Technische Information / Technical Information

IGBT-Module
IGBT-Modules

FZ 800 R 33 KF2

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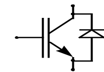

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preliminary datasheet

Höchstzulässige Werte / Maximum rated values

Elektrische Eigenschaften / Electrical properties

Kollektor-Emitter-Sperrspannung collector-emitter voltage	T_j = 25°C T_j = -25°C	V_{CES}	3300 3300	V
Kollektor-Dauergleichstrom DC-collector current	T_C = 80°C T_C = 25 °C	$I_{C,nom.}$ I_C	800 1200	A A
Periodischer Kollektor Spitzenstrom repetitive peak collector current	t_P = 1 ms, T_C = 80°C	I_{CRM}	1600	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	800	A
Periodischer Spitzenstrom repetitive peak forw. current	t_P = 1 ms	I_{FRM}	1600	A
Grenzlastintegral der Diode I^2t - value, Diode	V_R = 0V, t_p = 10ms, T_{Vj} = 125°C	I^2t	222.200	A^2s
Spitzenverlustleistung der Diode maximum power dissipation diode	T_j = 125°C	P_{RQM}	800	kW
Isolations-Prüfspannung insulation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}	6.000	V
Teilentladungs-Aussetzspannung partial discharge extinction voltage	RMS, f = 50 Hz, $Q_{PD} \leq$ 10 pC (acc. to IEC 1287)	V_{ISOL}	2.600	V

Charakteristische Werte / Characteristic values

Transistor / Transistor

			min.	typ.	max.	
Kollektor-Emitter Sättigungsspannung collector-emitter saturation voltage	I_C = 800A, V_{GE} = 15V, Tvj = 25°C I_C = 800A, V_{GE} = 15V, T_{vj} = 125°C	$V_{CE\ sat}$	- -	3,40 4,30	4,25 -	V V
Gate-Schwellenspannung gate threshold voltage	I_C = 80 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}	-	100	-	nF
Rückwirkungskapazität reverse transfer capacitance	f = 1MHz,T_{vj} = 25°C,V_{CE} = 25V, V_{GE} = 0V	C_{res}	-	5,4	-	nF
Gateladung gate charge	V_{GE} = -15V ... + 15V, V_{CE} = 1800V	Q_G	-	15	-	µC
Kollektor-Emitter Reststrom collector-emitter cut-off current	V_{CE} = 3300V, V_{GE} = 0V, T_{vj} = 25°C V_{CE} = 3300V, V_{GE} = 0V, T_{vj} = 125°C	I_{CES}	- -	20 40	- -	µA mA
Gate-Emitter Reststrom gate-emitter leakage current	V_{CE} = 0V, V_{GE} = 20V, T_{vj} = 25°C	I_{GES}	-	-	400	nA

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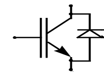

