

Vorläufig
Preliminary**Elektrische Eigenschaften / Electrical properties****Höchstzulässige Werte / Maximum rated values****Diode Gleichrichter/ Diode Rectifier**

Periodische Rückw. Spitzensperrspannung repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{RRM}	800	V
Durchlaßstrom Grenzeffektivwert pro Chip RMS forward current per chip	$T_C = 80^{\circ}\text{C}$	I_{FRMSM}	23	A
Gleichrichter Ausgang Grenzeffektivstrom maximum RMS current at Rectifier output	$T_C = 80^{\circ}\text{C}$	I_{RMSmax}	51	A
Stoßstrom Grenzwert surge forward current	$t_p = 10 \text{ ms}, T_{vj} = 25^{\circ}\text{C}$ $t_p = 10 \text{ ms}, T_{vj} = 150^{\circ}\text{C}$	I_{FSM}	197 158	A A
Grenzlastintegral i^2t - value	$t_p = 10 \text{ ms}, T_{vj} = 25^{\circ}\text{C}$ $t_p = 10 \text{ ms}, T_{vj} = 150^{\circ}\text{C}$	i^2t	194 125	A^2s A^2s

Transistor Wechselrichter/ Transistor Inverter

Kollektor-Emitter-Sperrspannung collector-emitter voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{CES}	600	V
Kollektor-Dauergleichstrom DC-collector current	$T_C = 80^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}$	$I_{C,nom.}$ I_C	10 15	A A
Periodischer Kollektor Spitzenstrom repetitive peak collector current	$t_p = 1 \text{ ms}, T_C = 80^{\circ}\text{C}$	I_{CRM}	20	A
Gesamt-Verlustleistung total power dissipation	$T_C = 25^{\circ}\text{C}$	P_{tot}	55	W
Gate-Emitter-Spitzenspannung gate-emitter peak voltage		V_{GES}	+/- 20V	V

Diode Wechselrichter/ Diode Inverter

Dauergleichstrom DC forward current		I_F	10	A
Periodischer Spitzenstrom repetitive peak forw. current	$t_p = 1 \text{ ms}$	I_{FRM}	20	A
Grenzlastintegral i^2t - value	$V_R = 0\text{V}, t_p = 10\text{ms}, T_{vj} = 125^{\circ}\text{C}$	i^2t	12	A^2s

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Technische Information / Technical Information

IGBT-Module
IGBT-Modules

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Modul Isolation/ Module Isolation

Isolations-Prüfspannung insulation test voltage	RMS, f = 50 Hz, t = 1 min. NTC connected to Baseplate	V_{ISOL}	2,5	kV
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Elektrische Eigenschaften / Electrical properties

Charakteristische Werte / Characteristic values

Diode Gleichrichter/ Diode Rectifier

min. typ. max.

Durchlaßspannung forward voltage	$T_{vj} = 150^{\circ}\text{C}$, $I_F = 10\text{ A}$	V_F	-	0,9	-	V
Schleusenspannung threshold voltage	$T_{vj} = 150^{\circ}\text{C}$	$V_{(TO)}$	-	0,67	-	V
Ersatzwiderstand slope resistance	$T_{vj} = 150^{\circ}\text{C}$	r_T	-	21	-	mΩ
Sperrstrom reverse current	$T_{vj} = 150^{\circ}\text{C}$, $V_R = 800\text{ V}$	I_R	-	5	-	mA
Modul Leitungswiderstand, Anschlüsse-Chip lead resistance, terminals-chip	$T_C = 25^{\circ}\text{C}$	R_{AA+CC}	-	9	-	mΩ

Transistor Wechselrichter/ Transistor Inverter

min. typ. max.

