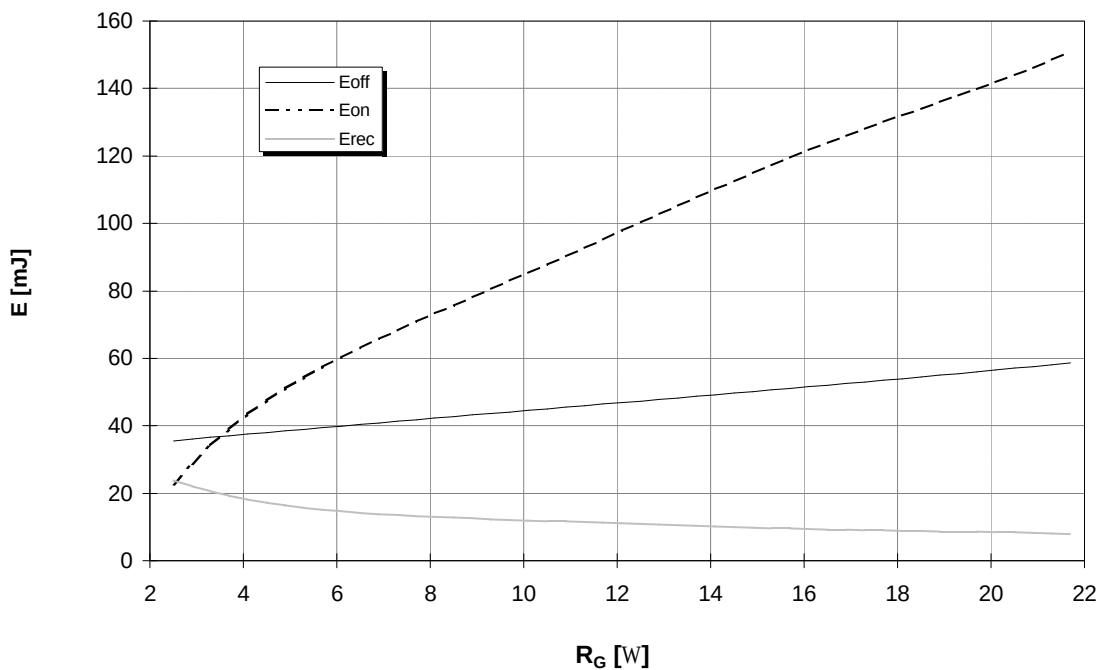
Switching losses (typical) $V_{GE}=15V$, $R_{gon} = R_{goff} = 3,3 \text{ } \Omega$, $V_{CE} = 600V$, $T_J = 125^\circ C$



Schaltverluste (typisch)
Switching losses (typical)

$E_{on} = f(R_G)$, $E_{off} = f(R_G)$, $E_{rec} = f(R_G)$

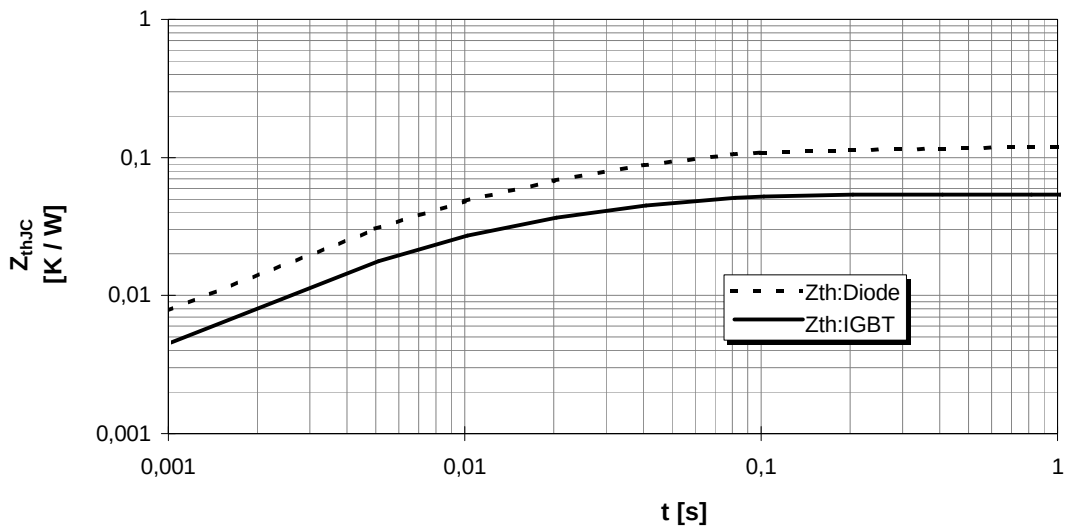
$V_{GE}=15V$, $I_C = 300A$, $V_{CE} = 600V$, $T_J = 125^\circ C$





