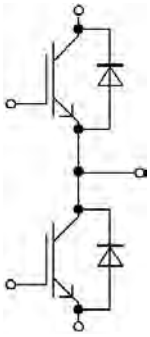
Technische Information / technical information

IGBT-Module
IGBT-modules

FF200R12KS4

62mm C-Serien Modul mit schnellem IGBT2 für hochfrequentes Schalten
62mm C-Series module with the fast IGBT2 for high-frequency switching



V_{CES} = 1200V
$I_{C\ nom}$ = 200A / I_{CRM} = 400A

Typische Anwendungen

- Hochfrequenz-Anwendungen
- Medizinische Anwendungen
- Motorantriebe
- Resonanzanwendungen
- Servoumrichter
- USV-Systeme

Typical Applications

- High Frequency Switching Application
- Medical Applications
- Motor Drives
- Resonant Inverter Appliccations
- Servo Drives
- UPS Systems

Elektrische Eigenschaften

- Hohe Kurzschlussrobustheit, selbstlimitierender Kurzschlussstrom
- Niedrige Schaltverluste
- Sehr große Robustheit
- V_{CEsat} mit positivem Temperaturkoeffizienten

Electrical Features

- High Short Circuit Capability, Self Limiting Short Circuit Current
- Low Switching Losses
- Unbeatable Robustness
- V_{CEsat} with positive Temperature Coefficient

Mechanische Eigenschaften

- Gehäuse mit CTI > 400
- Große Luft- und Kriechstrecken
- Isolierte Bodenplatte
- Kupferbodenplatte
- Standardgehäuse

Mechanical Features

- Package with CTI > 400
- High Creepage and Clearance Distances
- Isolated Base Plate
- Copper Base Plate
- Standard Housing

Module Label Code

Barcode Code 128

DMX - Code

Content of the Code	Digit
Module Serial Number	1 - 5
Module Material Number	6 - 11
Production Order Number	12 - 19
Datecode (Production Year)	20 - 21
Datecode (Production Week)	22 - 23

prepared by: MB	date of publication: 2009-08-14	material no: 19510
approved by: WR	revision: 3.4	UL approved (E83335)

IGBT-Wechselrichter / IGBT-inverter

Höchstzulässige Werte / maximum rated values

Kollektor-Emitter-Sperrspannung collector-emitter voltage	T_{vj} = 25°C	V_{CES}	1200	V
Kollektor-Dauergleichstrom DC-collector current	T_C = 65°C, T_{vj} = 150°C T_C = 25°C, T_{vj} = 150°C	$I_{C\ nom}$ I_C	200 275	A A
Periodischer Kollektor Spitzenstrom repetitive peak collector current	t_P = 1 ms	I_{CRM}	400	A
Gesamt-Verlustleistung total power dissipation	T_C = 25°C, T_{vj} = 150°C	P_{tot}	1400	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 = 200 A, V_{GE} = 15 V I_C = 200 A, V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C	$V_{CE\ sat}$		3,20 3,85	3,70	V V
Gate-Schwellenspannung gate threshold voltage	I_C = 8,00 mA, V_{CE} = V_{GE}, T_{vj} = 25°C		V_{GEth}	4,5	5,5	6,5	V
Gateladung gate charge	V_{GE} = -15 V ... +15 V		Q_G		2,10		µC
Interner Gatewiderstand internal gate resistor	T_{vj} = 25°C		R_{Gint}		2,5		Ω
Eingangskapazität input capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		13,0		nF
Rückwirkungskapazität reverse transfer capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{res}		0,85		nF
Kollektor-Emitter Reststrom collector-emitter cut-off current	V_{CE} = 1200 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 = 200 A, V_{CE} = 600 V V_{GE} = ±15 V R_{Gon} = 4,7 Ω	T_{vj} = 25°C T_{vj} = 125°C	$t_{d\ on}$		0,10 0,11		µs µs
Anstiegszeit (induktive Last) rise time (inductive load)	I_C = 200 A, V_{CE} = 600 V V_{GE} = ±15 V R_{Gon} = 4,7 Ω	T_{vj} = 25°C T_{vj} = 125°C	t_r		0,06 0,07		µs µs
Abschaltverzögerungszeit (ind. Last) turn-off delay time (inductive load)	I_C = 200 A, V_{CE} = 600 V V_{GE} = ±15 V R_{Goff} = 4,7 Ω	T_{vj} = 25°C T_{vj} = 125°C	$t_{d\ off}$		0,53 0,55		µs µs
Fallzeit (induktive Last) fall time (inductive load)	I_C = 200 A, V_{CE} = 600 V V_{GE} = ±15 V R_{Goff} = 4,7 Ω	T_{vj} = 25°C T_{vj} = 125°C	t_f		0,03 0,04		µs µs
Einschaltverlustenergie pro Puls turn-on energy loss per pulse	I_C = 200 A, V_{CE} = 600 V, L_S = 60 nH V_{GE} = ±15 V, di/dt = 3500 A/µs (T_{vj}=125°C) R_{Gon} = 4,7 Ω	T_{vj} = 25°C T_{vj} = 125°C	E_{on}		19,0		mJ mJ
Abschaltverlustenergie pro Puls turn-off energy loss per pulse	I_C = 200 A, V_{CE} = 600 V, L_S = 60 nH V_{GE} = ±15 V, du/dt = 7000 V/µs (T_{vj}=125°C) R_{Goff} = 4,7 Ω	T_{vj} = 25°C T_{vj} = 125°C	E_{off}		12,0		mJ mJ
Kurzschlussverhalten SC data	V_{GE} ≤ 15 V, V_{CC} = 900 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	t_P ≤ 10 µs, T_{vj} = 125°C	I_{SC}		1300		A
Innerer Wärmewiderstand thermal resistance, junction to case	pro IGBT / per IGBT		R_{thJC}			0,09	K/W
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	pro IGBT / per IGBT λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)		R_{thCH}		0,03		K/W

