

fastPACK 0 H, 600V
Maximum Ratings / Höchstzulässige Werte

Parameter	Condition	Symbol	Datasheet values	Unit
			max.	

Transistor Inverter
Transistor Wechselrichter

Collector-emitter break down voltage Kollektor-Emitter-Sperrspannung		V_{CE}	600	V
DC collector current Kollektor-Dauergleichstrom	$T_J=150^{\circ}\text{C}$ $T_h=80^{\circ}\text{C}$,	I_C	28	A
Repetitive peak collector current Periodischer Kollektorspitzenstrom	$t_p=1\text{ms}$ $T_h=80^{\circ}\text{C}$	I_{cpuls}	55	A
Power dissipation per IGBT Verlustleistung pro IGBT	$T_J=150^{\circ}\text{C}$ $T_h=80^{\circ}\text{C}$	P_{tot}	54	W
Gate-emitter peak voltage Gate-Emitter-Spitzenspannung		V_{GE}	± 20	V
SC withstand time Kurzschlußverhalten	$T_J=125^{\circ}\text{C}$ $V_{GE}=15\text{V}$ $V_{ce}=390\text{V}$	t_{SC}	3,2	us

Diode Inverter
Diode Wechselrichter

DC forward current Dauergleichstrom	$T_J=150^{\circ}\text{C}$ $T_h=80^{\circ}\text{C}$,	I_F	24	A
Repetitive peak forward current Periodischer Spitzenstrom	$t_p=1\text{ms}$ $T_h=80^{\circ}\text{C}$	I_{FRM}	48	A
Power dissipation per Diode Verlustleistung pro Diode	$T_J=150^{\circ}\text{C}$ $T_h=80^{\circ}\text{C}$	P_{tot}	32	W

Thermal properties
Thermische Eigenschaften

max. Chip temperature max. Chiptemperatur		T_{jmax}	150	$^{\circ}\text{C}$
Storage temperature Lagertemperatur		T_{stg}	-40...+125	$^{\circ}\text{C}$
Operation temperature Betriebstemperatur		T_{op}	-40...+125	$^{\circ}\text{C}$

Insulation properties
Modulisolation

Insulation voltage Isolationsspannung	$t=1\text{min}$	V_{is}	4000	Vdc
Creepage distance Kriechstrecke			min 12,7	mm
Clearance Luftstrecke			min 12,7	mm

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Characteristic values

Description	Symbol	Conditions					Datasheet values			Unit
		T(C°)	Other conditions (Rgon-Rgoff)	VGE(V) VGS(V)	VR(V) VCE(V) VDS(V)	IC(A) IF(A) Id(A)	Min	Typ	Max	
Transistor Inverter, inductive load										
Transistor Wechselrichter										
Gate emitter threshold voltage Gate-Schwellenspannung	V _{GE(th)}	T _J =25°C T _J =125°C	VCE=VGE			0,00025	4,5	5,5	7	V
Collector-emitter saturation voltage Kollektor-Emitter Sättigungsspannung	V _{CE(sat)}	T _J =25°C T _J =125°C		15		20		2,35 1,94	2,75	V
Collector-emitter cut-off Kollektor-Emitter Reststrom	I _{CES}	T _J =25°C T _J =125°C		0	600				0,25 2	mA
Gate-emitter leakage current Gate-Emitter Reststrom	I _{GES}	T _J =25°C T _J =125°C		25	0				300	nA
Turn-on delay time Einschaltverzögerungszeit	t _{d(on)}	T _J =25°C T _J =125°C	Rgon=6 Ohm Rgof=1 Ohm	15	300	20				ns
Rise time Anstiegszeit	t _r	T _J =25°C T _J =125°C	Rgon=6 Ohm Rgof=1 Ohm	15	300	20		8		ns
Turn-off delay time Abschaltverzögerungszeit	t _{d(off)}	T _J =25°C T _J =125°C	Rgon=6 Ohm Rgof=1 Ohm	15	300	20			94	ns
Fall time Fallzeit	t _f	T _J =25°C T _J =125°C	Rgon=6 Ohm Rgof=1 Ohm	15	300	20		24		ns
Turn-on energy loss per pulse Einschaltverlustenergie pro Puls	E _{on}	T _J =25°C T _J =125°C	Rgon=6 Ohm Rgof=1 Ohm	15	300	20		0,282		mWs
Turn-off energy loss per pulse Abschaltverlustenergie pro Puls	E _{off}	T _J =25°C T _J =125°C	Rgon=6 Ohm Rgof=1 Ohm	15	300	20		0,222		mWs
Input capacitance Eingangskapazität	C _{ies}	T _J =25°C T _J =125°C	f=1MHz	0	25			2,2		nF
Output capacitance Ausgangskapazität	C _{oss}	T _J =25°C T _J =125°C	f=1MHz	0	25			0,2		nF
Reverse transfer capacitance Rückwirkungskapazität	C _{rss}	T _J =25°C T _J =125°C	f=1MHz	0	25			0,1		nF
Gate charge Gate Ladung	Q _{Gate}	T _J =25°C T _J =125°C		15	300	20		142	162	nC
Thermal resistance chip to heatsink per chip Wärmewiderstand Chip-Kühlkörper pro Chip	R _{thJH}		Thermal grease thickness≤50um Wärmeleitpaste Dicke≤50um λ = 0,61 W/mK					1,3		K/W

