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}	1200	V
DC collector current Kollektor-Dauergleichstrom	T_j=150°C T_h=80°C, T_c=80°C	I_C	68 91	A
Repetitive peak collector current Periodischer Kollektorspitzenstrom	tp limited by Tj max	I_{cpuls}	300	A
Power dissipation per IGBT Verlustleistung pro IGBT	T_j=150°C T_h=80°C T_c=80°C	P_{tot}	137 207	W
Gate-emitter peak voltage Gate-Emitter-Spitzenspannung		V_{GE}	±20	V
SC withstand time* Kurzschlußverhalten*	Tj≤125°C V_{GE}=15V V_{CC}=900V	t_{SC}	tbd	us
Diode Inverter **Diode Wechselrichter**				
DC forward current Dauergleichstrom	T_j=150°C T_h=80°C, T_c=80°C	I_F	57 77	A
Repetitive peak forward current Periodischer Spitzenstrom	tp limited by Tj max	I_{FRM}	200	A
Power dissipation per Diode Verlustleistung pro Diode	T_j=150°C T_h=80°C T_c=80°C	P_{tot}	81 124	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

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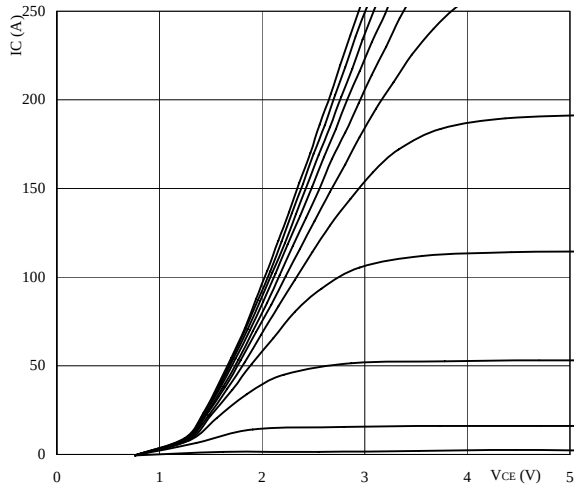
Characteristic values