Diode-Wechselrichter / diode-inverter

Höchstzulässige Werte / maximum rated values

Periodische Spitzensperrspannung repetitive peak reverse voltage	T_{vj} = 25°C		V_{RRM}	1200	V
Dauergleichstrom DC forward current			I_F	200	A
Periodischer Spitzenstrom repetitive peak forward current	t_P = 1 ms		I_{FRM}	400	A
Grenzlastintegral I²t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C		I²t	8500	A²s

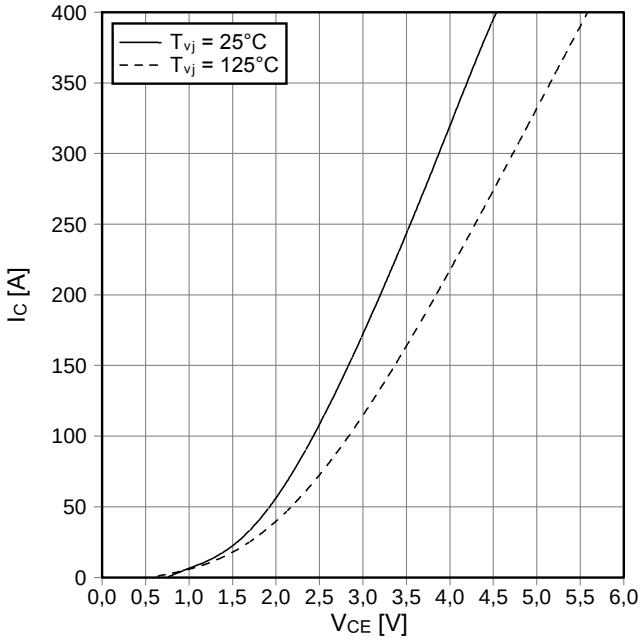
Charakteristische Werte / characteristic values

				min.	typ.	max.	
Durchlassspannung forward voltage	I_F = 200 A, V_{GE} = 0 V I_F = 200 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C	V_F		2,00 1,70	2,40	V V
Rückstromspitze peak reverse recovery current	I_F = 200 A, - di_F/dt = 3500 A/µs (T_{vj}=125°C) V_R = 600 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C	I_{RM}		140 210		A A
Sperrverzögerungsladung recovered charge	I_F = 200 A, - di_F/dt = 3500 A/µs (T_{vj}=125°C) V_R = 600 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C	Q_r		11,5 32,0		µC µC
Abschaltenergie pro Puls reverse recovery energy	I_F = 200 A, - di_F/dt = 3500 A/µs (T_{vj}=125°C) V_R = 600 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C	E_{rec}		4,20 11,0		mJ mJ
Innerer Wärmewiderstand thermal resistance, junction to case	pro Diode / per diode		R_{thJC}			0,18	K/W
Übergangs-Wärmewiderstand thermal resistance, case to heatsink	pro Diode / per diode λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)		R_{thCH}		0,06		K/W

