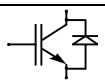


Elektrische Eigenschaften / Electrical properties

Höchstzulässige Werte / Maximum rated values

Diode Gleichrichter/ Diode Rectifier

Periodische Rückw. Spitzensperrspannung repetitive peak reverse voltage		V_{RRM}	1600	V
Durchlaßstrom Grenzeffektivwert RMS forward current per chip		I_{FRMSM}	40	A
Dauergleichstrom DC forward current	T_C = 80°C	I_d	50	A
Stoßstrom Grenzwert surge forward current	t_P = 10 ms, T_{vj} = 25°C t_P = 10 ms, T_{vj} = 150°C	I_{FSM}	500 400	A A
Grenzlastintegral I^2t - value	t_P = 10 ms, T_{vj} = 25°C t_P = 10 ms, T_{vj} = 150°C	I^2t	1250 800	A^2s A^2s

Transistor Wechselrichter/ Transistor Inverter

Kollektor-Emitter-Sperrspannung collector-emitter voltage		V_{CES}	1200	V
Kollektor-Dauergleichstrom DC-collector current	Tc = 80 °C T_C = 25 °C	$I_{C,nom.}$ I_C	50 70	A A
Periodischer Kollektor Spitzenstrom repetitive peak collector current	t_P = 1 ms, T_C = 80 °C	I_{CRM}	100	A
Gesamt-Verlustleistung total power dissipation	T_C = 25°C	P_{tot}	360	W
Gate-Emitter-Spitzenspannung gate-emitter peak voltage		V_{GES}	+/- 20V	V

Diode Wechselrichter/ Diode Inverter

Dauergleichstrom DC forward current	Tc = 80 °C	I_F	50	A
Periodischer Spitzenstrom repetitive peak forw. current	t_P = 1 ms	I_{FRM}	100	A
Grenzlastintegral I^2t - value	V_R = 0V, t_p = 10ms, T_{vj} = 125°C	I^2t	1.200	A^2s

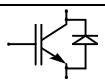
Transistor Brems-Chopper/ Transistor Brake-Chopper

Kollektor-Emitter-Sperrspannung collector-emitter voltage		V_{CES}	1200	V
Kollektor-Dauergleichstrom DC-collector current	T_C = 80 °C T_C = 25 °C	$I_{C,nom.}$ I_C	25 45	A A
Periodischer Kollektor Spitzenstrom repetitive peak collector current	t_P = 1 ms, T_C = 80°C	I_{CRM}	50	A
Gesamt-Verlustleistung total power dissipation	T_C = 25°C	P_{tot}	230	W
Gate-Emitter-Spitzenspannung gate-emitter peak voltage		V_{GES}	+/- 20V	V

Diode Brems-Chopper/ Diode Brake-Chopper

Dauergleichstrom DC forward current	Tc = 80 °C	I_F	15	A
Periodischer Spitzenstrom repetitive peak forw. current	t_P = 1 ms	I_{FRM}	30	A

prepared by: A.Schulz	date of publication: 2001-11-28
approved by: M.Hierholzer	revision: 2



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

Elektrische Eigenschaften / Electrical properties

Charakteristische Werte / Characteristic values

Diode Gleichrichter/ Diode Rectifier			**min.**	**typ.**	**max.**	
Durchlaßspannung forward voltage	T_{vj} = 150°C, I_F = 50 A	V_F	-	1,05	-	V
Schleusenspannung threshold voltage	T_{vj} = 150°C	$V_{(TO)}$	-	-	0,8	V
Ersatzwiderstand slope resistance	T_{vj} = 150°C	r_T	-	-	6,5	mΩ
Sperrstrom reverse current	T_{vj} = 150°C, V_R = 1600 V	I_R	-	3	-	mA
Modul Leitungswiderstand, Anschlüsse-Chip lead resistance, terminals-chip	T_C = 25°C	$R_{AA'+CC'}$	-	4	-	mΩ

Transistor Wechselrichter/ Transistor Inverter			**min.**	**typ.**	**max.**	
Kollektor-Emitter Sättigungsspannung collector-emitter saturation voltage	V_{GE} = 15V, T_{vj} = 25°C, I_C = 50 A V_{GE} = 15V, T_{vj} = 125°C, I_C = 50 A	$V_{CE\ sat}$	- -	3,2 3,85	3,7 -	V V
Gate-Schwellenspannung gate threshold voltage	V_{CE} = V_{GE}, T_{vj} = 25°C, I_C = 2 mA	$V_{GE(TO)}$	4,5	5,5	6,5	V
Eingangskapazität input capacitance	f = 1MHz, T_{vj} = 25°C V_{CE} = 25 V, V_{GE} = 0 V	C_{ies}	-	3,3	-	nF
Kollektor-Emitter Reststrom collector-emitter cut-off current	V_{GE} = 0V, T_{vj} = 25°C, V_{CE} = 1200 V	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
Einschaltverzögerungszeit (ind. Last) turn on delay time (inductive load)	I_C = I_{Nenn}, V_{CC} = 600 V V_{GE} = ±15V, T_{vj} = 25°C, R_G = 15 Ohm V_{GE} = ±15V, T_{vj} = 125°C, R_G = 15 Ohm	$t_{d,on}$	- -	60 60	- -	ns ns
Anstiegszeit (induktive Last) rise time (inductive load)	I_C = I_{Nenn}, V_{CC} = 600 V V_{GE} = ±15V, T_{vj} = 25°C, R_G = 15 Ohm V_{GE} = ±15V, T_{vj} = 125°C, R_G = 15 Ohm	t_r	- -	50 50	- -	ns ns
Abschaltverzögerungszeit (ind. Last) turn off delay time (inductive load)	I_C = I_{Nenn}, V_{CC} = 600 V V_{GE} = ±15V, T_{vj} = 25°C, R_G = 15 Ohm V_{GE} = ±15V, T_{vj} = 125°C, R_G = 15 Ohm	$t_{d,off}$	- -	340 400	- -	ns ns
Fallzeit (induktive Last) fall time (inductive load)	I_C = I_{Nenn}, V_{CC} = 600 V V_{GE} = ±15V, T_{vj} = 25°C, R_G = 15 Ohm V_{GE} = ±15V, T_{vj} = 125°C, R_G = 15 Ohm	t_f	- -	50 60	- -	ns ns
Einschaltverlustenergie pro Puls turn-on energy loss per pulse	I_C = I_{Nenn}, V_{CC} = 600 V V_{GE} = ±15V, T_{vj} = 125°C, R_G = 15 Ohm L_S = 50 nH	E_{on}	-	6,5	-	mWs
Abschaltverlustenergie pro Puls turn-off energy loss per pulse	I_C = I_{Nenn}, V_{CC} = 600 V V_{GE} = ±15V, T_{vj} = 125°C, R_G = 15 Ohm L_S = 50 nH	E_{off}	-	3,4	-	mWs
Kurzschlußverhalten SC Data	t_P ≤ 10µs, V_{GE} ≤ 15V, R_G = 15 Ohm T_{vj}≤125°C, V_{CC} = 720 V dI/dt = 4000 A/µs	I_{SC}	-	300	-	A