Description	Symbol	Conditions					Datasheet values			Unit
		T(C°)	Other conditions (Rgon-Rgoff)	VGE(V) VGS(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=125°C	VCE=VGE			0,004	4	5,5	8	V
Collector-emitter saturation voltage Kollektor-Emitter Sättigungsspannung	$V_{CE(sat)}$	Tj=25°C Tj=125°C		15		100	1,3	2,1 2,3	2,8	V
Collector-emitter cut-off Kollektor-Emitter Reststrom	I_{CES}	Tj=25°C Tj=125°C		0	1200				0,25	mA
Gate-emitter leakage current Gate-Emitter Reststrom	I_{GES}	Tj=25°C Tj=125°C		30	0				700	nA
Integrated Gate resistor Integrirter Gate Widerstand	R_{gint}							5		Ohm
Turn-on delay time Einschaltverzögerungszeit	$t_{d(on)}$	Tj=25°C Tj=125°C	Rgoff=4 Ohm Rgon=4 Ohm	±15	600	100		190		ns
Rise time Anstiegszeit	t_r	Tj=25°C Tj=125°C	Rgoff=4 Ohm Rgon=4 Ohm	±15	600	100		28		ns
Turn-off delay time Abschaltverzögerungszeit	$t_{d(off)}$	Tj=25°C Tj=125°C	Rgoff=4 Ohm Rgon=4 Ohm	±15	600	100		357		ns
Fall time Fallzeit	t_f	Tj=25°C Tj=125°C	Rgoff=4 Ohm Rgon=4 Ohm	±15	600	100		90		ns
Turn-on energy loss per pulse Einschaltverlustenergie pro Puls	E_{on}	Tj=25°C Tj=125°C	Rgoff=4 Ohm Rgon=4 Ohm	±15	600	100		8,34		mWs
Turn-off energy loss per pulse Abschaltverlustenergie pro Puls	E_{off}	Tj=25°C Tj=125°C	Rgoff=4 Ohm Rgon=4 Ohm	±15	600	100		7,01		mWs
Input capacitance Eingangskapazität	C_{ies}	Tj=25°C Tj=125°C	f=1MHz	0	25			7,85		nF
Output capacitance Ausgangskapazität	C_{oss}	Tj=25°C Tj=125°C	f=1MHz	0	25			0,65		nF
Reverse transfer capacitance Rückwirkungskapazität	C_{rss}	Tj=25°C Tj=125°C	f=1MHz	0	25			0,275		nF
Gate charge Gate Ladung	Q_{Gate}	Tj=25°C Tj=125°C	Rgoff=4 Ohm Rgon=4 Ohm	±15	600	100		1206		nC
Thermal resistance chip to heatsink per chip Wärmewiderstand Chip-Kühlkörper pro Chip	R_{thJH}		Thermal foil thickness=76um Warmeleitfolie Dicke=76um Kunze Folien KU-ALC5F					0,51		K/W
Thermal resistance chip to case per chip Wärmewiderstand Chip-Gehause pro Chip	R_{thJC}							0,34		K/W
Coupled thermal resistance inverter diode-transistor Gekoppelte Wärmewiderstand Wechselrichter Diode-Transistor	R_{thJH}		Thermal foil thickness=76um Warmeleitfolie Dicke=76um Kunze Folien KU-ALC5F					0,06		K/W
Coupled thermal resistance inverter transistor-transistor Gekoppelte Wärmewiderstand Wechselrichter Transistor-Transistor	R_{thJH}							0,03		K/W
Diode Inverter **Diode Wechselrichter**										
Diode forward voltage Durchlaßspannung	V_F	Tj=25°C Tj=125°C				100	1	1,75 1,75	2,4	V
Peak reverse recovery current Rückstromspitze	I_{RM}	Tj=25°C Tj=125°C	Rgon=4 Ohm di0/dt = 4817 A/us	-15	600	100		178,9		A
Reverse recovery time Sperreverzögerungszeit	t_{rr}	Tj=25°C Tj=125°C	Rgon=4 Ohm di0/dt = 4817 A/us	-15	600	100		312		ns
Reverse recovered charge Sperrverzögerungsladung	Q_{rr}	Tj=25°C Tj=125°C	Rgon=4 Ohm di0/dt = 4817 A/us	-15	600	100		17,9		uC
Reverse recovered energy Sperrverzögerungsenergie	Erec	Tj=25°C Tj=125°C	Rgon=4 Ohm di0/dt = 4817 A/us	-15	600	100		7,14		mWs
Thermal resistance chip to heatsink per chip Wärmewiderstand Chip-Kühlkörper pro Chip	R_{thJH}	Thermal foil thickness=76um Warmeleitfolie Dicke=76um Kunze Folien KU-ALC5F						0,86		K/W
Thermal resistance chip to case per chip Wärmewiderstand Chip-Gehause pro Chip	R_{thJC}							0,57		K/W
Coupled thermal resistance inverter transistor-diode Gekoppelte Wärmewiderstand Wechselrichter Transistor-Diode	R_{thJH}	Thermal foil thickness=76um						0,06		K/W
Coupled thermal resistance inverter diode-diode Gekoppelte Wärmewiderstand Wechselrichter Diode-Diode	R_{thJH}	Warmeleitfolie Dicke=76um Kunze Folien KU-ALC5F						0,02		K/W

