Technische Information / technical information

IGBT-Module
IGBT-modules

FS100R17KE3

power electronics in motion
eupec

Vorläufige Daten
preliminary data

IGBT-Wechselrichter / IGBT-inverter

Höchstzulässige Werte / maximum rated values

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	100 145	A A
Periodischer Kollektor Spitzenstrom repetitive peak collector current	t_P = 1 ms, T_C = 80°C	I_{CRM}	200	A
Gesamt-Verlustleistung total power dissipation	T_C = 25°C	P_{tot}	555	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 = 100 A, V_{GE} = 15 V, T_{vj} = 25°C I_C = 100 A, V_{GE} = 15 V, T_{vj} = 125°C	$V_{CE\,sat}$		2,00 2,40	2,45	V V
Gate-Schwellenspannung gate threshold voltage	I_C = 4,00 mA, V_{CE} = V_{GE}, T_{vj} = 25°C	V_{GEth}	5,2	5,8	6,4	V
Gateladung gate charge	V_{GE} = -15 V ... +15 V	Q_G		1,20		µC
Interner Gatewiderstand internal gate resistor	T_{vj} = 25°C	R_{Gint}		7,5		Ω
Eingangskapazität input capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V	C_{ies}		9,00		nF
Rückwirkungskapazität reverse transfer capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V	C_{res}		0,29		nF
Kollektor-Emitter Reststrom collector-emitter cut-off current	V_{CE} = 1700 V, V_{GE} = 0 V, T_{vj} = 25°C	I_{CES}			5,0	mA
Gate-Emitter Reststrom gate-emitter leakage current	V_{CE} = 0 V, V_{GE} = 20 V, T_{vj} = 25°C	I_{GES}			400	nA
Einschaltverzögerungszeit (ind. Last) turn-on delay time (inductive load)	I_C = 100 A, V_{CE} = 900 V V_{GE} = ±15 V, R_{Gon} = 4,0 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Gon} = 4,0 Ω, T_{vj} = 125°C	$t_{d\,on}$		0,37 0,40		µs µs
Anstiegszeit (induktive Last) rise time (inductive load)	I_C = 100 A, V_{CE} = 900 V V_{GE} = ±15 V, R_{Gon} = 4,0 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Gon} = 4,0 Ω, T_{vj} = 125°C	t_r		0,04 0,05		µs µs
Abschaltverzögerungszeit (ind. Last) turn-off delay time (inductive load)	I_C = 100 A, V_{CE} = 900 V V_{GE} = ±15 V, R_{Goff} = 4,0 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Goff} = 4,0 Ω, T_{vj} = 125°C	$t_{d\,off}$		0,65 0,80		µs µs
Fallzeit (induktive Last) fall time (inductive load)	I_C = 100 A, V_{CE} = 900 V V_{GE} = ±15 V, R_{Goff} = 4,0 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Goff} = 4,0 Ω, T_{vj} = 125°C	t_f		0,18 0,30		µs µs
Einschaltverlustenergie pro Puls turn-on energy loss per pulse	I_C = 100 A, V_{CE} = 900 V, L_S = 30 nH V_{GE} = ±15 V, R_{Gon} = 4,0 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Gon} = 4,0 Ω, T_{vj} = 125°C	E_{on}		22,0 32,0		mJ mJ
Abschaltverlustenergie pro Puls turn-off energy loss per pulse	I_C = 100 A, V_{CE} = 900 V, L_S = 30 nH V_{GE} = ±15 V, R_{Goff} = 4,0 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Goff} = 4,0 Ω, T_{vj} = 125°C	E_{off}		21,5 31,5		mJ mJ
Kurzschlußverhalten SC data	t_P ≤ 10 µs, V_{GE} ≤ 15 V T_{vj}≤125°C, V_{CC} = 1000 V, V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	I_{SC}		400		A
Innerer Wärmewiderstand thermal resistance, junction to case	pro IGBT per IGBT	R_{thJC}			0,225	K/W

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Diode-Wechselrichter / diode-inverter