Kollektor-Emitter Sättigungsspannung collector-emitter saturation voltage	$V_{GE} = 15\text{ V}$, $T_{vj} = 25^{\circ}\text{C}$, $I_C = 10\text{ A}$ $V_{GE} = 15\text{ V}$, $T_{vj} = 125^{\circ}\text{C}$, $I_C = 10\text{ A}$	$V_{CE\text{ sat}}$	-	1,95 2,2	2,55 -	V V
Gate-Schwellenspannung gate threshold voltage	$V_{CE} = V_{GE}$, $T_{vj} = 25^{\circ}\text{C}$, $I_C = 0,35\text{ mA}$	$V_{GE(TO)}$	4,5	5,5	6,5	V
Eingangskapazität input capacitance	f = 1MHz, $T_{vj} = 25^{\circ}\text{C}$ $V_{CE} = 25\text{ V}$, $V_{GE} = 0\text{ V}$	C_{ies}	-	0,8	-	nF
Kollektor-Emitter Reststrom collector-emitter cut-off current	$V_{GE} = 0\text{ V}$, $T_{vj} = 125^{\circ}\text{C}$, $V_{CE} = 600\text{ V}$	I_{CES}	-	5,0	-	mA
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}	-	-	400	nA
Einschaltverzögerungszeit (ind. Last) turn on delay time (inductive load)	$I_C = I_{Nenn}$, $V_{CC} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 25^{\circ}\text{C}$, $R_G = 82\text{ Ohm}$ $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 125^{\circ}\text{C}$, $R_G = 82\text{ Ohm}$	$t_{d,on}$	-	32 30	- -	ns ns
Anstiegszeit (induktive Last) rise time (inductive load)	$I_C = I_{Nenn}$, $V_{CC} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 25^{\circ}\text{C}$, $R_G = 82\text{ Ohm}$ $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 125^{\circ}\text{C}$, $R_G = 82\text{ Ohm}$	t_r	-	26 28	- -	ns ns
Abschaltverzögerungszeit (ind. Last) turn off delay time (inductive load)	$I_C = I_{Nenn}$, $V_{CC} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 25^{\circ}\text{C}$, $R_G = 82\text{ Ohm}$ $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 125^{\circ}\text{C}$, $R_G = 82\text{ Ohm}$	$t_{d,off}$	-	234 230	- -	ns ns
Fallzeit (induktive Last) fall time (inductive load)	$I_C = I_{Nenn}$, $V_{CC} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 25^{\circ}\text{C}$, $R_G = 82\text{ Ohm}$ $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 125^{\circ}\text{C}$, $R_G = 82\text{ Ohm}$	t_f	-	10 30	- -	ns ns
Einschaltverlustenergie pro Puls turn-on energy loss per pulse	$I_C = I_{Nenn}$, $V_{CC} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 125^{\circ}\text{C}$, $R_G = 82\text{ Ohm}$ $L_S = 80\text{ nH}$	E_{on}	-	0,36	-	mWs
Abschaltverlustenergie pro Puls turn-off energy loss per pulse	$I_C = I_{Nenn}$, $V_{CC} = 300\text{ V}$ $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 125^{\circ}\text{C}$, $R_G = 82\text{ Ohm}$ $L_S = 80\text{ nH}$	E_{off}	-	0,44	-	mWs
Kurzschlußverhalten SC Data	$t_P \leq 10\mu\text{s}$, $V_{GE} \leq 15\text{ V}$, $R_G = 82\text{ Ohm}$ $T_{vj} \leq 125^{\circ}\text{C}$, $V_{CC} = 360\text{ V}$	I_{SC}	-	40	-	A

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Elektrische Eigenschaften / Electrical properties

Charakteristische Werte / Characteristic values

			min.	typ.	max.	
Modulinduktivität stray inductance module		$L_{\sigma CE}$	-	-	40	nH
Modul Leitungswiderstand, Anschlüsse-Chip lead resistance, terminals-chip	$T_C = 25^\circ C$	$R_{CC+EE'}$	-	14	-	mΩ
Diode Wechselrichter/ Diode Inverter			min.	typ.	max.	
Durchlaßspannung forward voltage	$V_{GE} = 0V, T_{vj} = 25^\circ C, I_F = 10 A$ $V_{GE} = 0V, T_{vj} = 125^\circ C, I_F = 10 A$	V_F	-	1,85 1,9	2,25 -	V V
Rückstromspitze peak reverse recovery current	$I_F = I_{Nenn}, -di_F/dt = 300 A/us$ $V_{GE} = -10V, T_{vj} = 25^\circ C, V_R = 300 V$ $V_{GE} = -10V, T_{vj} = 125^\circ C, V_R = 300 V$	I_{RM}	-	11 12	- -	A A
Sperrverzögerungsladung recovered charge	$I_F = I_{Nenn}, -di_F/dt = 600 A/us$ $V_{GE} = -10V, T_{vj} = 25^\circ C, V_R = 300 V$ $V_{GE} = -10V, T_{vj} = 125^\circ C, V_R = 300 V$	Q_r	-	0,4 0,8	- -	μAs μAs
Abschaltenergie pro Puls reverse recovery energy	$I_F = I_{Nenn}, -di_F/dt = 600 A/us$ $V_{GE} = -10V, T_{vj} = 25^\circ C, V_R = 300 V$ $V_{GE} = -10V, T_{vj} = 125^\circ C, V_R = 300 V$	E_{rec}	-	0,05 0,12	- -	mWs mWs
NTC-Widerstand/ NTC-Thermistor			min.	typ.	max.	
Nennwiderstand	$T_C = 25^\circ C$	R_{25}	-	5	-	kΩ
Abweichung von R_{100} deviation of R_{100}	$T_C = 100^\circ C, R_{100} = 493 \Omega$	$\Delta R/R$	-5		5	%
Verlustleistung power dissipation	$T_C = 25^\circ C$	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