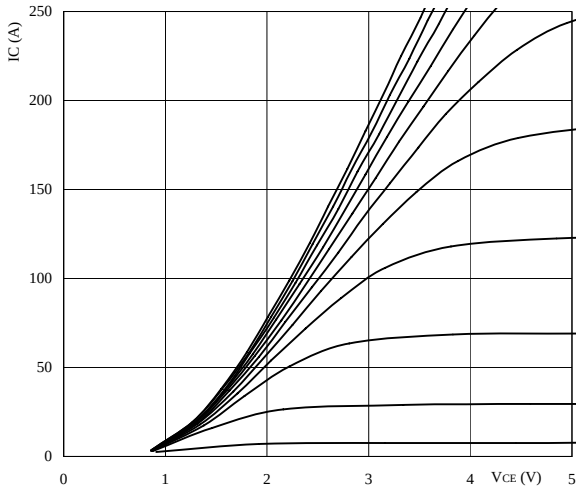
Output inverter

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



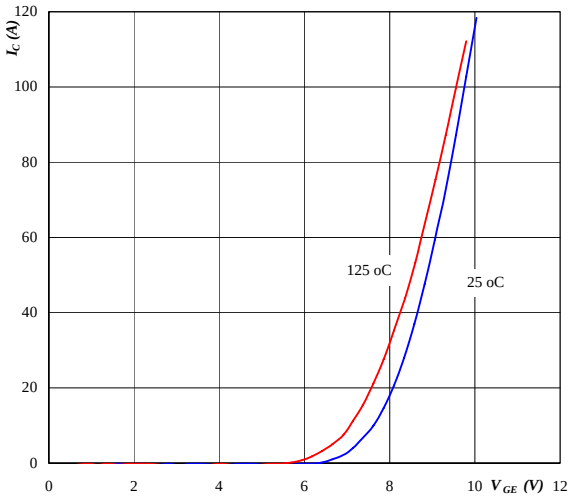
parameter: tp = 250 us Tj = 25 °C
VGE parameter: from: 7 V to 17 V
in 1 V steps

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



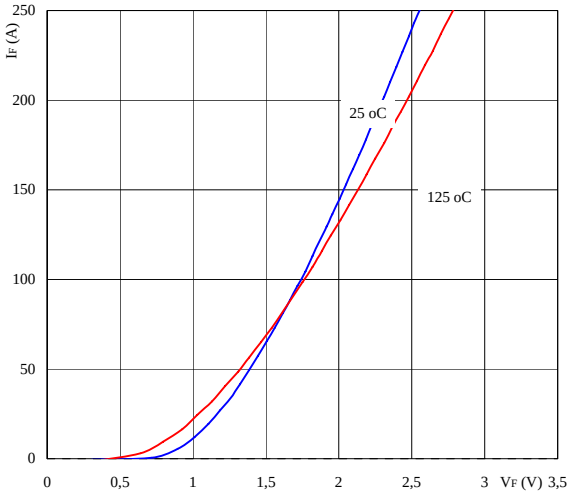
parameter: tp = 250 us Tj = 125 °C
VGE parameter: from: 7 V to 17 V
in 1 V steps

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



parameter: tp = 250 us VCE = 10 V

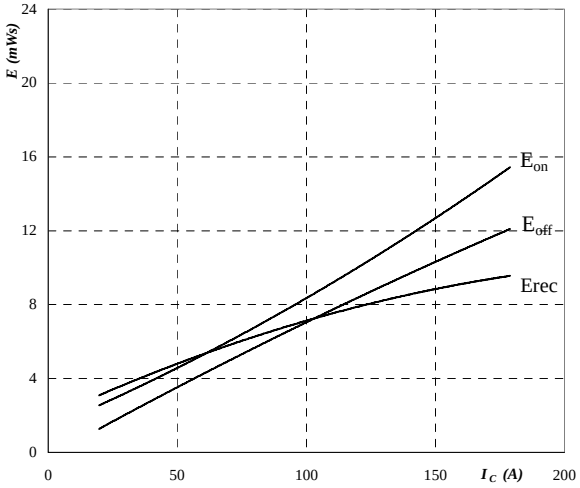
Figure 4. **Typical diode forward current as a function of forward voltage**
Output inverter FRED IF=f(VF)



parameter: tp = 250 us

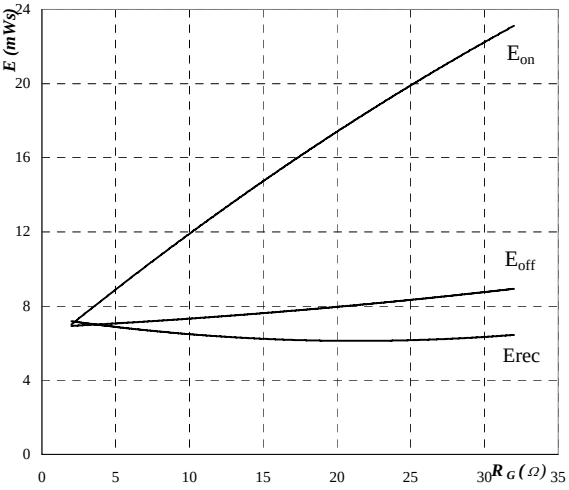
Output inverter

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



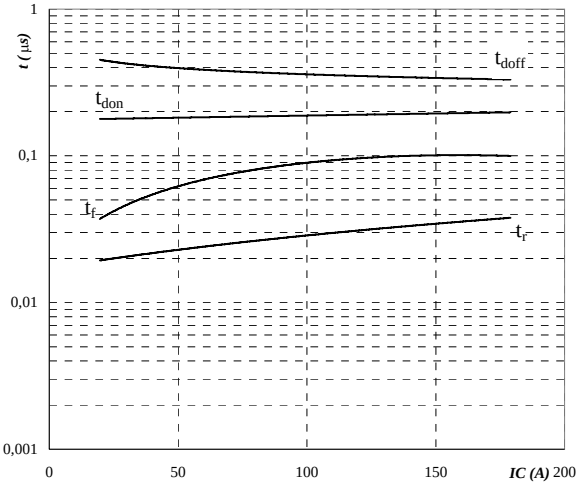
inductive load, Tj = 125 °C
VCE = 600 V
VGE= ±15 V
Rgon= 4 Ω
Rgoff= 4 Ω