Elektrische Eigenschaften / Electrical properties

Charakteristische Werte / Characteristic values

			min.	typ.	max.	
Modulinduktivität stray inductance module		$L_{\sigma CE}$	-	-	100	nH
Modul Leitungswiderstand, Anschlüsse-Chip lead resistance, terminals-chip	T_C = 25°C	$R_{CC'+EE'}$	-	7	-	mΩ
Diode Wechselrichter/ Diode Inverter			**min.**	**typ.**	**max.**	
Durchlaßspannung forward voltage	V_{GE} = 0V, T_{vj} = 25°C, I_F = 50 A V_{GE} = 0V, T_{vj} = 125°C, I_F = 50 A	V_F	- -	1,75 1,7	2,15 -	V V
Rückstromspitze peak reverse recovery current	I_F=I_{Nenn}, - di_F/dt = 1600A/µs V_{GE} = -10V, T_{vj} = 25°C, V_R = 600 V V_{GE} = -10V, T_{vj} = 125°C, V_R = 600 V	I_{RM}	 - -	 75 85	 - -	 A A
Sperrverzögerungsladung recovered charge	I_F=I_{Nenn}, - di_F/dt = 1600A/µs V_{GE} = -10V, T_{vj} = 25°C, V_R = 600 V V_{GE} = -10V, T_{vj} = 125°C, V_R = 600 V	Q_r	 - -	 5,5 12	 - -	 µAs µAs
Abschaltenergie pro Puls reverse recovery energy	I_F=I_{Nenn}, - di_F/dt = 1600A/µs V_{GE} = -10V, T_{vj} = 25°C, V_R = 600 V V_{GE} = -10V, T_{vj} = 125°C, V_R = 600 V	E_{RQ}	 - -	 1,6 4	 - -	 mWs mWs
Transistor Brems-Chopper/ Transistor Brake-Chopper			**min.**	**typ.**	**max.**	
Kollektor-Emitter Sättigungsspannung collector-emitter saturation voltage	V_{GE} = 15V, T_{vj} = 25°C, I_C = 25,0 A V_{GE} = 15V, T_{vj} = 125°C, I_C = 25,0 A	$V_{CE\ sat}$	- -	2,2 2,5	2,55 -	V V
Gate-Schwellenspannung gate threshold voltage	V_{CE} = V_{GE}, T_{vj} = 25°C, I_C = 1mA	$V_{GE(TO)}$	4,5	5,5	6,5	V
Eingangskapazität input capacitance	f = 1MHz, T_{vj} = 25°C V_{CE} = 25 V, V_{GE} = 0 V	C_{ies}	-	1,5	-	nF
Kollektor-Emitter Reststrom collector-emitter cut-off current	V_{GE} = 0V, T_{vj} = 25°C, V_{CE} = 1200 V V_{GE} = 0V, T_{vj} = 125°C, V_{CE} = 1200 V	I_{CES}	- -	1,5 2,0	500 -	µA mA
Gate-Emitter Reststrom gate-emitter leakage current	V_{CE} = 0V, V_{GE} = 20V, T_{vj} = 25°C	I_{GES}	-	-	300	nA
Schaltverluste und -bedingungen Switching losses and conditions	siehe Datenblatt (Wechselrichter) see datasheet (inverter)	BSM25GP120				
Diode Brems-Chopper/ Diode Brake-Chopper			**min.**	**typ.**	**max.**	
Durchlaßspannung forward voltage	T_{vj} = 25°C, I_F = 25,0 A T_{vj} = 125°C, I_F = 25,0 A	V_F	- -	2,1 2	2,4 -	V V
Schaltverluste und -bedingungen Switching losses and conditions	siehe Datenblatt (Wechselrichter) see datasheet (inverter)	BSM15GP120				
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} = 493 Ω	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