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Thermische Eigenschaften / Thermal properties

			min.	typ.	max.	
Innerer Wärmewiderstand thermal resistance, junction to heatsink	Gleichr. Diode/ Rectif. Diode $\lambda_{\text{paste}}=1\text{W/m}^2\text{K}$	R_{thJH}	-	2,6	-	K/W
	Trans. Wechr./ Trans. Inverter $\lambda_{\text{grease}}=1\text{W/m}^2\text{K}$		-	2,8	-	K/W
	Diode Wechr./ Diode Inverter		-	4,3	-	K/W
Innerer Wärmewiderstand thermal resistance, junction to case	Gleichr. Diode/ Rectif. Diode	R_{thJC}	-	-	2,4	K/W
	Trans. Wechr./ Trans. Inverter		-	-	2,2	K/W
	Diode Wechr./ Diode Inverter		-	-	3,1	K/W
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	Gleichr. Diode/ Rectif. Diode $\lambda_{\text{paste}}=1\text{W/m}^2\text{K}$	R_{thCH}	-	0,4	-	K/W
	Trans. Wechr./ Trans. Inverter $\lambda_{\text{grease}}=1\text{W/m}^2\text{K}$		-	0,8	-	K/W
	Diode Wechr./ Diode Inverter		-	1,5	-	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

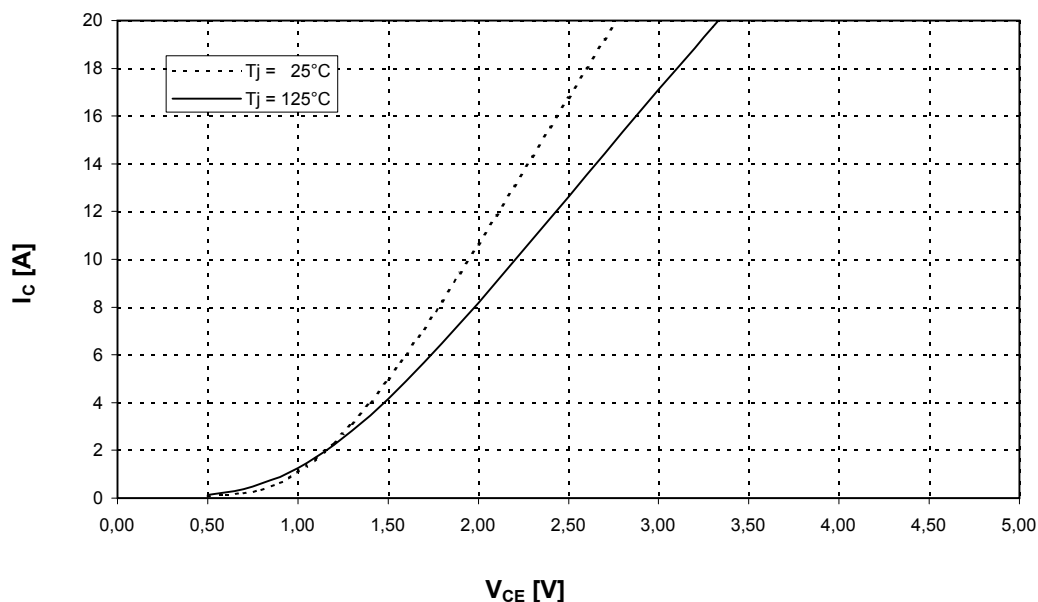
Innere Isolation internal insulation			Al_2O_3	
CTI comperative tracking index			225	
Anpreßkraft f. mech. Befestigung pro Feder mounting force per clamp		F	40...80	N
Gewicht weight		G	36	g
Kontakt - Kühlkörper terminal to heatsink	Kriechstrecke creeping distance		13,5	mm
	Luftstrecke clearance		12	mm
Terminal - Terminal terminal to terminal	Kriechstrecke creeping distance		7,5	mm
	Luftstrecke clearance		7,5	mm



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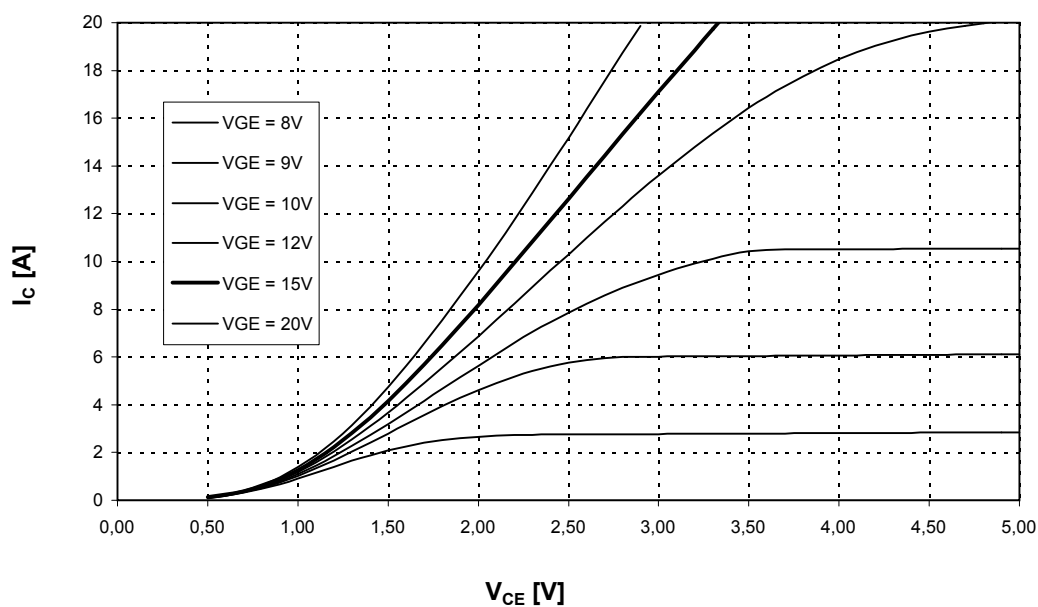
Ausgangskennlinienfeld Wechselr. (typisch)
Output characteristic Inverter (typical)

