Maximum Ratings / Höchstzulässige Werte

at Tj=25°C, unless otherwise specified

Parameter	Condition		Symbol	Value	Unit
Input Rectifier Bridge **Gleichrichterbrücke**					
Repetitive peak reverse voltage Periodische Rückw. Spitzensperrspannung			V_{RRM}	1600	V
DC forward current Dauergleichstrom	T_J=140°C,	T_C=25°C T_C=80°C	I_d	127 84	A
Surge forward current Stoßstrom Grenzwert	tp=10ms tp=10ms	T_J=25°C T_J=150°C	I_{FSM}	400 350	A
Energypulse (sin 50Hz) Grenzlastintegral	tp=10ms tp=10ms	T_J=25°C T_J=150°C	I^2t	800 610	A2s
Transistor Inverter **Transistor Wechselrichter**					
Collector-emitter break down voltage Kollektor-Emitter-Sperrspannung			V_{CE}	1200	V
DC collector current Kollektor-Dauergleichstrom	T_J=140°C,	T_C=25°C T_C=80°C	I_C	54 36	A A
Repetitive peak collector current Periodischer Kollektorspitzenstrom	T_J=140°C, tp=1ms	T_C=25°C T_C=80°C	I_{Cpuls}	108 72	A
Power dissipation per IGBT Verlustleistung pro IGBT	T_J=140°C,	T_C=25°C T_C=80°C	P_{tot}	195 102	W
Gate-emitter peak voltage Gate-Emitter-Spitzenspannung			V_{GE}	±20	V
Diode Inverter **Diode Wechselrichter**					
DC forward current Dauergleichstrom	T_J=140°C,	T_C=25°C T_C=80°C	I_F	49 32	A
Repetitive peak forward current Periodischer Spitzenstrom	T_J=140°C, tp=1ms	T_C=25°C T_C=80°C	I_{FRM}	99 64	A
I^2t Grenzlastintegral			I^2t	50 20	A²s
Transistor Brake-Chopper **Transistor Brems-Chooper**					
Collector-emitter voltage Kollektor-Emitter-Sperrspannung			V_{CES}	1200	V
DC collector current Kollektor-Dauergleichstrom	T_J=140°C,	T_C=25°C T_C=80°C	I_C	33 22	A
Repetitive peak collector current Periodischer Kollektorspitzenstrom	T_J=140°C, tp=1ms	T_C=25°C T_C=80°C	I_{Cpuls}	66 44	A
Power dissipation Verlustleistung	T_J=140°C,	T_C=25°C T_C=80°C	P_{tot}	128 67	W
Gate-emitter peak voltage Gate-Emitter-Spitzenspannung			V_{GE}	±20	V
Diode Brake-Chopper **Diode Brems-Chopper**					
DC forward current Dauergleichstrom	T_J=140°C,	T_C=25°C T_C=80°C	I_F	14 10	A
Repetitive peak forward current Periodischer Spitzenstrom	T_J=140°C, tp=1ms	T_C=25°C T_C=80°C	I_{FRM}	29 20	A

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Maximum Ratings / Höchstzulässige Werte

at Tj=25°C, unless otherwise specified

Parameter	Condition	Symbol	Value	Unit
Thermal properties **Thermische Eigenschaften**				
max. Chip temperature max. Chiptemperatur		T_{jmax}	150	°C
Storage temperature Lagertemperatur		T_{stg}	-40…+125	°C
Operation temperature Betriebstemperatur		T_{op}	-40…+125	°C
Thermal resistance, chip to case Wärmewiderstand Chip-Bodenplatte	Diode Rectifier	R_{thJC}	1,15	K/W
	Transistor Inverter	R_{thJC}	0,59	K/W
	Diode Inverter	R_{thJC}	0,98	K/W
	Transistor Brake	R_{thJC}	0,9	K/W
	Diode Brake	R_{thJC}	2,51	K/W
Insulation properties **Modulisolation**				
Insulation test voltage Isolationsspannung	t=1min	V_{is}	4000	Vdc
Creepage distance Kriechstrecke			12,7	mm
Clearance Luftstrecke			12,7	mm

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Characteristic values / Charakteristische Werte

