Technische Information / Technical Information

IGBT-Module
IGBT-Modules

FS 150 R17 KE3 G

eupec



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Höchstzulässige Werte / Maximum rated values

Elektrische Eigenschaften / Electrical properties

Kollektor-Emitter-Sperrspannung collector-emitter voltage	T_{vj} = 25°C	V_{CES}	1700	V
Kollektor-Dauergleichstrom DC-collector current	T_C = 80 °C T_C = 25 °C	$I_{C,nom.}$ I_C	150 240	A A
Periodischer Kollektor Spitzenstrom repetitive peak collctor current	t_P = 1 ms, T_C = 80°C	I_{CRM}	300	A
Gesamt-Verlustleistung total power dissipation	T_C=25°C, Transistor	P_{tot}	1040	W
Gate-Emitter-Spitzenspannung gate-emitter peak voltage		V_{GES}	+/- 20V	V
Dauergleichstrom DC forward current		I_F	150	A
Periodischer Spitzenstrom repetitive peak forw. current	tp = 1 ms	I_{FRM}	300	A
Grenzlastintegral der Diode I^2t - value, Diode	V_R = 0V, t_p = 10ms, T_{vj} = 125°C	I^2t	t.b.d	k A^2s
Isolations-Prüfspannung insulation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}	3,4	kV

Charakteristische Werte / Characteristic values

Transistor / Transistor			min.	typ.	max.	
Kollektor-Emitter Sättigungsspannung collector-emitter saturation voltage	I_C = 150A, V_{GE} = 15V, T_{vj} = 25°C I_C = 150A, V_{GE} = 15V, T_{vj} = 125°C	$V_{CE\ sat}$	- -	2,0 2,4	2,45 -	V V
Gate-Schwellenspannung gate threshold voltage	I_C = 6mA, V_{CE} = V_{GE}, T_{vj} = 25°C	$V_{GE(th)}$	5,2	5,8	6,4	V
Gateladung gate charge	V_{GE} = -15V ... +15V	Q_G	-	1,7	-	µC
Eingangskapazität input capacitance	f = 1MHz,T_{vj} = 25°C,V_{CE} = 25V, V_{GE} = 0V	C_{ies}	-	12	-	nF
Rückwirkungskapazität reverse transfer capacitance	f = 1MHz,T_{vj} = 25°C,V_{CE} = 25V, V_{GE} = 0V	C_{res}	-	0,45	-	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}	- -	- -	5 -	mA 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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approved by: Christoph Lübke	revision: 2.0



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Charakteristische Werte / Characteristic values

Transistor / Transistor			min.	typ.	max.	
Einschaltverzögerungszeit (ind. Last) turn on delay time (inductive load)	I_C = 150A, V_{CE} = 900V					
	V_{GE} = ±15V, R_G = 9,1Ω, T_{vj} = 25°C	$t_{d,on}$	-	0,20	-	µs
	V_{GE} = ±15V, R_G = 9,1Ω, T_{vj} = 125°C		-	0,22	-	µs
Anstiegszeit (induktive Last) rise time (inductive load)	I_C = 150A, V_{CE} = 900V					
	V_{GE} = ±15V, R_G = 9,1Ω, T_{vj} = 25°C	t_r	-	0,10	-	µs
	V_{GE} = ±15V, R_G = 9,1Ω, T_{vj} = 125°C		-	0,10	-	µs
Abschaltverzögerungszeit (ind. Last) turn off delay time (inductive load)	I_C = 150A, V_{CE} = 900V					
	V_{GE} = ±15V, R_G = 9,1Ω, T_{vj} = 25°C	$t_{d,off}$	-	0,72	-	µs
	V_{GE} = ±15V, R_G = 9,1Ω, T_{vj} = 125°C		-	0,88	-	µs
Fallzeit (induktive Last) fall time (inductive load)	I_C = 150A, V_{CE} = 900V					
	V_{GE} = ±15V, R_G = 9,1Ω, T_{vj} = 25°C	t_f	-	0,10	-	µs
	V_{GE} = ±15V, R_G = 9,1Ω, T_{vj} = 125°C		-	0,20	-	µs
Einschaltverlustenergie pro Puls turn-on energy loss per pulse	I_C = 150A, V_{CE} = 900V, V_{GE} = ±15V					
	R_G = 9,1Ω, T_{vj} = 125°C, L_σ = 80nH	E_{on}	-	60	-	mJ
Abschaltverlustenergie pro Puls turn-off energy loss per pulse	I_C = 150A, V_{CE} = 900V, V_{GE} = ±15V					
	R_G = 9,1Ω, T_{vj} = 125°C, L_σ = 80nH	E_{off}	-	50	-	mJ
Kurzschlußverhalten SC Data	$t_P \leq$ 10µsec, $V_{GE} \leq$ 15V					
	$T_{vj} \leq$125°C, V_{CC}=1000V, V_{CEmax}=V_{CES} -$L_{\sigma CE}$ ·di/dt	I_{SC}	-	560	-	A
Modulinduktivität stray inductance module		$L_{\sigma CE}$	-	20	-	nH
Modulleitungswiderstand, Anschlüsse - Chip module lead resistance, terminals - chip	pro Zweig / per arm, T_C = 25°C	$R_{CC'+EE'}$	-	1,1	-	mΩ