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



Ausgangskennlinienfeld Wechselr. (typisch)
Output characteristic Inverter (typical)

$I_C = f(V_{CE})$
 $T_{vj} = 125^\circ\text{C}$

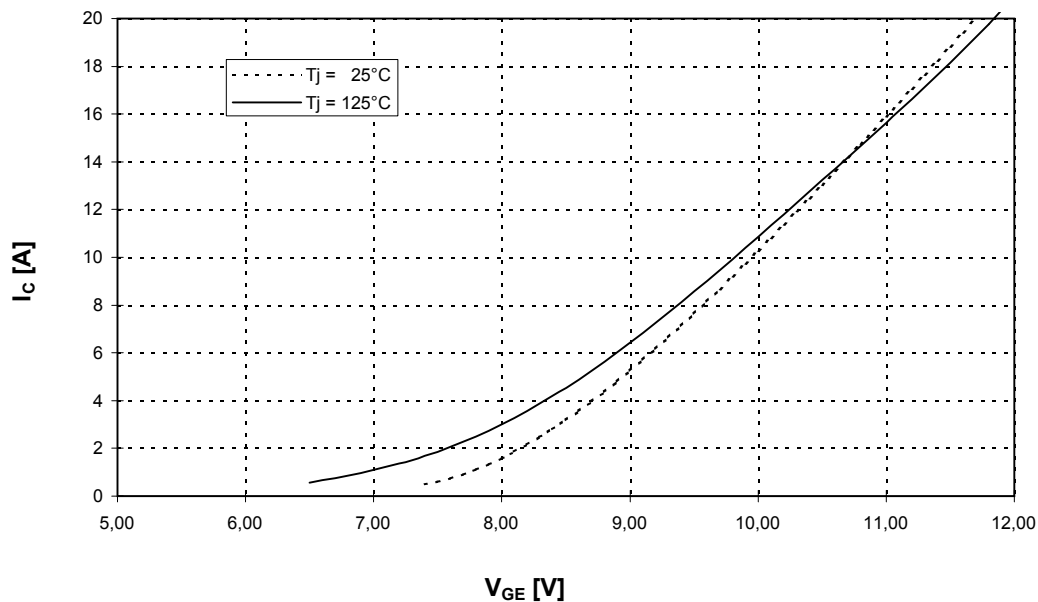


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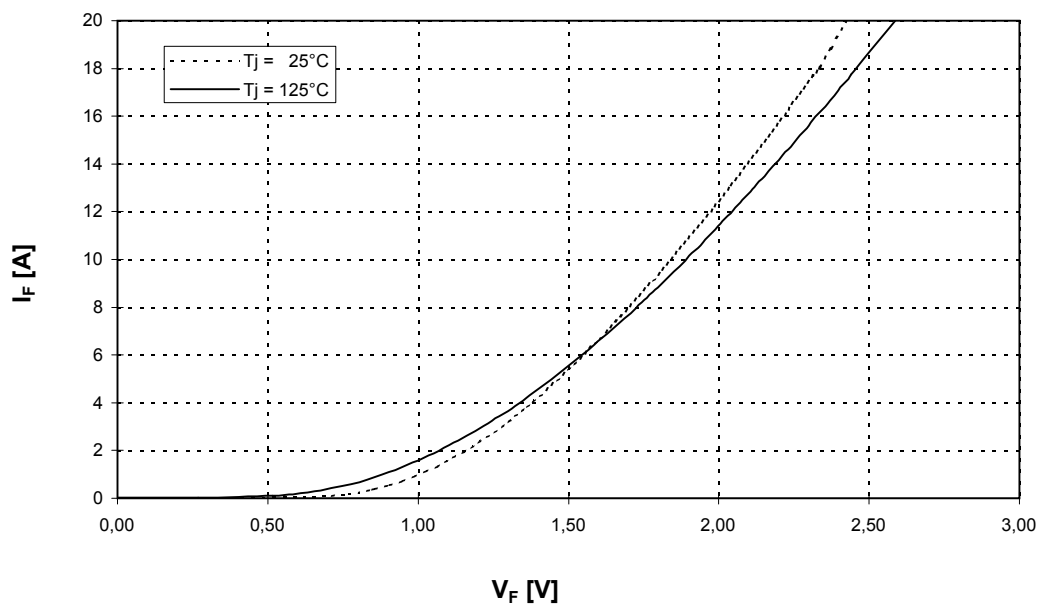
Übertragungscharakteristik Wechsellr. (typisch)
Transfer characteristic Inverter (typical)