at T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition	T (°C)	RG (Ω)	VGE (V)	VCE (V)	IF (A)	IC (A)	Value min.	Value typ.	Value max.	Unit
Input Rectifier Bridge												
Gleichrichter												
Forward voltage Durchlasspannung			T_J=25°C				50			1,35		V
Threshold voltage Schleusenspannung			T_J=25°C							0,8		V
Slope resistance Ersatzwiderstand			T_J=25°C							11		mΩ
Reverse current Sperrstrom		V_R=V_{Rmax}	T_J=25°C TJ=125°C							0,02 2		mA
Transistor Inverter, inductive load												
Transistor Wechselrichter												
Gate threshold voltage Gate-Schwellenspannung	$V_{GE(th)}$		Tj=25°C			VGE		0,001	4,5		6,5	V
Collector-emitter saturation voltage Kollektor-Emitter Sättigungsspannung	$V_{CE(sat)}$		T_C=25°C Tj=125°C		15			25		2,1 2,4	2,55	V
Collector-emitter cut-off current Kollektor-Emitter Reststrom	I_{CES}		T_C=25°C Tj=125°C		0	1200					1,65	mA
Gate-emitter leakage current Gate-Emitter Reststrom	I_{GES}		Tj=25°C		20	0					250	nA
Turn-on delay time Einschaltverzögerungszeit	$t_{d(on)}$		T_J=25°C T_J=125°C	35	15	600		25		48 45		ns
Rise time Anstiegszeit	t_r		T_J=25°C T_J=125°C	35	15	600		25		35 28		ns
Turn-off delay time Abschaltverzögerungszeit	$t_{d(off)}$		T_J=25°C T_J=125°C	35	15	600		25		680 700		ns
Fall time Fallzeit	t_f		T_J=25°C T_J=125°C	35	15	600		25		40 42		ns
Turn-on energy loss per pulse Einschaltverlustenergie pro Puls	E_{on}		T_J=125°C	35	15	600		25		4		mWs
Turn-off energy loss per pulse Abschaltverlustenergie pro Puls	E_{off}		T_J=125°C	35	15	600		25		3		mWs
SC Data Kurzschlussverhalten	I_{SC}	$t_p \leq 10\mu s$	$T_J \leq 125°C$							tbd		A
Input capacitance Eingangskapazität	C_{ies}	f=1MHz	T_J=25°C		0	25				1,5		nF
Diode Inverter												
Diode Wechselrichter												
Diode forward voltage Durchlassspannung	V_F		T_J=25°C T_J=125°C				25		1,6	2	2,2	V
Peak reverse recovery current Rückstromspitze			TJ=25°C TJ=125°C							tbd		
Reverse recovered charge Sperrverzögerungsladung	Q_{rr}		T_J=125°C			600	25			4,7		µC
Reverse recovery energy Abschaltenergie pro Puls			TJ=25°C TJ=125°C							tbd		mWs
Reverse recovery time Sperrverzögerungszeit	t_{rr}		TJ=125°C			600	25			200		ns
Transistor Brake-Chopper												
Transistor Brems-Chooper												
Gate threshold voltage Gate-Schwellenspannung	$V_{GE(th)}$		Tj=25°C			VGE		0,0006	4,5		6,5	V
Collector-emitter saturation voltage Kollektor-Emitter Sättigungsspannung	$V_{CE(sat)}$		Tj=25°C Tj=125°C		12,5			12,5		2,3 2,4	3,15	V
Input capacitance Eingangskapazität	C_{ies}	f=1MHz	Tj=25°C		0	25				0,6		nF
Collector-emitter cut-off current Kollektor-Emitter Reststrom	I_{CES}		T_C=25°C Tj=125°C		0	1200				1		mA
Gate-emitter leakage current Gate-Emitter Reststrom	I_{GES}		Tj=25°C		20	0				250		nA
Diode Brake-Chopper												
Diode Brems-Chopper												
Diode forward voltage Durchlassspannung	V_F		T_J=25°C				12,5		1,6	2,8	3,2	V
NTC-Thermistor												
NTC-Widerstand												
Rated resistance Nennwiderstand	R_{25}		Tc=25°C							22		kΩ
Deviation of R_{100} Abweichung von R_{100}	ΔR/R	R100=1486Ω	Tc=100°C						-5		5	%
Power dissipation Verlustleistung	P		Tc=25°C								210	mW
B-value B-Wert	$B_{(25/100)}$	Tolerance=±3								4000		K