vorläufiges Datenblatt
preliminary datasheet

Charakteristische Werte / Characteristic values

Transistor / Transistor

			min.	typ.	max.	
Einschaltverzögerungszeit (ind. Last) turn on delay time (inductive load)	I_C = 800 A, V_{CE} = 1800V V_{GE} = ±15V, R_G = 1,8 Ω, C_{GE} = 150nF, T_{vj} = 25°C V_{GE} = ±15V, R_G = 1,8 Ω, C_{GE} = 150nF, T_{vj} = 125°C	$t_{d,on}$	- -	370 350	- -	ns ns
Anstiegszeit (induktive Last) rise time (inductive load)	I_C = 800 A, V_{CE} = 1800V V_{GE} = ±15V, R_G = 1,8 Ω, C_{GE} = 150nF, T_{vj} = 25°C V_{GE} = ±15V, R_G = 1,8 Ω, C_{GE} = 150nF, T_{vj} = 125°C	t_r	- -	250 270	- -	ns ns
Abschaltverzögerungszeit (ind. Last) turn off delay time (inductive load)	I_C = 800 A, V_{CE} = 1800V V_{GE} = ±15V, R_G = 1,8 Ω, C_{GE} = 150nF, T_{vj} = 25°C V_{GE} = ±15V, R_G = 1,8 Ω, C_{GE} = 150nF, T_{vj} = 125°C	$t_{d,off}$	- -	1550 1700	- -	ns ns
Fallzeit (induktive Last) fall time (inductive load)	I_C = 800 A, V_{CE} = 1800V V_{GE} = ±15V, R_G = 1,8 Ω, C_{GE} = 150nF, T_{vj} = 25°C V_{GE} = ±15V, R_G = 1,8 Ω, C_{GE} = 150nF, T_{vj} = 125°C	t_f	- -	200 200	- -	ns ns
Einschaltverlustenergie pro Puls turn-on energy loss per pulse	I_C = 800 A, V_{CE} = 1800V, V_{GE} = 15V R_G = 1,8 Ω, C_{GE} = 150, nF, T_{vj} = 125°C, L_S = 40nH	E_{on}	-	1920	-	mWs
Abschaltverlustenergie pro Puls turn-off energy loss per pulse	I_C = 800 A, V_{CE} = 1800V, V_{GE} = 15V R_G = 1,8 Ω, C_{GE} = 150, nF, T_{vj} = 125°C, L_S = 40nH	E_{off}	-	1020	-	mWs
Kurzschlußverhalten SC Data	$t_P \leq$ 10µsec, $V_{GE} \leq$ 15V $T_{Vj} \leq$125°C, V_{CC}=2500V, V_{CEmax}=V_{CES} -L_{sCE} ·dI/dt	I_{SC}	-	4000	-	A
Modulinduktivität stray inductance module		L_{sCE}	-	12	-	nH
Modul-Leitungswiderstand, Anschlüsse - Chip lead resistance, terminals - chip		$R_{CC'+EE'}$	-	0,08	-	mΩ

Charakteristische Werte / Characteristic values

Diode / Diode

			min.	typ.	max.	
Durchlaßspannung forward voltage	I_F = 800 A, V_{GE} = 0V, T_{vj} = 25°C I_F = 800 A, V_{GE} = 0V, T_{vj} = 125°C	V_F	- -	2,80 2,80	3,50 -	V V
Rückstromspitze peak reverse recovery current	I_F = 800 A, - di_F/dt = 3500 A/µsec V_R = 1800V, VGE = -10V, T_{vj} = 25°C V_R = 1800V, VGE = -10V, T_{vj} = 125°C	I_{RM}	- -	880 980	- -	A A
Sperrverzögerungsladung recovered charge	I_F = 800 A, - di_F/dt = 3500 A/µsec V_R = 1800V, VGE = -10V, T_{vj} = 25°C V_R = 1800V, VGE = -10V, T_{vj} = 125°C	Q_r	- -	500 940	- -	µAs µAs
Abschaltenergie pro Puls reverse recovery energy	I_F = 800 A, - di_F/dt = 3500 A/µsec V_R = 1800V, VGE = -10V, T_{vj} = 25°C V_R = 1800V, VGE = -10V, T_{vj} = 125°C	E_{rec}	- -	- 1000	- -	mWs mWs

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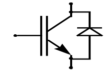


vorläufiges Datenblatt
preliminary datasheet

Thermische Eigenschaften / Thermal properties

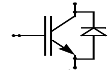
			min.	typ.	max.	
Innerer Wärmewiderstand thermal resistance, junction to case	Transistor / transistor, DC	R_{thJC}	-	-	0,013	K/W
	Diode/Diode, DC		-	-	0,026	K/W
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	pro Modul / per module λ_{Paste} = 1 W/m*K / λ_{grease} = 1 W/m*K	R_{thCK}	-	0,006	-	K/W
Höchstzulässige Sperrschichttemperatur maximum junction temperature		T_{vj}	-	-	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				
Material Modulgrundplatte material of module baseplate			AlSiC	
Innere Isolation internal insulation			AlN	
Kriechstrecke creepage distance			32,2	mm
Luftstrecke clearance			19,1	mm
CTI comperative tracking index			> 400	
Anzugsdrehmoment f. mech. Befestigung mounting torque		M1	5	Nm
Anzugsdrehmoment f. elektr. Anschlüsse terminal connection torque	terminals M4	M2	2	Nm
	terminals M8		8 .. 10	Nm
Gewicht weight		G	1000	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.