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

$$V_{CE} = 20 \text{ V}$$



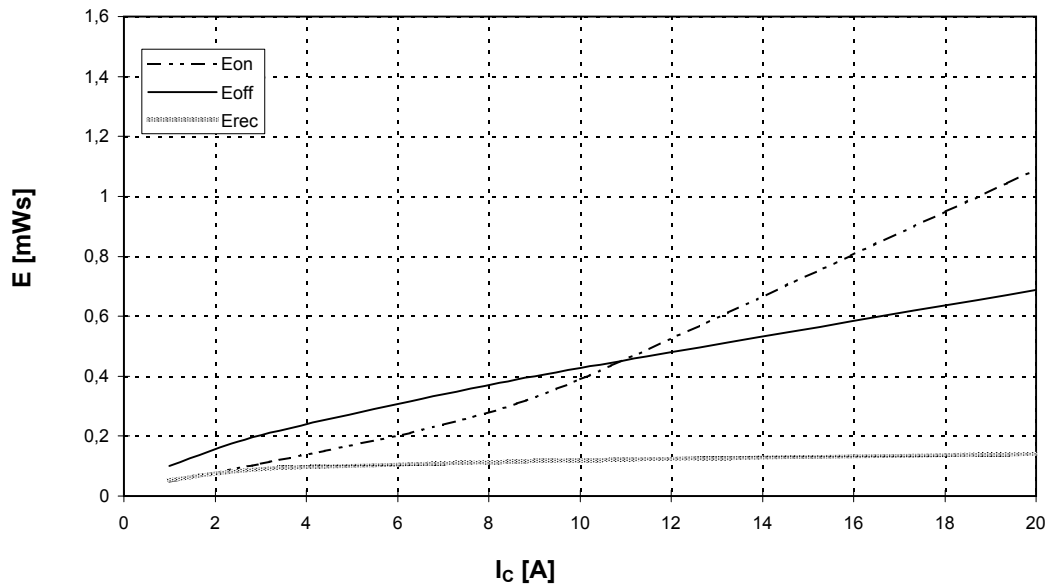
Durchlaßkennlinie der Freilaufdiode Wechsellr. (typisch) $I_F = f(V_F)$
Forward characteristic of FWD Inverter (typical)



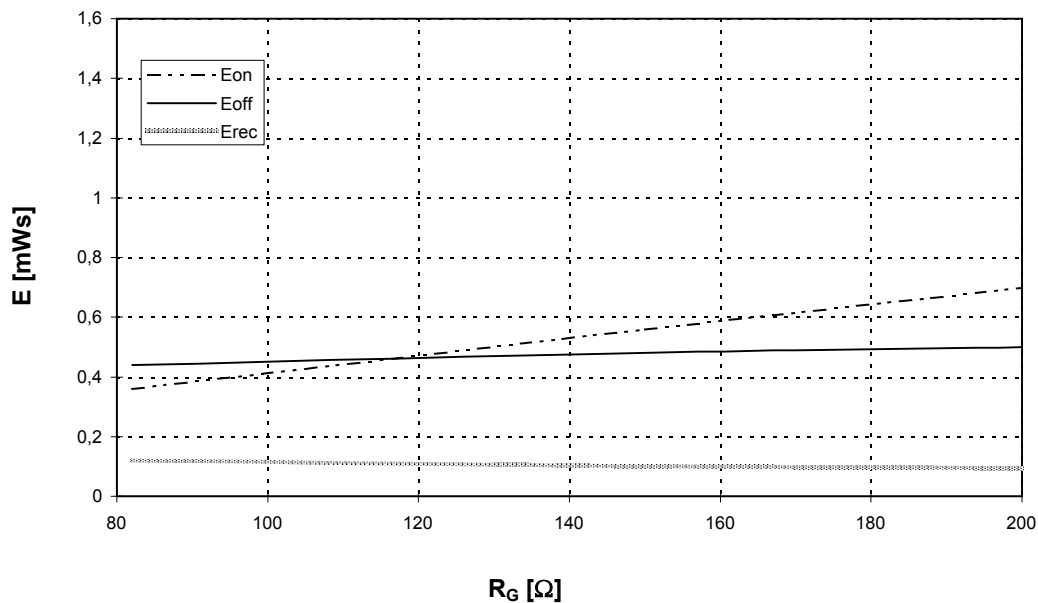


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Schaltverluste Wechselr. (typisch) $E_{on} = f(I_C)$, $E_{off} = f(I_C)$, $E_{rec} = f(I_C)$ $V_{CC} = 300\text{ V}$
Switching losses Inverter (typical) $T_j = 125^\circ\text{C}$, $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = R_{Goff} = 820\Omega$



