

**Vorläufige Daten**  
**preliminary data**

**IGBT-Wechselrichter/IGBT-inverter**  
**Höchstzulässige Werte/maximum rated values**

Kollektor-Emitter-Sperrspannung collector-emitter voltage	$T_{vj} = 25^{\circ}\text{C}$	$V_{CES}$	1200	V
Kollektor-Dauergleichstrom DC-collector current	$T_C = 80^{\circ}\text{C}$ $T_C = 25^{\circ}\text{C}$	$I_{C\ nom}$ $I_C$	75 105	A A
Periodischer Kollektor Spitzenstrom repetitive peak collector current	$t_P = 1\ \text{ms}, T_C = 80^{\circ}\text{C}$	$I_{CRM}$	150	A
Gesamt-Verlustleistung total power dissipation	$T_C = 25^{\circ}\text{C}$	$P_{tot}$	355	W
Gate-Emitter-Spitzenspannung gate-emitter peak voltage		$V_{GES}$	+/-20	V

**Charakteristische Werte/characteristic values**

			min.	typ.	max.	
Kollektor-Emitter Sättigungsspannung collector-emitter saturation voltage	$I_C = 75\ \text{A}, V_{GE} = 15\ \text{V}, T_{vj} = 25^{\circ}\text{C}$ $I_C = 75\ \text{A}, V_{GE} = 15\ \text{V}, T_{vj} = 125^{\circ}\text{C}$	$V_{CE\ sat}$		1,70 1,90	2,15	V V
Gate-Schwellenspannung gate threshold voltage	$I_C = 3,00\ \text{mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$	$V_{GEth}$	5,0	5,8	6,5	V
Gateladung gate charge	$V_{GE} = -15\ \text{V} \dots +15\ \text{V}$	$Q_G$		0,70		$\mu\text{C}$
Interner Gatewiderstand internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$	$R_{Gint}$		10		$\Omega$
Eingangskapazität input capacitance	$f = 1\ \text{MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\ \text{V}, V_{GE} = 0\ \text{V}$	$C_{ies}$		5,30		nF
Rückwirkungskapazität reverse transfer capacitance	$f = 1\ \text{MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\ \text{V}, V_{GE} = 0\ \text{V}$	$C_{res}$		0,20		nF
Kollektor-Emitter Reststrom collector-emitter cut-off current	$V_{CE} = 1200\ \text{V}, V_{GE} = 0\ \text{V}, T_{vj} = 25^{\circ}\text{C}$	$I_{CES}$			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)	$I_C = 75\ \text{A}, V_{CE} = 600\ \text{V}$ $V_{GE} = \pm 15\ \text{V}, R_{Gon} = 4,7\ \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15\ \text{V}, R_{Gon} = 4,7\ \Omega, T_{vj} = 125^{\circ}\text{C}$	$t_{d\ on}$		0,26 0,29		$\mu\text{s}$ $\mu\text{s}$
Anstiegszeit (induktive Last) rise time (inductive load)	$I_C = 75\ \text{A}, V_{CE} = 600\ \text{V}$ $V_{GE} = \pm 15\ \text{V}, R_{Gon} = 4,7\ \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15\ \text{V}, R_{Gon} = 4,7\ \Omega, T_{vj} = 125^{\circ}\text{C}$	$t_r$		0,03 0,05		$\mu\text{s}$ $\mu\text{s}$
Abschaltverzögerungszeit (ind. Last) turn-off delay time (inductive load)	$I_C = 75\ \text{A}, V_{CE} = 600\ \text{V}$ $V_{GE} = \pm 15\ \text{V}, R_{Goff} = 4,7\ \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15\ \text{V}, R_{Goff} = 4,7\ \Omega, T_{vj} = 125^{\circ}\text{C}$	$t_{d\ off}$		0,42 0,52		$\mu\text{s}$ $\mu\text{s}$
Fallzeit (induktive Last) fall time (inductive load)	$I_C = 75\ \text{A}, V_{CE} = 600\ \text{V}$ $V_{GE} = \pm 15\ \text{V}, R_{Goff} = 4,7\ \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15\ \text{V}, R_{Goff} = 4,7\ \Omega, T_{vj} = 125^{\circ}\text{C}$	$t_f$		0,07 0,09		$\mu\text{s}$ $\mu\text{s}$
Einschaltverlustenergie pro Puls turn-on energy loss per pulse	$I_C = 75\ \text{A}, V_{CE} = 600\ \text{V}, L_S = 45\ \text{nH}$ $V_{GE} = \pm 15\ \text{V}, R_{Gon} = 4,7\ \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15\ \text{V}, R_{Gon} = 4,7\ \Omega, T_{vj} = 125^{\circ}\text{C}$	$E_{on}$		6,55 9,40		mJ mJ
Abschaltverlustenergie pro Puls turn-off energy loss per pulse	$I_C = 75\ \text{A}, V_{CE} = 600\ \text{V}, L_S = 45\ \text{nH}$ $V_{GE} = \pm 15\ \text{V}, R_{Goff} = 4,7\ \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15\ \text{V}, R_{Goff} = 4,7\ \Omega, T_{vj} = 125^{\circ}\text{C}$	$E_{off}$		6,80 8,00		mJ mJ
Kurzschlußverhalten SC data	$t_P \leq 10\ \mu\text{s}, V_{GE} \leq 15\ \text{V}$ $T_{vj} \leq 125^{\circ}\text{C}, V_{CC} = 900\ \text{V}, V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$	$I_{SC}$		300		A
Innerer Wärmewiderstand thermal resistance, junction to case	pro IGBT per IGBT	$R_{thJC}$			0,35	K/W