Charakteristische Werte / Characteristic values

Diode / Diode			min.	typ.	max.	
Durchlaßspannung forward voltage	I_F = 150A, V_{GE} = 0V, T_{vj} = 25°C	V_F	-	1,8	2,2	V
	I_F = 150A, V_{GE} = 0V, T_{vj} = 125°C		-	1,9	t.b.d.	V
Rückstromspitze peak reverse recovery current	I_F = 150A, - di_F/dt = 2200A/µs					
	V_R = 900V, V_{GE} = -15V, T_{vj} = 25°C	I_{RM}	-	185	-	A
	V_R = 900V, V_{GE} = -15V, T_{vj} = 125°C		-	200	-	A
Sperrverzögerungsladung recovered charge	I_F = 150A, - di_F/dt = 2200A/µs					
	V_R = 900V, V_{GE} = -15V, T_{vj} = 25°C	Q_r	-	40	-	µC
	V_R = 900V, V_{GE} = -15V, T_{vj} = 125°C		-	65	-	µC
Abschaltenergie pro Puls reverse recovery energy	I_F = 150A, - di_F/dt = 2200A/µs					
	V_R = 900V, V_{GE} = -15V, T_{vj} = 25°C	E_{rec}	-	20	-	mJ
	V_R = 900V, V_{GE} = -15V, T_{vj} = 125°C		-	35	-	mJ



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Charakteristische Werte / Characteristic values

NTC - Widerstand / NTC - thermistor			min.	typ.	max.	
Nennwiderstand rated resistance	T_C = 25°C	R_{25}	-	5	-	kΩ
Abweichung von R_{100} devitation of R_{100}	T_C = 100°C; R_{100} = 493Ω	ΔR/R	-5	-	5	%
Verlustleistung Power dissipation	T_C = 25°C	P_{25}	-	-	20	mW
B - Wert B - value	R2= R1 exp[B(1/T2 - 1/T1)]	$B_{25/50}$	-	3375	-	K

Thermische Eigenschaften / Thermal properties

			min.	typ.	max.	
Innerer Wärmewiderstand thermal resistance, junction to case	Transistor / transistor, DC	R_{thJC}	-	-	0,120	K/W
	Diode/Diode, DC	R_{thJC}	-	-	0,210	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}	-	0,005	-	K/W
Höchstzulässige Sperrschichttemperatur maximum junction temperature		$T_{vj\ max}$	-	-	150	°C
Betriebstemperatur operation temperature		T_{vjop}	-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				14		mm
Luftstrecke clearance				10		mm
CTI comperative tracking index				225		
Anzugsdrehmoment f. mech. Befestigung mounting torque	Schraube / screw M5	M	3	-	6	Nm
Anzugsdrehmoment f. elektr. Anschlüsse terminal connection torque	Anschlüsse / terminals M6	M	3	-	6	Nm
Gewicht weight		G		916		g