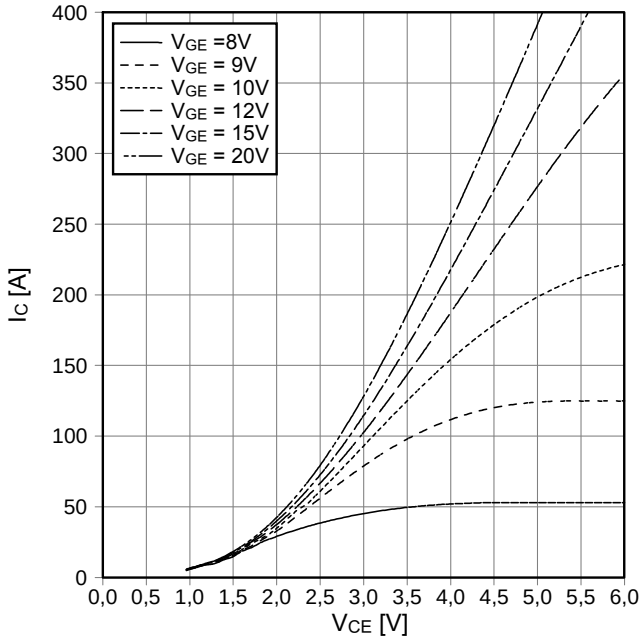
Modul / module

Isolations-Prüfspannung insulation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}		2,5		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			29,0 23,0		mm
Luftstrecke clearance distance	Kontakt - Kühlkörper / terminal to heatsink Kontakt - Kontakt / terminal to terminal			23,0 11,0		mm
Vergleichszahl der Kriechwegbildung comparative tracking index		CTI		> 400		
			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}		0,01		K/W
Modulinduktivität stray inductance module		L_{sCE}		20		nH
Modulleitungswiderstand, Anschlüsse - Chip module lead resistance, terminals - chip	T_C = 25°C, pro Schalter / per switch	$R_{CC'+EE'}$		0,70		mΩ
Höchstzulässige Sperrschichttemperatur maximum junction temperature	Wechselrichter, Brems-Chopper / Inverter, Brake-Chopper	$T_{vj\ max}$			150	°C
Temperatur im Schaltbetrieb temperature under switching conditions	Wechselrichter, Brems-Chopper / Inverter, Brake-Chopper	$T_{vj\ op}$	-40		125	°C
Lagertemperatur storage temperature		T_{stg}	-40		125	°C
Anzugsdrehmoment f. mech. Befestigung mounting torque	Schraube M6 - Montage gem. gültiger Applikation Note screw M6 - mounting according to valid application note	M	3,00	-	6,00	Nm
Anzugsdrehmoment f. elektr. Anschlüsse terminal connection torque	Schraube M6 - Montage gem. gültiger Applikation Note screw M6 - mounting according to valid application note	M	2,5	-	5,0	Nm
Gewicht weight		G		340		g

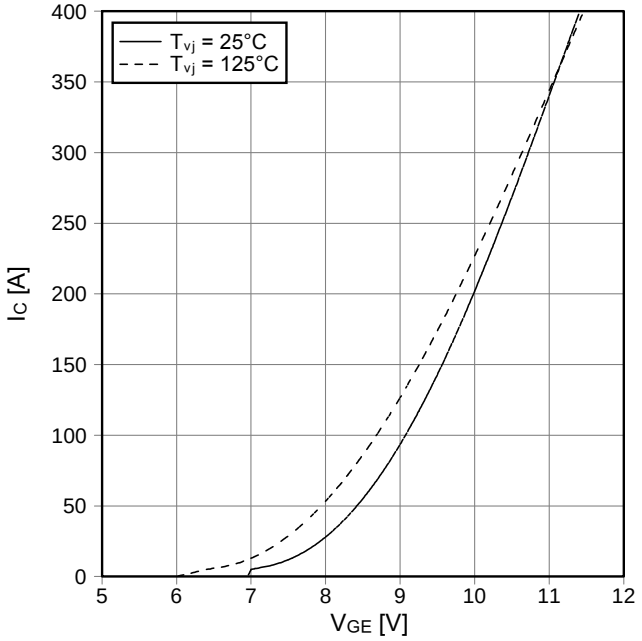
Ausgangskennlinie IGBT-Wechselr. (typisch)
output characteristic IGBT-inverter (typical)
$I_C = f(V_{CE})$
V_{GE} = 15 V