Höchstzulässige Werte / maximum rated values

Periodische Spitzensperrspannung repetitive peak reverse voltage	T_{vj} = 25°C	V_{RRM}	1700	V
Dauergleichstrom DC forward current		I_F	100	A
Periodischer Spitzenstrom repetitive peak forward current	t_P = 1 ms	I_{FRM}	200	A
Grenzlastintegral I²t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C	I²t	1800	A²s

Charakteristische Werte / characteristic values

			min.	typ.	max.	
Durchlassspannung forward voltage	I_F = 100 A, V_{GE} = 0 V, T_{vj} = 25°C I_F = 100 A, V_{GE} = 0 V, T_{vj} = 125°C	V_F		1,80 1,90	2,20	V V
Rückstromspitze peak reverse recovery current	I_F = 100 A, - di_F/dt = 2450 A/µs V_R = 900 V, V_{GE} = -15 V, T_{vj} = 25°C V_R = 900 V, V_{GE} = -15 V, T_{vj} = 125°C	I_{RM}		155 165		A A
Sperrverzögerungsladung recovered charge	I_F = 100 A, -di_F/dt = 2450 A/µs V_R = 900 V, V_{GE} = -15 V, T_{vj} = 25°C V_R = 900 V, V_{GE} = -15 V, T_{vj} = 125°C	Q_r		29,0 48,5		µC µC
Abschaltenergie pro Puls reverse recovery energy	I_F = 100 A, -di_F/dt = 2450 A/µs V_R = 900 V, V_{GE} = -15 V, T_{vj} = 25°C V_R = 900 V, V_{GE} = -15 V, T_{vj} = 125°C	E_{rec}		15,5 27,5		mJ mJ
Innerer Wärmewiderstand thermal resistance, junction to case	pro Diode per diode	R_{thJC}			0,39	K/W

NTC-Widerstand / NTC-thermistor

Charakteristische Werte / characteristic values

			min.	typ.	max.	
Nennwiderstand rated resistance	T_C = 25°C	R_{25}		5,00		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}			20,0	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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Modul / module

Isolations-Prüfspannung insulation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}	3,4			kV
Material Modulgrundplatte material of module baseplate			Cu			
Material für innere Isolation material for internal insulation			Al_2O_3			
Kriechstrecke creepage distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal		10,0 10,0			mm
Luftstrecke clearance distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal		7,50 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 λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)	R_{thCH}		0,009		K/W
Modulinduktivität stray inductance module		L_{sCE}		21		nH
Modulleitungswiderstand, Anschlüsse - Chip module lead resistance, terminals - chip	T_C = 25°C, pro Schalter / per switch	$R_{CC'+EE'}$		1,80		mΩ
Höchstzulässige Sperrschichttemperatur maximum junction temperature		$T_{vj\ max}$			150	°C
Temperatur im Schaltbetrieb temperature under switching conditions		$T_{vj\ op}$	-40		125	°C
Lagertemperatur storage temperature		T_{stg}	-40		125	°C
Anzugsdrehmoment f. mech. Befestigung mounting torque	Schraube / screw M5	M	3,00	-	6,00	Nm
Gewicht weight		G		300		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 guarantees no characteristics. It is valid with the appropriate technical explanations.