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**Diode-Wechselrichter/diode-inverter**  
**Höchstzulässige Werte/maximum rated values**

Periodische Spitzensperrspannung repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	$V_{RRM}$	1200	V
Dauergleichstrom DC forward current		$I_F$	75	A
Periodischer Spitzenstrom repetitive peak forward current	$t_p = 1 \text{ ms}$	$I_{FRM}$	150	A
Grenzlastintegral $I^2t$ - value	$V_R = 0 \text{ V}, t_p = 10 \text{ ms}, T_{vj} = 125^{\circ}\text{C}$	$I^2t$	1200	$\text{A}^2\text{s}$

**Charakteristische Werte/characteristic values**

			min.	typ.	max.	
Durchlassspannung forward voltage	$I_F = 75 \text{ A}, V_{GE} = 0 \text{ V}, T_{vj} = 25^{\circ}\text{C}$ $I_F = 75 \text{ A}, V_{GE} = 0 \text{ V}, T_{vj} = 125^{\circ}\text{C}$	$V_F$		1,65 1,65	2,15	V V
Rückstromspitze peak reverse recovery current	$I_F = 75 \text{ A}, -di_F/dt = 2000 \text{ A}/\mu\text{s}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 25^{\circ}\text{C}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 125^{\circ}\text{C}$	$I_{RM}$		80,0 86,0		A A
Sperrverzögerungsladung recovered charge	$I_F = 75 \text{ A}, -di_F/dt = 2000 \text{ A}/\mu\text{s}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 25^{\circ}\text{C}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 125^{\circ}\text{C}$	$Q_r$		9,30 16,5		$\mu\text{C}$ $\mu\text{C}$
Abschaltenergie pro Puls reverse recovery energy	$I_F = 75 \text{ A}, -di_F/dt = 2000 \text{ A}/\mu\text{s}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 25^{\circ}\text{C}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 125^{\circ}\text{C}$	$E_{rec}$		3,20 6,50		mJ mJ
Innerer Wärmewiderstand thermal resistance, junction to case	pro Diode per diode	$R_{thJC}$			0,58	K/W

