Technische Information / technical information

IGBT-Module
IGBT-Modules

FS10R06XL4

eupec

vorläufige Daten
preliminary data

Höchstzulässige Werte / maximum rated values

Elektrische Eigenschaften / electrical properties

Kollektor Emitter Sperrspannung collector emitter voltage	T_{vj} = 25 °C	V_{CES}	600	V
Kollektor Dauergleichstrom DC collector current	T_C = 80 °C T_C = 25 °C	$I_{C,nom.}$ I_C	10 17	A A
Periodischer Kollektor Spitzenstrom repetitive peak collector current	t_p= 1ms, T_C = 80 °C	I_{CRM}	20	A
Gesamt Verlustleistung total power dissipation	T_c= 25°C, Transistor	P_{tot}	76	W
Gate Emitter Spitzenspannung gate emitter peak voltage		V_{GES}	±20	V
Dauergleichstrom DC forward current		I_F	10	A
Periodischer Spitzenstrom repetitive peak forward current	t_p= 1ms	I_{FRM}	20	A
Grenzlastintegral I²t value	V_R= 0V, t_p= 10ms, T_{vj}= 125°C	I²t	12	A²s
Isolations Prüfspannung insulation test voltage	RMS, f= 50Hz, t= 1min	V_{ISOL}	2,5	kV

Charakteristische Werte / characteristic values

Transistor Wechselrichter / transistor inverter

			min.	typ.	max.	
Kollektor Emitter Sättigungsspannung collector emitter saturation voltage	V_{GE}= 15V, T_{vj}= 25°C, I_C= $I_{C,nom}$ V_{GE}= 15V, T_{vj}= 125°C, I_C= $I_{C,nom}$	V_{CEsat}	- -	1,95 2,20	2,55 -	V V
Gate Schwellenspannung gate threshold voltage	V_{CE}= V_{GE}, T_{vj}= 25°C, I_C= 0,4 mA	$V_{GE(th)}$	4,5	5,5	6,5	V
Gateladung gate charge	V_{GE}= -15V...+15V	Q_G	-	0,05	-	µC
Eingangskapazität input capacitance	f= 1MHz, T_{vj}= 25°C, V_{CE}= 25V, V_{GE}= 0V	C_{ies}	-	0,45	-	nF
Rückwirkungskapazität reverse transfer capacitance	f= 1MHz, T_{vj}= 25°C, V_{CE}= 25V, V_{GE}= 0V	C_{res}	-	0,04	-	nF
Kollektor Emitter Reststrom collector emitter cut off current	V_{CE} = 600 V, 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

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Charakteristische Werte / characteristic values

Transistor Wechselrichter / transistor inverter

			min.	typ.	max.	
Einschaltverzögerungszeit (induktive Last) turn on delay time (inductive load)	I_C= 10 A, V_{CC} = 300 V V_{GE} = ±15V, R_G = 27 Ω, T_{vj}= 25°C V_{GE} = ±15V, R_G = 27 Ω, T_{vj}= 125°C	$t_{d,on}$	- -	20 21	- -	ns ns
Anstiegszeit (induktive Last) rise time (inductive load)	I_C= 10 A, V_{CC} = 300 V V_{GE} = ±15V, R_G = 27 Ω, T_{vj}= 25°C V_{GE} = ±15V, R_G = 27 Ω, T_{vj}= 125°C	t_r	- -	7 8	- -	ns ns
Abschaltverzögerungszeit (induktive Last) turn off delay time (inductive load)	I_C= 10 A, V_{CC} = 300 V V_{GE} = ±15V, R_G = 27 Ω, T_{vj}= 25°C V_{GE} = ±15V, R_G = 27 Ω, T_{vj}= 125°C	$t_{d,off}$	- -	80 110	- -	ns ns
Fallzeit (induktive Last) fall time (inductive load)	I_C= 10 A, V_{CC} = 300 V V_{GE} = ±15V, R_G = 27 Ω, T_{vj}= 25°C V_{GE} = ±15V, R_G = 27 Ω, T_{vj}= 125°C	t_f	- -	18 25	- -	ns ns
Einschaltverlustenergie pro Puls turn on energy loss per pulse	I_C= 10 A, V_{CC} = 300 V R_G = 27 Ω, T_{vj} = 125°C, L_σ = 25 nH	E_{on}	-	0,25	-	mJ
Ausschaltverlustenergie pro Puls turn off energy loss per pulse	I_C= 10 A, V_{CC} = 300 V R_G = 27 Ω, T_{vj} = 125°C, L_σ = 25 nH	E_{off}	-	0,30	-	mJ
Kurzschlussverhalten SC data	$t_P \leq$ 10µsec, $V_{GE} \leq$ 15V, T_{vj}= 125°C, V_{CC} = 360 V, V_{CEmax}=V_{CES} -$L_{\sigma CE}$ ·|di/dt|	I_{SC}	-	40	-	A
Modulinduktivität stray inductance module		$L_{\sigma CE}$	-	25	-	nH
Leitungswiderstand, Anschluss-Chip lead resistance, terminal-chip	T_c= 25°C	$R_{CC'/EE'}$	-	8	-	mΩ