Diode Inverter

Diode Wechselrichter

Diode forward voltage Durchlaßspannung	V _F	Tj=25°C Tj=125°C				20		1,72 1,37	2,3	V
Peak reverse recovery current Rückstromspitze	I _{RM}	Tj=25°C Tj=125°C	Rgon=6 Ohm	15	300	20		41,4		A
Reverse recovery time Sperreverzögerungszeit	t _{rr}	Tj=25°C Tj=125°C	Rgon=6 Ohm	15	300	20		56		ns
Reverse recovered charge Sperrverzögerungsladung	Q _{rr}	Tj=25°C Tj=125°C	Rgon=6 Ohm	15	300	20		1,21		uC
Reverse recovered energy Sperrverzögerungsenergie	E _{rec}	Tj=25°C Tj=125°C	Rgon=6 Ohm	15	300	20		0,214		mWs
Thermal resistance chip to heatsink per chip Wärmewiderstand Chip-Kühlkörper pro Chip	R _{thJH}		Thermal grease thickness≤50um Wärmeleitpaste Dicke≤50um λ = 0,61 W/mK					2,2		K/W

NTC-Thermistor

NTC-Widerstand

Rated resistance Nennwiderstand	R ₂₅	Tj=25°C	Tol. ±5%				9,5	10	10,5	kOhm
Deviation of R100 Abweichung von R100	D _{R/R}	Tc=100°C	R100=1503Ohm					3,4		%/K
Power dissipation given Epcos-Typ Verlustleistung Epcos-Typ angeben	P	Tj=25°C							210	mW
B-value B-Wert	B _(25/100)	Tj=25°C	Tol. ±3%					4500		K