**Diode-Gleichrichter/diode-rectifier**  
**Höchstzulässige Werte/maximum rated values**

Periodische Rückw. Spitzensperrspannung repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	$V_{RRM}$	1600	V
Durchlassstrom Grenzeffektivwert pro Dio. forward current RMS maximum per diode	$T_C = 80^{\circ}\text{C}$	$I_{FRMSM}$	115	A
Gleichrichter Ausgang Grenzeffektivstrom maximum RMS current at Rectifier output	$T_C = 80^{\circ}\text{C}$	$I_{RMSM}$	80	A
Stoßstrom Grenzwert surge forward current	$t_p = 10 \text{ ms}, T_{vj} = 25^{\circ}\text{C}$ $t_p = 10 \text{ ms}, T_{vj} = 150^{\circ}\text{C}$	$I_{FSM}$	500 400	A A
Grenzlastintegral $I^2t$ - value	$t_p = 10 \text{ ms}, T_{vj} = 25^{\circ}\text{C}$ $t_p = 10 \text{ ms}, T_{vj} = 150^{\circ}\text{C}$	$I^2t$	1250 800	$\text{A}^2\text{s}$ $\text{A}^2\text{s}$

**Charakteristische Werte/characteristic values**

			min.	typ.	max.	
Durchlassspannung forward voltage	$T_{vj} = 150^{\circ}\text{C}, I_F = 75 \text{ A}$	$V_F$		1,10		V
Sperrstrom reverse current	$T_{vj} = 150^{\circ}\text{C}, V_R = 1600 \text{ V}$	$I_R$		3,00		mA
Innerer Wärmewiderstand thermal resistance, junction to case	pro Diode per diode	$R_{thJC}$			0,65	K/W

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**IGBT-Brems-Chopper/IGBT-brake-chopper**  
**Höchstzulässige Werte/maximum rated values**

Kollektor-Emitter-Sperrspannung collector-emitter voltage	$T_{vj} = 25^{\circ}\text{C}$	$V_{CES}$	1200	V
Kollektor-Dauergleichstrom DC-collector current	$T_c = 80^{\circ}\text{C}$ $T_c = 25^{\circ}\text{C}$	$I_{Cnom}$ $I_C$	40 55	A A
Periodischer Kollektor Spitzenstrom repetitive peak collector current	$t_P = 1 \text{ ms}, T_c = 80^{\circ}\text{C}$	$I_{CRM}$	80	A
Gesamt-Verlustleistung total power dissipation	$T_c = 25^{\circ}\text{C}$	$P_{tot}$	210	W
Gate-Emitter-Spitzenspannung gate-emitter peak voltage		$V_{GES}$	+/-20	V

