Technische Information / technical information

IGBT-Module
IGBT-modules

FP15R12KT3

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}	1200	V
Kollektor-Dauergleichstrom DC-collector current	T_C = 80°C T_C = 25°C	$I_{C\ nom}$ I_C	15 25	A A
Periodischer Kollektor Spitzenstrom repetitive peak collector current	t_P = 1 ms, T_C = 80°C	I_{CRM}	30	A
Gesamt-Verlustleistung total power dissipation	T_C = 25°C	P_{tot}	105	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 = 15 A, V_{GE} = 15 V, T_{vj} = 25°C I_C = 15 A, V_{GE} = 15 V, T_{vj} = 125°C	$V_{CE\ sat}$		1,70 1,90	2,15	V V
Gate-Schwellenspannung gate threshold voltage	I_C = 0,50 mA, V_{CE} = V_{GE}, T_{vj} = 25°C	V_{GEth}	5,0	5,8	6,5	V
Gateladung gate charge	V_{GE} = -15 V ... +15 V	Q_G		0,15		µC
Interner Gatewiderstand internal gate resistor	T_{vj} = 25°C	R_{Gint}		0,0		Ω
Eingangskapazität input capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V	C_{ies}		1,10		nF
Rückwirkungskapazität reverse transfer capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V	C_{res}		0,04		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 = 15 A, V_{CE} = 600 V V_{GE} = ±15 V, R_{Gon} = 75 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Gon} = 75 Ω, T_{vj} = 125°C	$t_{d\ on}$		0,09 0,09		µs µs
Anstiegszeit (induktive Last) rise time (inductive load)	I_C = 15 A, V_{CE} = 600 V V_{GE} = ±15 V, R_{Gon} = 75 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Gon} = 75 Ω, T_{vj} = 125°C	t_r		0,03 0,05		µs µs
Abschaltverzögerungszeit (ind. Last) turn-off delay time (inductive load)	I_C = 15 A, V_{CE} = 600 V V_{GE} = ±15 V, R_{Goff} = 75 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Goff} = 75 Ω, T_{vj} = 125°C	$t_{d\ off}$		0,42 0,52		µs µs
Fallzeit (induktive Last) fall time (inductive load)	I_C = 15 A, V_{CE} = 600 V V_{GE} = ±15 V, R_{Goff} = 75 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Goff} = 75 Ω, T_{vj} = 125°C	t_f		0,07 0,09		µs µs
Einschaltverlustenergie pro Puls turn-on energy loss per pulse	I_C = 15 A, V_{CE} = 600 V, L_S = 45 nH V_{GE} = ±15 V, R_{Gon} = 75 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Gon} = 75 Ω, T_{vj} = 125°C	E_{on}		1,50 2,10		mJ mJ
Abschaltverlustenergie pro Puls turn-off energy loss per pulse	I_C = 15 A, V_{CE} = 600 V, L_S = 45 nH V_{GE} = ±15 V, R_{Goff} = 75 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Goff} = 75 Ω, T_{vj} = 125°C	E_{off}		1,10 1,30		mJ mJ
Kurzschlußverhalten SC data	t_P ≤ 10 µs, V_{GE} ≤ 15 V T_{vj}≤125°C, V_{CC} = 900 V, V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	I_{SC}		60		A
Innerer Wärmewiderstand thermal resistance, junction to case	pro IGBT per IGBT	R_{thJC}			1,20	K/W

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Vorläufige Daten
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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}	1200	V
Dauergleichstrom DC forward current		I_F	15	A
Periodischer Spitzenstrom repetitive peak forward current	t_P = 1 ms	I_{FRM}	30	A
Grenzlastintegral I²t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C	I^2t	60,0	A²s

Charakteristische Werte / characteristic values

			min.	typ.	max.	
Durchlassspannung forward voltage	I_F = 15 A, V_{GE} = 0 V, T_{vj} = 25°C I_F = 15 A, V_{GE} = 0 V, T_{vj} = 125°C	V_F		1,65 1,65	2,15	V V
Rückstromspitze peak reverse recovery current	I_F = 15 A, - di_F/dt = 400 A/µs V_R = 600 V, V_{GE} = -15 V, T_{vj} = 25°C V_R = 600 V, V_{GE} = -15 V, T_{vj} = 125°C	I_{RM}		16,0 15,0		A A
Sperrverzögerungsladung recovered charge	I_F = 15 A, -di_F/dt = 400 A/µs V_R = 600 V, V_{GE} = -15 V, T_{vj} = 25°C V_R = 600 V, V_{GE} = -15 V, T_{vj} = 125°C	Q_r		1,80 3,00		µC µC
Abschaltenergie pro Puls reverse recovery energy	I_F = 15 A, -di_F/dt = 400 A/µs V_R = 600 V, V_{GE} = -15 V, T_{vj} = 25°C V_R = 600 V, V_{GE} = -15 V, T_{vj} = 125°C	E_{rec}		0,55 1,10		mJ mJ
Innerer Wärmewiderstand thermal resistance, junction to case	pro Diode per diode	R_{thJC}			1,50	K/W

