Maximum Ratings / Höchstzulässige Werte

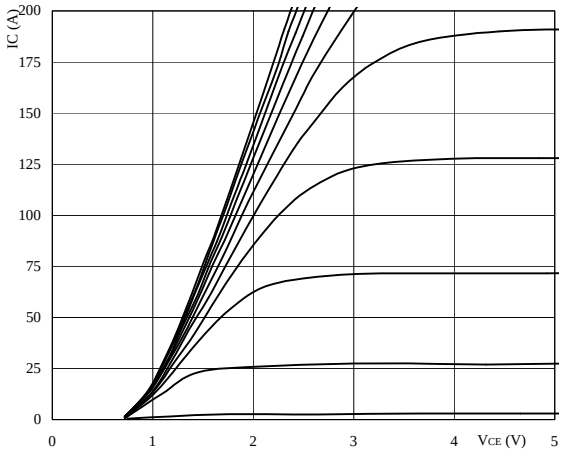
Parameter	Condition		Symbol	Datasheet values max.	Unit
Transistor Inverter **Transistor Wechselrichter**					
Collector-emitter break down voltage Kollektor-Emitter-Sperrspannung			V_{CE}	1200	V
DC collector current Kollektor-Dauergleichstrom	T_j=150°C	T_h=80°C, T_c=80°C	I_C	94 100, limited by wires	A
Repetitive peak collector current Periodischer Kollektorspitzenstrom	t_p=1ms	T_h=80°C	I_{cpuls}	189	A
Power dissipation per IGBT Verlustleistung pro IGBT	T_j=150°C	T_h=80°C T_c=80°C	P_{tot}	185 281	W
Gate-emitter peak voltage Gate-Emitter-Spitzenspannung			V_{GE}	±20	V
SC withstand time Kurzschlußverhalten	Tj≤125°C V_{CC}=900V	V_{GE}=15V	t_{SC}	10	us
Diode Inverter **Diode Wechselrichter**					
DC forward current Dauergleichstrom	T_j=150°C	T_h=80°C, T_c=80°C	I_F	81 100, limited by wires	A
Repetitive peak forward current Periodischer Spitzenstrom	t_p=1ms	T_h=80°C	I_{FRM}	161	A
Power dissipation per Diode Verlustleistung pro Diode	T_j=150°C	T_h=80°C T_c=80°C	P_{tot}	131 199	W
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
Insulation properties **Modulisolation**					
Insulation voltage Isolationsspannung		t=1min	V_{is}	4000	Vdc
Creepage distance Kriechstrecke				min 12,7	mm
Clearance Luftstrecke				min 12,7	mm