Charakteristische Werte / characteristic values

Diode Wechselrichter / diode inverter

Durchlassspannung forward voltage	I_F = 10 A, V_{GE}= 0V, T_{vj}= 25°C I_F = 10 A, V_{GE}= 0V, T_{vj}= 125°C	V_F	- -	1,85 1,90	2,25 -	V V
Rückstromspitze peak reverse recovery current	I_F = 10 A, -di_F/dt = 1500 A/µs V_R = 300 V, V_{GE}= -10V, T_{vj}= 25°C V_R = 300 V, V_{GE}= -10V, T_{vj}= 125°C	I_{RM}	- -	26 27	- -	A A
Sperrverzögerungsladung recovered charge	I_F = 10 A, -di_F/dt = 1500 A/µs V_R = 300 V, V_{GE}= -10V, T_{vj}= 25°C V_R = 300 V, V_{GE}= -10V, T_{vj}= 125°C	Q_r	- -	0,55 0,95	- -	µC µC
Ausschaltenergie pro Puls reverse recovery energy	I_F = 10 A, -di_F/dt = 1500 A/µs V_R = 300 V, V_{GE}= -10V, T_{vj}= 25°C V_R = 300 V, V_{GE}= -10V, T_{vj}= 125°C	E_{rec}	- -	0,15 0,2	- -	mJ 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} deviation 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	$R_2 = R_1 \exp[B(1/T_2 - 1/T_1)]$	$B_{25/50}$	-	3375	-	K

Thermische Eigenschaften / thermal properties

Innerer Wärmewiderstand; DC thermal resistance, junction to case; DC	Transistor Wechselr. / transistor inverter Diode Wechselrichter / diode inverter	R_{thJC}	- -	- -	1,65 3,80	K/W K/W
Wärmewiderstand; DC thermal resistance, junction to heat sink; DC	Transistor Wechselr. / transistor inverter Diode Wechselrichter / diode inverter λ_{Paste} = 1 W/m*K / λ_{grease} = 1 W/m*K	R_{thJH}	- -	2,20 4,50	- -	K/W K/W
Übergangs-Wärmewiderstand; DC thermal resistance, case to heat sink; DC	Transistor Wechselr. / transistor inverter Diode Wechselrichter / diode inverter λ_{Paste} = 1 W/m*K / λ_{grease} = 1 W/m*K	R_{thCH}	- -	0,70 1,00	- -	K/W K/W
Höchstzulässige Sperrschichttemp. maximum junction temperature		T_{vjmax}	-	-	150	°C
Betriebstemperatur operation temperature		T_{op}	-40	-	125	°C
Lagertemperatur storage temperature		T_{stg}	-40	-	125	°C

Mechanische Eigenschaften / mechanical properties

Innere Isolation internal insulation			Al_2O_3	
CTI comperative tracking index			225	
Anpresskraft pro Feder mounting force per clamp		F	20..50	N
Gewicht weight		G	25	g
Kriechstrecke creepage distance	Anschluss - Kühlkörper terminal to heat sink		10,5	mm
	Anschluss - Anschluss terminal to terminal		5	mm
Luftstrecke clearance distance	Anschluss - Kühlkörper terminal to heat sink		9	mm
	Anschluss - Anschluss terminal to terminal		5	mm