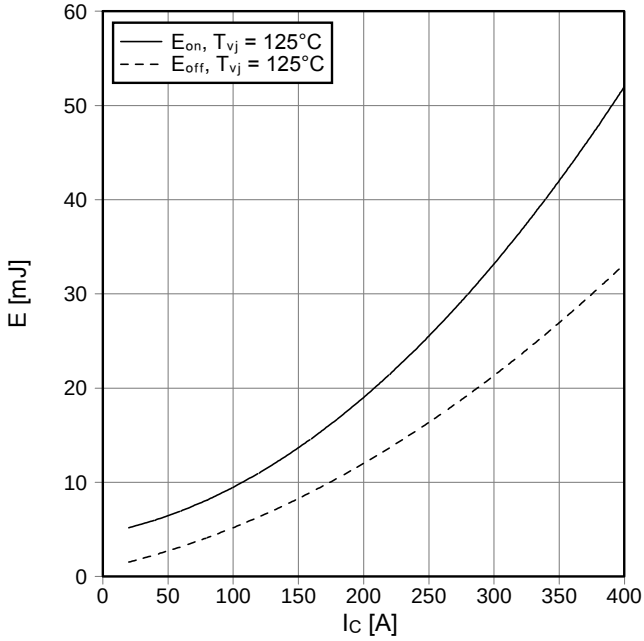
Ausgangskennlinienfeld IGBT-Wechselr. (typisch)
output characteristic IGBT-inverter (typical)
$I_C = f(V_{CE})$
T_{vj} = 125°C



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} = ±15 V, R_{Gon} = 4.7 Ω, R_{Goff} = 4.7 Ω, V_{CE} = 600 V



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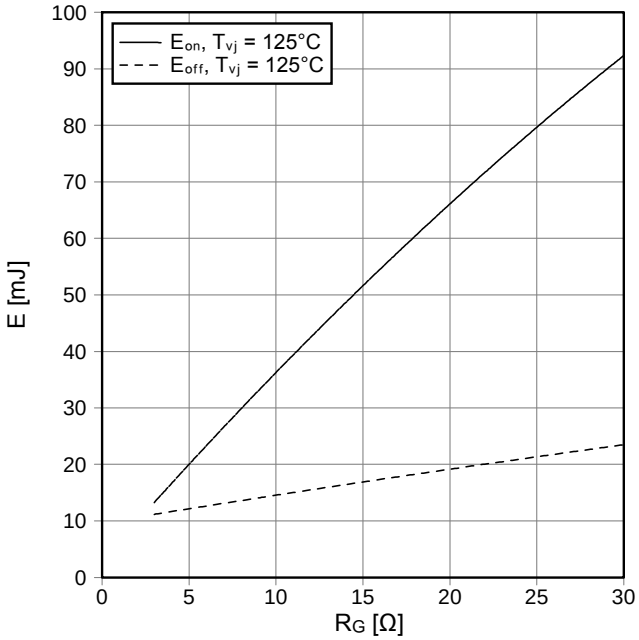
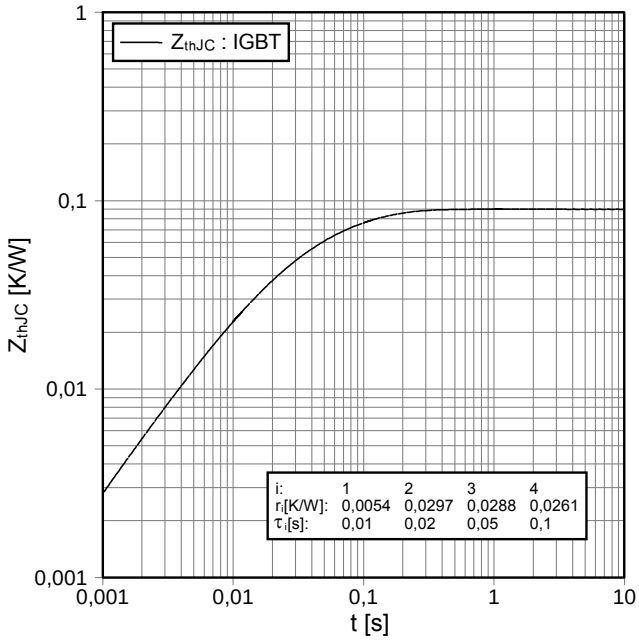
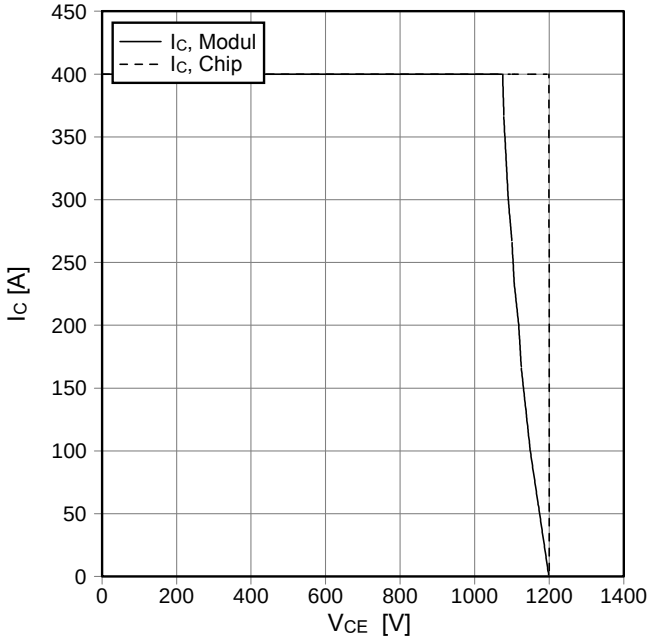
Schaltverluste IGBT-Wechselr. (typisch)
switching losses IGBT-Inverter (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
V_{GE} = ±15 V, I_C = 200 A, V_{CE} = 600 V