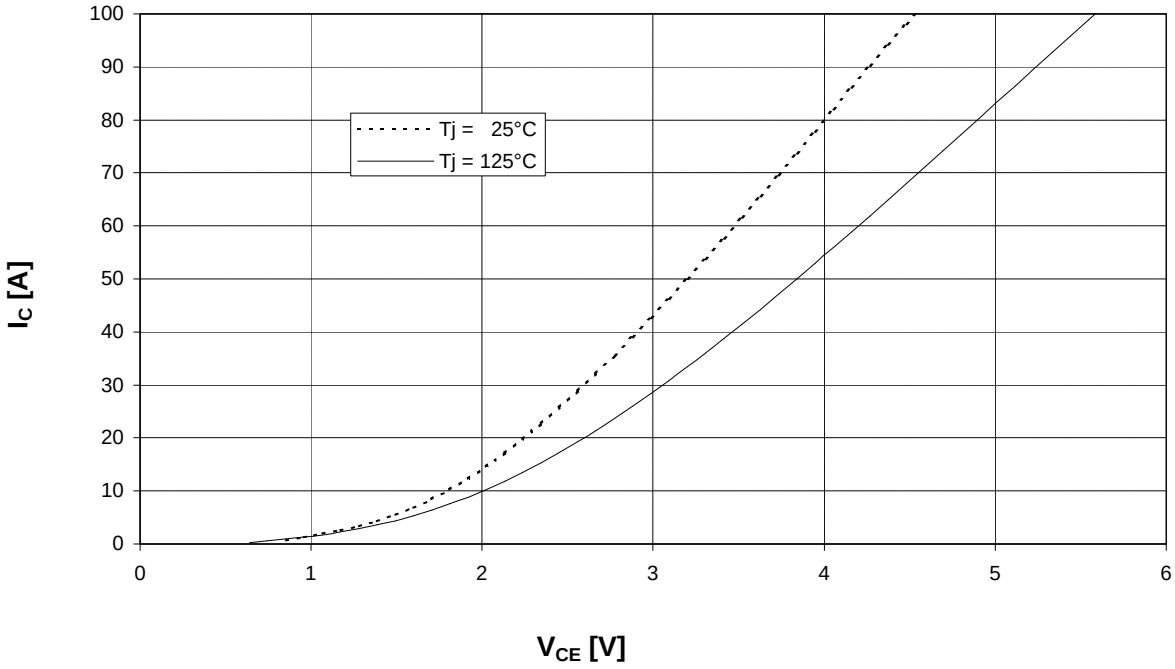
				min.	typ.	max.	
Innerer Wärmewiderstand thermal resistance, junction to case	Gleichr. Diode/ Rectif. Diode		R_{thJC}	-	-	0,65	K/W
	Trans. Wechsr./ Trans. Inverter			-	-	0,35	K/W
	Diode Wechsr./ Diode Inverter			-	-	0,55	K/W
	Trans. Bremse/ Trans. Brake			-	-	0,55	K/W
	Diode Bremse/ Diode Brake			-	-	1,2	K/W
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	Gleichr. Diode/ Rectif. Diode	λ_{Paste}=1W/m*K	R_{thCK}	-	0,04	-	K/W
	Trans. Wechsr./ Trans. Inverter	λ_{grease}=1W/m*K		-	0,02	-	K/W
	Diode Wechsr./ Diode Inverter			-	0,04	-	K/W
Höchstzulässige Sperrschichttemperatur maximum junction temperature			$T_{vj\ max}$	-	-	150	°C
Betriebstemperatur operation temperature			$T_{vj\ op}$	-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	
Anzugsdrehmoment f. mech. Befestigung mounting torque		M	3 ±10%	Nm
Gewicht weight		G	300	g

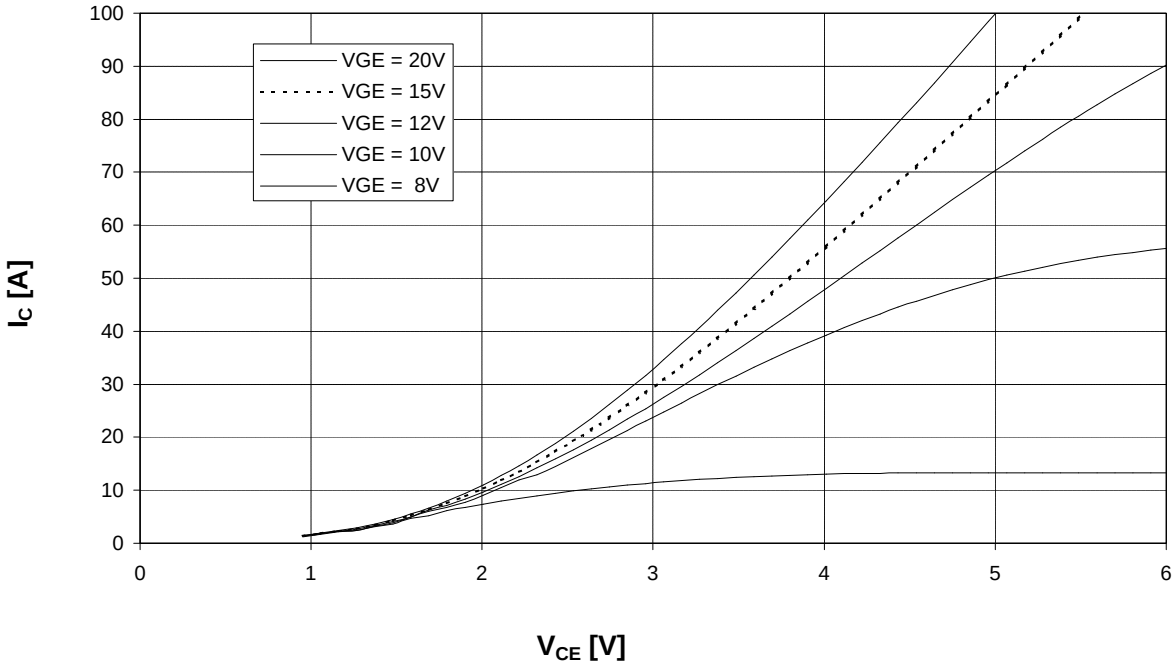
Ausgangskennlinienfeld Wechselr. (typisch) $I_C = f(V_{CE})$