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



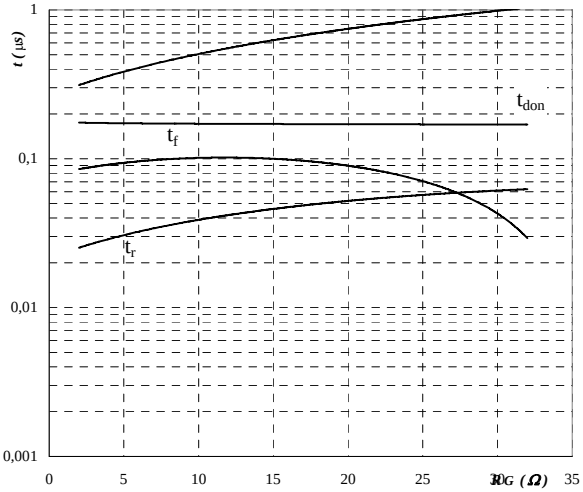
inductive load, Tj = 125 °C
VCE = 600 V
VGE= ±15 V
Ic = 100 A

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= 4 Ω
Rgoff= 4 Ω

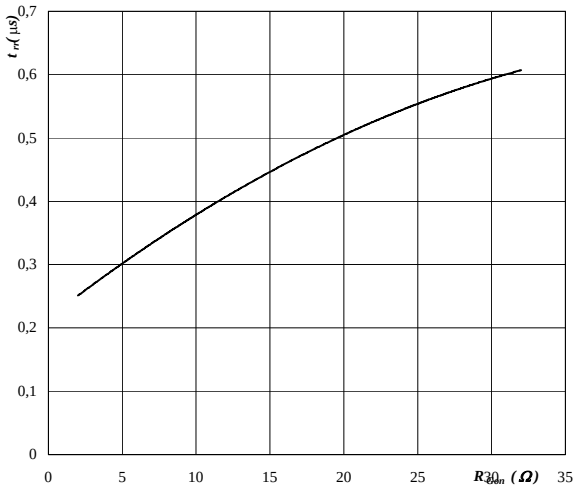
Figure 8. Typical switching times as a function of gate resistor
Output inverter IGBT
t = f (RG)



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

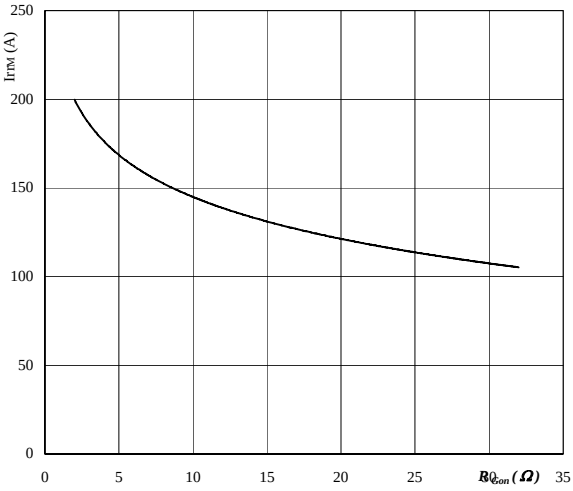
Output inverter

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



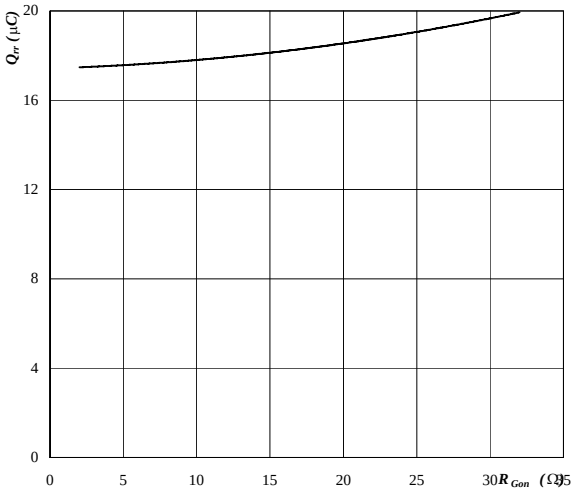
Tj = 125 °C
V_R = 600 V
I_F = 100 A
V_{GE} = ±15 V