Characteristic values/ Charakteristische Werte

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	$V_{GE(th)}$	Tj=25°C Tj=150°C	VCE=VGE			0,004	5	5,8	6,5	V
Collector-emitter saturation voltage Kollektor-Emitter Sättigungsspannung	$V_{CE(sat)}$	Tj=25°C Tj=125°C		15		100	1,3	1,73 1,96	2,2	V
Collector-emitter cut-off Kollektor-Emitter Reststrom	I_{CES}	Tj=25°C Tj=125°C		0	1200				0,65	mA
Gate-emitter leakage current Gate-Emitter Reststrom	I_{GES}	Tj=25°C Tj=150°C		30	0				700	nA
Integrated Gate resistor Integrirter Gate Widerstand	R_{gint}							7,5		Ohm
Turn-on delay time Einschaltverzögerungszeit	$t_{d(on)}$	Tj=25°C Tj=125°C	Rgoff=6 Ohm Rgon=6 Ohm	±15	600	100		298		ns
Rise time Anstiegszeit	t_r	Tj=25°C Tj=125°C	Rgoff=6 Ohm Rgon=6 Ohm	±15	600	100		37		ns
Turn-off delay time Abschaltverzögerungszeit	$t_{d(off)}$	Tj=25°C Tj=125°C	Rgoff=6 Ohm Rgon=6 Ohm	±15	600	100		528		ns
Fall time Fallzeit	t_f	Tj=25°C Tj=125°C	Rgoff=6 Ohm Rgon=6 Ohm	±15	600	100		176		ns
Turn-on energy loss per pulse Einschaltverlustenergie pro Puls	E_{on}	Tj=25°C Tj=125°C	Rgoff=6 Ohm Rgon=6 Ohm	±15	600	100		15,224		mWs
Turn-off energy loss per pulse Abschaltverlustenergie pro Puls	E_{off}	Tj=25°C Tj=125°C	Rgoff=6 Ohm Rgon=6 Ohm	±15	600	100		10,313		mWs
SC withstand time Kurzschlußverhalten	t_{SC}									us
Input capacitance Eingangskapazität	C_{ies}	Tj=25°C Tj=125°C	f=1MHz	0	25			7,21		nF
Output capacitance Ausgangskapazität	C_{oss}	Tj=25°C Tj=125°C	f=1MHz	0	25			1,5		nF
Reverse transfer capacitance Rückwirkungskapazität	C_{rss}	Tj=25°C Tj=125°C	f=1MHz	0	25			1,3		nF
Gate charge Gate Ladung	Q_{Gate}	Tj=25°C Tj=125°C						900		nC
Thermal resistance chip to heatsink per chip Wärmewiderstand Chip-Kühlkörper pro Chip	R_{thJH}		Thermal foil thickness=76um					0,38		K/W
Thermal resistance chip to case per chip Wärmewiderstand Chip-Gehause pro Chip	R_{thJC}		Warmeleitfolie Dicke=76um Kunze Folien KU-ALF5					0,27		K/W
Coupled thermal resistance inverter diode-transistor Gekoppelte Wärmewiderstand Wechselrichter Diode-Transistor	R_{thJH}		Thermal foil thickness=76um					0,051		K/W
Coupled thermal resistance inverter transistor-transistor Gekoppelte Wärmewiderstand Wechselrichter Transistor-Transistor	R_{thJH}		Warmeleitfolie Dicke=76um Kunze Folien KU-ALF5					0,046		K/W
Diode Inverter										
Diode Wechselrichter										
Diode forward voltage Durchlaßspannung	V_F	Tj=25°C Tj=125°C				100		1,7 1,76	2,4	V
Peak reverse recovery current Rückstromspitze	I_{RM}	Tj=25°C Tj=125°C	Rgon=6 Ohm di0/dt = 3000 A/us	0	600	100		113,3		A
Reverse recovery time Sperreverzögerungszeit	t_{rr}	Tj=25°C Tj=125°C	Rgon=6 Ohm di0/dt = 3000 A/us	0	600	100		647		ns
Reverse recovered charge Sperrverzögerungsladung	Q_{rr}	Tj=25°C Tj=125°C	Rgon=6 Ohm di0/dt = 3000 A/us	0	600	100		24,62		uC
Reverse recovered energy Sperrverzögerungsenergie	Erec	Tj=25°C Tj=125°C	Rgon=6 Ohm di0/dt = 3000 A/us	0	600	100		9,378		mWs
Thermal resistance chip to heatsink per chip Wärmewiderstand Chip-Kühlkörper pro Chip	R_{thJH}		Thermal foil thickness=76um					0,53		K/W
Thermal resistance chip to case per chip Wärmewiderstand Chip-Gehause pro Chip	R_{thJC}		Warmeleitfolie Dicke=76um Kunze Folien KU-ALF5					0,37		K/W
Coupled thermal resistance inverter transistor-diode Gekoppelte Wärmewiderstand Wechselrichter Transistor-Diode	R_{thJH}		Thermal foil thickness=76um					0,051		K/W
Coupled thermal resistance inverter diode-diode Gekoppelte Wärmewiderstand Wechselrichter Diode-Diode	R_{thJH}		Warmeleitfolie Dicke=76um Kunze Folien KU-ALF5					0,046		K/W