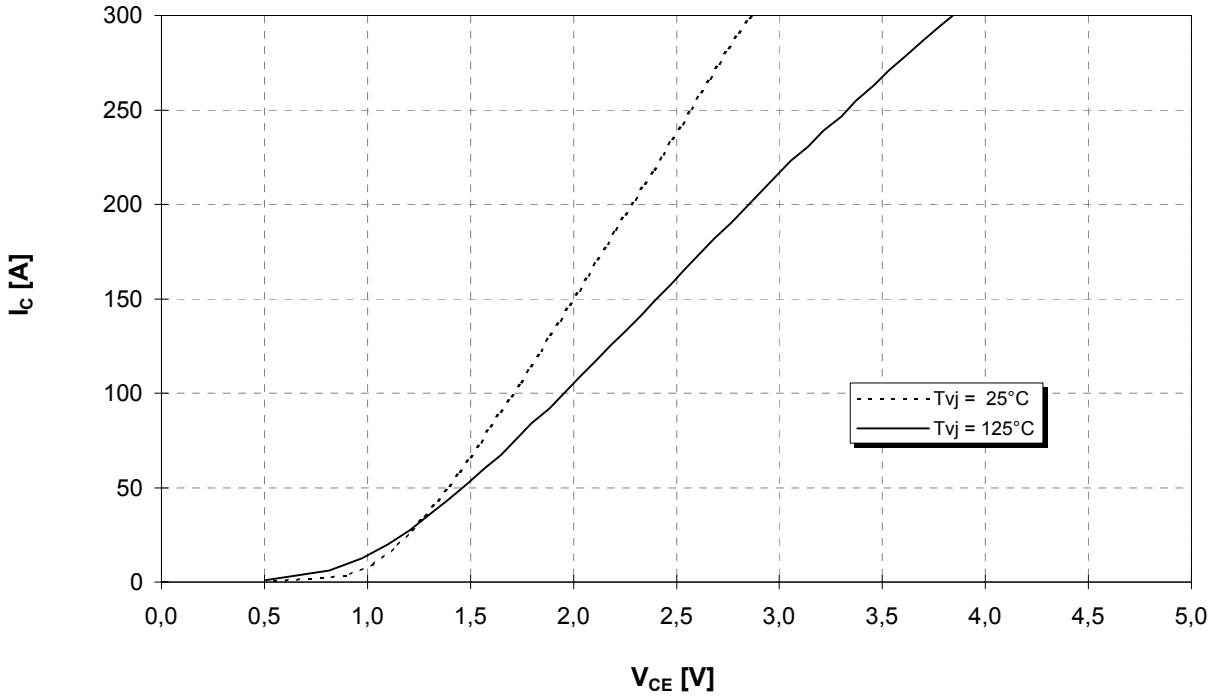
Mit dieser technischen Information werden Halbleiterbauelemente spezifiziert, jedoch keine Eigenschaften zugesichert.

Sie gilt in Verbindung mit den zugehörigen Technischen Erläuterungen.

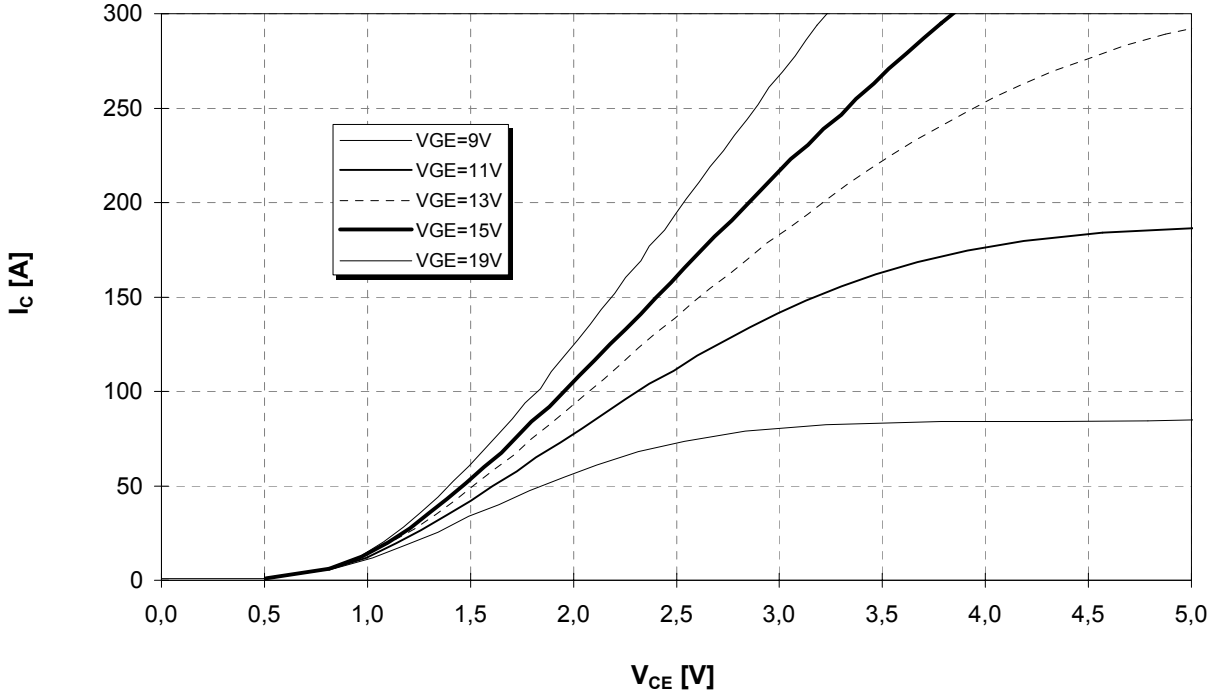
This technical information specifies semiconductor devices but promises no characteristics. It is valid in combination with the belonging technical notes.