Output characteristic Inverter (typical) $V_{GE} = 15$ V



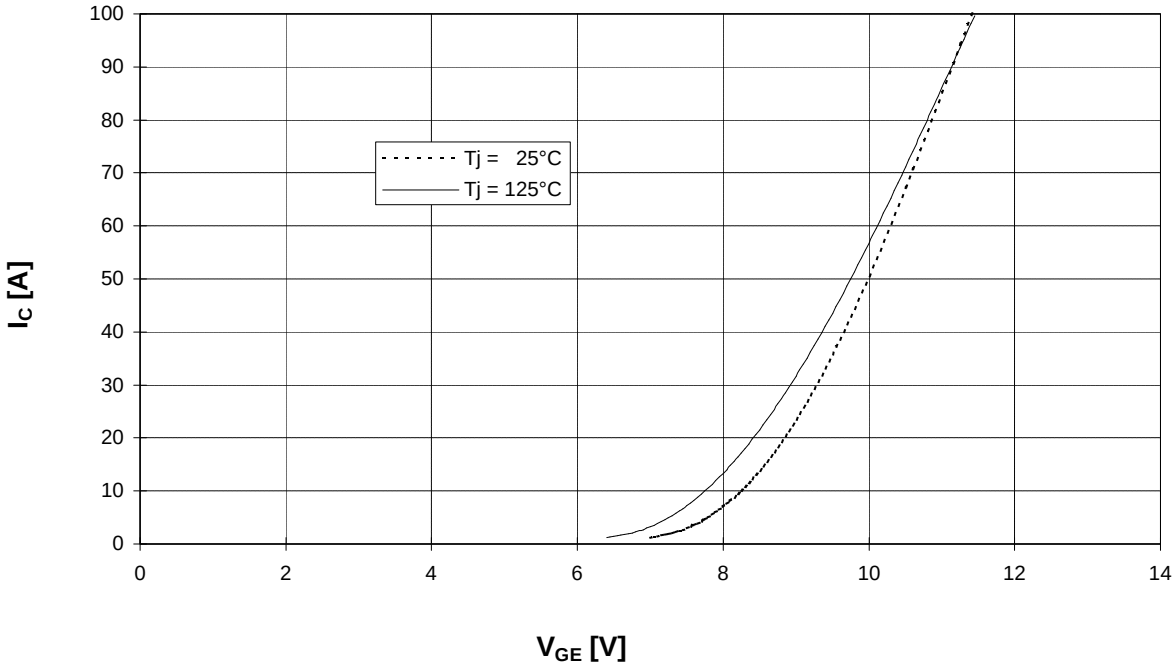
Ausgangskennlinienfeld Wechselr. (typisch) $I_C = f(V_{CE})$

Output characteristic Inverter (typical) $T_{vj} = 125°C$



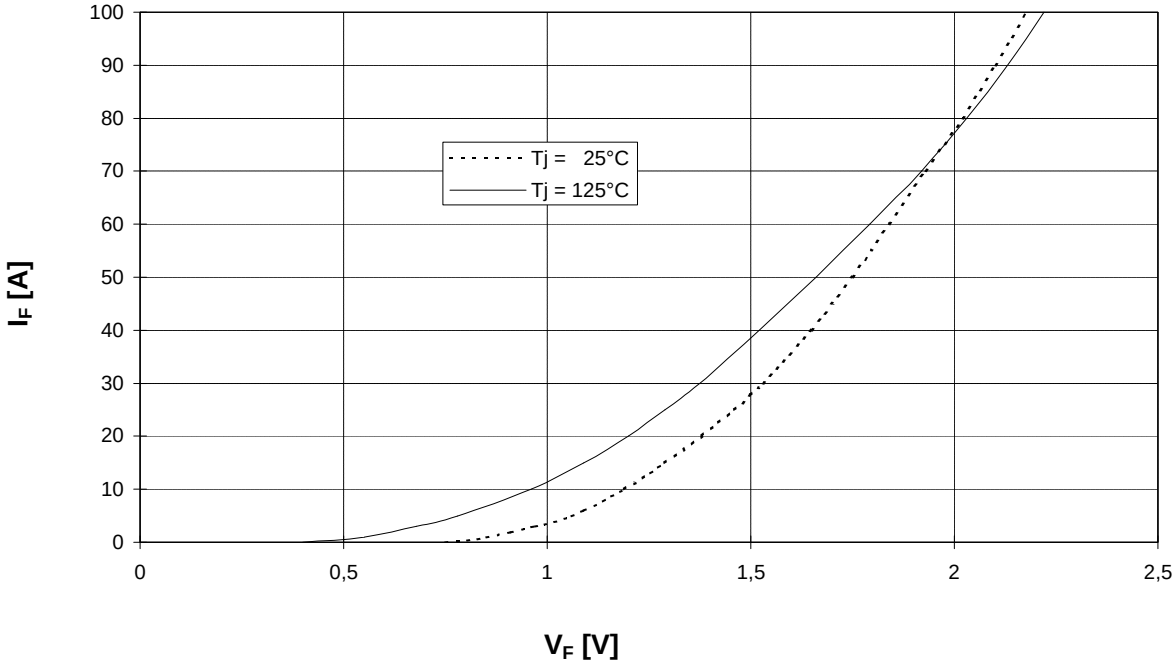
Übertragungscharakteristik Wechselr. (typisch) $I_C = f(V_{GE})$

Transfer characteristic Inverter (typical) $V_{CE} = 20\ V$



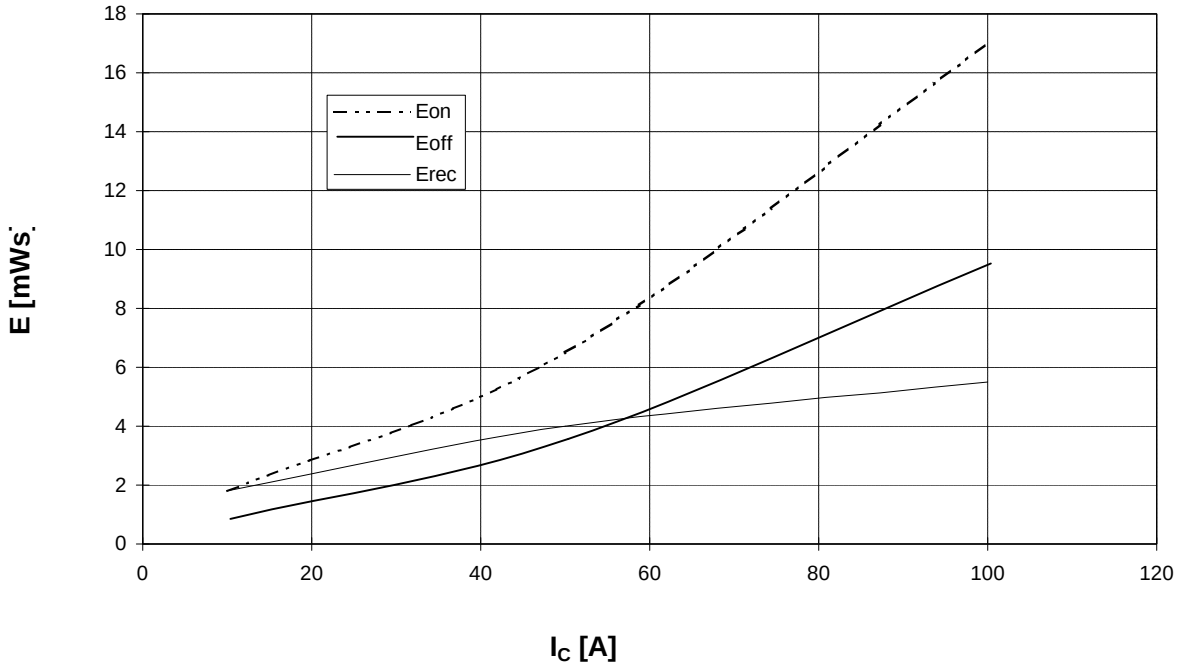
Durchlaßkennlinie der Freilaufdiode Wechselr. (typisch) $I_F = f(V_F)$