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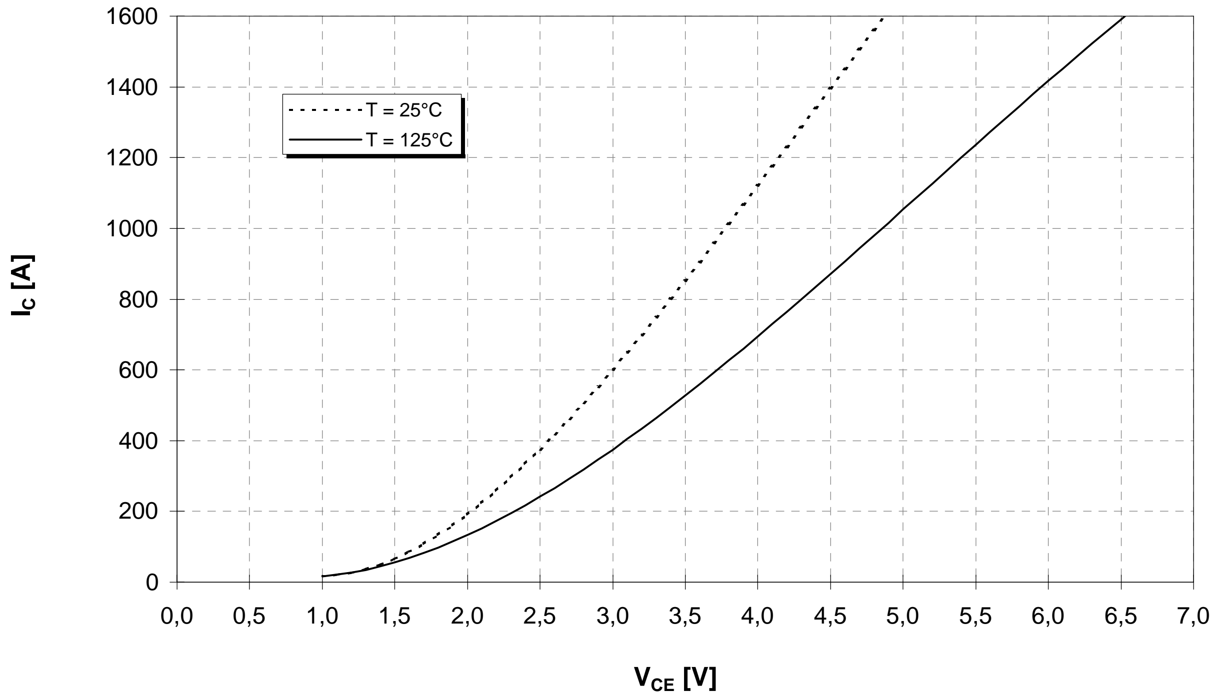
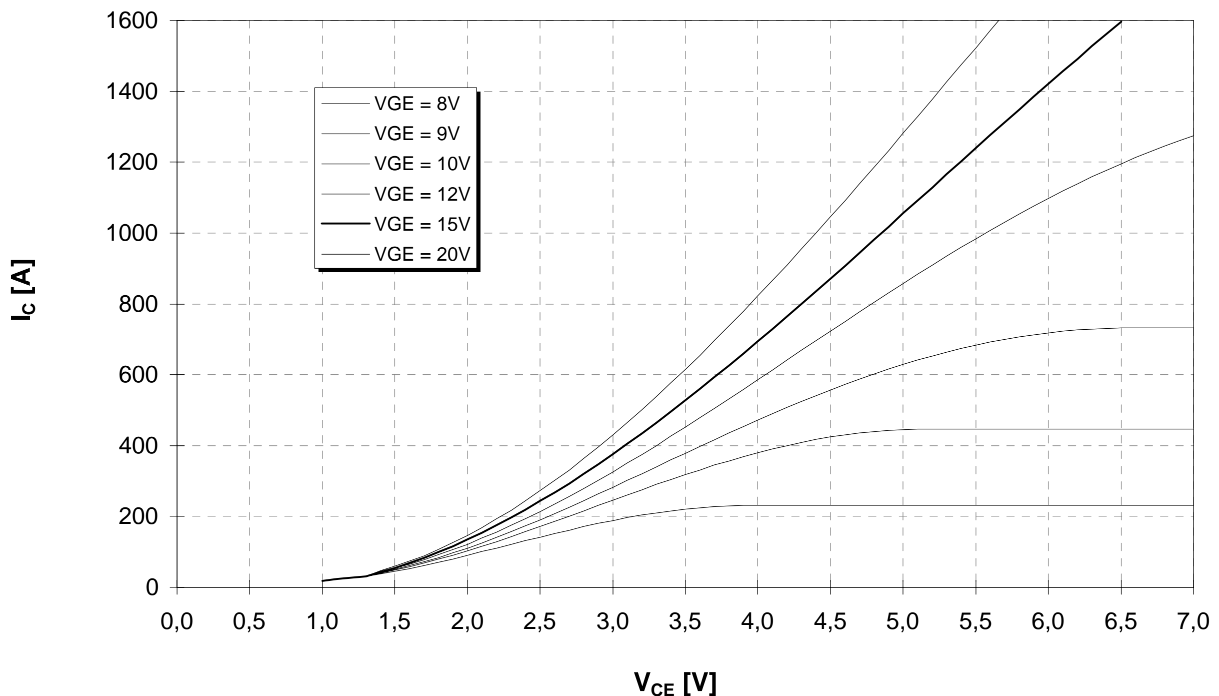
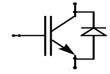
Ausgangskennlinie (typisch) $I_C = f(V_{CE})$
Output characteristic (typical) $V_{GE} = 15V$