Diode-Gleichrichter / diode-rectifier

Höchstzulässige Werte / maximum rated values

Periodische Rückw. Spitzensperrspannung repetitive peak reverse voltage	T_{vj} = 25°C	V_{RRM}	1600	V
Durchlassstrom Grenzeffektivwert pro Dio. forward current RMS maximum per diode	T_C = 80°C	I_{FRMSM}	50	A
Gleichrichter Ausgang Grenzeffektivstrom maximum RMS current at Rectifier output	T_C = 80°C	I_{RMSM}	60	A
Stoßstrom Grenzwert surge forward current	t_p = 10 ms, T_{vj} = 25°C t_p = 10 ms, T_{vj} = 150°C	I_{FSM}	315 260	A A
Grenzlastintegral I²t - value	t_p = 10 ms, T_{vj} = 25°C t_p = 10 ms, T_{vj} = 150°C	I^2t	495 340	A²s A²s

Charakteristische Werte / characteristic values

			min.	typ.	max.	
Durchlassspannung forward voltage	T_{vj} = 150°C, I_F = 15 A	V_F		0,90		V
Sperrstrom reverse current	T_{vj} = 150°C, V_R = 1600 V	I_R		2,00		mA
Innerer Wärmewiderstand thermal resistance, junction to case	pro Diode per diode	R_{thJC}			1,00	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} = 80°C	V_{CES}	1200	V
Kollektor-Dauergleichstrom DC-collector current	T_c = 80°C T_c = 25°C	I_{Cnom} I_C	10 18	A A
Periodischer Kollektor Spitzenstrom repetitive peak collector current	t_P = 1 ms, T_C = 80°C	I_{CRM}	20	A
Gesamt-Verlustleistung total power dissipation	T_C = 25°C	P_{tot}	83,5	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 = 10 A, V_{GE} = 15 V, T_{vj} = 25°C I_C = 10 A, V_{GE} = 15 V, T_{vj} = 125°C	$V_{CE\ sat}$		1,85 2,15	2,45	V V
Gate-Schwellenspannung gate threshold voltage	I_C = 0,30 mA, V_{CE} = V_{GE}, T_{vj} = 25°C	V_{GEth}	5,0	5,8	6,5	V
Gateladung gate charge	V_{GE} = -15 V ... +15 V	Q_G		0,10		µC
Interner Gatewiderstand internal gate resistor		R_{Gint}		0,00		Ω
Eingangskapazität input capacitance	f = 1 MHz, T_{vj} = 25°C V_{CE} = 25 V, V_{GE} = 0 V	C_{ies}		0,60		nF
Rückwirkungskapazität reverse transfer capacitance	f = 1 MHz, T_{vj} = 25°C V_{CE} = 25 V, V_{GE} = 0 V	C_{res}		0,026		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 = 10 A, V_{CE} = 600 V V_{GE} = ±15 V, R_{Gon} = 100 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Gon} = 100 Ω, T_{vj} = 125°C	$t_{d\ on}$		0,09 0,09		µs µs
Anstiegszeit (induktive Last) rise time (inductive load)	I_C = 10 A, V_{CE} = 600 V V_{GE} = ±15 V, R_{Gon} = 100 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Gon} = 100 Ω, T_{vj} = 125°C	t_r		0,03 0,05		µs µs
Abschaltverzögerungszeit (ind. Last) turn-off delay time (inductive load)	I_C = 10 A, V_{CE} = 600 V V_{GE} = ±15 V, R_{Goff} = 100 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Goff} = 100 Ω, T_{vj} = 125°C	$t_{d\ off}$		0,42 0,52		µs µs
Fallzeit (induktive Last) fall time (inductive load)	I_C = 10 A, V_{CE} = 600 V V_{GE} = ±15 V, R_{Goff} = 100 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Goff} = 100 Ω, T_{vj} = 125°C	t_f		0,07 0,09		µs µs
Einschaltverlustenergie pro Puls turn-on energy loss per pulse	I_C = 10 A, V_{CE} = 600 V V_{GE} = ±15 V, R_{Gon} = 100 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Gon} = 100 Ω, T_{vj} = 125°C	E_{on}		1,00 1,40		mJ mJ
Abschaltverlustenergie pro Puls turn-off energy loss per pulse	I_C = 10 A, V_{CE} = 600 V V_{GE} = ±15 V, R_{Goff} = 100 Ω, T_{vj} = 25°C V_{GE} = ±15 V, R_{Goff} = 100 Ω, T_{vj} = 125°C	E_{off}		0,90 1,00		mJ mJ
Kurzschlußverhalten SC data	t_P ≤ 10 µsec, V_{GE} ≤ 15 V T_{vj}≤ 125°C, V_{CC} = 900 V, V_{CEmax} = V_{CES} -L_{sCE} · di/dt	I_{SC}		40		A
Innerer Wärmewiderstand thermal resistance, junction to case	pro IGBT per IGBT	R_{thJC}			1,50	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} = 80°C	V_{RRM}	1200	V
Dauergleichstrom DC forward current		I_F	10	A
Periodischer Spitzenstrom repetitive peak forw. current	t_p = 1 ms	I_{FRM}	20	A
Grenzlastintegral I^2t - value	V_R = 0 V, t_p = 10 ms, T_{vj} = 125°C	I^2t	20,0	A²s