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

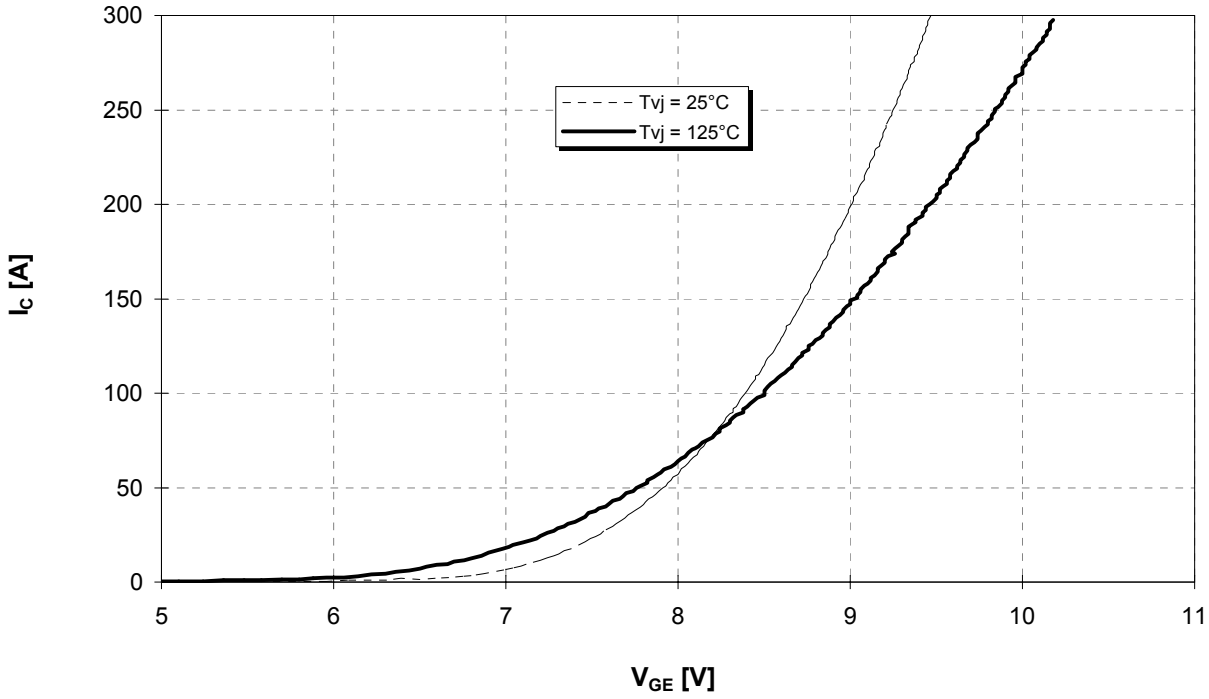


Ausgangskennlinienfeld (typisch) $I_C = f(V_{CE})$
Output characteristic (typical) $T_{vj} = 125°C$