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





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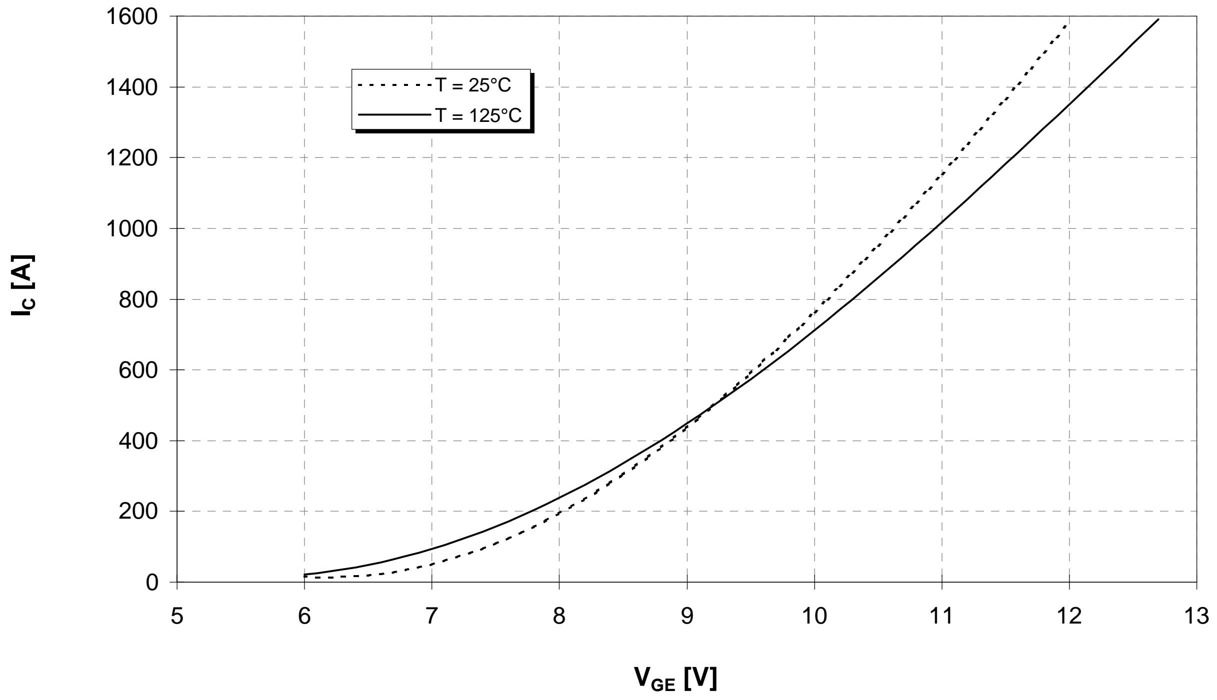
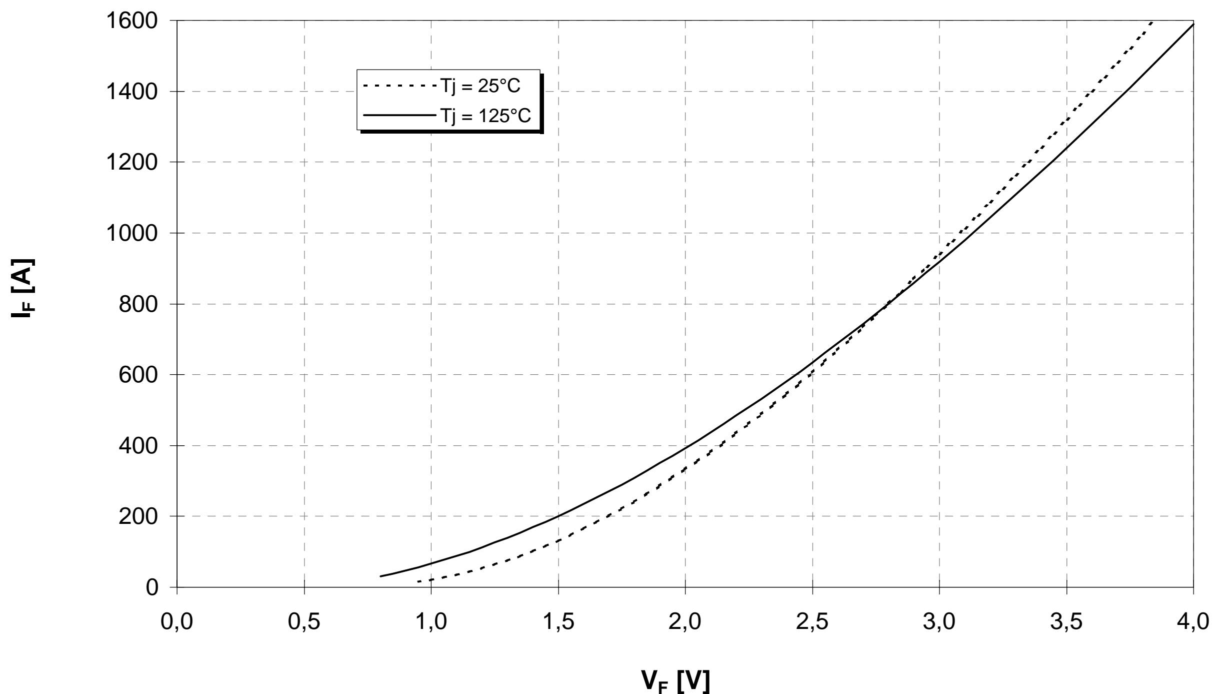
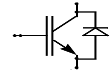
Übertragungscharakteristik (typisch) $I_C = f(V_{GE})$
Transfer characteristic (typical)