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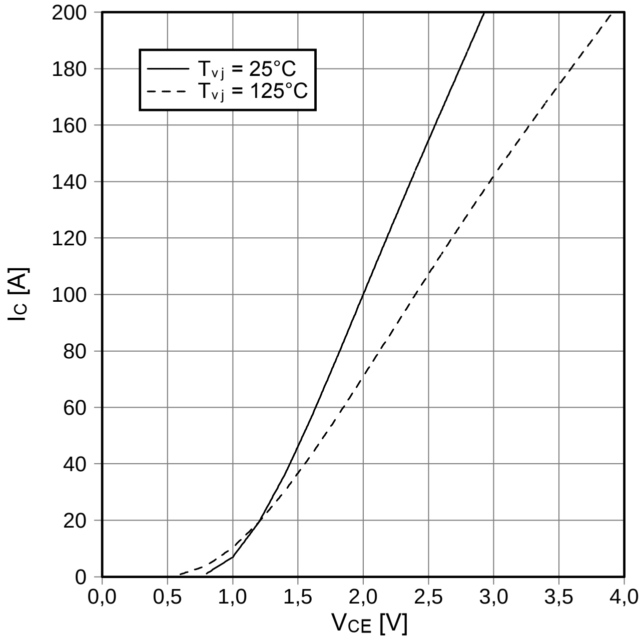
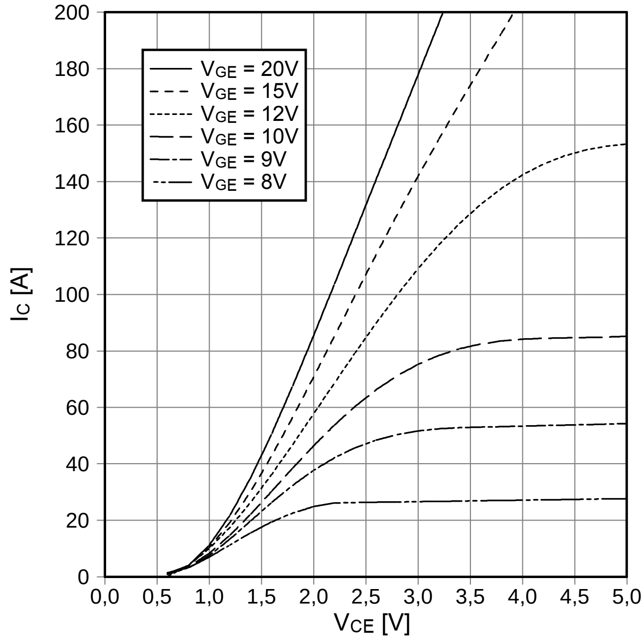
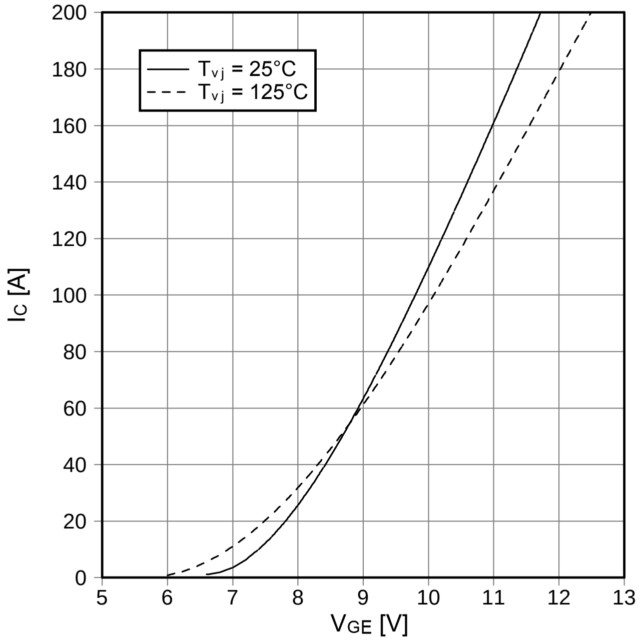
Ausgangskennlinie IGBT-Wechselr. (typisch)
output characteristic IGBT-inverter (typical)
$I_C = f(V_{CE})$
$V_{GE} = 15$ V



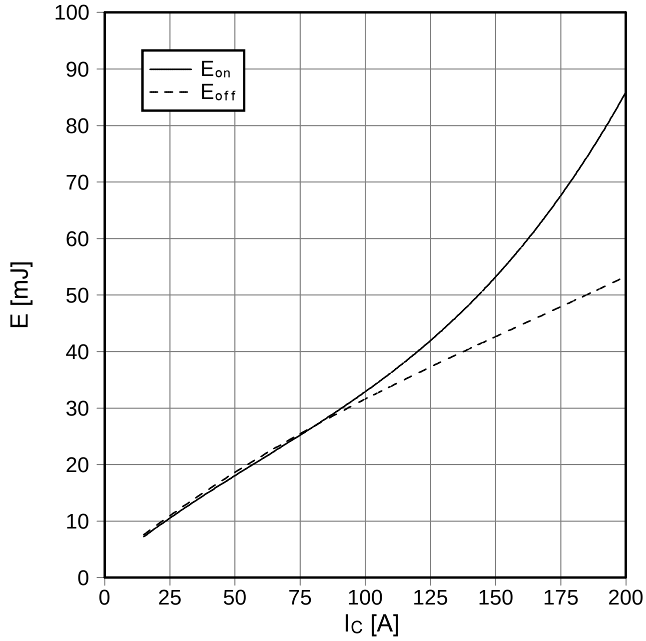
Ausgangskennlinienfeld IGBT-Wechselr. (typisch)
output characteristic IGBT-inverter (typical)
$I_C = f(V_{CE})$
$T_{vj} = 125°C$