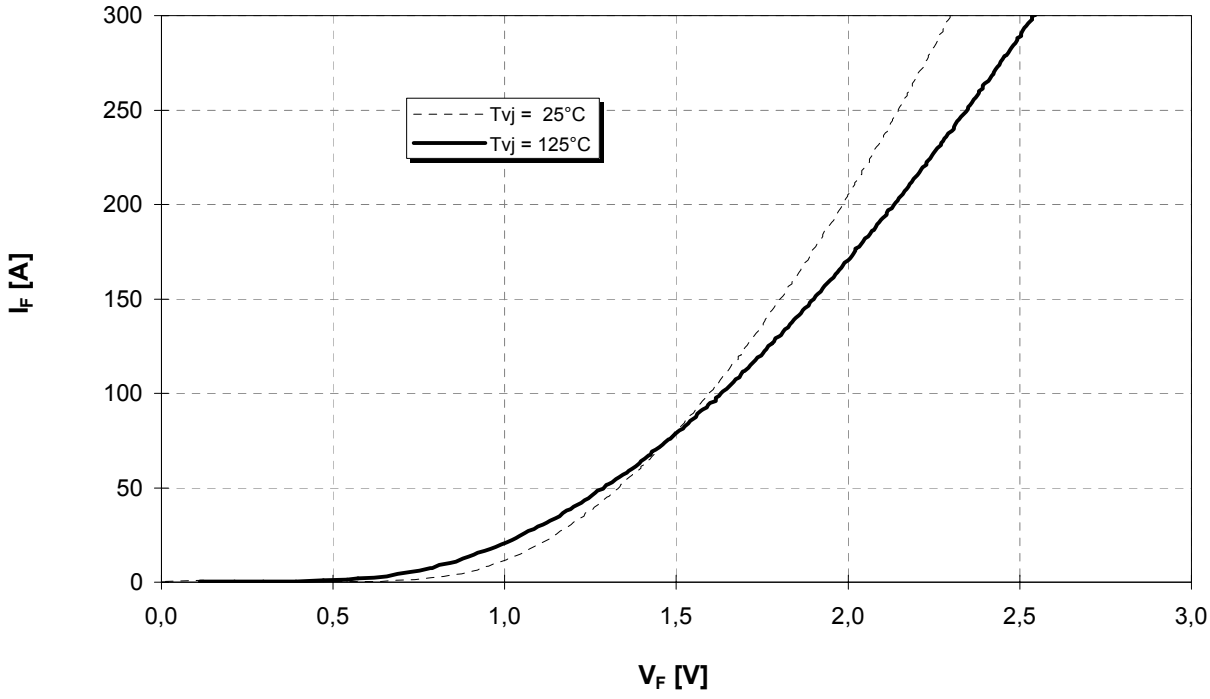


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Übertragungscharakteristik (typisch) $I_C = f(V_{GE})$
Transfer characteristic (typical) $V_{CE} = 20V$