$V_{CE} = 20V$



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





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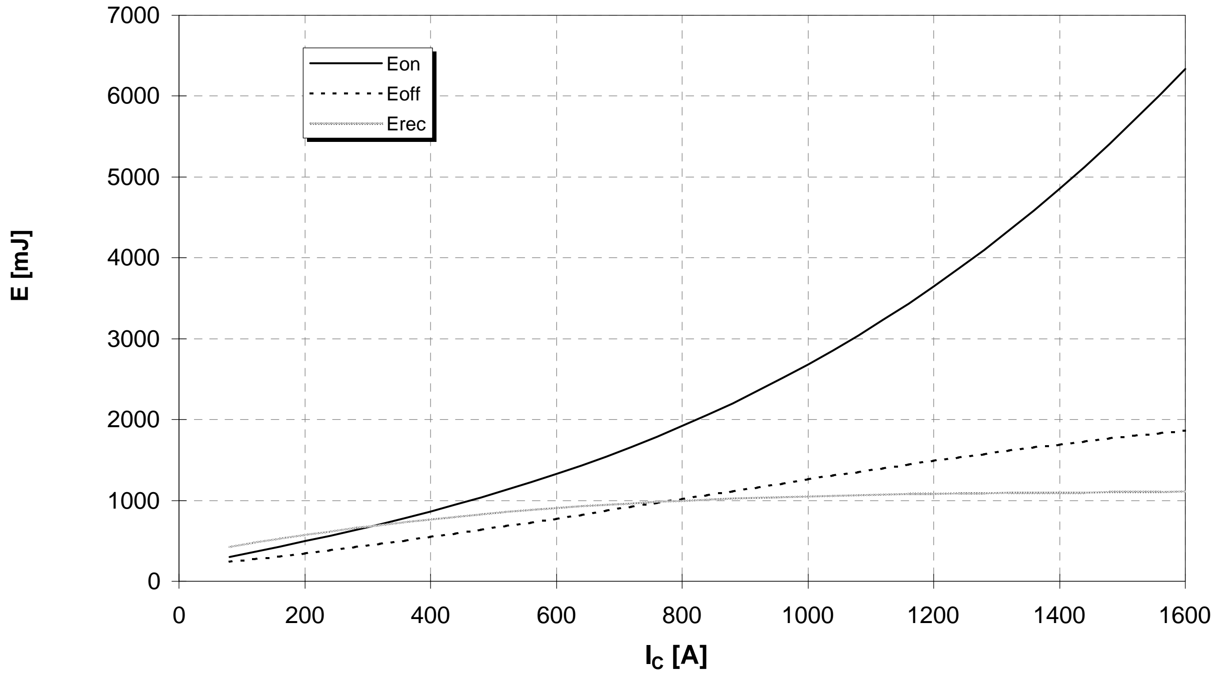
Schaltverluste (typisch)
Switching losses (typical)