Output inverter

Figure 1. Typical output characteristics

Output inverter IGBT

$I_C = f(V_{CE})$

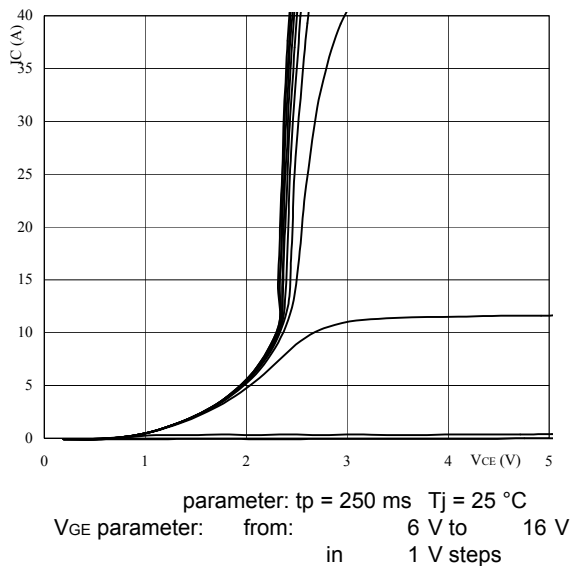


Figure 2. Typical output characteristics

Output inverter IGBT

$I_C = f(V_{CE})$

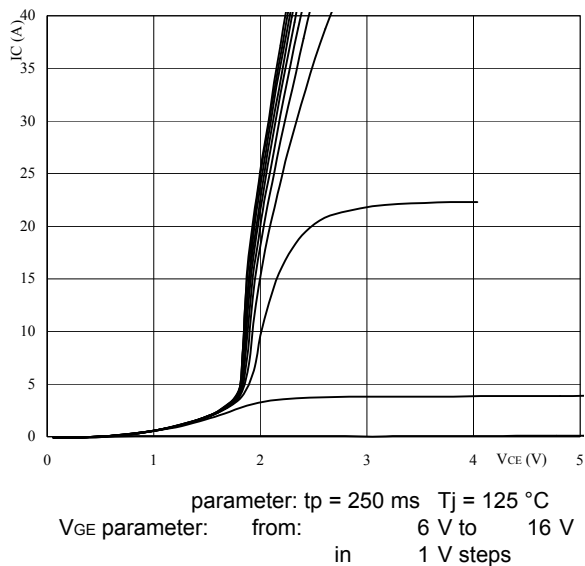


Figure 3. Typical transfer characteristics

Output inverter IGBT

$I_C = f(V_{GE})$

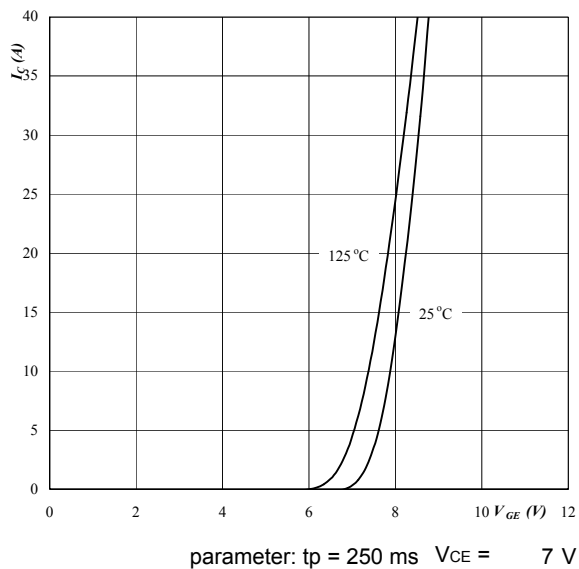
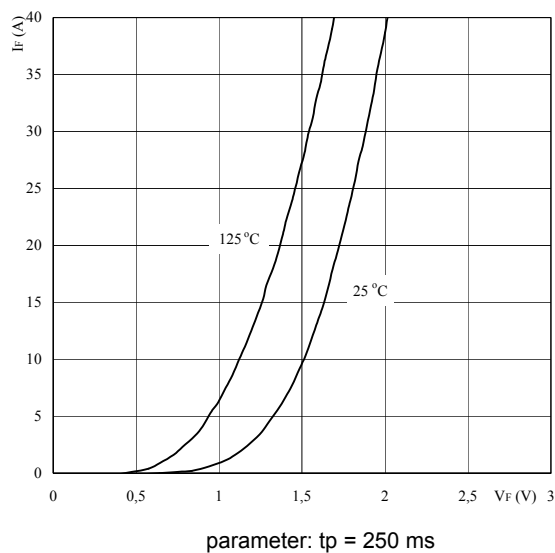


Figure 4. Typical diode forward current as a function of forward voltage

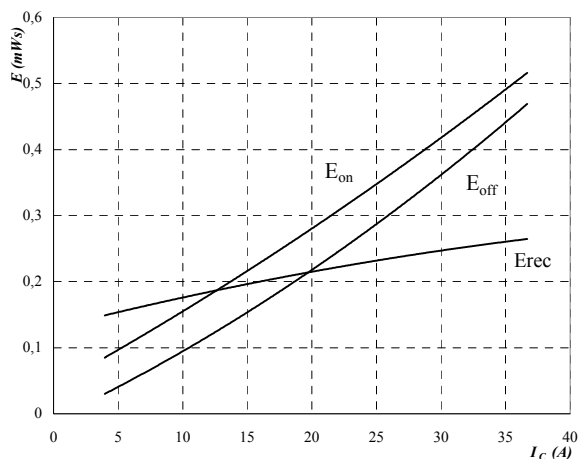
Output inverter FRED

$I_F = f(V_F)$



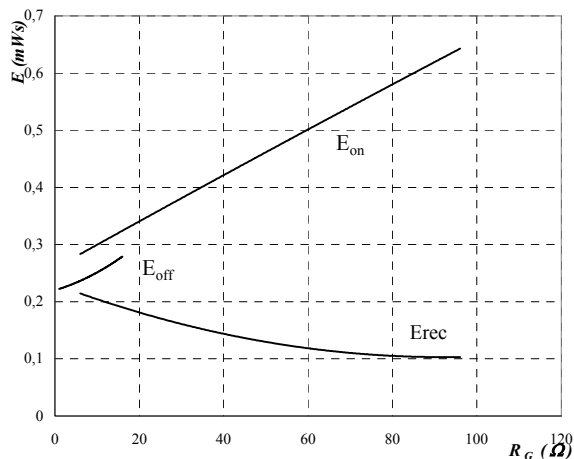
Output inverter

Figure 5. Typical switching energy losses as a function of collector current
Output inverter IGBT
 $E = f(I_c)$