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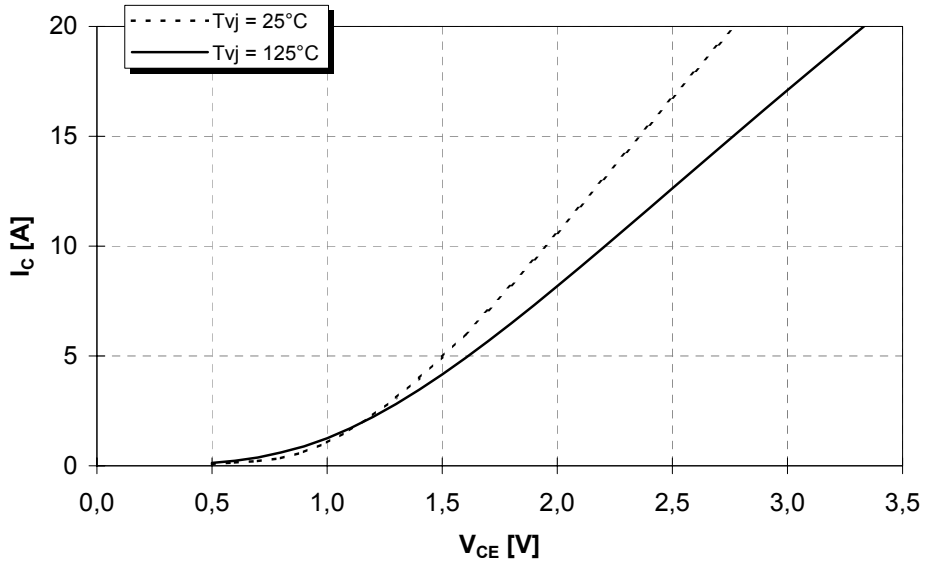
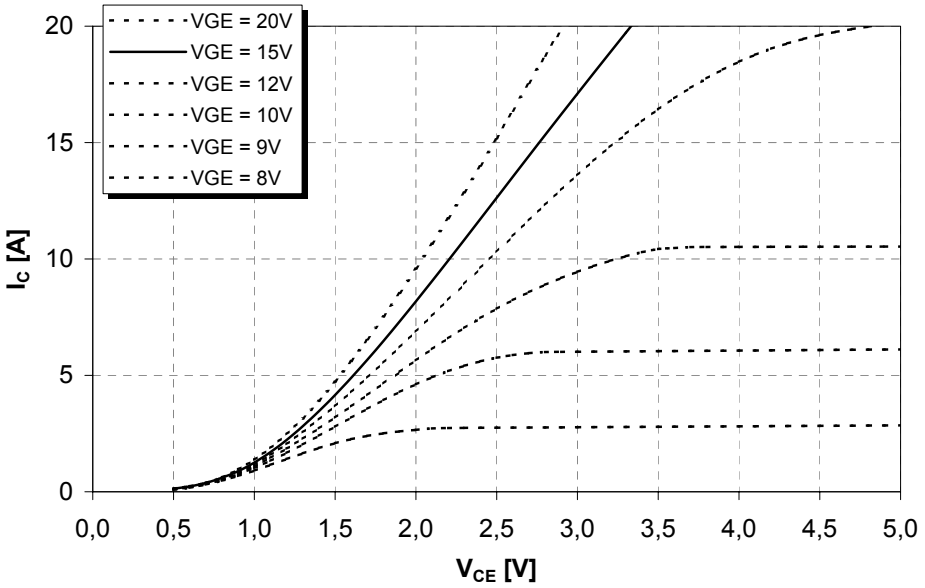
Ausgangskennlinie (typisch)
output characteristic (typical)

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



Ausgangskennlinienfeld (typisch)
output characteristic (typical)