Übertragungscharakteristik IGBT-Wechselr. (typisch)
transfer characteristic IGBT-inverter (typical)
$I_C = f(V_{GE})$
$V_{CE} = 20$ V



Schaltverluste IGBT-Wechselr. (typisch)
switching losses IGBT-inverter (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
$V_{GE} = \pm 15$ V, $R_{Gon} = 4\ \Omega$, $R_{Goff} = 4\ \Omega$, $V_{CE} = 900$ V, $T_{vj} = 125°C$



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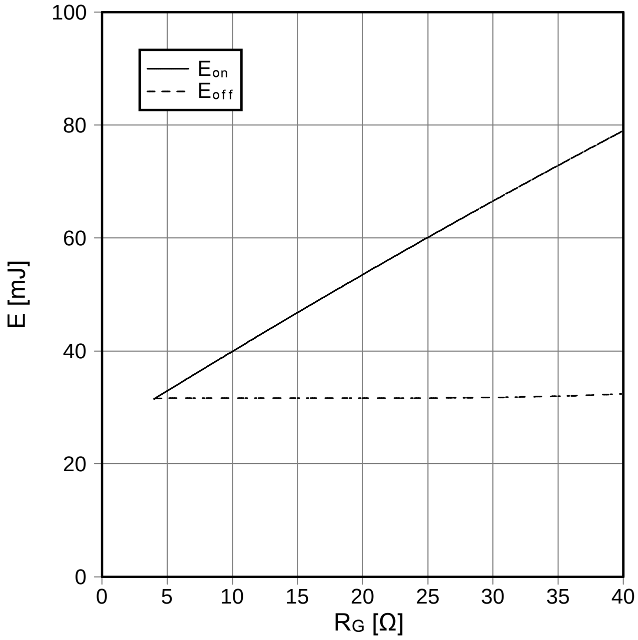
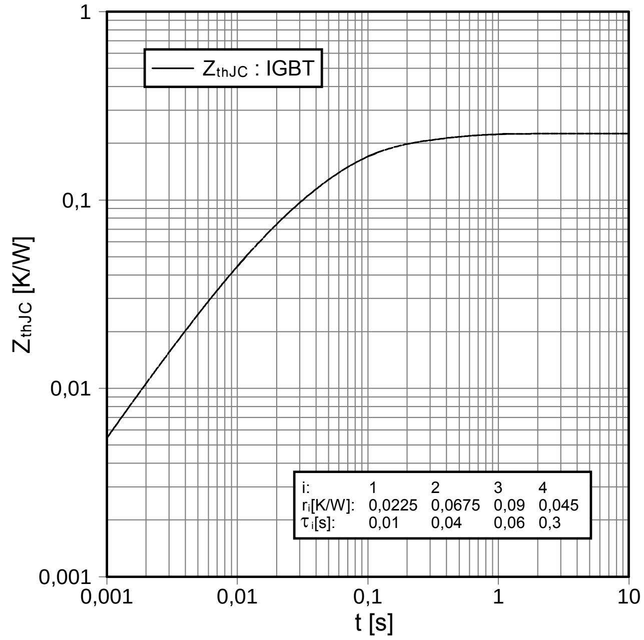
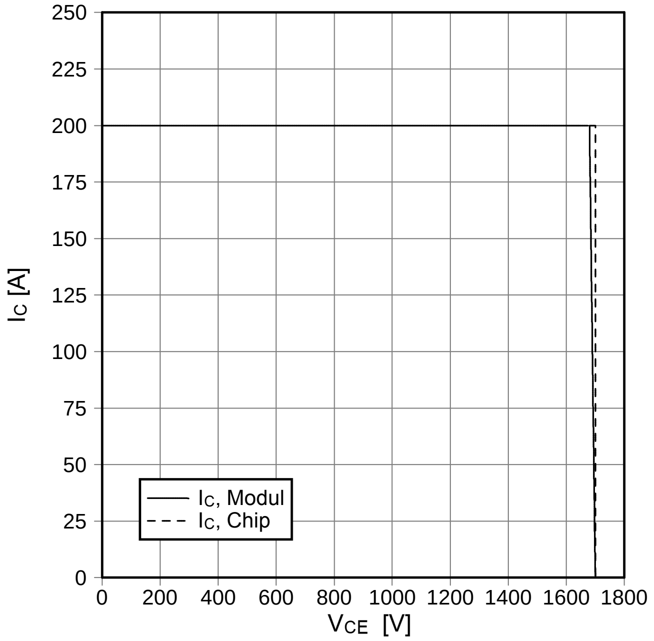
Schaltverluste IGBT-Wechselr. (typisch)
switching losses IGBT-Inverter (typical)
E_{on} = f (R_G), E_{off} = f (R_G)
V_{GE} = ±15 V, I_C = 100 A, V_{CE} = 900 V, T_{vj} = 125°C