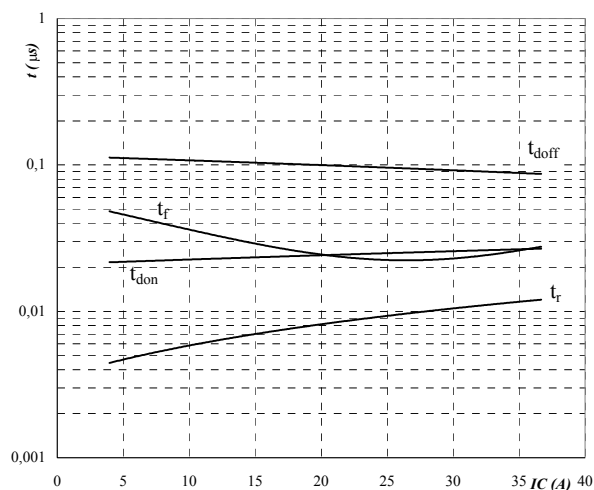
inductive load, $T_j = 125^\circ\text{C}$
 $V_{CE} = 300\text{ V}$
 $V_{GE} = 15\text{ V}$
 $R_{Gon} = 6 \cdot R_{Goff} = 6\text{ Ohm}$

Figure 6. Typical switching energy losses as a function of gate resistor
Output inverter IGBT
 $E = f(R_G)$



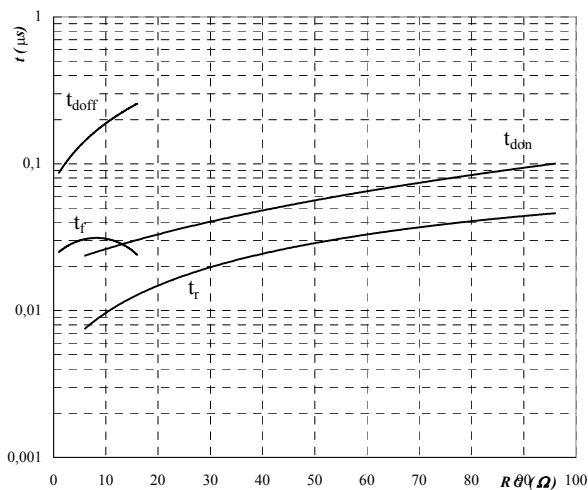
inductive load, $T_j = 125^\circ\text{C}$
 $V_{CE} = 300\text{ V}$
 $V_{GE} = 15\text{ V}$
 $I_c = 20\text{ A}$

Figure 7. Typical switching times as a function of collector current
Output inverter IGBT
 $t = f(I_c)$



inductive load, $T_j = 125^\circ\text{C}$
 $V_{CE} = 300\text{ V}$
 $V_{GE} = 15\text{ V}$
 $R_{Gon} = 6 \cdot R_{Goff} = 6\text{ Ohm}$

Figure 8. Typical switching times as a function of gate resistor
Output inverter IGBT
 $t = f(R_G)$

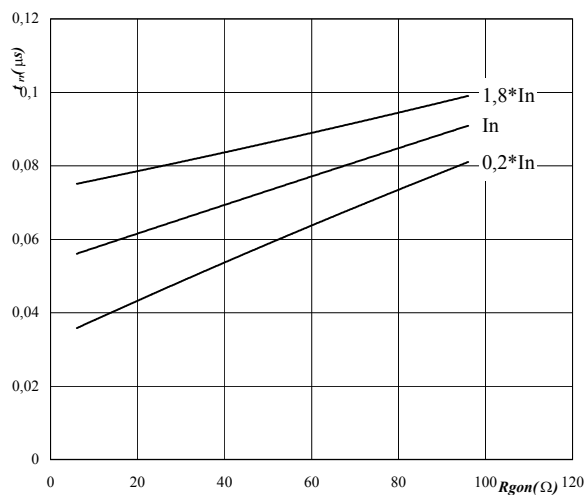


inductive load, $T_j = 125^\circ\text{C}$
 $V_{CE} = 300\text{ V}$
 $V_{GE} = 15\text{ V}$
 $I_c = 20\text{ A}$