$I_C = f(V_{CE})$
$T_{vj} = 125°C$



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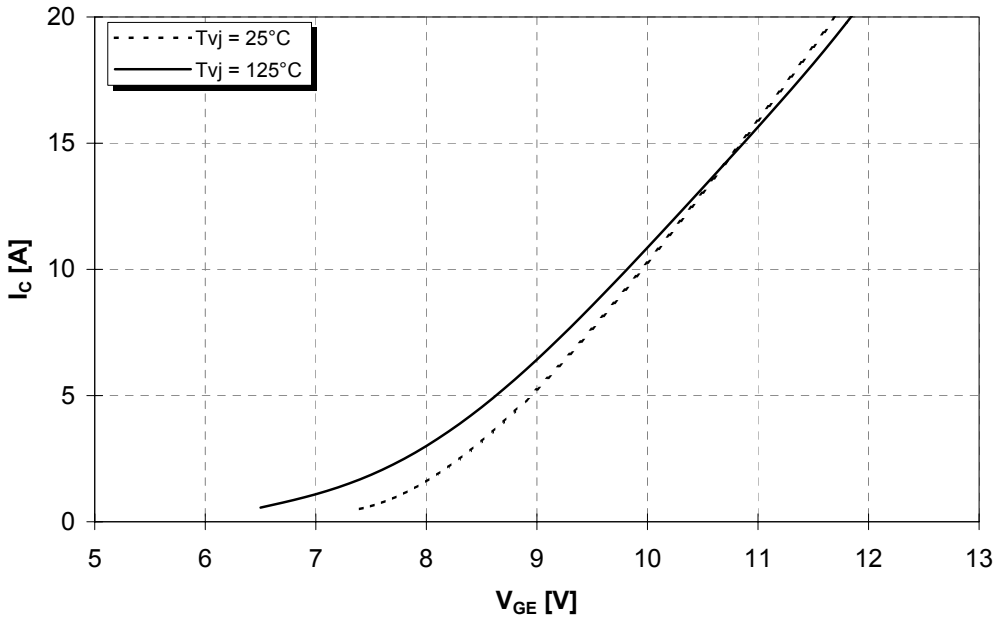
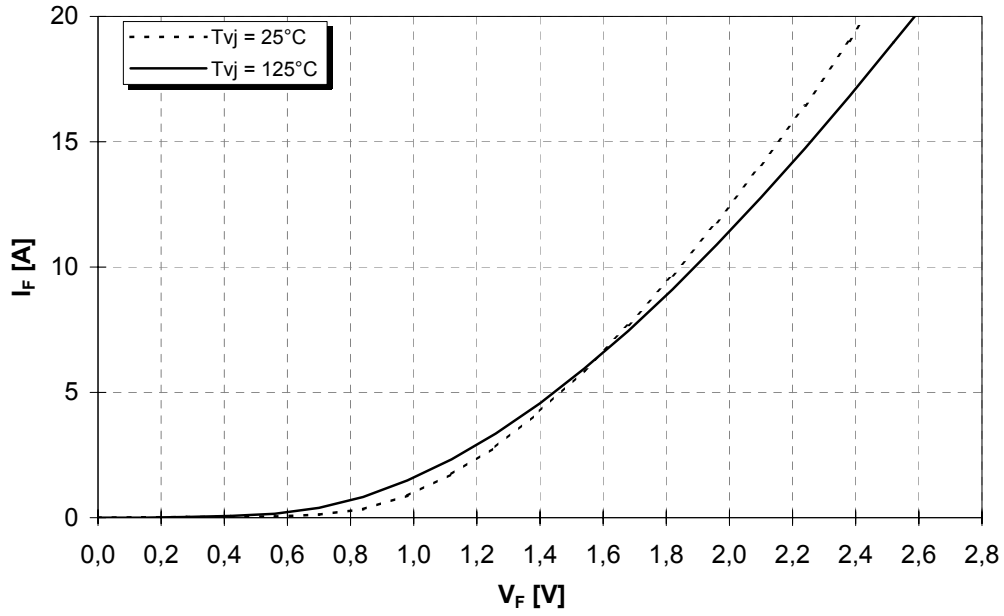
Übertragungscharakteristik (typisch) $I_C = f(V_{GE})$
transfer characteristic (typical) $V_{CE} = 20V$



Durchlasskennlinie der Inversdiode (typisch) $I_F = f(V_F)$
forward characteristic of inverse diode (typical)