**Charakteristische Werte/characteristic values**

			min.	typ.	max.	
Kollektor-Emitter Sättigungsspannung collector-emitter saturation voltage	$I_C = 40 \text{ A}, V_{GE} = 15 \text{ V}, T_{vj} = 25^{\circ}\text{C}$ $I_C = 40 \text{ A}, V_{GE} = 15 \text{ V}, T_{vj} = 125^{\circ}\text{C}$	$V_{CE sat}$		1,80 2,05	2,30	V V
Gate-Schwellenspannung gate threshold voltage	$I_C = 1,50 \text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$	$V_{GEth}$	5,0	5,8	6,5	V
Gateladung gate charge	$V_{GE} = -15 \text{ V} \dots +15 \text{ V}$	$Q_G$		0,33		$\mu\text{C}$
Interner Gatewiderstand internal gate resistor		$R_{Gint}$		6,00		$\Omega$
Eingangskapazität input capacitance	$f = 1 \text{ MHz}, T_{vj} = 25^{\circ}\text{C}$ $V_{CE} = 25 \text{ V}, V_{GE} = 0 \text{ V}$	$C_{ies}$		2,50		nF
Rückwirkungskapazität reverse transfer capacitance	$f = 1 \text{ MHz}, T_{vj} = 25^{\circ}\text{C}$ $V_{CE} = 25 \text{ V}, V_{GE} = 0 \text{ V}$	$C_{res}$		0,09		nF
Kollektor-Emitter Reststrom collector-emitter cut-off current	$V_{CE} = 1200 \text{ V}, V_{GE} = 0 \text{ V}, T_{vj} = 25^{\circ}\text{C}$	$I_{CES}$			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)	$I_C = 40 \text{ A}, V_{CE} = 600 \text{ V}$ $V_{GE} = \pm 15 \text{ V}, R_{Gon} = 27 \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15 \text{ V}, R_{Gon} = 27 \Omega, T_{vj} = 125^{\circ}\text{C}$	$t_{d on}$		0,09 0,09		$\mu\text{s}$ $\mu\text{s}$
Anstiegszeit (induktive Last) rise time (inductive load)	$I_C = 40 \text{ A}, V_{CE} = 600 \text{ V}$ $V_{GE} = \pm 15 \text{ V}, R_{Gon} = 27 \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15 \text{ V}, R_{Gon} = 27 \Omega, T_{vj} = 125^{\circ}\text{C}$	$t_r$		0,03 0,05		$\mu\text{s}$ $\mu\text{s}$
Abschaltverzögerungszeit (ind. Last) turn-off delay time (inductive load)	$I_C = 40 \text{ A}, V_{CE} = 600 \text{ V}$ $V_{GE} = \pm 15 \text{ V}, R_{Goff} = 27 \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15 \text{ V}, R_{Goff} = 27 \Omega, T_{vj} = 125^{\circ}\text{C}$	$t_{d off}$		0,42 0,52		$\mu\text{s}$ $\mu\text{s}$
Fallzeit (induktive Last) fall time (inductive load)	$I_C = 40 \text{ A}, V_{CE} = 600 \text{ V}$ $V_{GE} = \pm 15 \text{ V}, R_{Goff} = 27 \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15 \text{ V}, R_{Goff} = 27 \Omega, T_{vj} = 125^{\circ}\text{C}$	$t_f$		0,07 0,09		$\mu\text{s}$ $\mu\text{s}$
Einschaltverlustenergie pro Puls turn-on energy loss per pulse	$I_C = 40 \text{ A}, V_{CE} = 600 \text{ V}$ $V_{GE} = \pm 15 \text{ V}, R_{Gon} = 27 \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15 \text{ V}, R_{Gon} = 27 \Omega, T_{vj} = 125^{\circ}\text{C}$	$E_{on}$		4,10 6,00		mJ mJ
Abschaltverlustenergie pro Puls turn-off energy loss per pulse	$I_C = 40 \text{ A}, V_{CE} = 600 \text{ V}$ $V_{GE} = \pm 15 \text{ V}, R_{Goff} = 27 \Omega, T_{vj} = 25^{\circ}\text{C}$ $V_{GE} = \pm 15 \text{ V}, R_{Goff} = 27 \Omega, T_{vj} = 125^{\circ}\text{C}$	$E_{off}$		3,10 3,55		mJ mJ
Kurzschlußverhalten SC data	$t_P \leq 10 \mu\text{sec}, V_{GE} \leq 15 \text{ V}$ $T_{vj} \leq 125^{\circ}\text{C}, V_{CC} = 900 \text{ V}, V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$	$I_{SC}$		160		A
Innerer Wärmewiderstand thermal resistance, junction to case	pro IGBT per IGBT	$R_{thJC}$			0,60	K/W

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**Diode-Brems-Chopper/Diode-brake-chopper**  
**Höchstzulässige Werte/maximum rated values**

Periodische Spitzensperrspannung repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	$V_{RRM}$	1200	V
Dauergleichstrom DC forward current		$I_F$	25	A
Periodischer Spitzenstrom repetitive peak forw. current	$t_p = 1 \text{ ms}$	$I_{FRM}$	50	A
Grenzlastintegral $I^2t$ - value	$V_R = 0 \text{ V}, t_p = 10 \text{ ms}, T_{vj} = 125^{\circ}\text{C}$	$I^2t$	170	$\text{A}^2\text{s}$