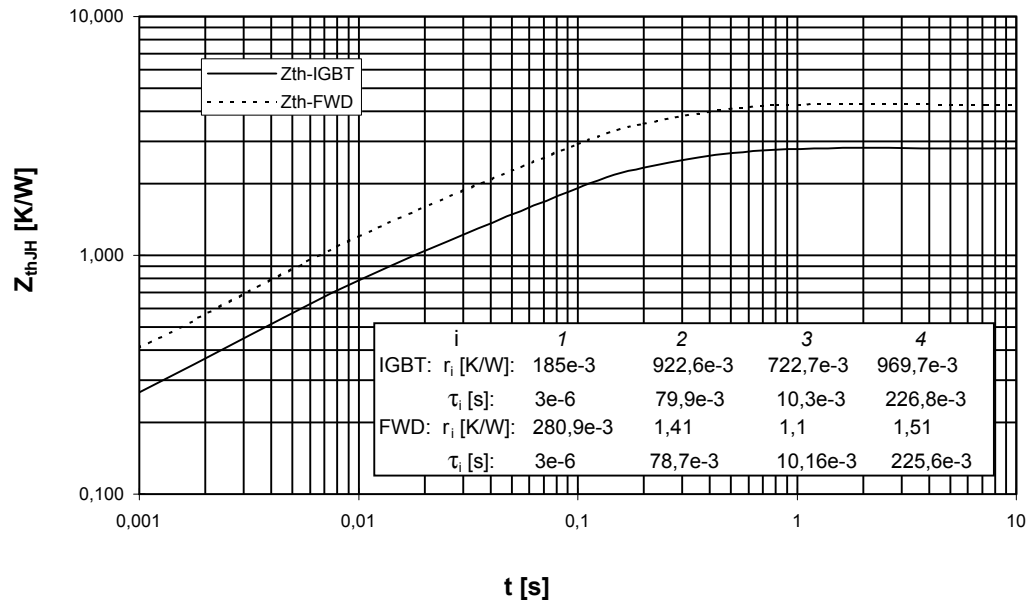
Schaltverluste Wechselr. (typisch) $E_{on} = f(R_G)$, $E_{off} = f(R_G)$, $E_{rec} = f(R_G)$
Switching losses Inverter (typical) $T_j = 125^\circ\text{C}$, $V_{GE} = \pm 15\text{ V}$, $I_C = I_{nenn}$, $V_{CC} = 300\text{ V}$



Vorläufig
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Transienter Wärmewiderstand Wechslr.
Transient thermal impedance Inverter

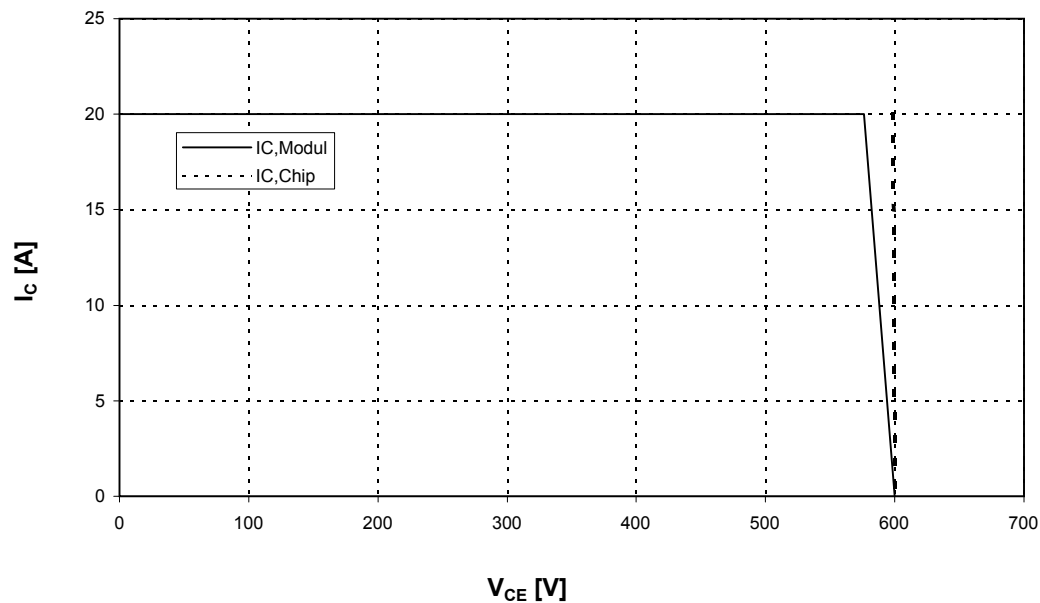
$$Z_{thJH} = f(t)$$



Sicherer Arbeitsbereich Wechslr. (RBSOA)