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

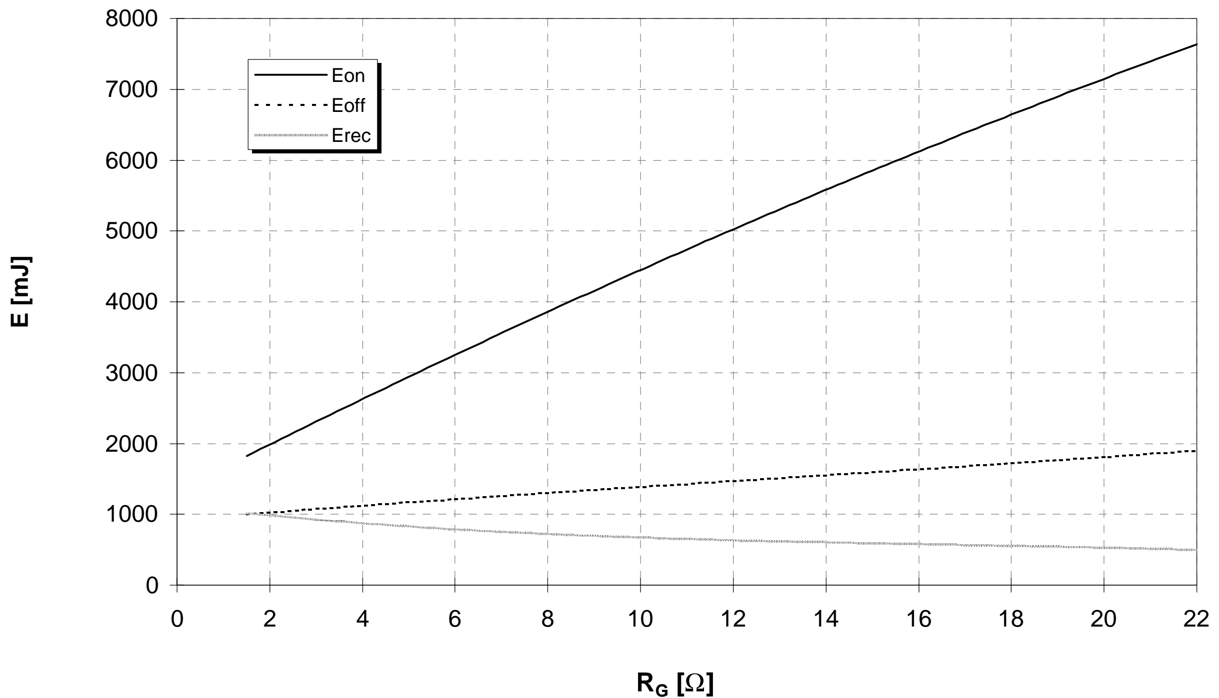
$R_{G,on} = 1{,}8\ \Omega$, $R_{G,off} = 1{,}8\ \Omega$, $C_{GE} = 150$ nF, $V_{CE} = 1800$V, $T_j = 125°C$

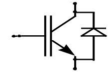


Schaltverluste (typisch)
Switching losses (typical)