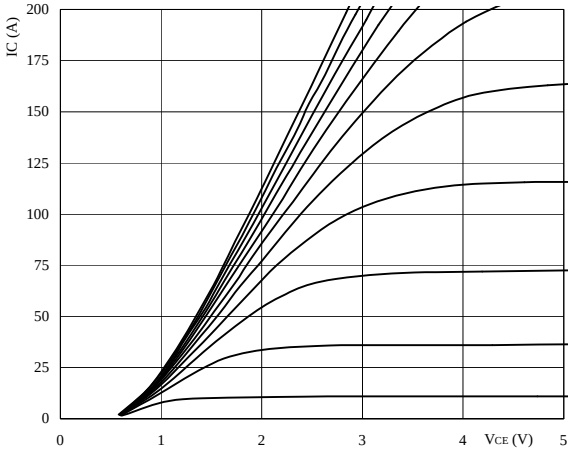
Output inverter

Figure 1. Typical output characteristics
Output inverter IGBT
Ic= f(VCE)



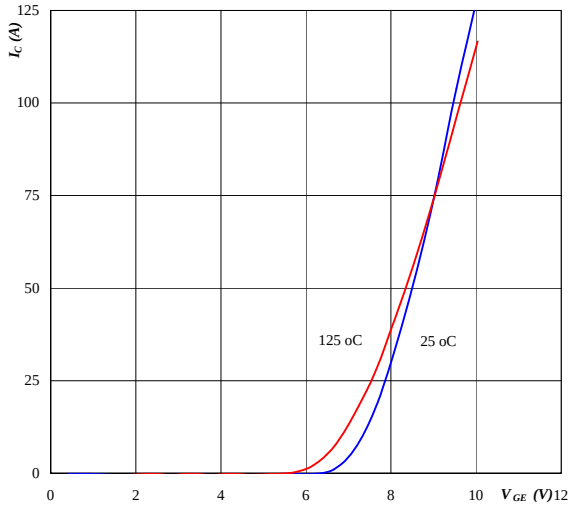
parameter: tp = 250 us Tj = 25 °C
VGE parameter: from: 7 V to 17 V
in 1 V steps

Figure 2. Typical output characteristics
Output inverter IGBT
Ic= f(VCE)



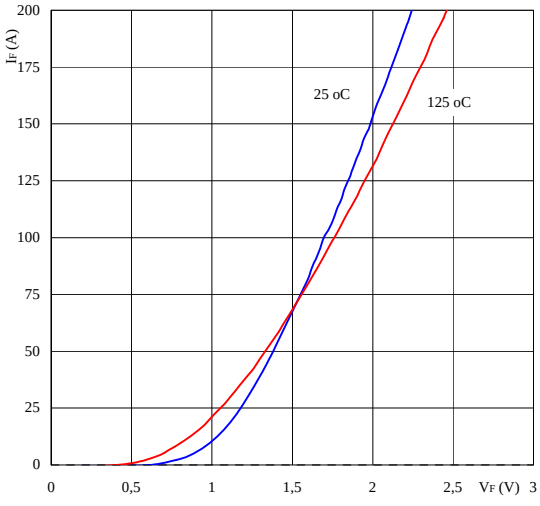
parameter: tp = 250 us Tj = 125 °C
VGE parameter: from: 7 V to 17 V
in 1 V steps

Figure 3. Typical transfer characteristics
Output inverter IGBT
Ic= f(VGE)



parameter: tp = 250 us VCE = 10 V

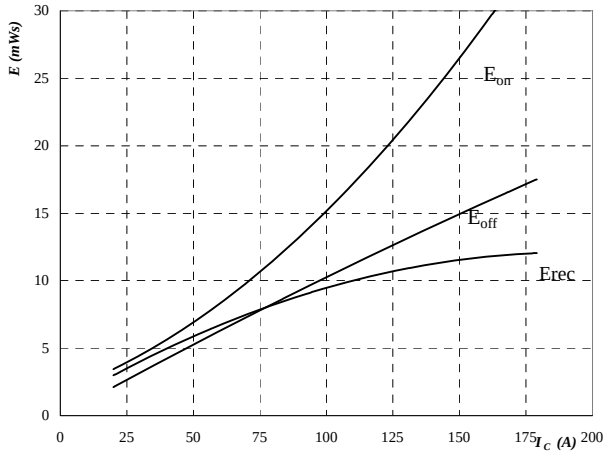
Figure 4. Typical diode forward current as a function of forward voltage
Output inverter FRED IF=f(VF)