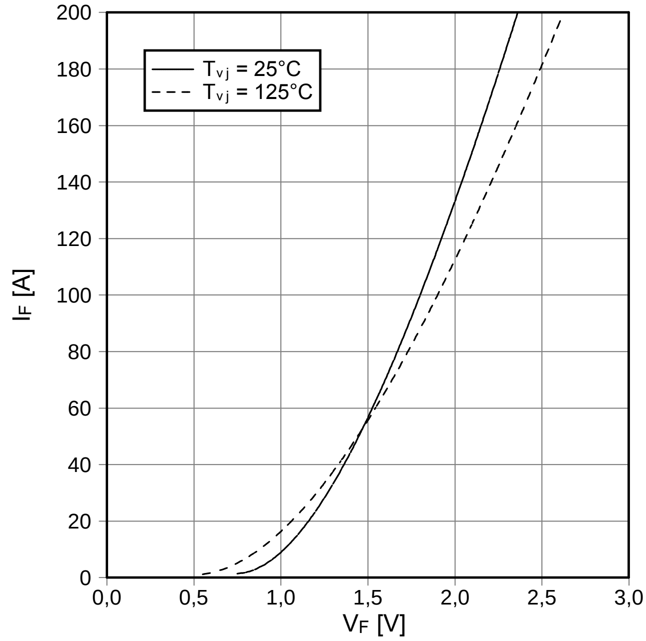
Transienter Wärmewiderstand IGBT-Wechselr.
transient thermal impedance IGBT-inverter
Z_{thJC} = f (t)



Sicherer Rückwärts-Arbeitsbereich IGBT-Wr. (RBSOA)
reverse bias safe operating area IGBT-inv. (RBSOA)
I_C = f (V_{CE})
V_{GE} = ±15 V, R_{Goff} = 4 Ω, T_{vj} = 125°C



Durchlaßkennlinie der Diode-Wechselr. (typisch)
forward characteristic of diode-inverter (typical)
I_F = f (V_F)