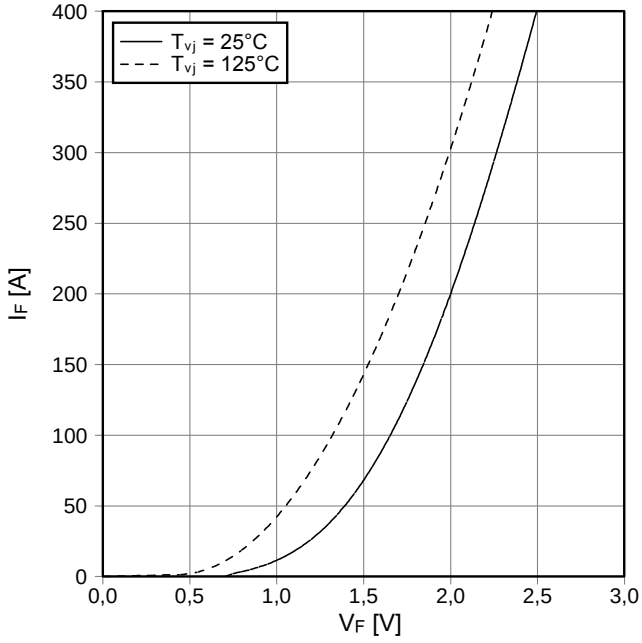
Transienter Wärmewiderstand IGBT-Wechselr.
transient thermal impedance IGBT-inverter
$Z_{thJC} = f(t)$