Transienter Wärmewiderstand Transient thermal impedance

$$Z_{thJC} = f(t)$$

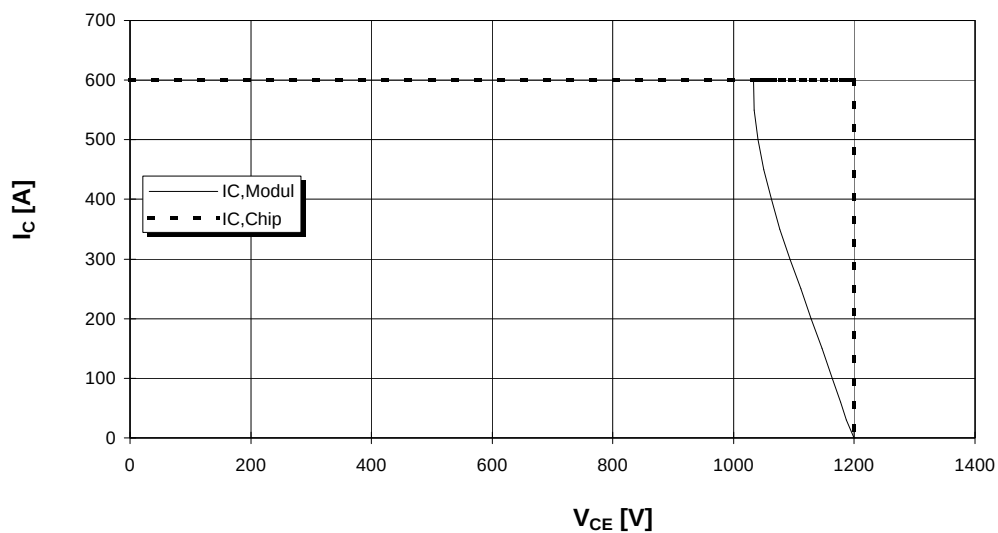


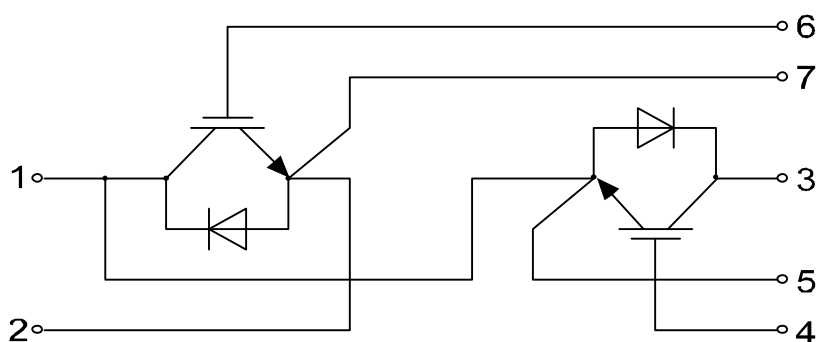
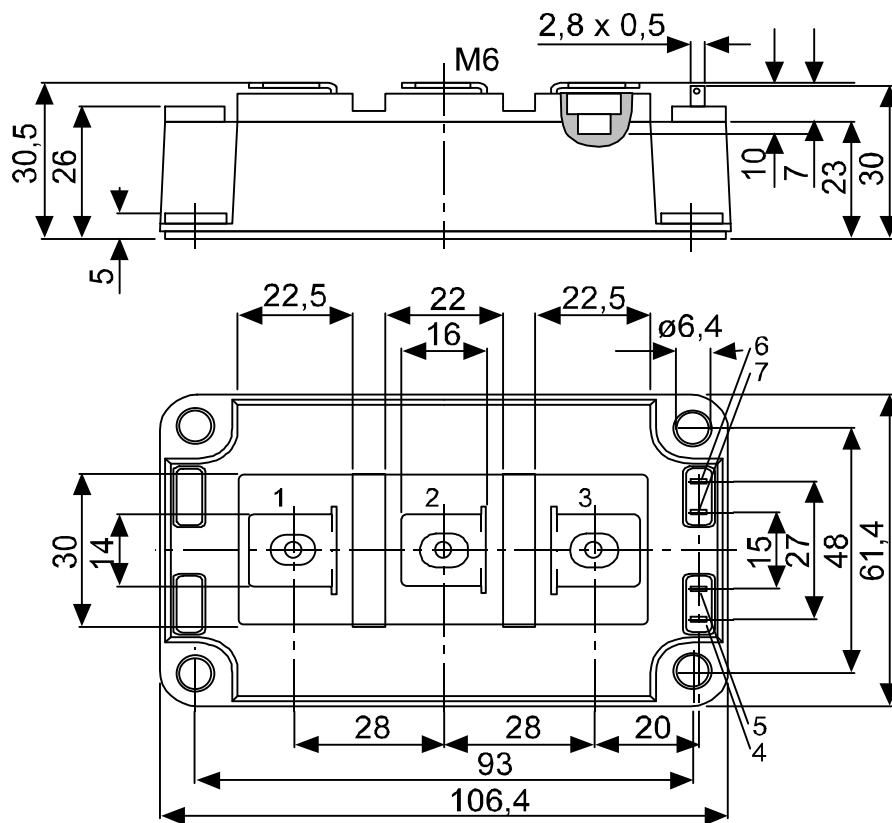
i	1	2	3	4
r_i [K/kW] : IGBT	21,02	25,19	2,85	0,94
τ_i [s] : IGBT	6,499E-02	2,601E-02	2,364E-03	1,187E-05
r_i [K/kW] : Diode	52,55	62,97	7,13	2,35
τ_i [s] : Diode	6,499E-02	2,601E-02	2,364E-03	1,187E-05

Sicherer Arbeitsbereich (RBSOA)

Reverse bias safe operation area (RBSOA)

$$V_{GE} = 15V, R_g = 3,3 \text{ Ohm}, T_{vj} = 125^\circ C$$







typ.

Modulinduktivität stray inductance module		L_{sCE}	20	nH
Modul Leitungswiderstand, Anschlüsse – Chip module lead resistance, terminals – chip	$T_C=25^{\circ}C$	$R_{CC'+EE'}$	0,7	mΩ

Gehäusemaße C-Serie Package outline C-series