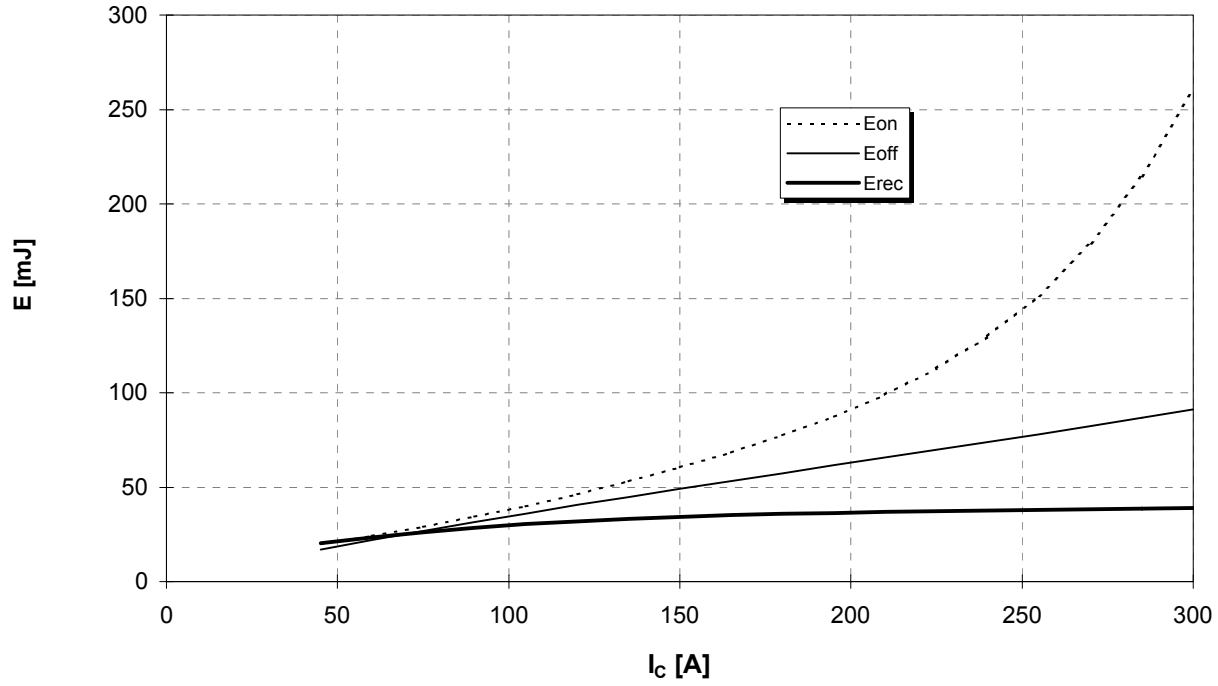


Durchlaßkennlinie der Inversdiode (typisch) $I_F = f(V_F)$
Forward characteristic of inverse diode (typical)

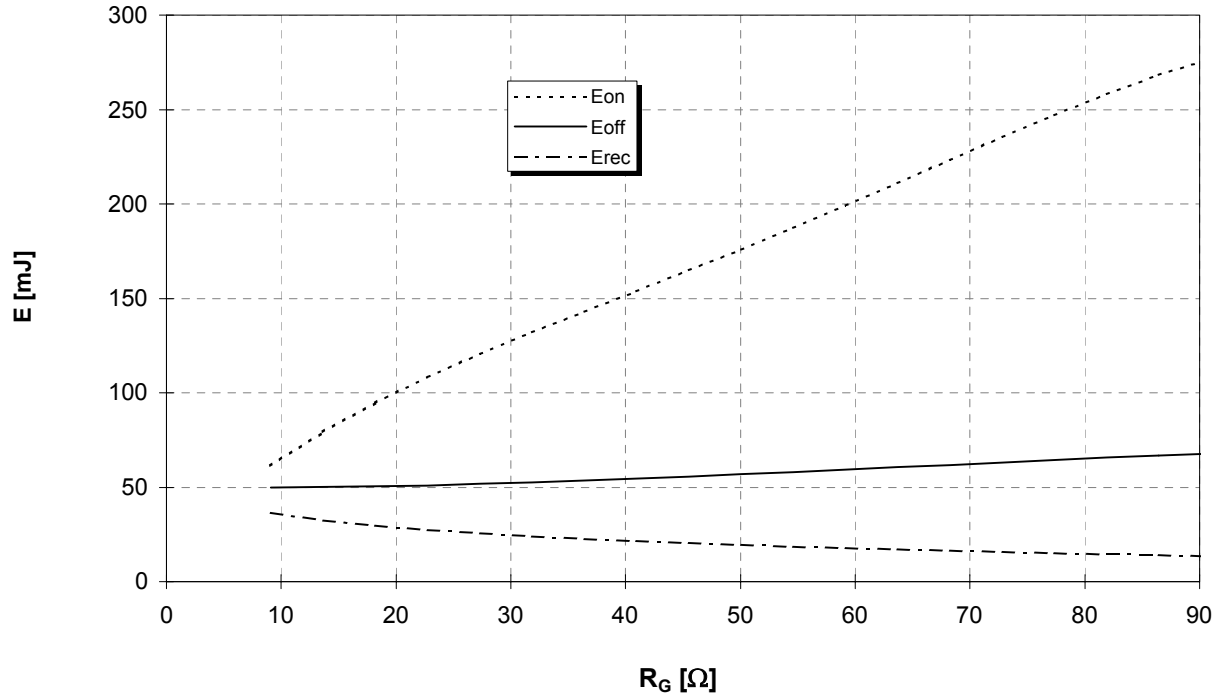


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Schaltverluste (typisch) $E_{on} = f(I_C)$, $E_{off} = f(I_C)$, $E_{rec} = f(I_C)$
Switching losses (typical) $V_{GE} = \pm 15V$, $R_{Gon} = R_{Goff} = 9{,}1\Omega$, $V_{CE} = 900V$, $T_{vj} = 125°C$