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



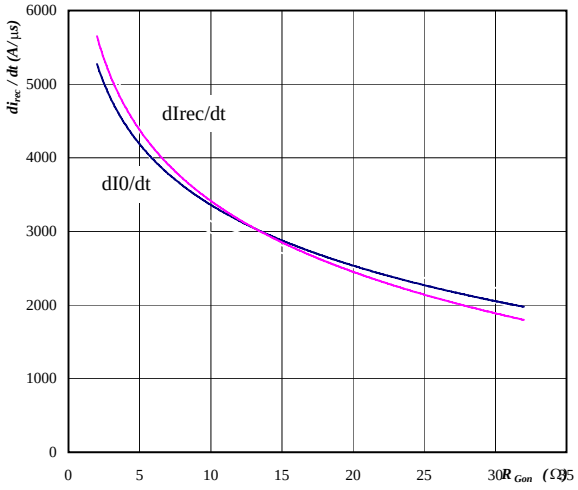
Tj = 125 °C
V_R = 600 V
I_F = 100 A
V_{GE} = ±15 V

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
V_{GE} = ±15 V

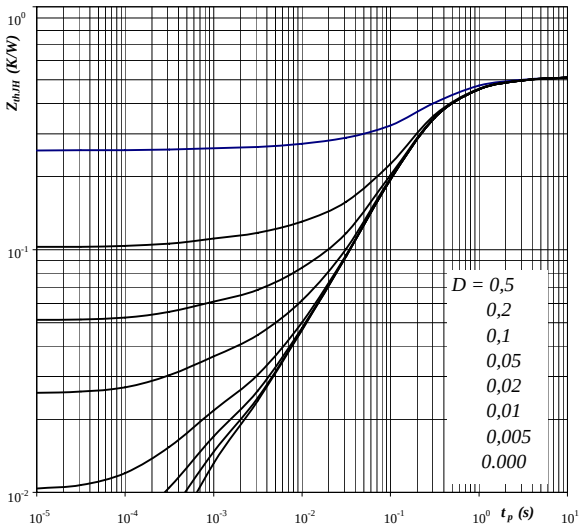
Figure 12. Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
Output inverter FRED diode
dI0/dt,dIrec/dt= f (Rgon)



Tj = 125 °C
V_R = 600 V
I_F = 100 A
V_{GE} = ±15 V

Output inverter

Figure 13. IGBT transient thermal impedance as a function of pulse width
ZthJH = f(tp)

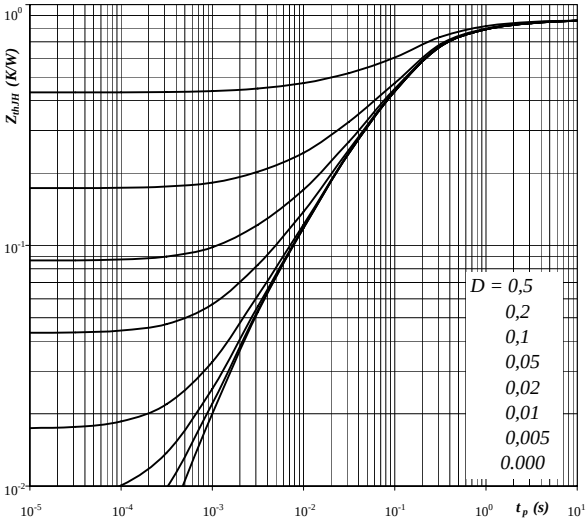


Parameter: D = tp / T RthJH= 0,51 K/W

IGBT thermal model values

R (C/W)	Tau (s)
0,06	2,1E+00
0,19	3,9E-01
0,22	1,4E-01

Figure 14. FRED transient thermal impedance as a function of pulse width
ZthJH = f(tp)