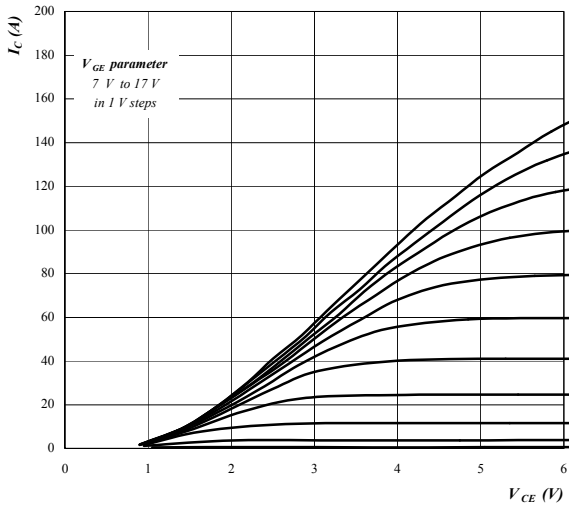
Output inverter

Typ. output characteristics

Output Inverter IGBT

$I_C = f(V_{CE})$

parameter: t_p *= 250 ms,* T_j *= 25 °C*

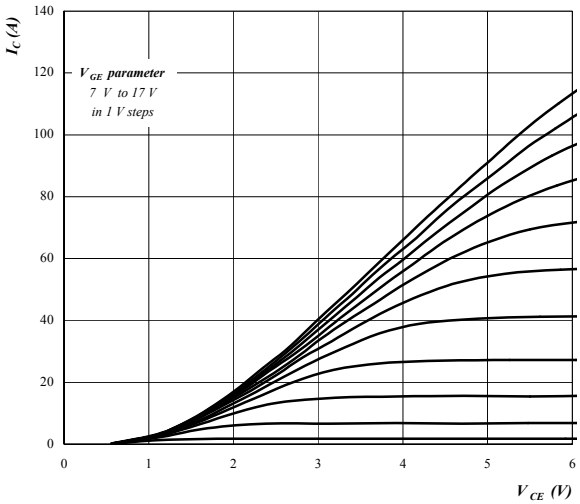


Typ. output characteristics

Output Inverter IGBT

$I_C = f(V_{CE})$

parameter: t_p *= 250 ms,* T_j *= 125 °C*

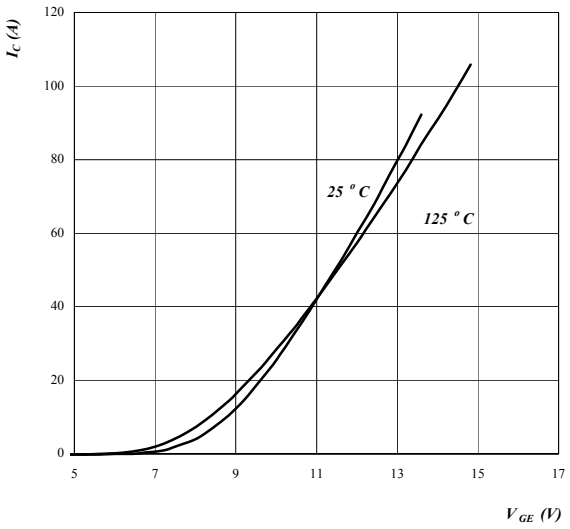


Typ. transfer characteristics

Output Inverter IGBT

$I_C = f(V_{GE})$

parameter: t_p *= 250 ms,* V_{CE} *= 20 V*

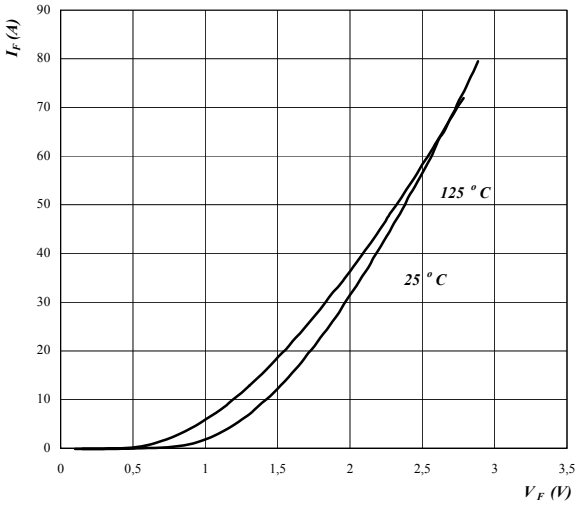


Typ. diode characteristics

Output Inverter FRED

$I_F = f(V_F)$

parameter: t_p *= 250 ms*



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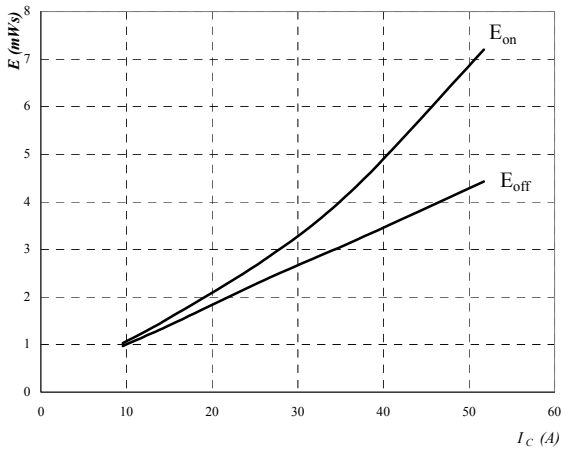
Output inverter