Output inverter

Figure 9. Typical reverse recovery time as a function of gate resistor

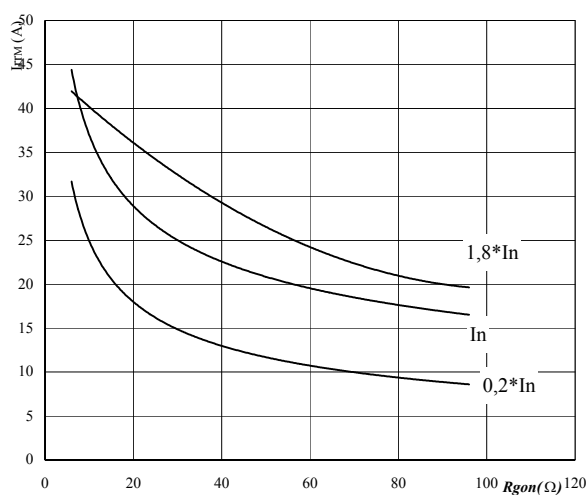
Output inverter FRED diode
 $t_{rr} = f(R_{gon})$



$T_j = 125^\circ C$
 $V_R = 300 V$
 $I_n = 20 A$

Figure 10. Typical reverse recovery current as a function of gate resistor

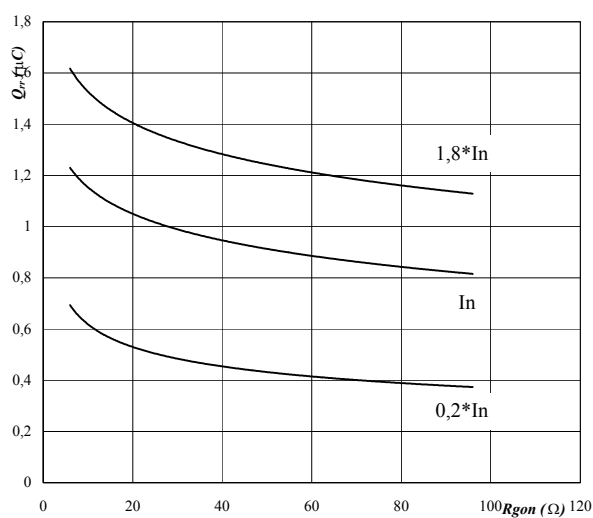
Output inverter FRED diode
 $I_{RRM} = f(R_{gon})$



$T_j = 125^\circ C$
 $V_R = 300 V$
 $I_n = 20 A$

Figure 11. Typical reverse recovery charge as a function of gate resistor

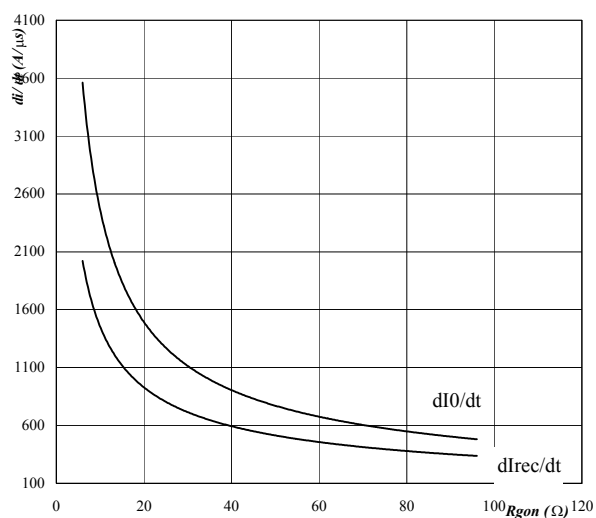
Output inverter FRED diode
 $Q_{rr} = f(R_{gon})$



$T_j = 125^\circ C$
 $V_R = 300 V$
 $I_n = 20 A$

Figure 12. Typical diode peak rate of fall of forward and reverse recovery current as a function of gate resistor

Output inverter FRED diode
 $di_0/dt, dI_{rec}/dt = f(R_{gon})$



$T_j = 125^\circ C$
 $V_R = 300 V$
 $I_F = 20 A$

Thermistor

**Figure 23. Typical NTC characteristic
as a function of temperature**

NTC
 $R_T / R_{25} = f(T)$