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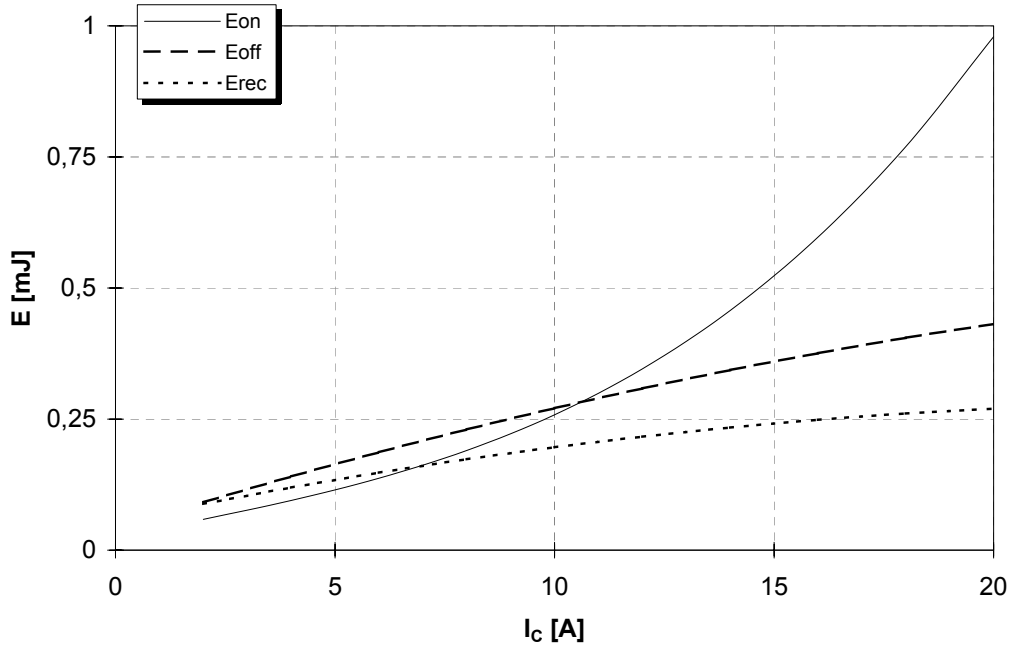
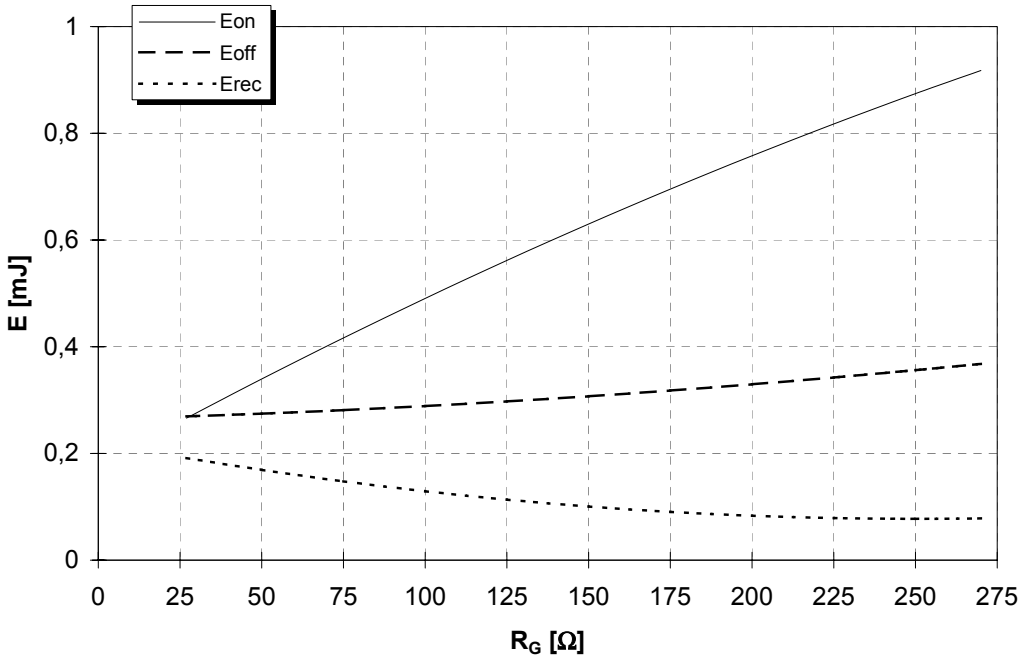
Schaltverluste (typisch)
switching losses (typical)