Typ. Switching losses

Output inverter IGBT

E = f (I C), inductive load, T j = 25 °C

par.: V CE = 600 V, V GE = 15 V, R G = 35 Ω

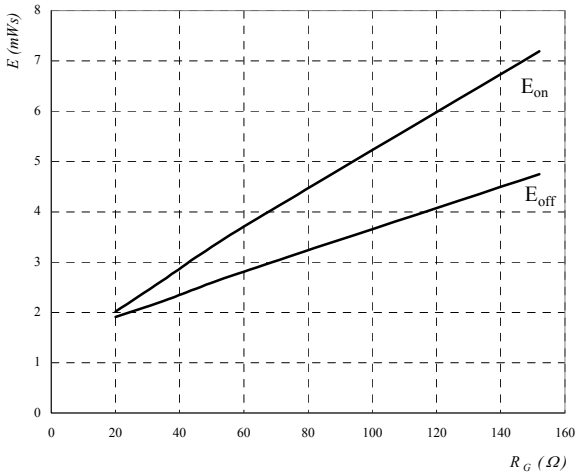


Typ. Switching losses

Output inverter IGBT

E = f (R G), inductive load, T j = 25 °C

par.: V CE = 600 V, V GE = 15 V, I C = 25 A

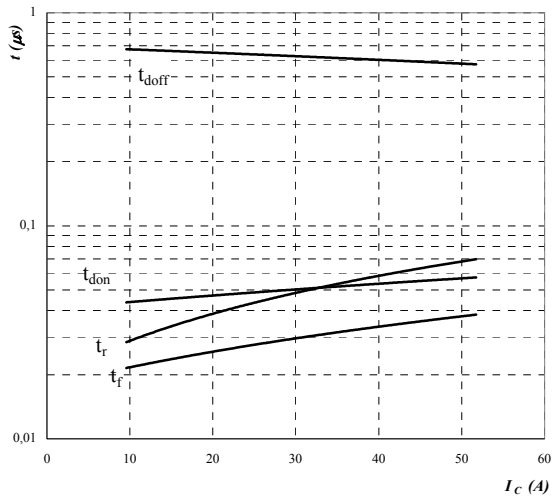


Typ. Switching time

Output inverter IGBT

t = f (I C), inductive load, T j = 25 °C

par.: V CE = 600 V, V GE = 15 V, R G = 35 Ω

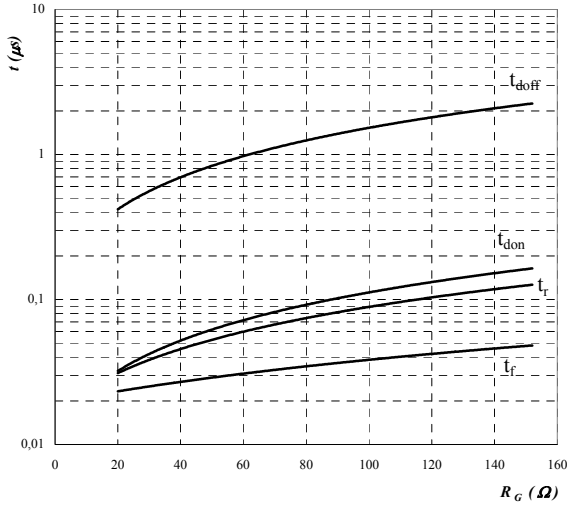


Typ. Switching time

Output inverter IGBT

t = f (R G), inductive load, T j = 25 °C

par.: V CE = 600 V, V GE = 15 V, I C = 25 A



flow PIM® 2, 1200V, 36A Version 0601

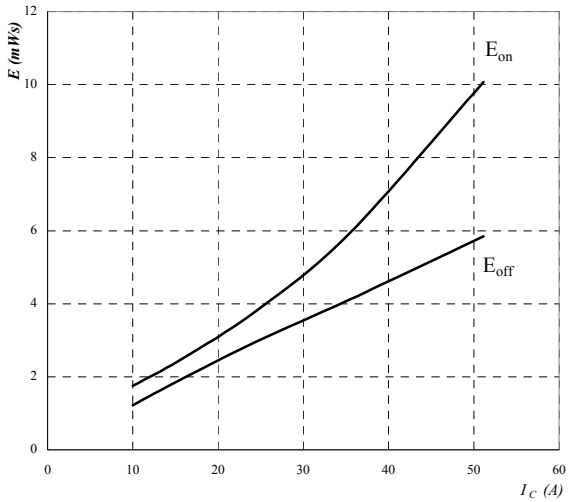
Output inverter

Typ. Switching losses

Output inverter IGBT

$E = f(I_C)$, inductive load, $T_j = 125\ ^oC$