parameter: tp = 250 us

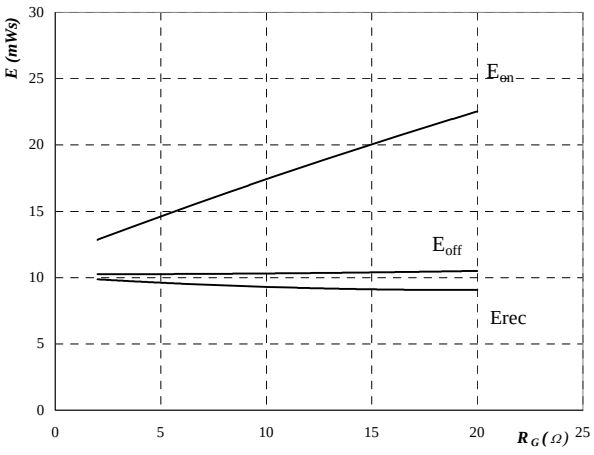
Output inverter

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



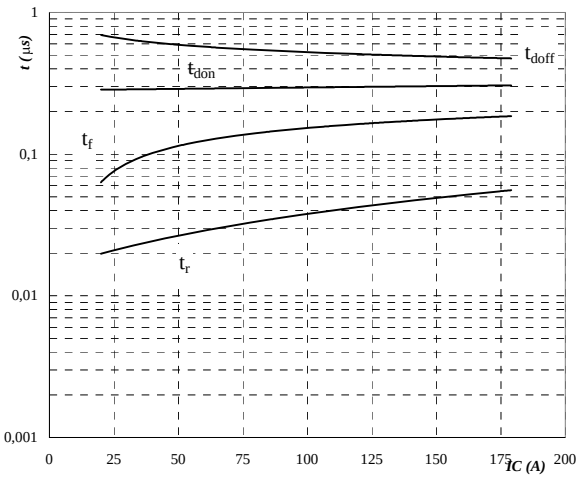
inductive load, Tj = 125 °C
VCE = 600 V
VGE= ±15 V
Rgon= 6 Ω
Rgoff= 6 Ω

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



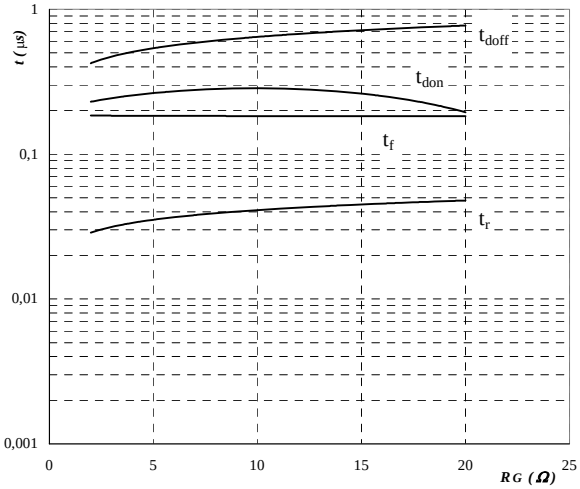
inductive load, Tj = 125 °C
VCE = 600 V
VGE= ±15 V
Ic = 100 A