$E_{on} = f(I_C)$, $E_{off} = f(I_C)$, $E_{rec} = f(I_C)$
V_{GE}= ±15V, R_{Gon}=R_{Goff}= 27Ω, V_{CE}= 300V, T_{vj}= 125°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= 10A, V_{CE}= 300V, T_{vj}= 125°C



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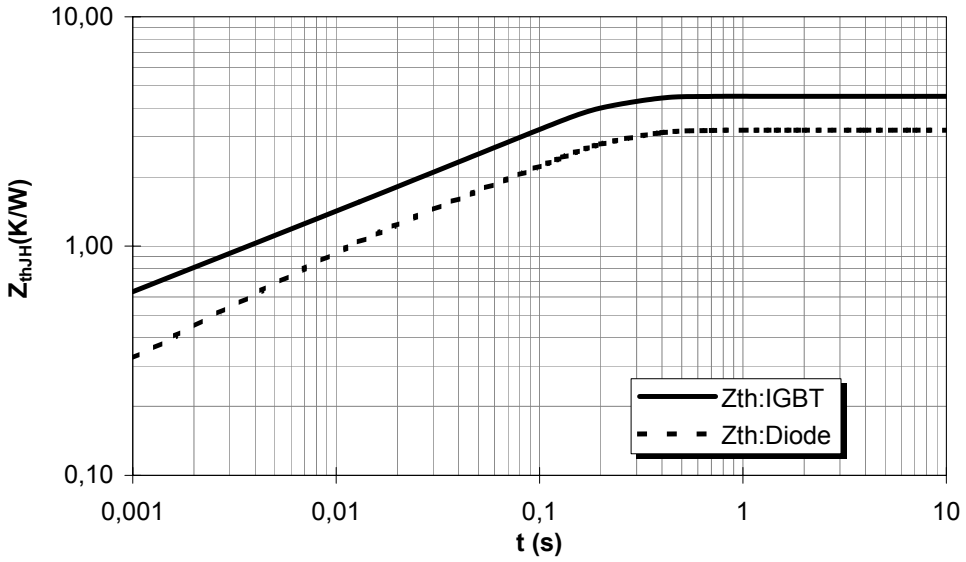
Transienter Wärmewiderstand
transient thermal impedance

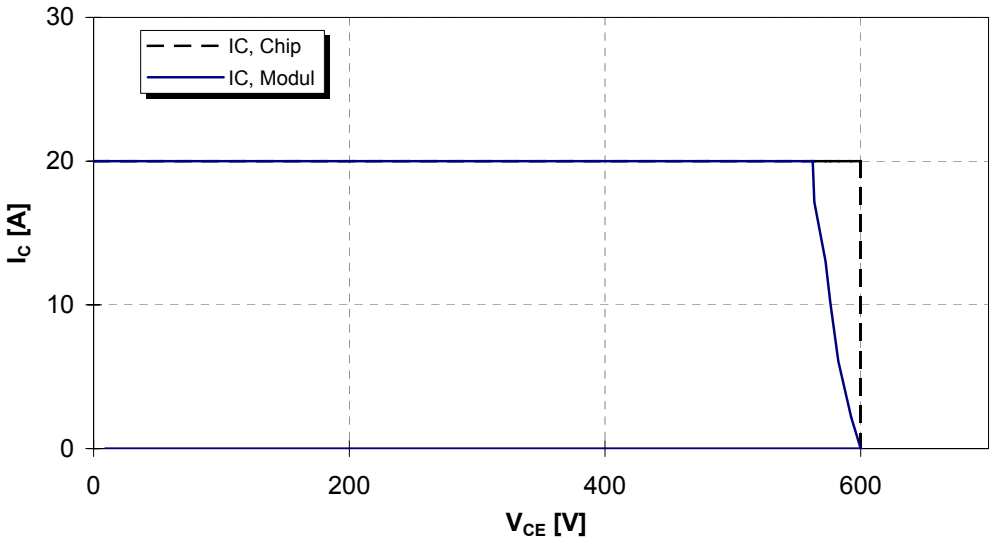
$Z_{thJH} = f(t)$



i	1	2	3	4
r_i [K/kW]: IGBT	270,0	900,0	2520,0	810,0
τ_i [s]: IGBT	0,000232	0,00215	0,09946	0,12318
r_i [K/kW]: Diode	192,0	640,0	1792,0	576,0
τ_i [s]: Diode	0,000307	0,00484	0,10644	0,14203