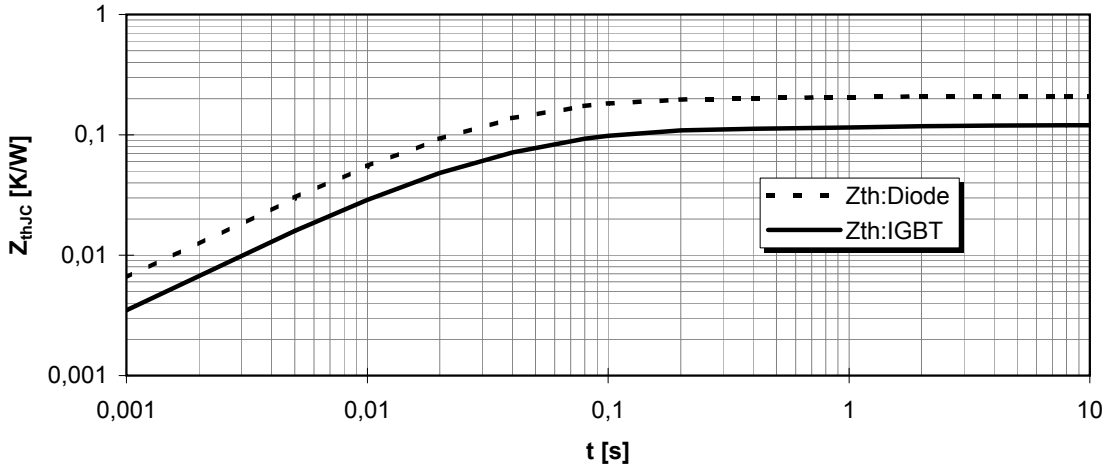


Schaltverluste (typisch) $E_{on} = f(R_G)$, $E_{off} = f(R_G)$, $E_{rec} = f(R_G)$
Switching losses (typical) $V_{GE} = \pm 15V$, $I_C = 150A$, $V_{CE} = 900V$, $T_{vj} = 125°C$



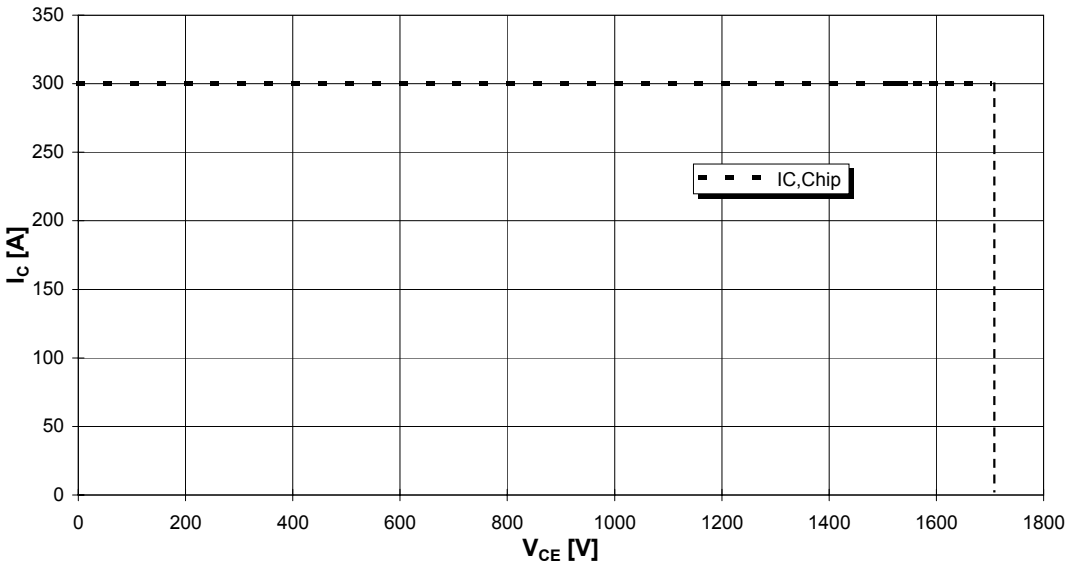
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Transienter Wärmewiderstand $Z_{thJC} = f(t)$
Transient thermal impedance