Charakteristische Werte / characteristic values

			min.	typ.	max.	
Durchlaßspannung forward voltage	I_F = 10 A, V_{GE} = 0 V, T_{vj} = 25°C I_F = 10 A, V_{GE} = 0 V, T_{vj} = 125°C	V_F		1,80 1,85	2,25	V V
Rückstromspitze peak reverse recovery current	I_F = 10 A, $-di_F/dt$ = 400 A/µs V_R = 600 V, V_{GE} = -15 V, T_{vj} = 25°C V_R = 600 V, V_{GE} = -15 V, T_{vj} = 125°C	I_{RM}		14,0 15,0		A A
Sperrverzögerungsladung recovered charge	I_F = 10 A, $-di_F/dt$ = 400 A/µs V_R = 600 V, V_{GE} = -15 V, T_{vj} = 25°C V_R = 600 V, V_{GE} = -15 V, T_{vj} = 125°C	Q_r		1,00 1,80		µC µC
Abschaltenergie pro Puls reverse recovery energy	I_F = 10 A, $-di_F/dt$ = 400 A/µs V_R = 600 V, V_{GE} = -15 V, T_{vj} = 25°C V_R = 600 V, V_{GE} = -15 V, T_{vj} = 125°C	E_{rec}		0,26 0,56		mJ mJ
Innerer Wärmewiderstand thermal resistance, junction to case	pro Diode per diode	R_{thJC}			2,30	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	$\Delta R/R$	-5		5	%
Verlustleistung power dissipation	T_C = 25°C	P_{25}			20,0	mW
B-Wert B-value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15\ K))]$	$B_{25/50}$		3375		K

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Modul / module

			min.	typ.	max.	
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			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		
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}		0,02		K/W
Modulinduktivität stray inductance module		L_{sCE}		60		nH
Modulleitungswiderstand, Anschlüsse - Chip module lead resistance, terminals - chip	T_C = 25°C, pro Schalter / per switch	$R_{CC'+EE'}$ $R_{AA'+CC'}$		4,00 3,00		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		180		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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Vorläufige Daten
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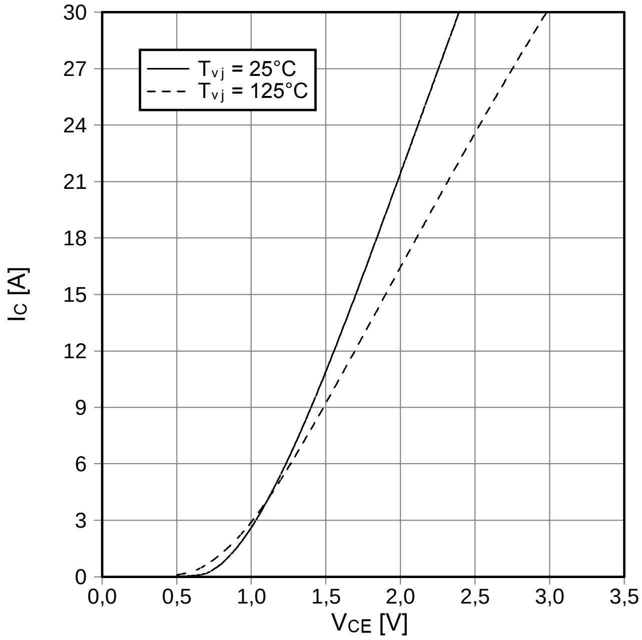
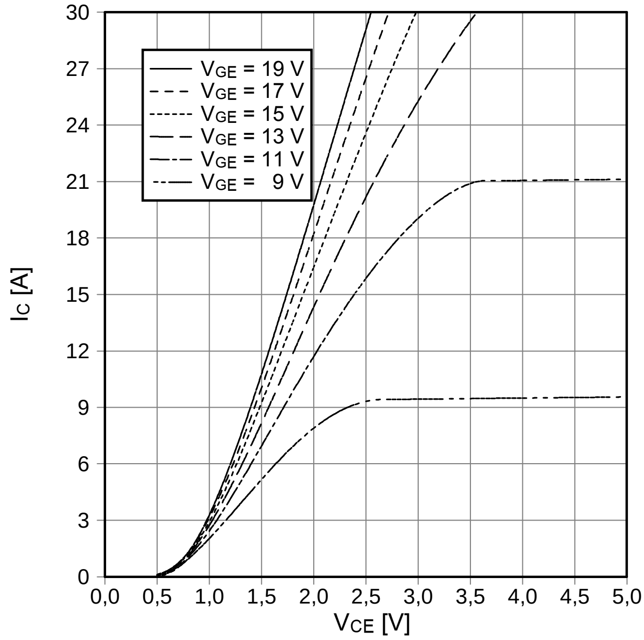
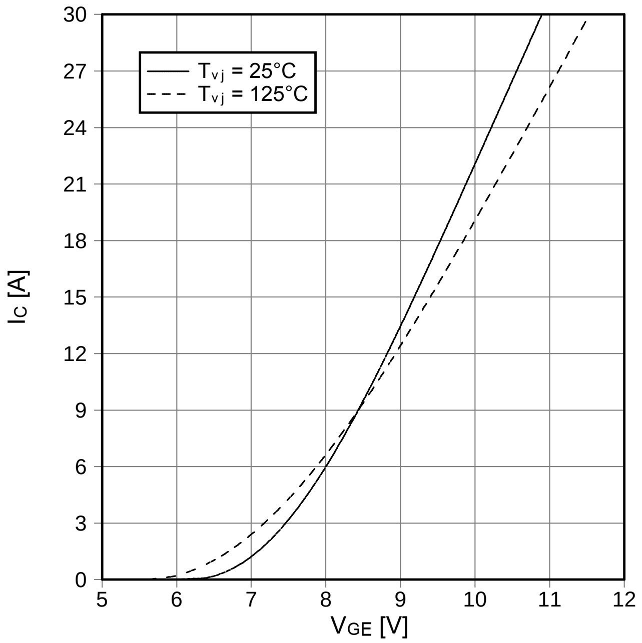
Ausgangskennlinie IGBT-Wechselr. (typisch)
output characteristic IGBT-inverter (typical)
$I_C = f(V_{CE})$
$V_{GE} = 15$ V