**Charakteristische Werte/characteristic values**

			min.	typ.	max.	
Durchlaßspannung forward voltage	$I_F = 25 \text{ A}, V_{GE} = 0 \text{ V}, T_{vj} = 25^{\circ}\text{C}$ $I_F = 25 \text{ A}, V_{GE} = 0 \text{ V}, T_{vj} = 125^{\circ}\text{C}$	$V_F$		1,65 1,65	2,20	V V
Rückstromspitze peak reverse recovery current	$I_F = 25 \text{ A}, -di_F/dt = 700 \text{ A}/\mu\text{s}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 25^{\circ}\text{C}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 125^{\circ}\text{C}$	$I_{RM}$		26,0 24,0		A A
Sperrverzögerungsladung recovered charge	$I_F = 25 \text{ A}, -di_F/dt = 700 \text{ A}/\mu\text{s}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 25^{\circ}\text{C}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 125^{\circ}\text{C}$	$Q_r$		2,80 5,00		$\mu\text{C}$ $\mu\text{C}$
Abschaltenergie pro Puls reverse recovery energy	$I_F = 25 \text{ A}, -di_F/dt = 700 \text{ A}/\mu\text{s}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 25^{\circ}\text{C}$ $V_R = 600 \text{ V}, V_{GE} = -15 \text{ V}, T_{vj} = 125^{\circ}\text{C}$	$E_{rec}$		0,90 1,80		mJ mJ
Innerer Wärmewiderstand thermal resistance, junction to case	pro Diode per diode	$R_{thJC}$			1,20	K/W

**NTC-Widerstand/NTC-thermistor**

**Charakteristische Werte/characteristic values**

			min.	typ.	max.	
Nennwiderstand rated resistance	$T_C = 25^{\circ}\text{C}$	$R_{25}$		5,00		k $\Omega$
Abweichung von $R_{100}$ deviation of $R_{100}$	$T_C = 100^{\circ}\text{C}, R_{100} = 493 \Omega$	$\Delta R/R$	-5		5	%
Verlustleistung power dissipation	$T_C = 25^{\circ}\text{C}$	$P_{25}$			20,0	mW
B-Wert B-value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298, 15K))]$	$B_{25/50}$		3375		K

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# Technische Information/technical information

IGBT-Module  
IGBT-modules

## FP75R12KT3



### Vorläufige Daten preliminary data

#### Modul/module

Isolations-Prüfspannung insulation test voltage	RMS, f = 50 Hz, t = 1 min.	V <sub>ISO</sub>	2,5		kV
Material Modulgrundplatte material of module baseplate			Cu		
Material für innere Isolation material for internal insulation			Al <sub>2</sub> O <sub>3</sub>		
Kriechstrecke creepage distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal		10,0		mm
Luftstrecke clearance distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal		7,50		mm
Vergleichszahl der Kriechwegbildung comparative tracking index		CTI	> 225		
			min.	typ.	max.
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	pro Modul / per module $\lambda_{\text{Paste}} = 1 \text{ W}/(\text{m}\cdot\text{K}) / \lambda_{\text{grease}} = 1 \text{ W}/(\text{m}\cdot\text{K})$	R <sub>thCH</sub>	0,009		K/W
Modulinduktivität stray inductance module		L <sub>sCE</sub>	60		nH
Modulleitungswiderstand, Anschlüsse - Chip module lead resistance, terminals - chip	T <sub>C</sub> = 25°C, pro Schalter / per switch	R <sub>CC'+EE'</sub> R <sub>AA'+CC'</sub>	4,00 2,00		mΩ
Höchstzulässige Sperrschichttemperatur maximum junction temperature		T <sub>vj max</sub>		150	°C
Temperatur im Schaltbetrieb temperature under switching conditions		T <sub>vj op</sub>	-40	125	°C
Lagertemperatur storage temperature		T <sub>stg</sub>	-40	125	°C
Anzugsdrehmoment f. mech. Befestigung mounting torque	Schraube / screw M5	M	3,00	-	6,00 Nm
Gewicht weight		G	300		g

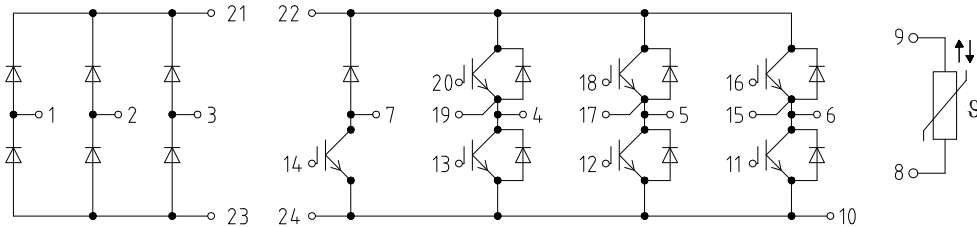
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**This technical information specifies semiconductor devices but guarantees no characteristics. It is valid with the appropriate technical explanations.**