Forward characteristic of FWD Inverter (typical)



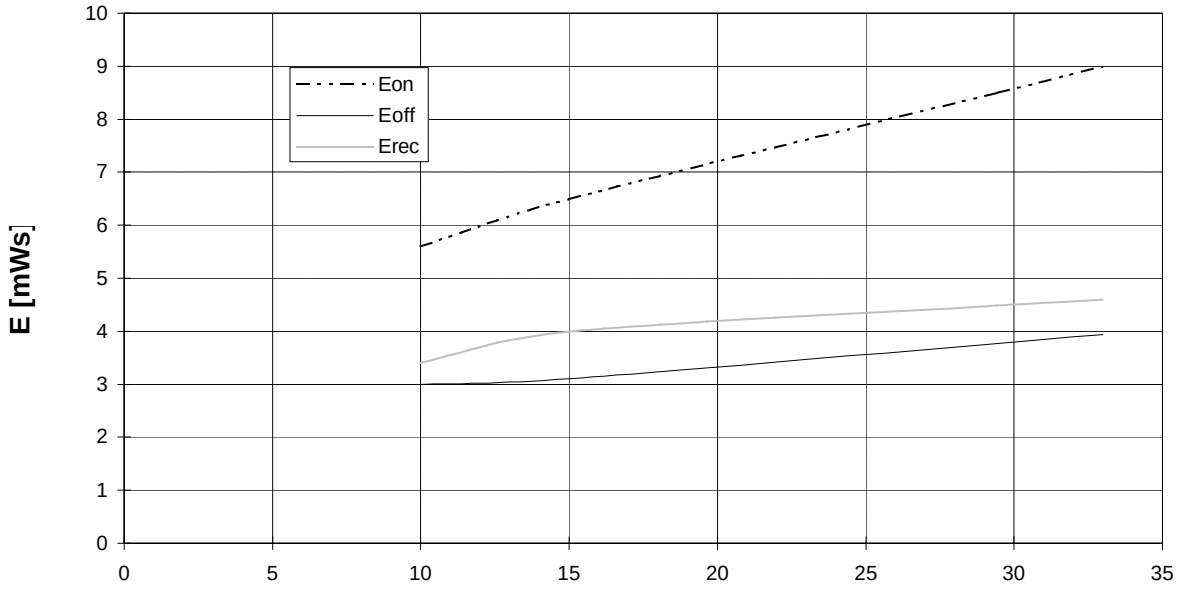
Schaltverluste Wechselr. (typisch) $E_{on} = f(I_C)$, $E_{off} = f(I_C)$, $E_{rec} = f(I_C)$ V_{CC} = **600 V**

Switching losses Inverter (typical) T_j = 125°C, V_{GE} = ±15 V, R_{Gon} = R_{Goff} = **15Ohm**



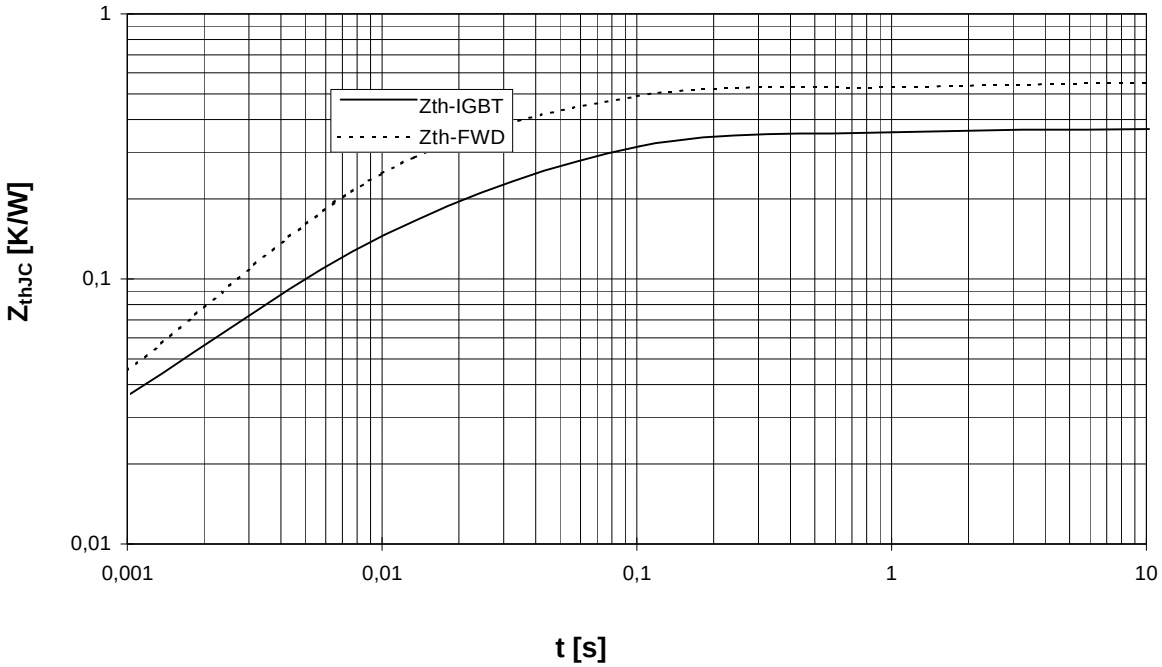
Schaltverluste Wechselr. (typisch) $E_{on} = f(R_G)$, $E_{off} = f(R_G)$, $E_{rec} = f(R_G)$