Parameter: D = tp / T RthJH= 0,86 K/W

FRED thermal model values

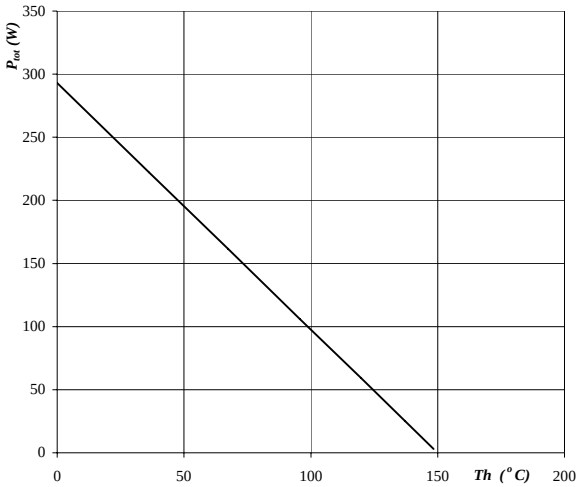
R (C/W)	Tau (s)
0,05	4,8E+00
0,15	7,2E-01
0,51	1,4E-01

Output inverter

Figure 15. Power dissipation as a function of heatsink temperature

Output inverter IGBT

$P_{tot} = f(Th)$

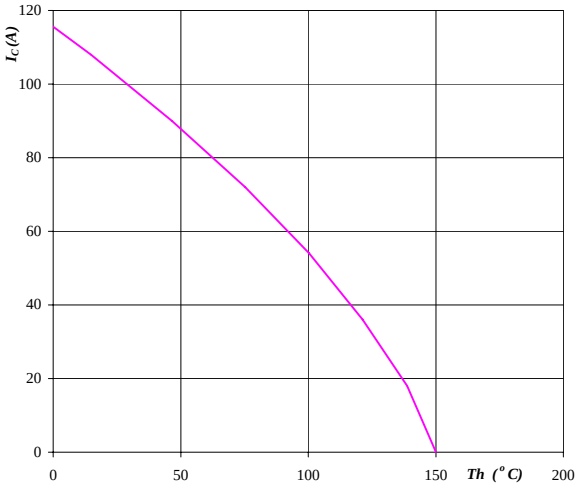


parameter: Tj = 150°C

Figure 16. Collector current as a function of heatsink temperature

Output inverter IGBT

$I_C = f(Th)$

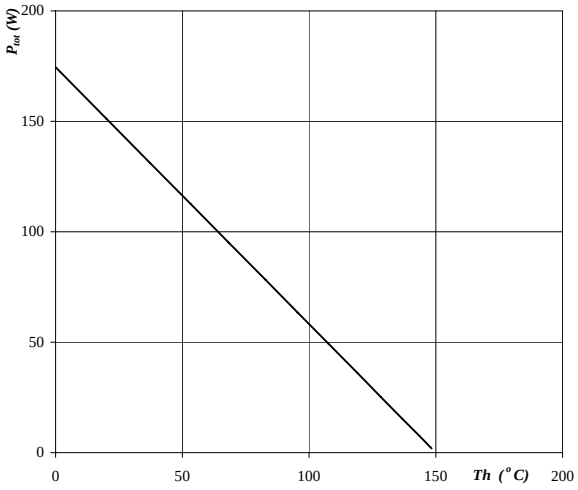


parameter: Tj = 150°C
V_{GE}= 15 V

Figure 17. Power dissipation as a function of heatsink temperature

Output inverter FRED

$P_{tot} = f(Th)$

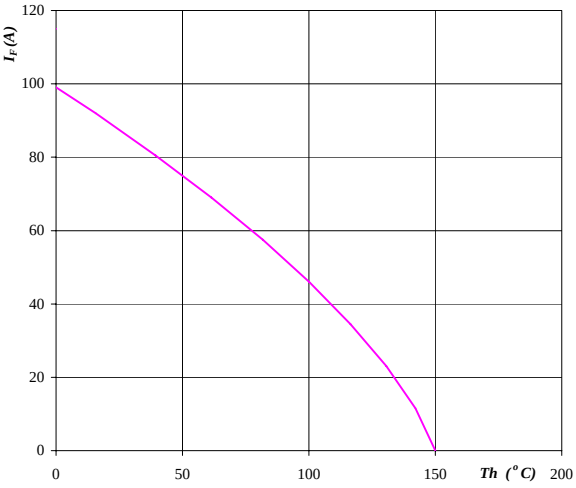


parameter: Tj = 150°C

Figure 18. Forward current as a function of heatsink temperature

Output inverter FRED

$I_F = f(Th)$



parameter: Tj = 150°C