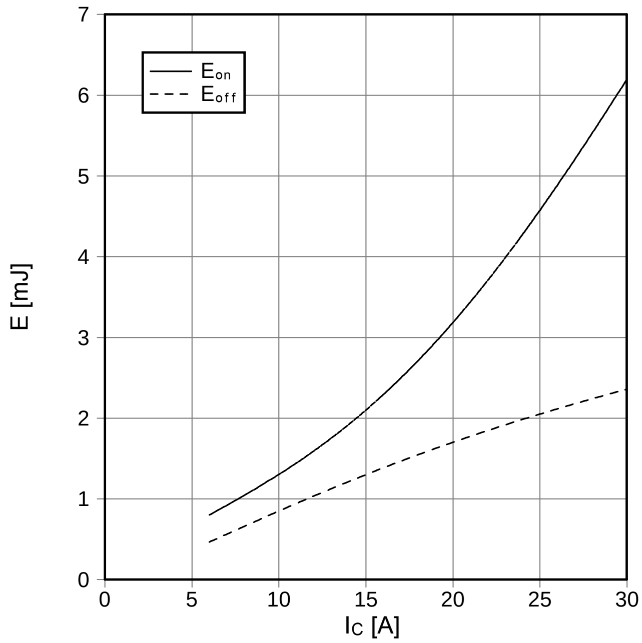
Ausgangskennlinienfeld IGBT-Wechselr. (typisch)
output characteristic IGBT-inverter (typical)
$I_C = f(V_{CE})$
$T_{vj} = 125$°C



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, $R_{Gon} = 75\ \Omega$, $R_{Goff} = 75\ \Omega$, $V_{CE} = 600$ V,
$T_{vj} = 125$°C