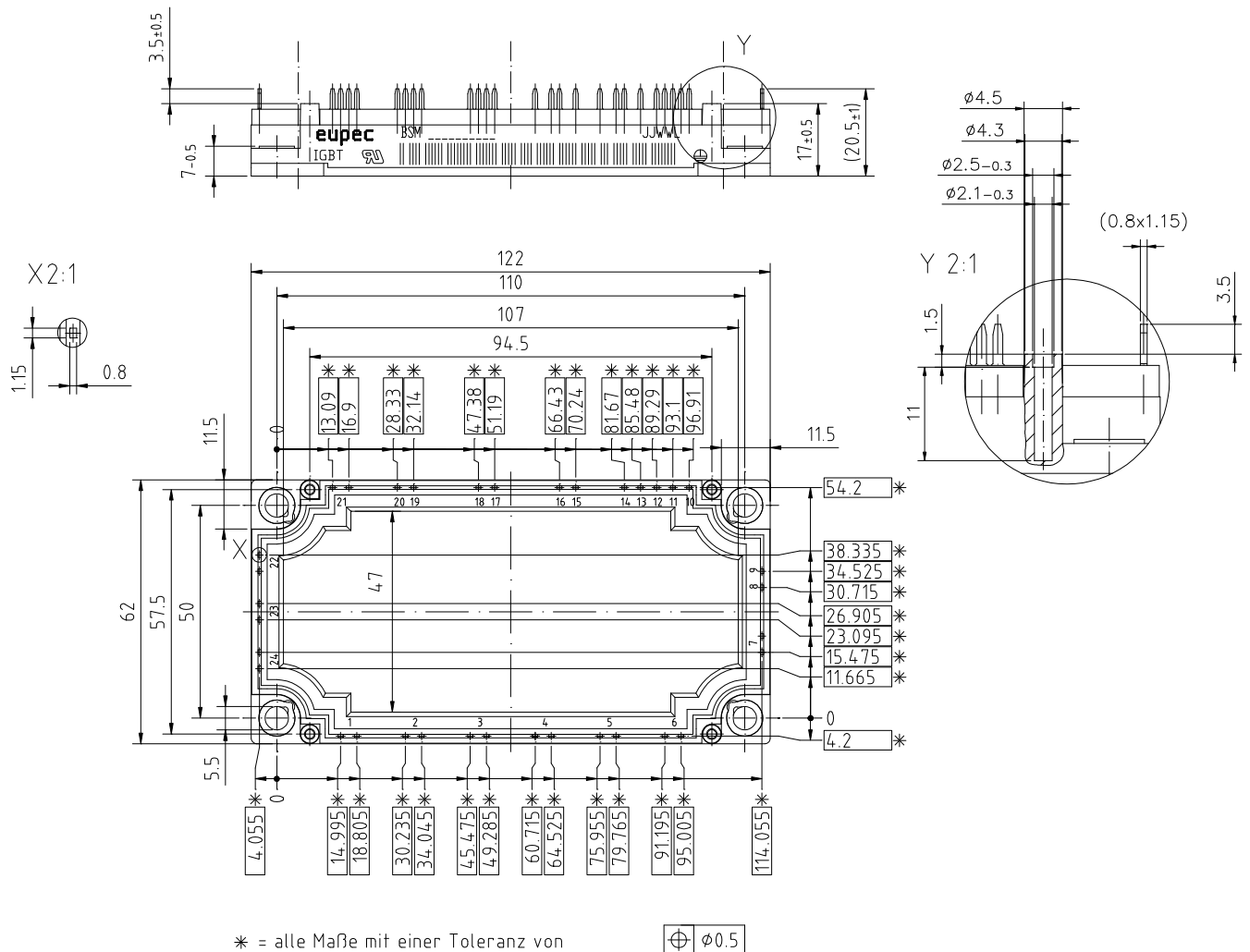
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## Schaltplan/circuit diagram



## Gehäuseabmessungen/package outlines



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