Switching losses Inverter (typical) T_j = 125°C, V_{GE} = +-15 V , $I_c = I_{nenn}$, V_{CC} = **600 V**



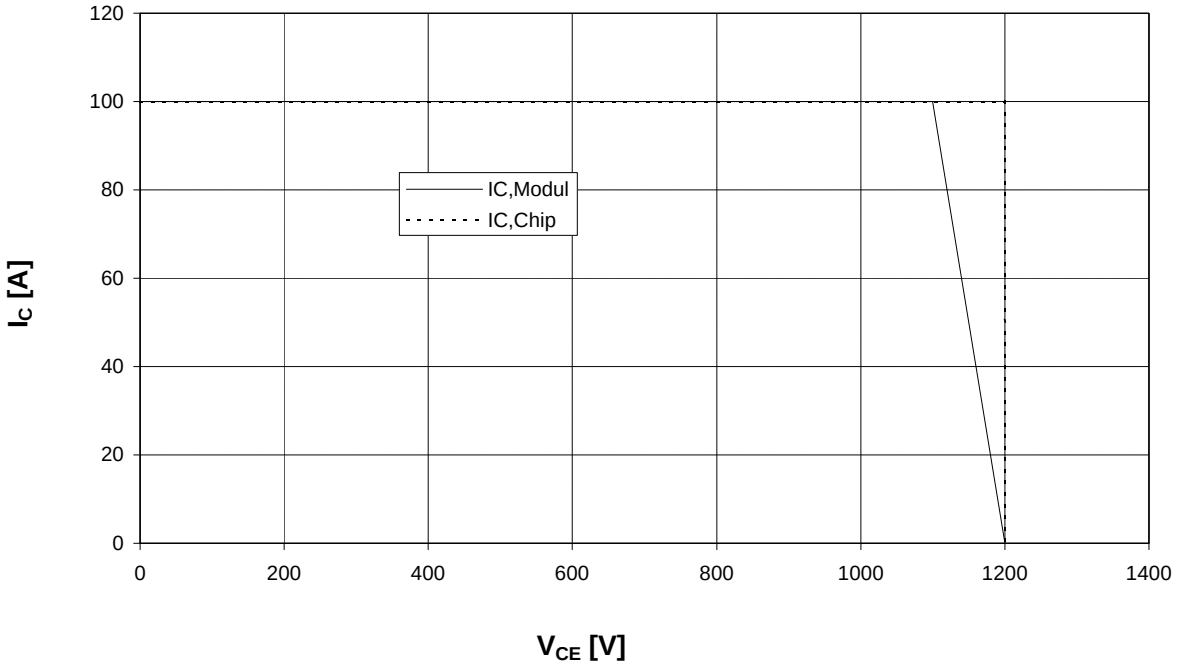
Transienter Wärmewiderstand Wechselr. $Z_{thJC} = f(t)$

Transient thermal impedance Inverter



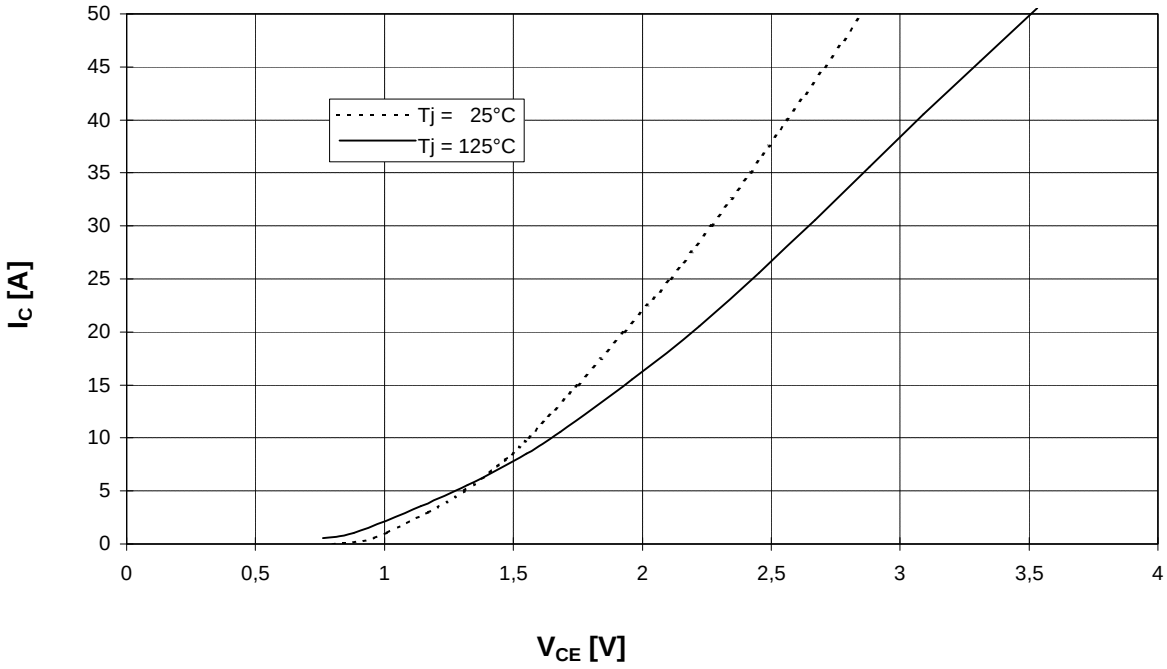
Sicherer Arbeitsbereich Wechselr. (RBSOA) $I_C = f(V_{CE})$

Reverse bias save operating area Inverter (RBSOA) $T_{vj} = 125°C$, $V_{GE} = \pm 15V$, $R_G =$ **15Ohm**