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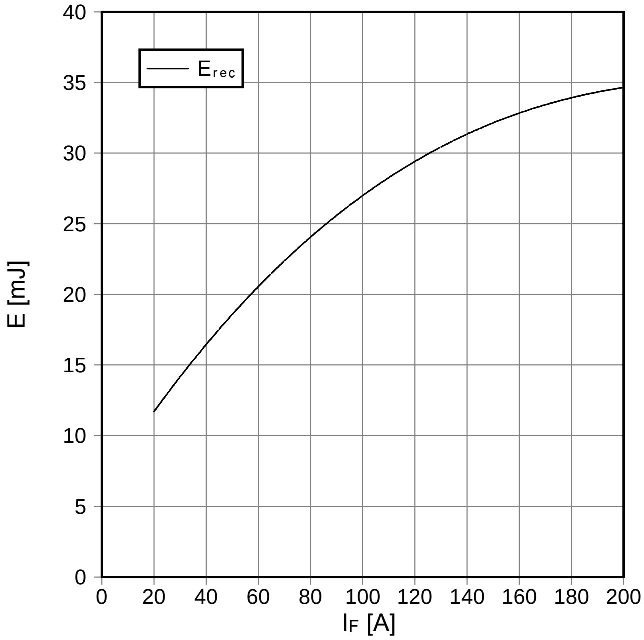
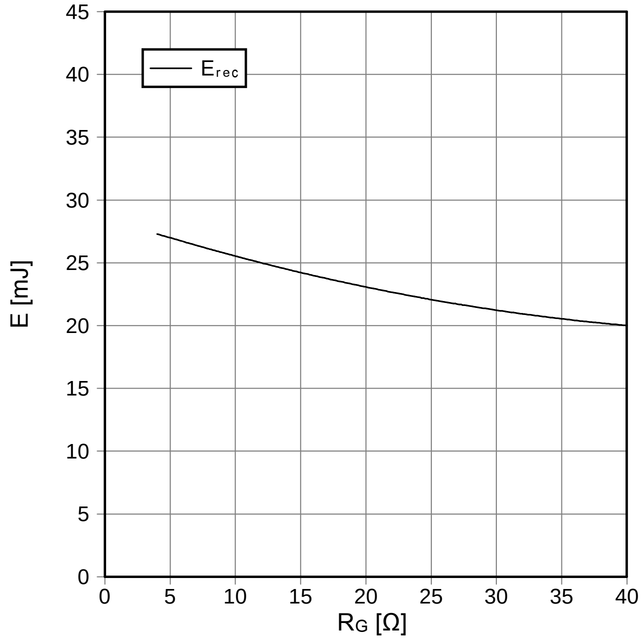
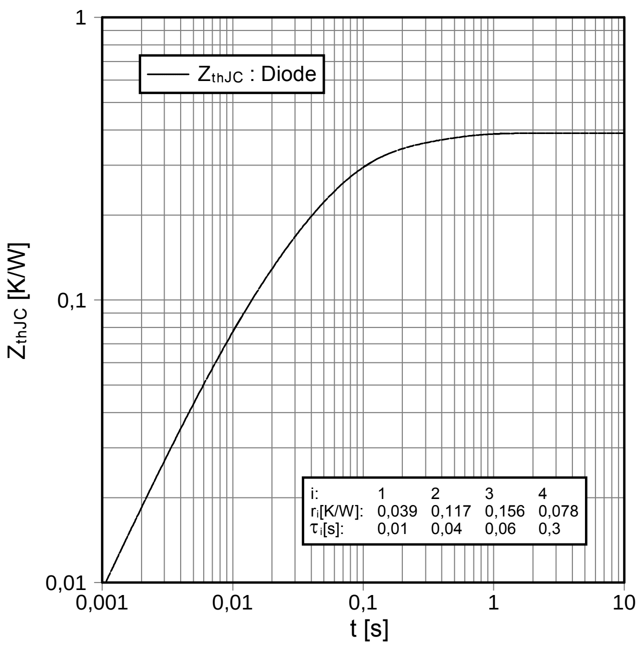
Schaltverluste Diode-Wechselr. (typisch)
switching losses diode-inverter (typical)
E_{rec} = f (I_F)
R_{Gon} = 4 Ω, V_{CE} = 900 V, T_{vj} = 125°C



Schaltverluste Diode-Wechselr. (typisch)
switching losses diode-inverter (typical)
E_{rec} = f (R_G)
I_F = 100 A, V_{CE} = 900 V, T_{vj} = 125°C



Transienter Wärmewiderstand Diode-Wechselr.
transient thermal impedance diode-inverter
Z_{thJC} = f (t)