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



inductive load, Tj = 125 °C
VCE = 600 V
VGE= ±15 V
Rgon= 6 Ω
Rgoff= 6 Ω

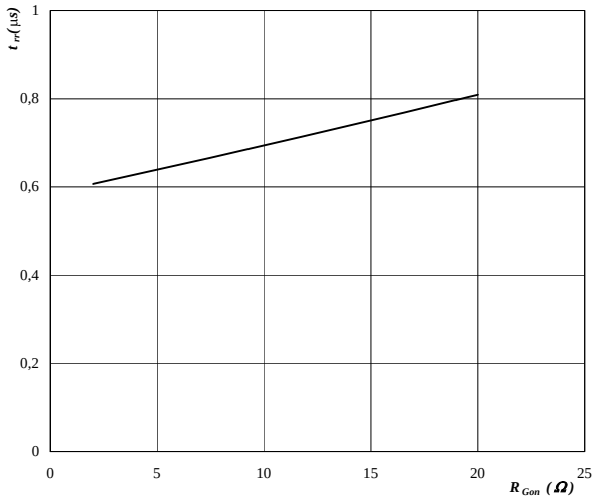
Figure 8. Typical switching times as a function of gate resistor
Output inverter IGBT
t = f (RG)



inductive load, Tj = 125 °C
VCE = 600 V
VGE= ±15 V
Ic = 100 A

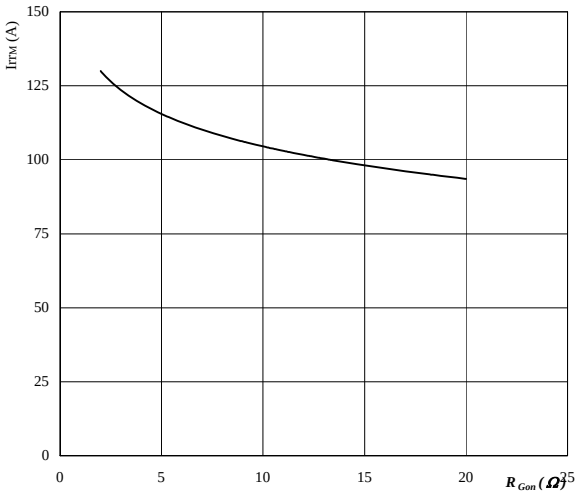
Output inverter

Figure 9. Typical reverse recovery time as a function of IGBT turn on gate resistor
Output inverter FRED diode
t_{rr} = f (Rgon)



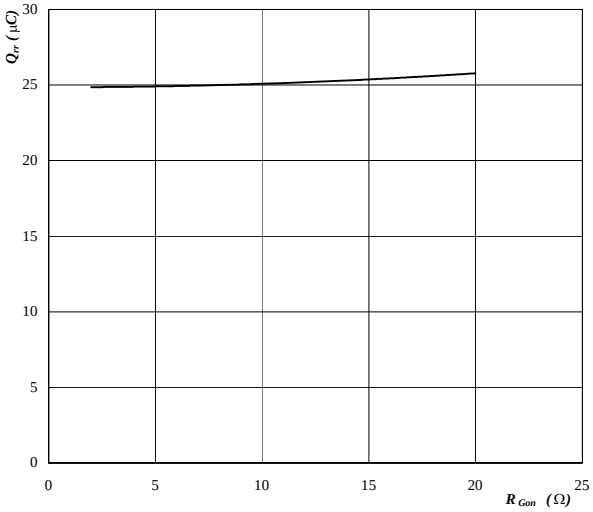
Tj = 125 °C
V_R = 600 V
I_F = 100 A

Figure 10. Typical reverse recovery current as a function of IGBT turn on gate resistor
Output inverter FRED diode
I_{RRM} = f (Rgon)