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

$I_C = 800$ A, $C_{GE} = 150$ nF, $V_{CE} = 1800$V, $T_j = 125°C$





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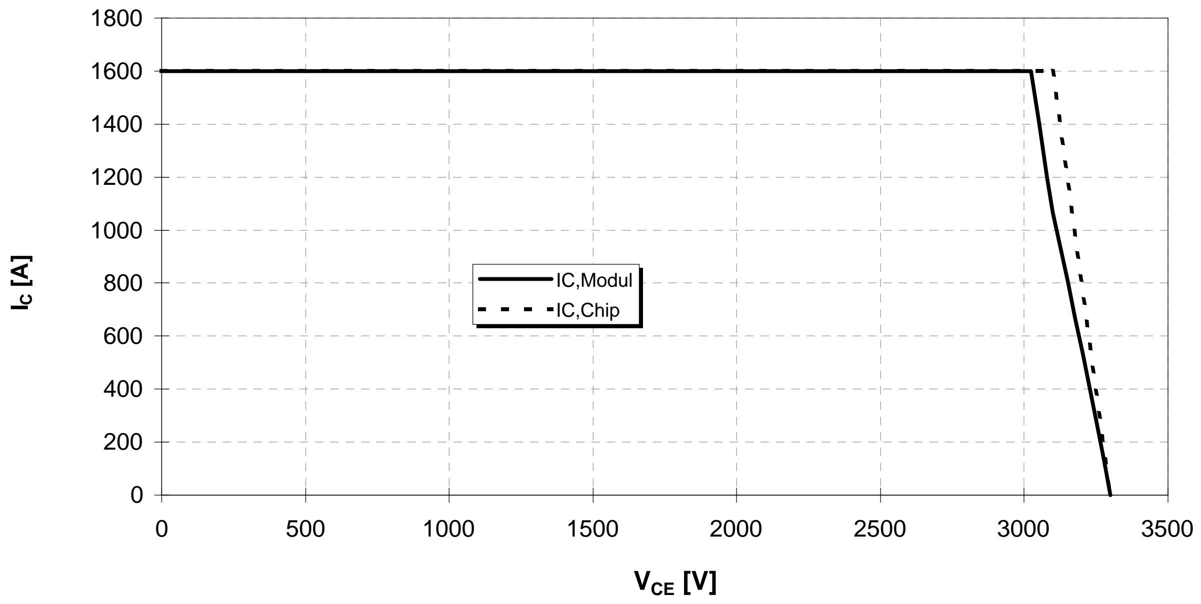
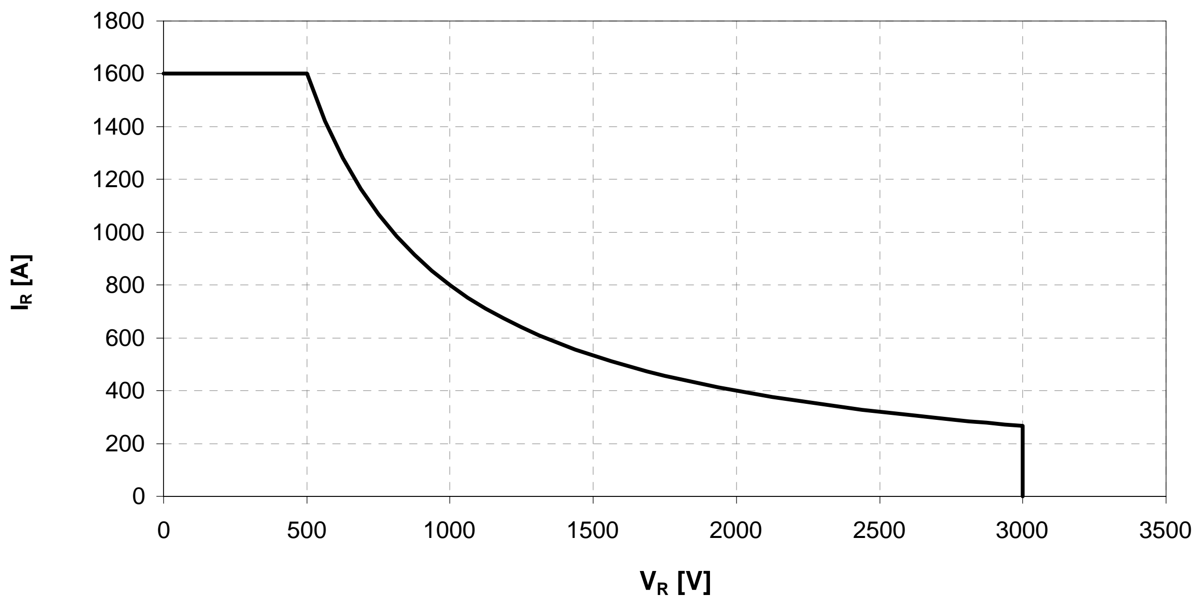
Sicherer Arbeitsbereich IGBT (RBSOA)
Reverse bias safe operation area IGBT (RBSOA)

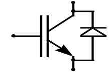
$R_{G,off}$ = 1,8 Ω, C_{GE} = 150 nF
T_{vj} = 125°C



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

T_{vj} = 125°C





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preliminary datasheet

Transienter Wärmewiderstand
Transient thermal impedance

$Z_{thJC} = f(t)$

i		1	2	3	4
r_i [K/kW]	: IGBT	2,21	7,74	0,71	2,34
τ_i [sec]	: IGBT	0,0185	0,0984	0,5001	2,0000
r_i [K/kW]	: Diode	4,42	15,48	1,42	4,68
τ_i [sec]	: Diode	0,0185	0,0984	0,5001	2,0000

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Gehäusemaße / Schaltbild
Package outline / Circuit diagram