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Vorläufige Daten
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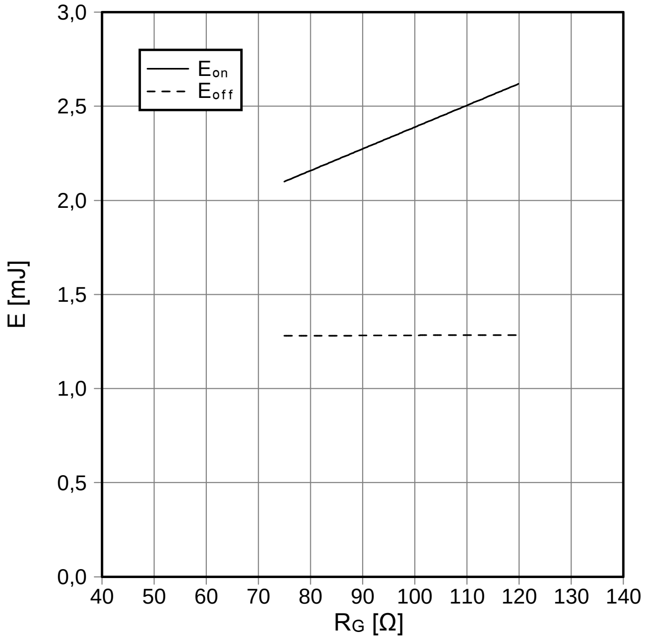
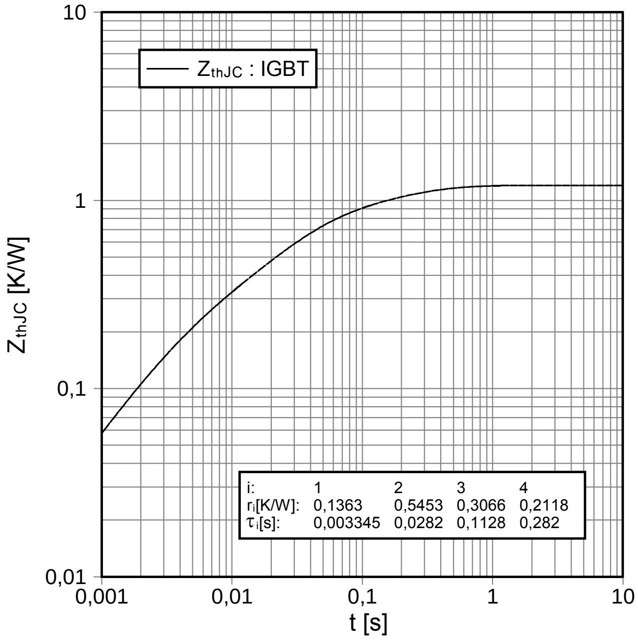
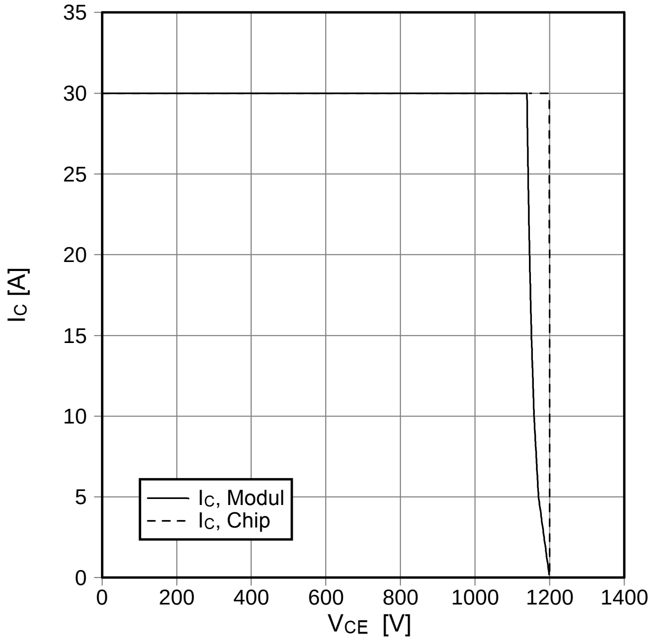
Schaltverluste IGBT-Wechselr. (typisch)
switching losses IGBT-Inverter (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
$V_{GE} = \pm 15$ V, $I_C = 15$ A, $V_{CE} = 600$ V, $T_{vj} = 125$°C



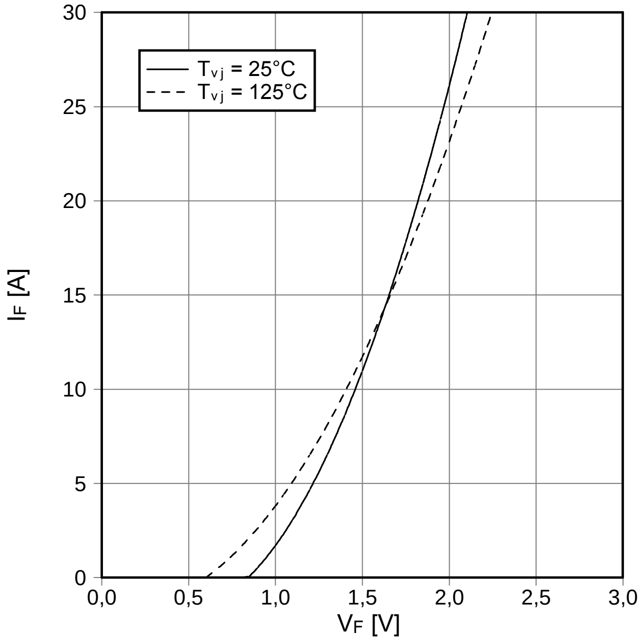
Transienter Wärmewiderstand IGBT-Wechselr.
transient thermal impedance IGBT-inverter
$Z_{thJC} = f(t)$