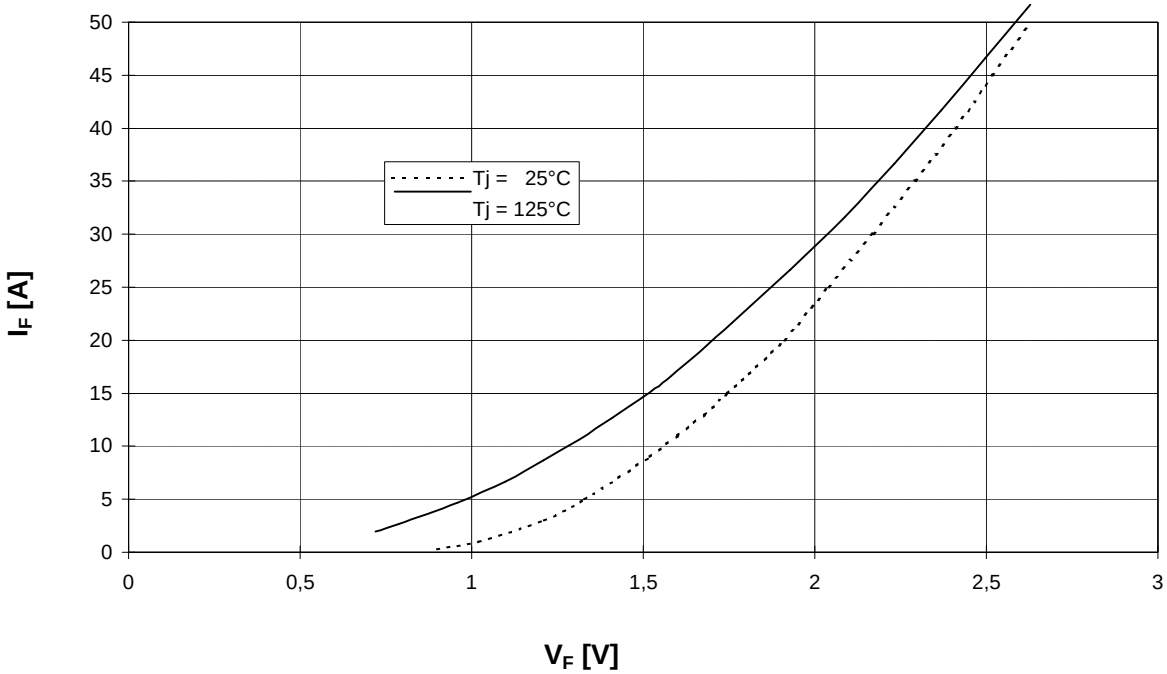
Ausgangskennlinienfeld Brems-Chopper-IGBT (typisch) $I_C = f(V_{CE})$