par.: $V_{CE} = 600\ V$, $V_{GE} = 15\ V$, $R_G = 35\ \Omega$

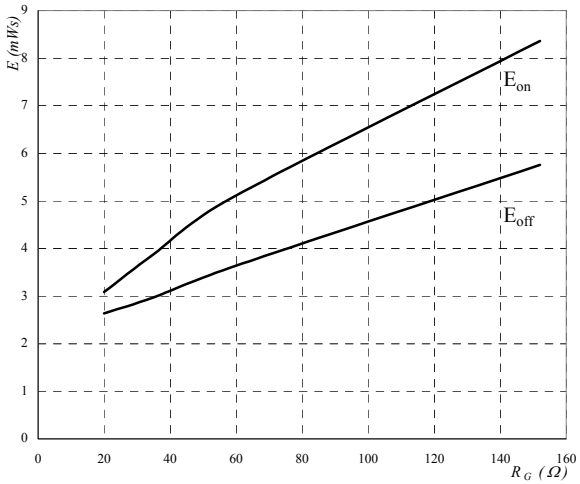


Typ. Switching losses

Output inverter IGBT

$E = f(R_G)$, inductive load, $T_j = 125\ ^oC$

par.: $V_{CE} = 600\ V$, $V_{GE} = 15\ V$, $I_C = 25A$

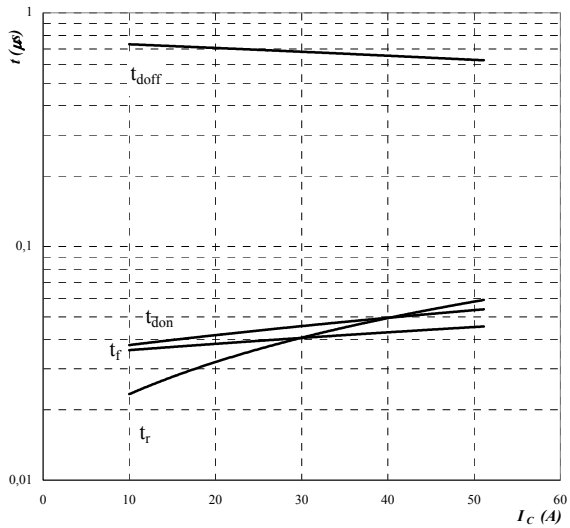


Typ. Switching time

Output inverter IGBT

$t = f(I_C)$, inductive load, $T_j = 125\ ^oC$

par.: $V_{CE} = 600\ V$, $V_{GE} = 15\ V$, $R_G = 35\ \Omega$

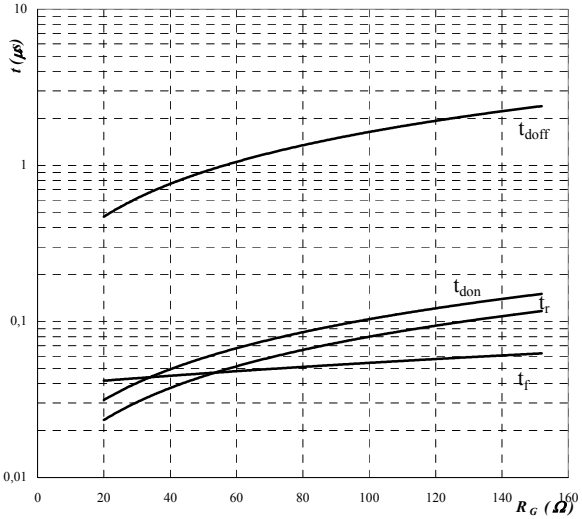


Typ. Switching time

Output inverter IGBT

$t = f(R_G)$, inductive load, $T_j = 125\ ^oC$

par.: $V_{CE} = 600\ V$, $V_{GE} = 15\ V$, $I_C = 25\ A$



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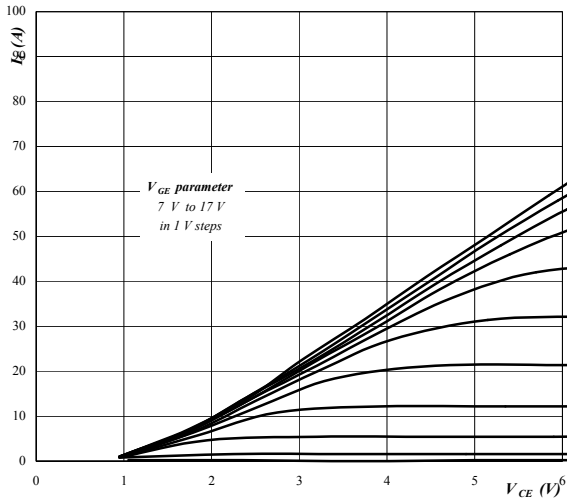
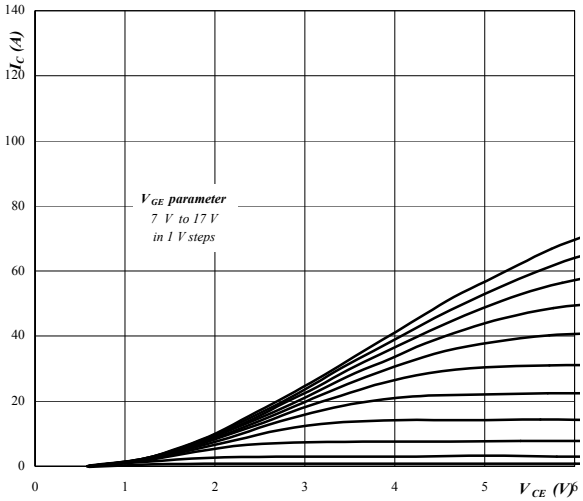
Brake chopper / Brems - Chopper