Sicherer Arbeitsbereich (RBSOA)
reverse bias safe operation area (RBSOA)

V_{GE}=15V, T_j=125°C, R_G = 27 Ω



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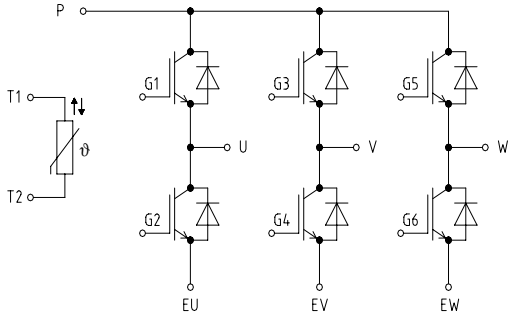
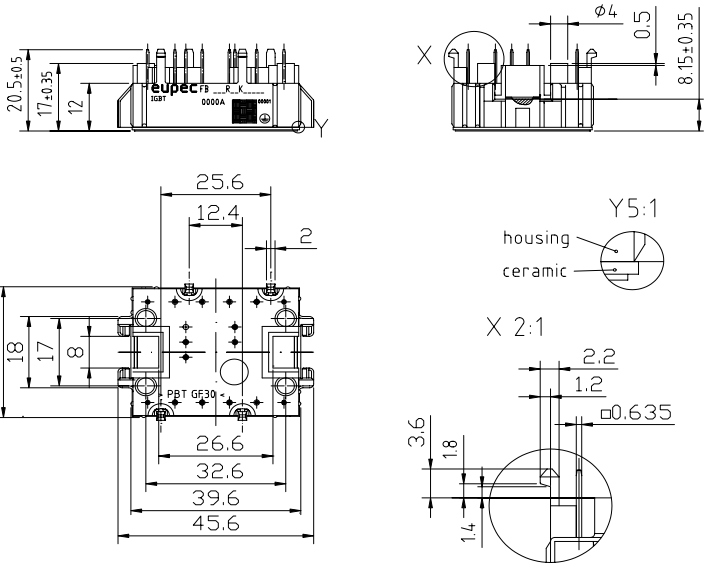
Schaltbild
circuit diagram

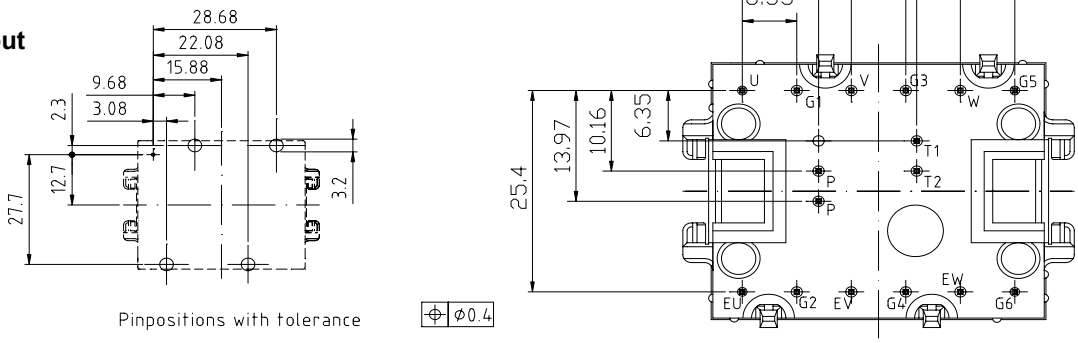


Gehäusemaße
package outline



Module only designed for mounting on PCB with 1.6 ±0.2 mm thickness

Bohrplan
drilling layout



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 with the belonging technical notes.