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} = 4.7 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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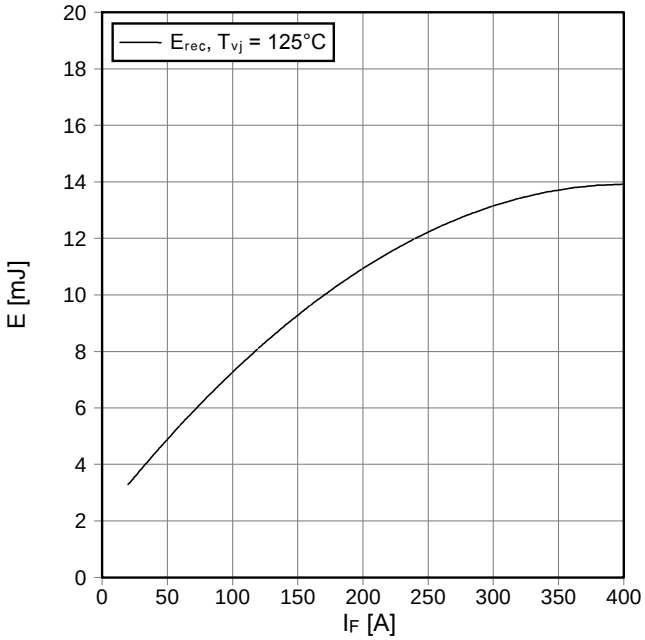
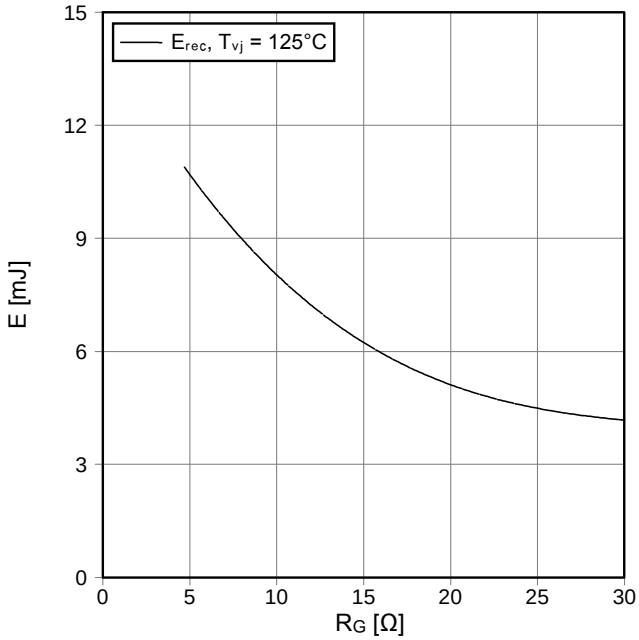
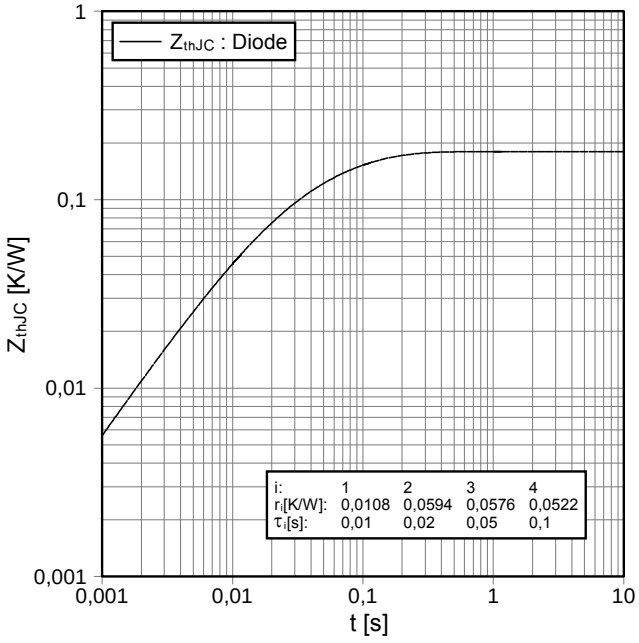
Schaltverluste Diode-Wechselr. (typisch)
switching losses diode-inverter (typical)
$E_{rec} = f(I_F)$
$R_{Gon} = 4.7\ \Omega$, $V_{CE} = 600$ V



Schaltverluste Diode-Wechselr. (typisch)
switching losses diode-inverter (typical)
$E_{rec} = f(R_G)$
$I_F = 200$ A, $V_{CE} = 600$ V