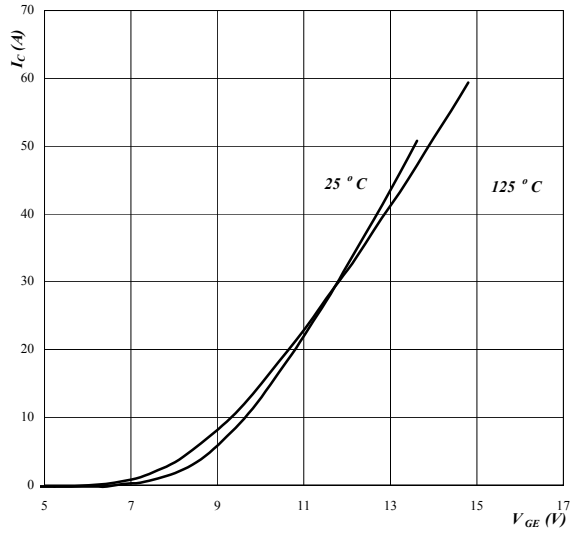
Typ. output characteristics
Brake Circuit IGBT
$I_C = f(V_{CE})$
parameter: t_p = 250 ms, T_j = 25 °C



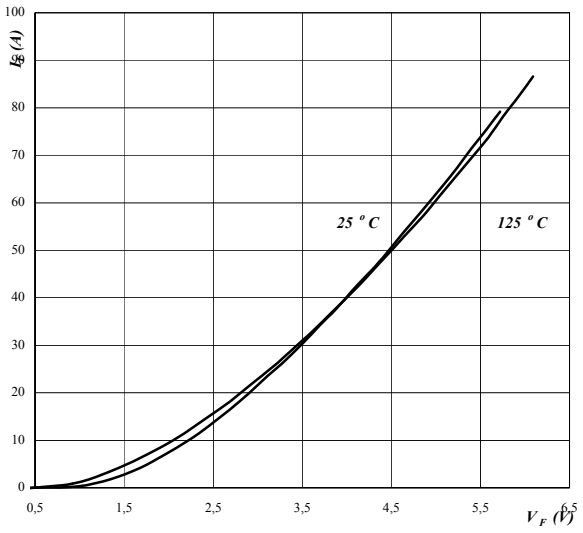
Typ. output characteristics
Brake Circuit IGBT
$I_C = f(V_{CE})$
parameter: t_p = 250 ms, T_j = 125 °C



Typ. transfer characteristics
Brake Circuit IGBT
$I_C = f(V_{GE})$
parameter: t_p = 250 ms, V_{CE} = 20 V



Typ. diode chararacteristics
Brake Circuit FRED
$I_F = f(V_F)$
parameter: t_p = 250 ms



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***flow*PIM® 2, 1200V, 36A** Version 0601