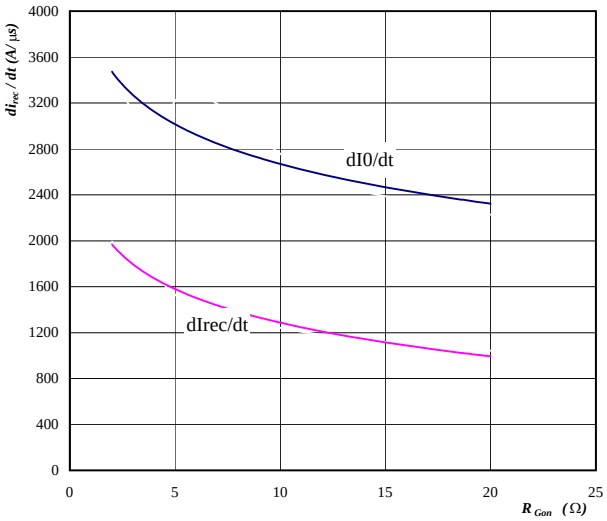
Tj = 125 °C
V_R = 600 V
I_F = 100 A

Figure 11. Typical reverse recovery charge as a function of IGBT turn on gate resistor
Output inverter FRED diode
Q_{rr} = f (Rgon)



Tj = 125 °C
V_R = 600 V
I_F = 100 A

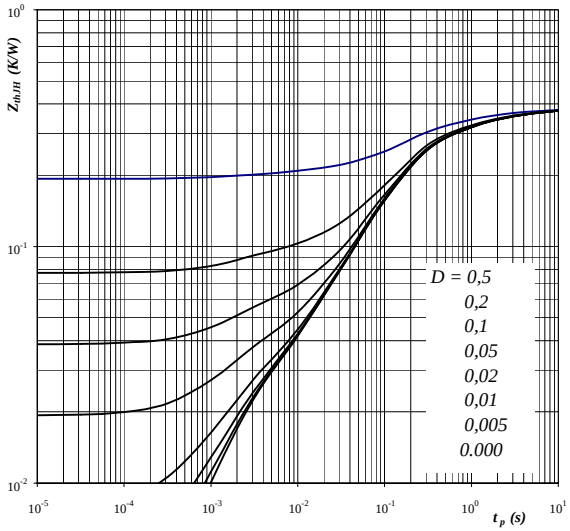
Figure 12. Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
Output inverter FRED diode
dI0/dt,dIrec/dt= f (Rgon)



Tj = 125 °C
V_R = 600 V
I_F = 100 A

Output inverter

Figure 13. IGBT transient thermal impedance as a function of pulse width
$Z_{thJH} = f(tp)$

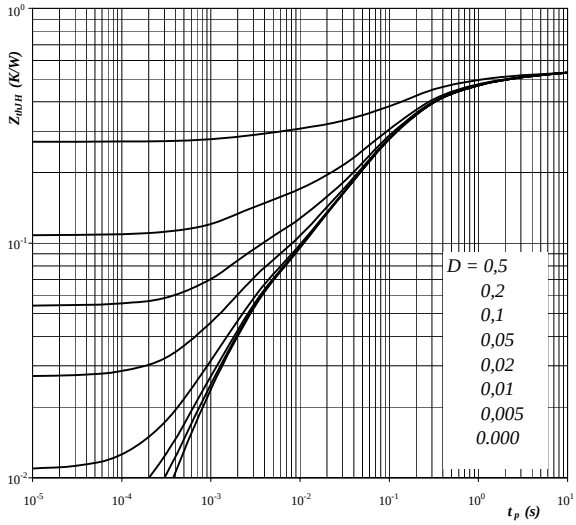


Parameter: D = tp / T RthJH= 0,38 K/W

IGBT thermal model values

R (C/W)	Tau (s)
0,04	7,0E+00
0,09	8,4E-01
0,21	1,5E-01
0,03	2,3E-02
0,02	1,9E-03

Figure 14. FRED transient thermal impedance as a function of pulse width
$Z_{thJH} = f(tp)$