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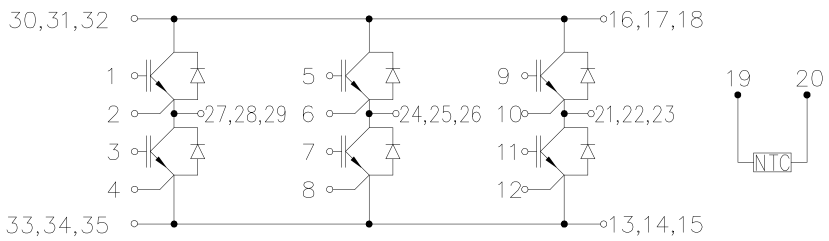
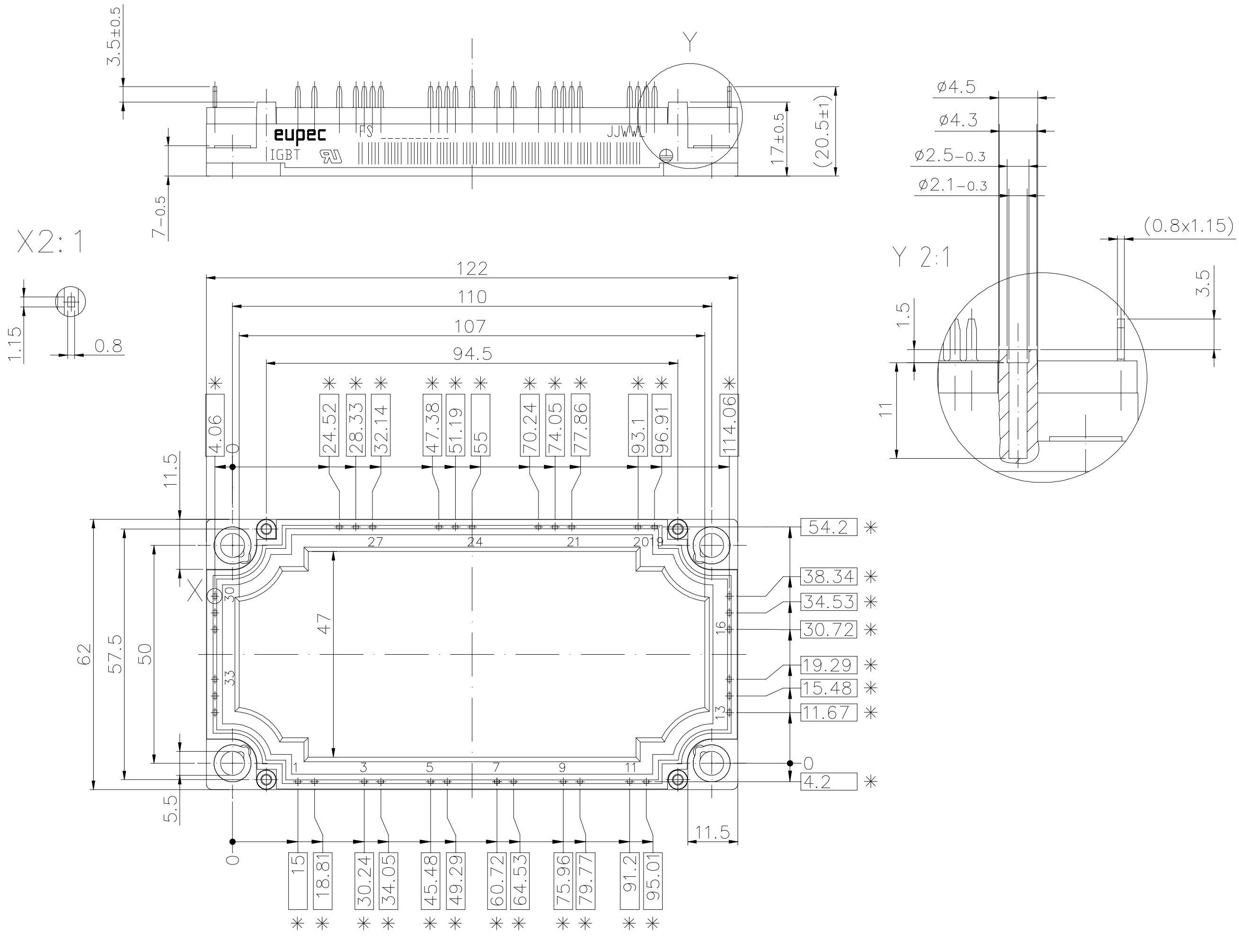
Schaltplan / circuit diagram



Gehäuseabmessungen / package outlines



∗ = alle Maße mit einer Toleranz von ⌖ ø0.5

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