Sicherer Rückwärts-Arbeitsbereich IGBT-Wr. (RBSOA)
reverse bias safe operating area IGBT-inv. (RBSOA)
$I_C = f(V_{CE})$
$V_{GE} = \pm 15$ V, $R_{Goff} = 75$ 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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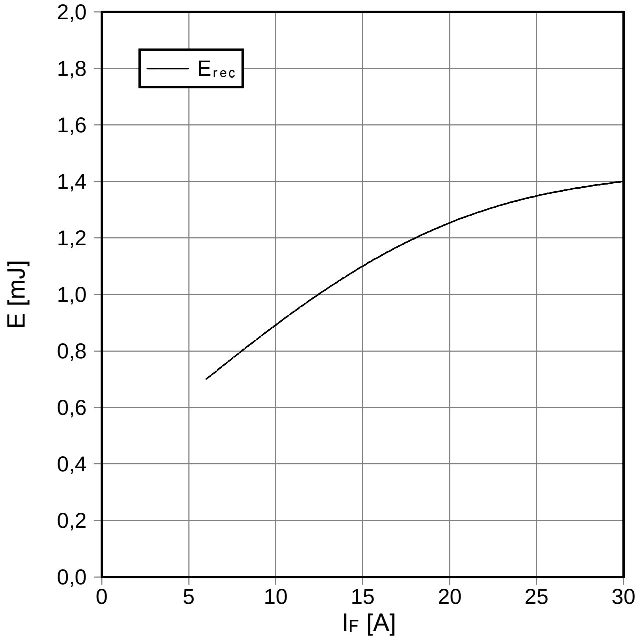
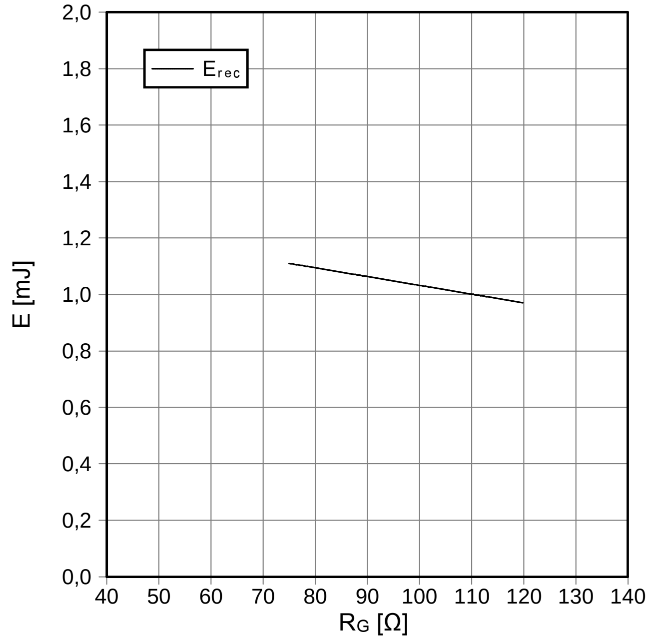
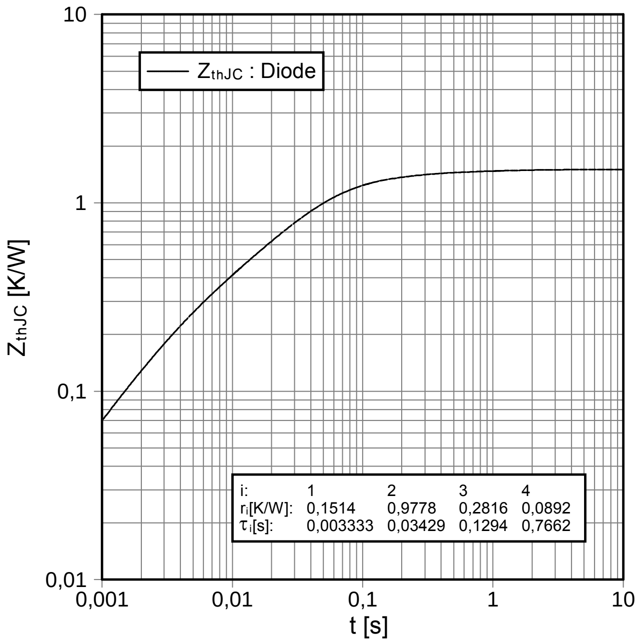
Schaltverluste Diode-Wechselr. (typisch)
switching losses diode-inverter (typical)
$E_{rec} = f(I_F)$
$R_{Gon} = 75\ \Omega$, $V_{CE} = 600$ V, $T_{vj} = 125$°C



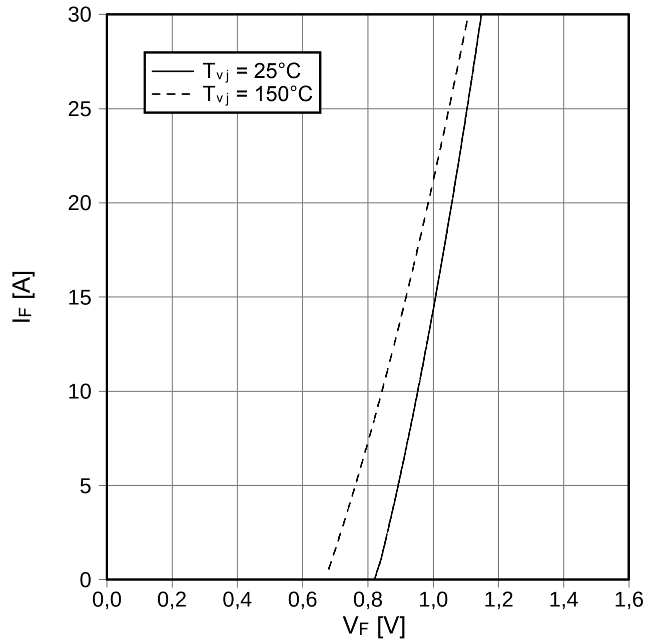
Schaltverluste Diode-Wechselr. (typisch)
switching losses diode-inverter (typical)
$E_{rec} = f(R_G)$
$I_F = 15$ A, $V_{CE} = 600$ V, $T_{vj} = 125$°C