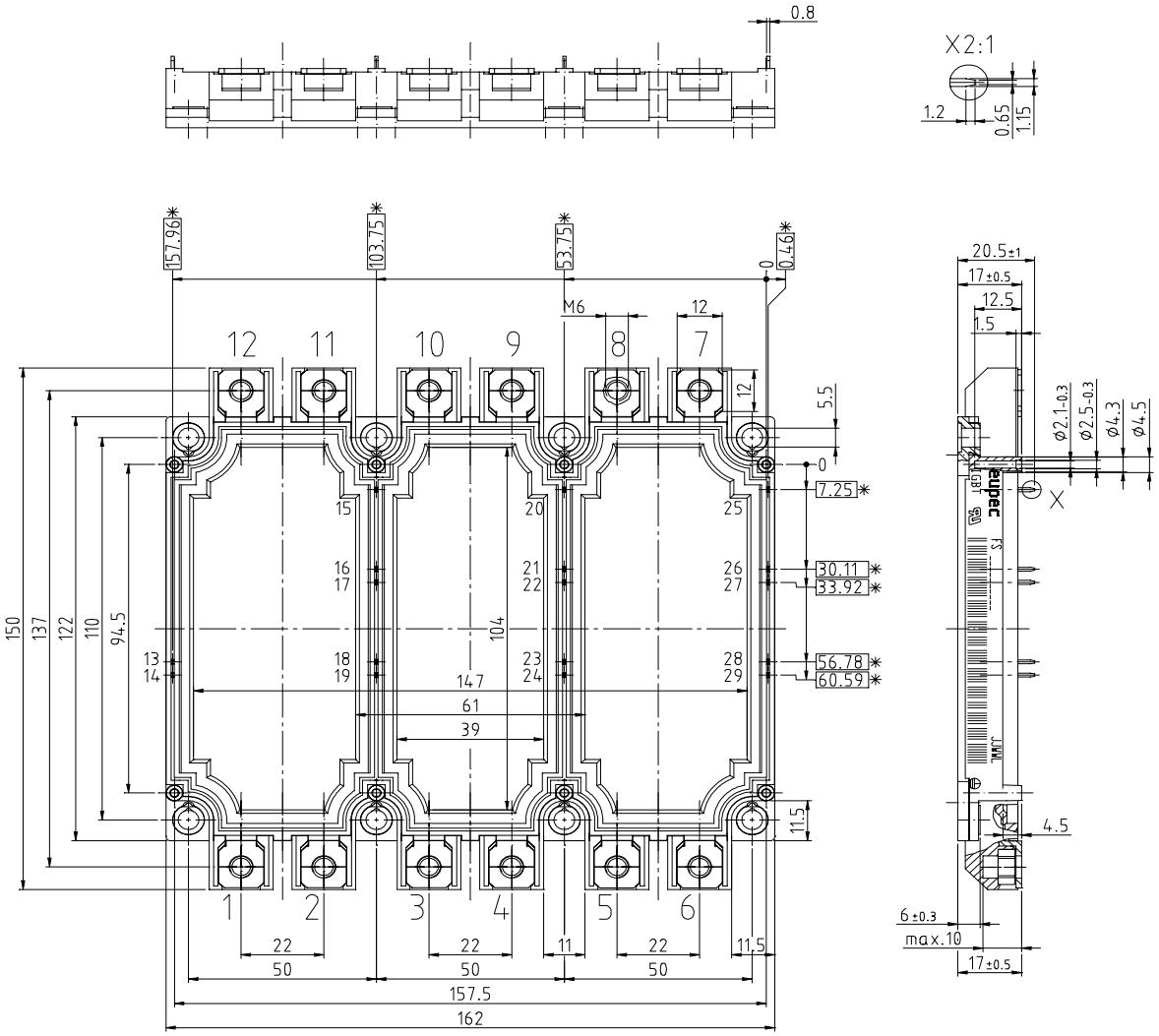


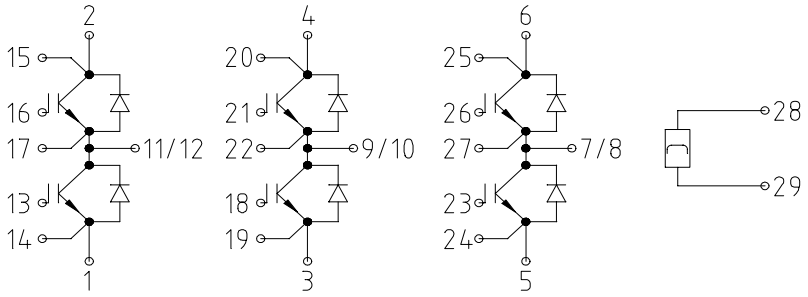
i		1	2	3	4
r_i [K/kW]	: IGBT	30,54	45,13	34,85	9,479
τ_i [s]	: IGBT	0,01565	0,03977	0,07521	1,443
r_i [K/kW]	: Diode	71,17	78,97	50,01	9,856
τ_i [s]	: Diode	0,02103	0,03011	0,08672	1,1583

Sicherer Arbeitsbereich (RBSOA)
Reverse bias safe operation area (RBSOA) V_{GE}=±15V, R_G = 9,1 Ohm, T_{vj}= 125°C



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