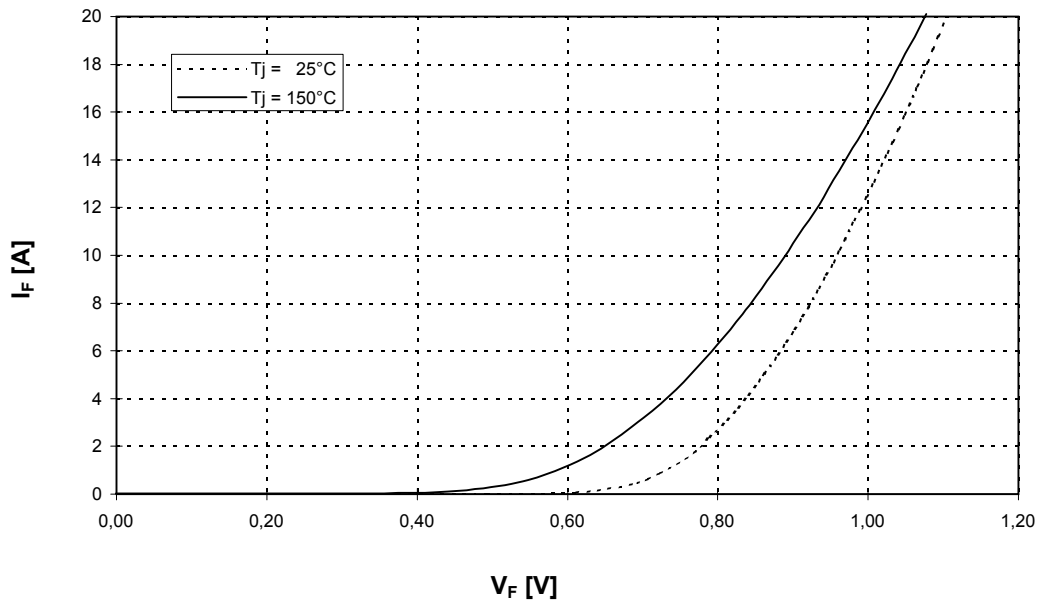
$$I_C = f(V_{CE})$$

Reverse bias save operating area Inverter (RBSOA) $T_{vj} = 125^\circ\text{C}$, $V_{GE} = \pm 15\text{V}$, $R_G = 820\Omega$

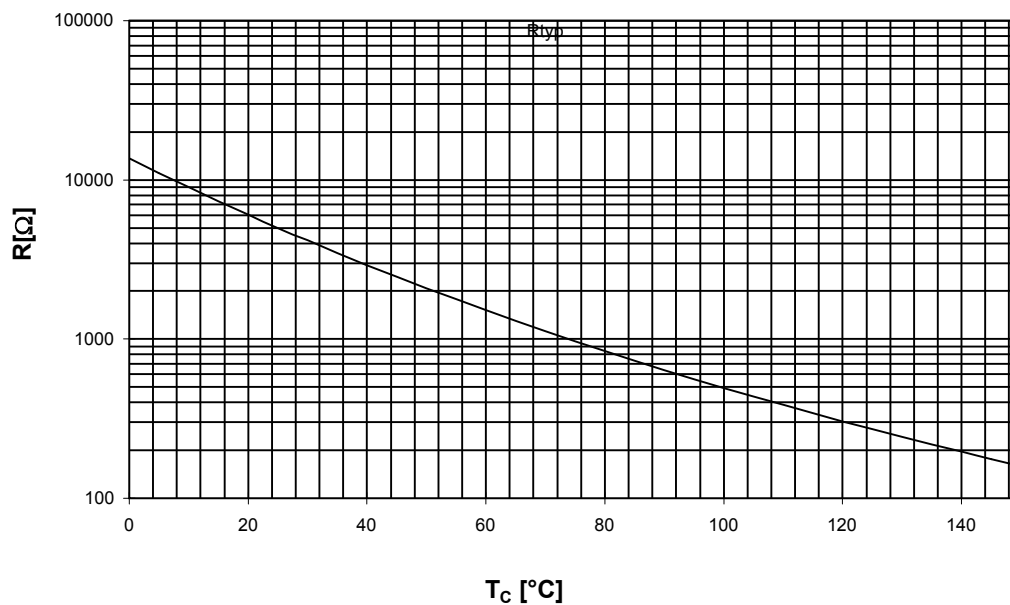


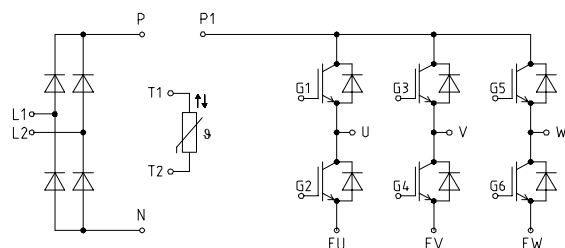
Vorläufig
Preliminary**Durchlaßkennlinie der Gleichrichterdiode (typisch)**
Forward characteristic of Rectifier Diode (typical)