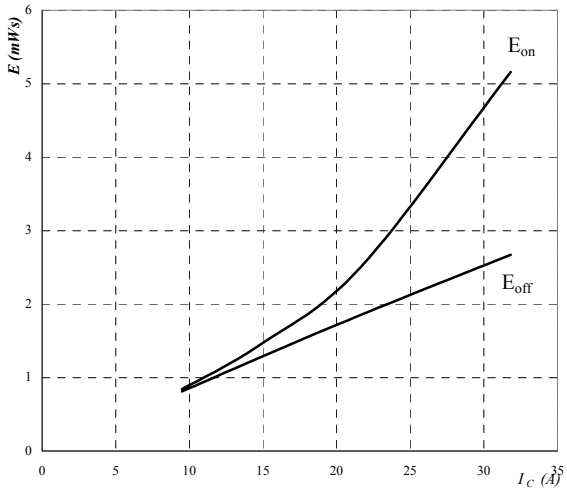
Brake chopper / Brems - Chopper

Typ. Switching losses

Brake circuit IGBT

$E = f(I_C)$, *inductive load,* $T_j = 25\ ^oC$

par.: $V_{CE} = 600\ V$, $V_{GE} = 15\ V$, $R_G = 58\ \Omega$

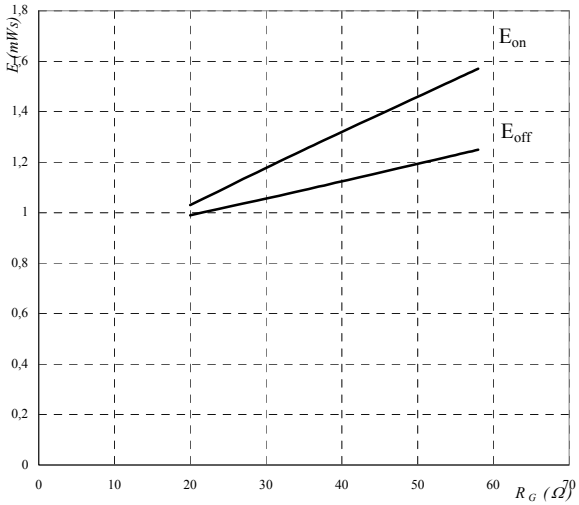


Typ. Switching losses

Brake circuit IGBT

$E = f(R_G)$, *inductive load,* $T_j = 25\ ^oC$

par.: $V_{CE} = 600\ V$, $V_{GE} = 15\ V$, $I_C = 15\ A$

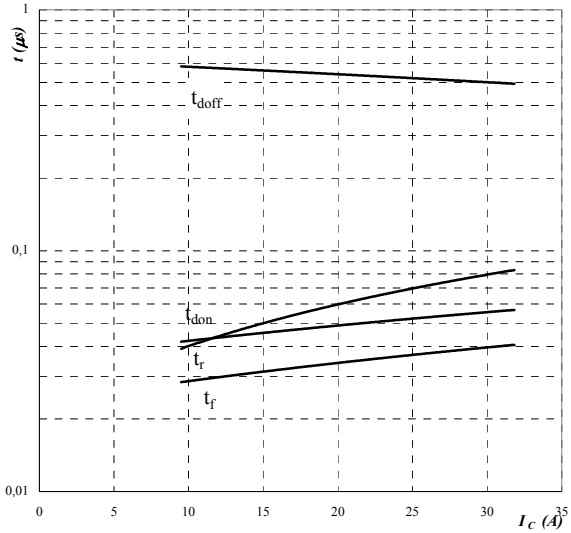


Typ. Switching time

Brake circuit IGBT

$t = f(I_C)$, *inductive load,* $T_j = 25\ ^oC$

par.: $V_{CE} = 600\ V$, $V_{GE} = 15\ V$, $R_G = 58\ \Omega$

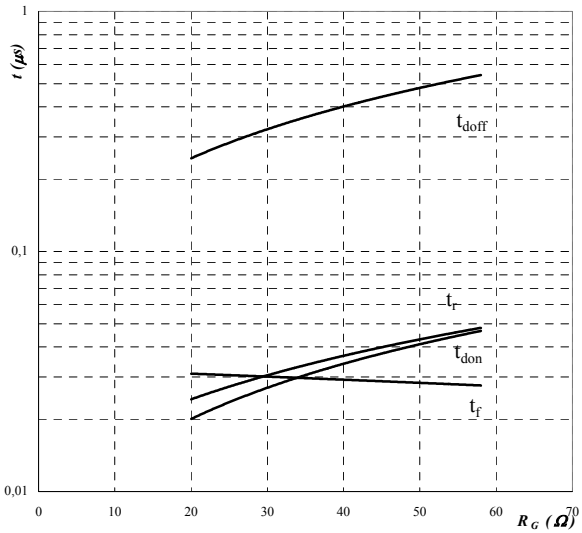


Typ. Switching time

Brake circuit IGBT

$t = f(R_G)$, *inductive load,* $T_j = 25\ ^oC$

par.: $V_{CE} = 600\ V$, $V_{GE} = 15\ V$, $I_C = 15\ A$



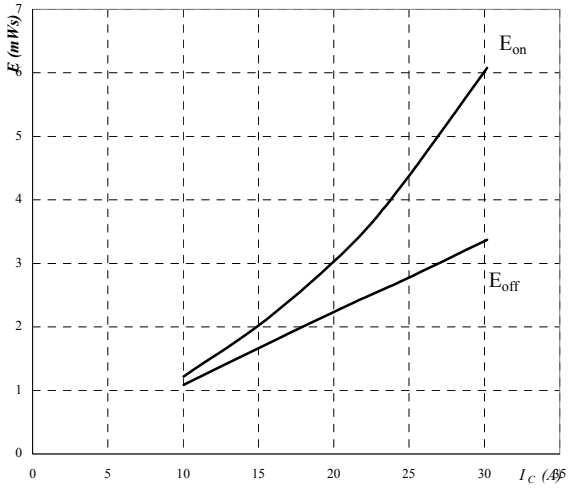
Brake chopper / Brems - Chopper

Typ. Switching losses

Brake circuit IGBT