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



Durchlaßkennlinie der Diode-Gleichrichter (typisch)
forward characteristic of diode-rectifier (typical)
$I_F = f(V_F)$



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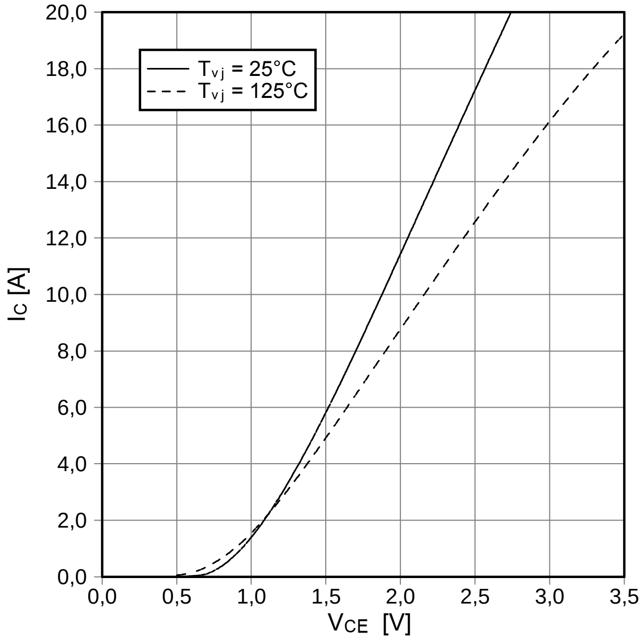
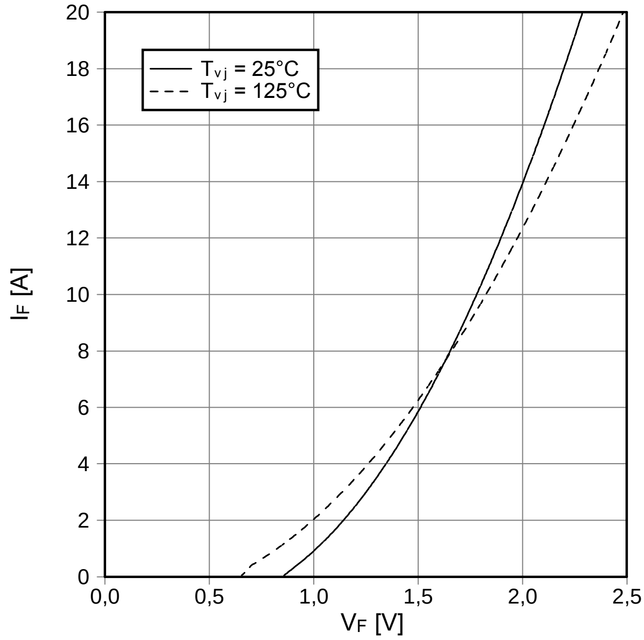
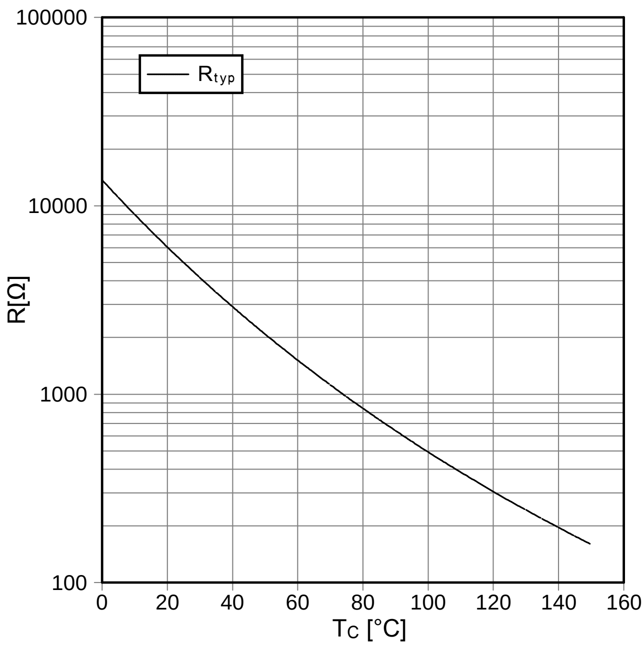
Ausgangskennlinie IGBT-Brems-Copper (typisch)
output characteristic IGBT-brake-chopper (typical)
$I_C = f(V_{CE})$
V_{GE} = 15 V



Durchlaßkennlinie der Diode-Brems-Chopper (typisch)
forward characteristic of diode-brake-chopper (typical)
$I_F = f(V_F)$