$$I_F = f(V_F)$$

**NTC- Temperaturkennlinie (typisch)**
NTC- temperature characteristic (typical)

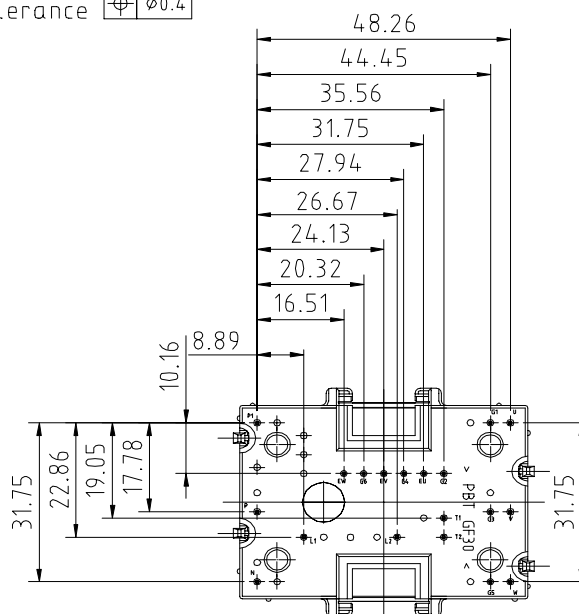
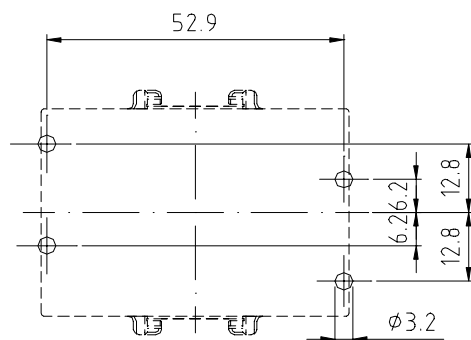
$$R = f(T)$$

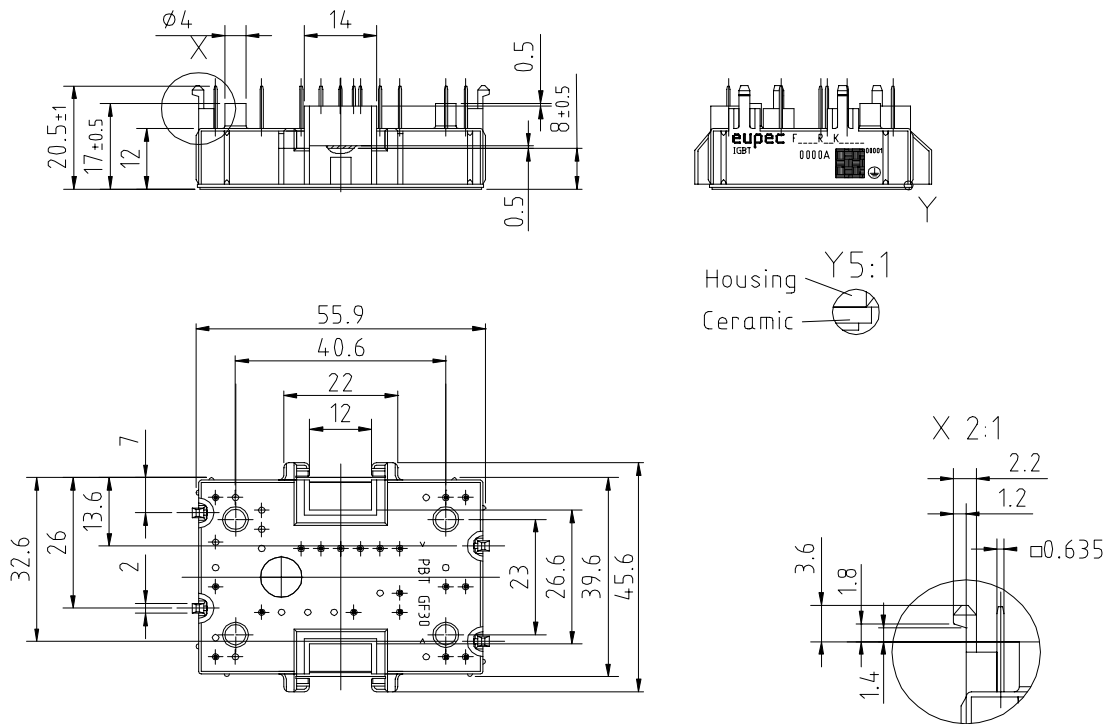



**Vorläufig
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Schaltplan/ Circuit diagram

Gehäuseabmessungen/ Package outlines

Modul only designed for mounting on PCB's with 1.6 ± 0.2 mm thickness

Pinpositions with tolerance ± 0.4

Bohrplan /
drilling layout



Gehäuseabmessungen Forts. / Package outlines contd.


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