$E = f(I_C)$, *inductive load,* $T_j = 125\ ^oC$

par.: $V_{CE} = 600\ V$, $V_{GE} = 15\ V$, $R_G = 58\ \Omega$

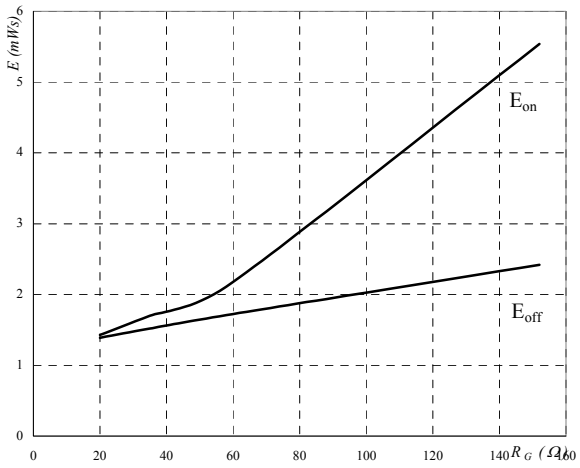


Typ. Switching losses

Brake circuit IGBT

$E = f(R_G)$, *inductive load,* $T_j = 125\ ^oC$

par.: $V_{CE} = 600\ V$, $V_{GE} = 15\ V$, $I_C = 15\ A$

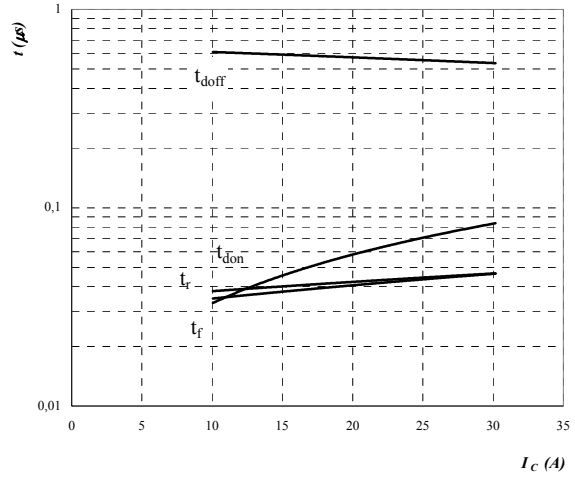


Typ. Switching time

Brake circuit IGBT

$t = f(I_C)$, *inductive load,* $T_j = 125\ ^oC$

par.: $V_{CE} = 600\ V$, $V_{GE} = 15\ V$, $R_G = 58\ \Omega$

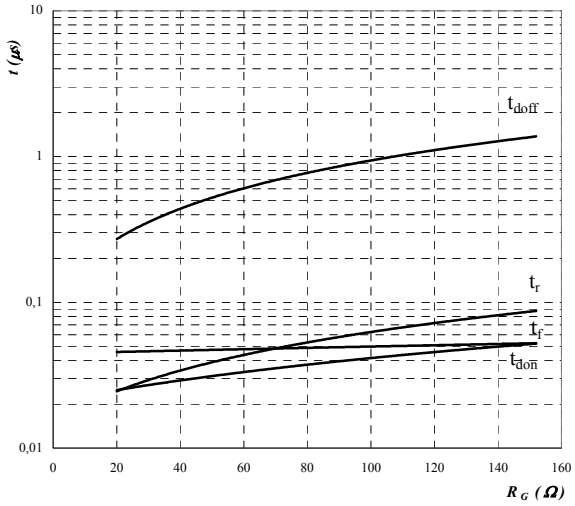


Typ. Switching time

Brake circuit IGBT

$t = f(R_G)$, *inductive load,* $T_j = 125\ ^oC$

par.: $V_{CE} = 600\ V$, $V_{GE} = 15\ V$, $I_C = 15\ A$

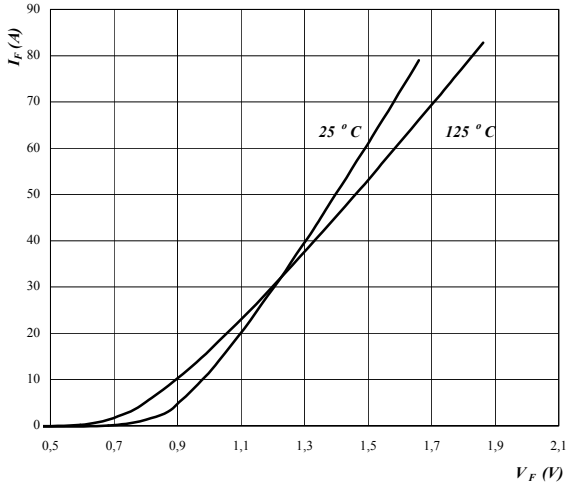


***flow* PIM® 2, 1200V, 36A** Version 0601

Input rectifier bridge / Eingangsgleichrichter Thermistor

Typ. diode characteristics

Input Rectifier Bridge
$I_F = f(V_F)$
parameter: t_p = 250 ms



NTC-typical temperature characteristic