Output characteristic brake-chopper-IGBT (typical) $V_{GE} = 15\ V$

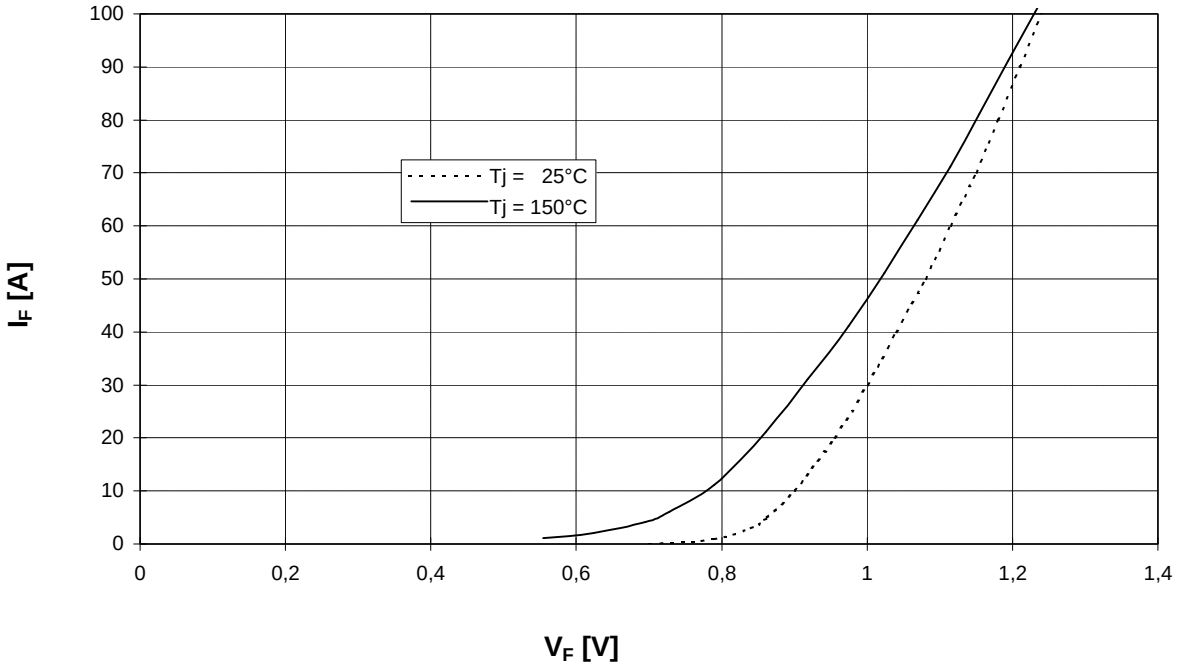


Durchlaßkennlinie der Brems-Chopper-Diode (typisch) $I_F = f(V_F)$

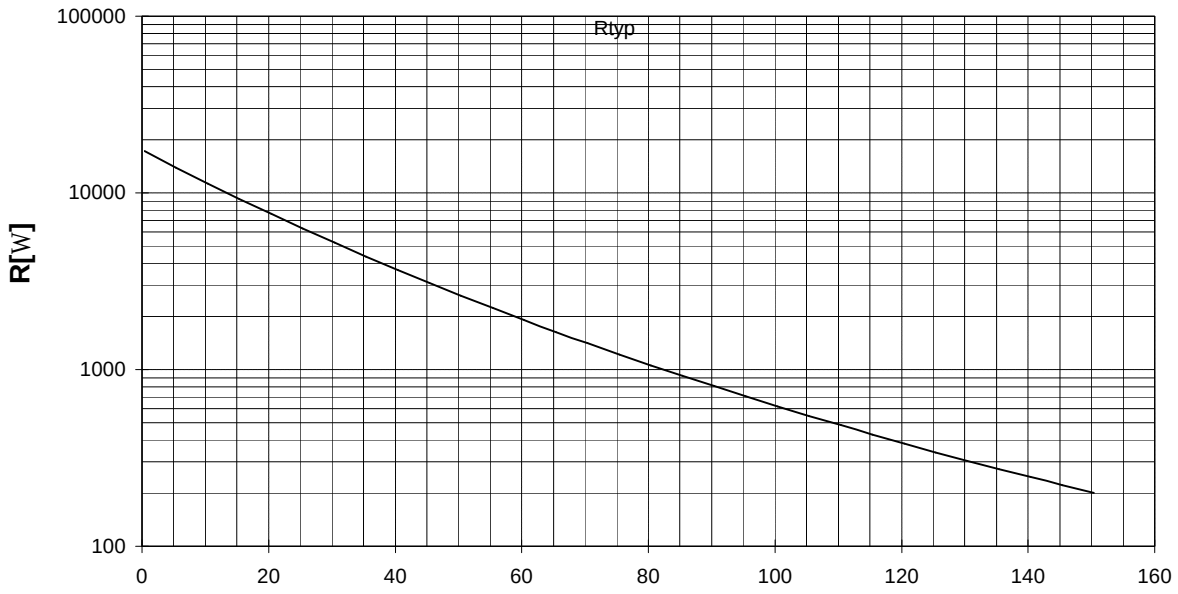
Forward characteristic of brake-chopper-FWD (typical)



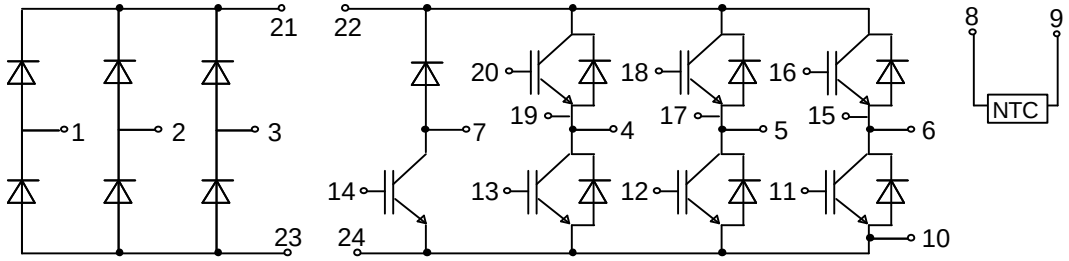
Durchlaßkennlinie der Gleichrichterdiode (typisch) $I_F = f(V_F)$
Forward characteristic of Rectifier Diode (typical)



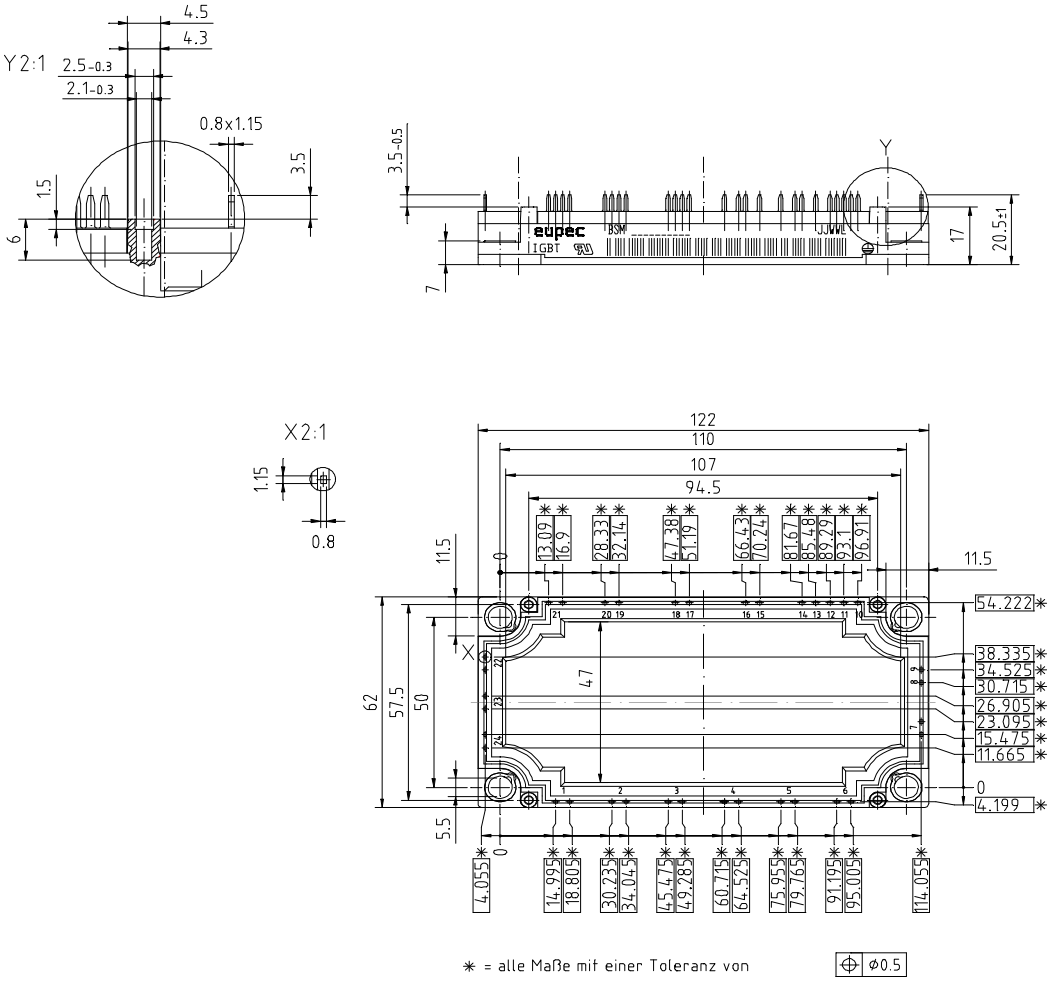
NTC- Temperaturkennlinie (typisch) $R = f(T)$
NTC- temperature characteristic (typical)



Schaltplan/ Circuit diagram



Gehäuseabmessungen/ Package outlines



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