Parameter: D = tp / T RthJH= 0,53 K/W

FRED thermal model values

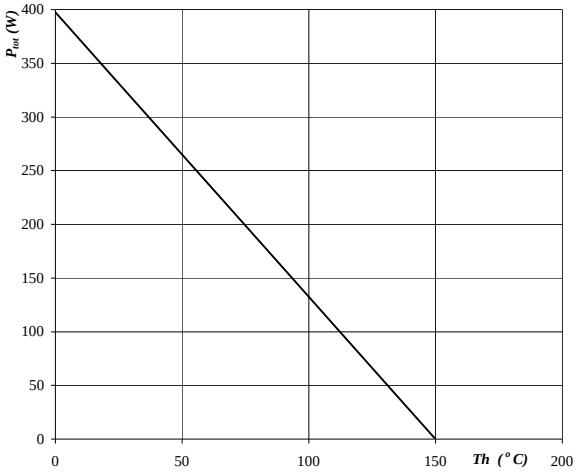
R (C/W)	Tau (s)
0,06	5,1E+00
0,14	5,7E-01
0,24	1,0E-01
0,06	1,9E-02
0,05	2,1E-03

Output inverter

Figure 15. Power dissipation as a function of heatsink temperature

Output inverter IGBT

P_{tot} = f (Th)

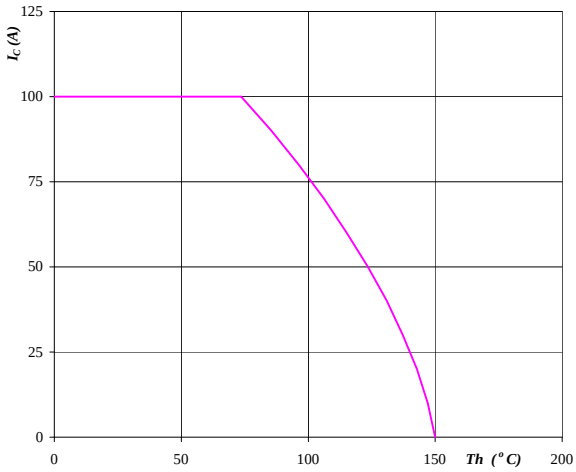


parameter: Tj = 150°C

Figure 16. Collector current as a function of heatsink temperature

Output inverter IGBT

I_C = f (Th)



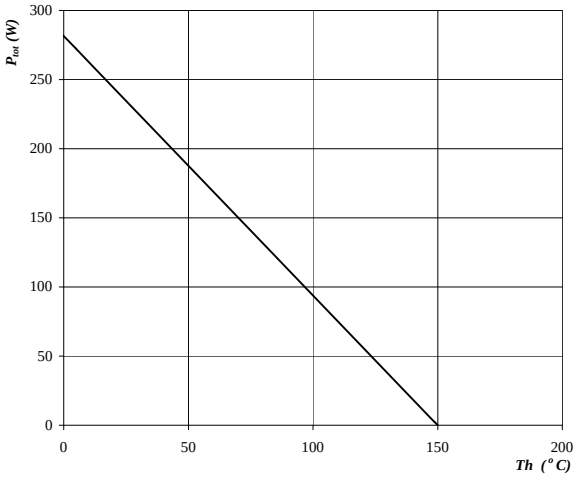
parameter: Tj = 150°C

V_{GE}= 15 V

Figure 17. Power dissipation as a function of heatsink temperature

Output inverter FRED

P_{tot} = f (Th)

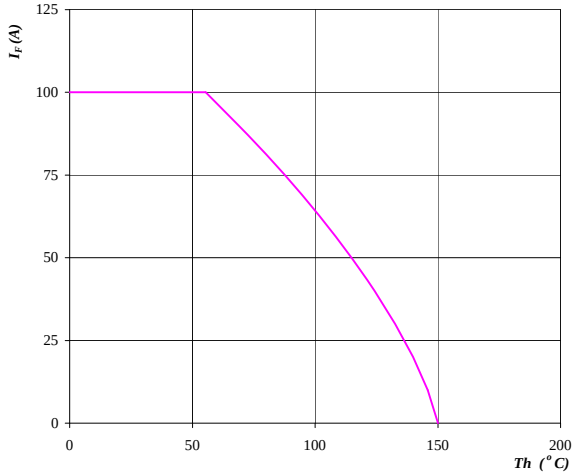


parameter: Tj = 150°C

Figure 18. Forward current as a function of heatsink temperature

Output inverter FRED

I_F = f (Th)



parameter: Tj = 150°C