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



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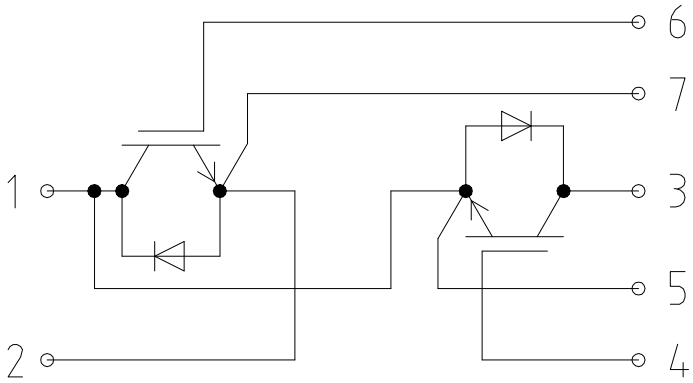
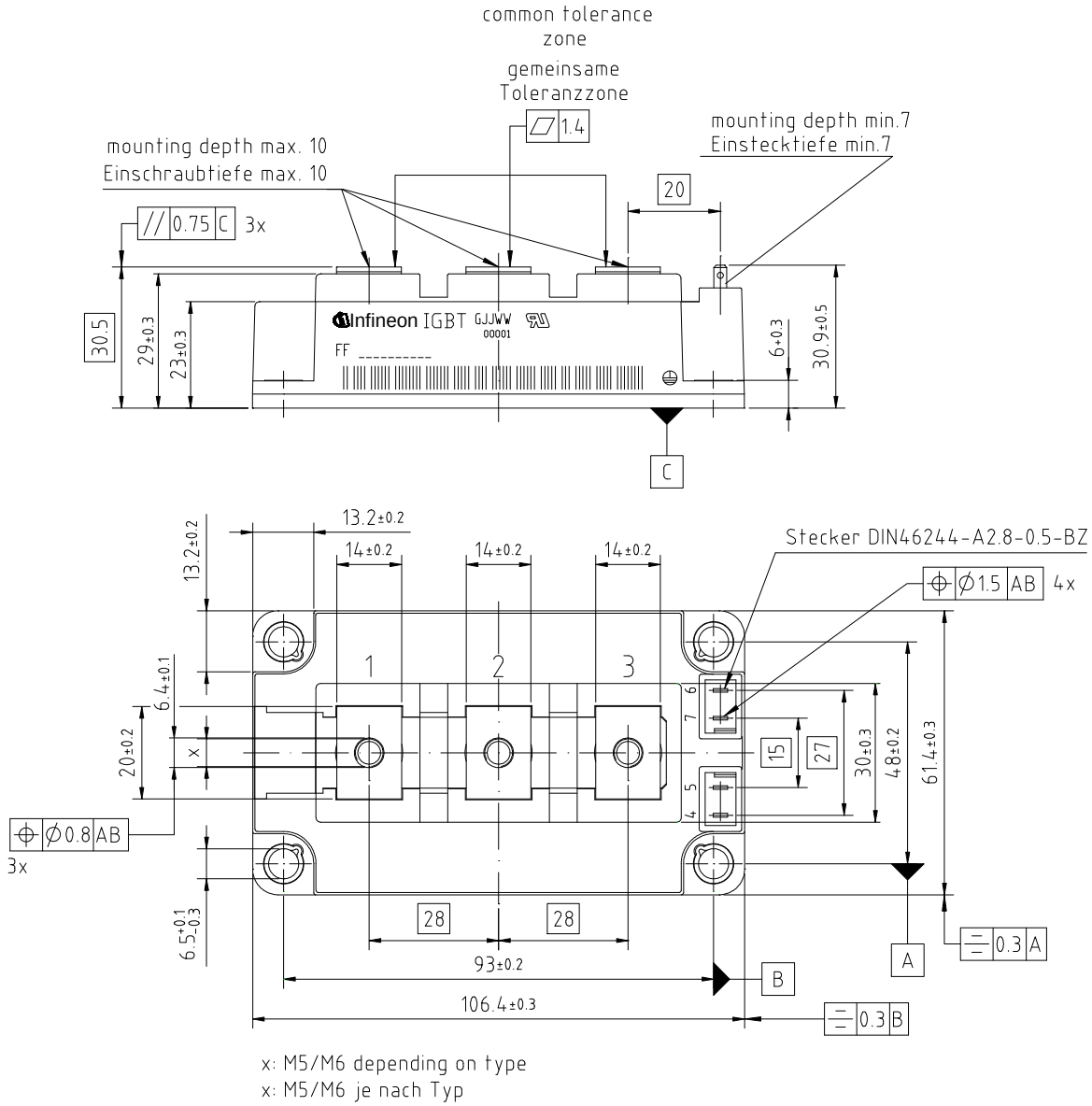
Schaltplan / circuit diagram



Gehäuseabmessungen / package outlines



x: M5/M6 depending on type
x: M5/M6 je nach Typ

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