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

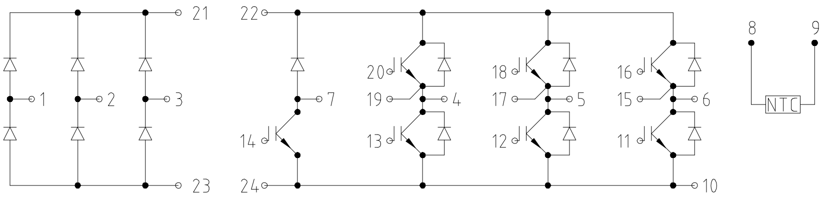


prepared by: Andreas Schulz	date of publication: 2003-12-2
approved by: Robert Severin	revision: 2.1

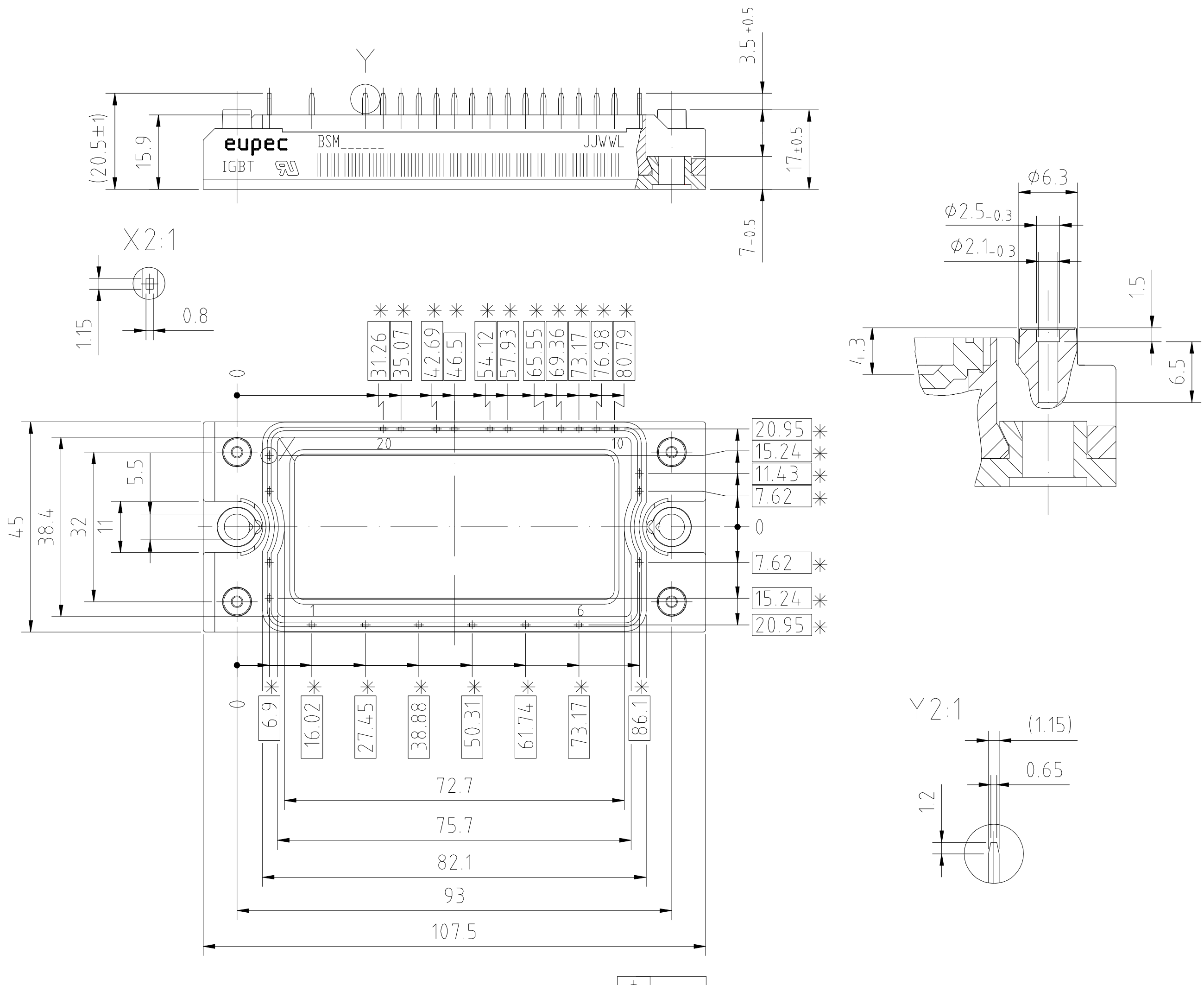
power electronics in motion
eupec

Vorläufige Daten
preliminary data

Schaltplan / circuit diagram



Gehäuseabmessungen / package outlines



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Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

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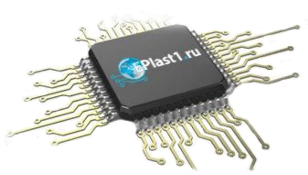
- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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