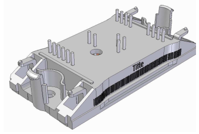
***flow* PHASE 0** — **1200 V / 75 A**

Features

- Trench Fieldstop IGBT4 technology
- 2-clip housing in 12mm height
- Compact and low inductance design

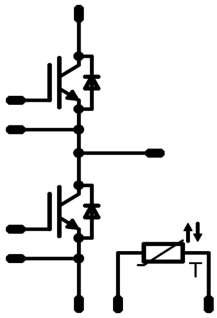
flow 0 housing



Target Applications

- Motor Drive
- UPS

Schematic



Types

- 10-FZ122PB075SC-M818F08

Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Inverter IGBT					
Collector-emitter break down voltage	V_{CE}			1200	V
DC collector current	I_C	$T_j=T_{jmax}$	T_s = 80 °C T_c = 80 °C	59 75	A
Pulsed collector current	I_{CRM}	t_p limited by T_{jmax}		225	A
Turn off safe operating area		V_{CE} ≤ 1200V, T_j ≤ T_{op} max		150	A
Power dissipation per IGBT	P_{tot}	$T_j=T_{jmax}$	T_s = 80 °C T_c = 80 °C	126 191	W
Gate-emitter peak voltage	V_{GE}			±20	V
Short circuit ratings	t_{SC} V_{CC}	T_j≤150°C V_{GE}=15V		10 800	μs V
Maximum Junction Temperature	T_{jmax}			175	°C
Inverter FWD					
Peak Repetitive Reverse Voltage	V_{RRM}			1200	V
DC forward current	I_F	$T_j=T_{jmax}$	T_s = 80 °C T_c = 80 °C	55 74	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		150	A
Power dissipation per Diode	P_{tot}	$T_j=T_{jmax}$	T_s = 80 °C T_c = 80 °C	85 128	W
Drain to source breakdown voltage	T_{jmax}			175	°C

Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Thermal Properties				
Storage temperature	T_{stg}		-40…+125	°C
Operation temperature under switching condition	T_{op}		-40…+(T_{jmax} - 25)	°C
Insulation Properties				
Insulation voltage	V_{is}	t = 2 s DC voltage	4000	V
Creepage distance			min 12,7	mm
Clearance			9,12	mm

Characteristic Values

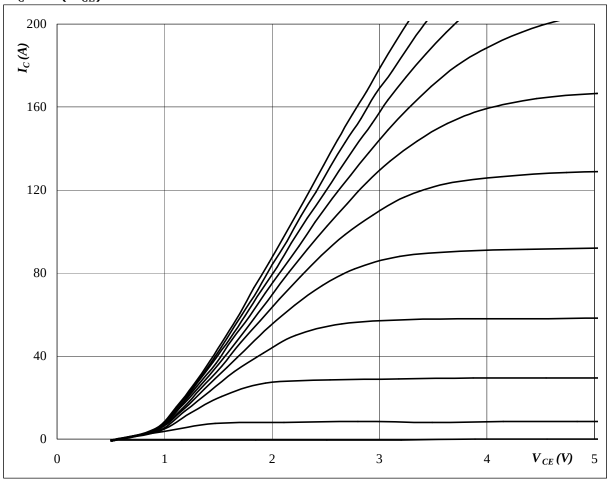
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] or V_{GS} [V]	V_r [V] or V_{CE} [V] or V_{DS} [V]	I_C [A] or I_F [A] or I_D [A]	T_j [°C]	Min	Typ	Max	
Inverter IGBT										
Gate emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,003	25 150	5	5,8	6,5	V
Collector-emitter saturation voltage	V_{CEsat}		15		75	25 150	1,5	1,94 2,38	2,3	V
Collector-emitter cut-off current incl. Diode	I_{CES}		0	1200		25 150			0,03	mA
Gate-emitter leakage current	I_{GES}		20	0		25 150			700	nA
Integrated Gate resistor	R_{gint}							10		Ω
Turn-on delay time	$t_{d(on)}$	R_{goff} = 4 Ω R_{gon} = 4 Ω	±15	600	75	25 150		178 196		ns
Rise time	t_r					25 150		34 36		
Turn-off delay time	$t_{d(off)}$					25 150		284 373		
Fall time	t_f					25 150		63 124		
Turn-on energy loss per pulse	E_{on}					25 150		6,17 9,39		mWs
Turn-off energy loss per pulse	E_{off}					25 150		4,01 6,99		
Input capacitance	C_{ies}	f = 1 MHz	0	25		25		4400		pF
Output capacitance	C_{oss}							290		
Reverse transfer capacitance	C_{rss}							235		
Gate charge	Q_G		±15			25		290		nC
Thermal resistance chip to heatsink	$R_{th(j-s)}$	Thermal grease thickness≤50um λ = 1 W/mK						0,75		K/W
Inverter FWD										
Diode forward voltage	V_F				75	25 150	1	1,78 1,72	2,3	V
Peak reverse recovery current	I_{RRM}	R_{gon} = 4 Ω	±15	600	75	25 150		69,44 86,2		A
Reverse recovery time	t_{rr}					25 150		275,1 457		ns
Reverse recovered charge	Q_{rr}					25 150		6,62 14,08		µC
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 150		1859 724		A/µs
Reverse recovered energy	E_{rec}					25 150		2,29 5,22		mWs
Thermal resistance chip to heatsink	$R_{th(j-s)}$	Thermal grease thickness≤50um λ = 1 W/mK						1,12		K/W
Thermistor										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P					25		5		mW
Power dissipation constant						25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. ±1 %				25		3962		K
B-value	$B_{(25/100)}$	Tol. ±1 %				25		4000		K
Vincotech NTC Reference									I	

Output Inverter

figure 1. **Output inverter IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



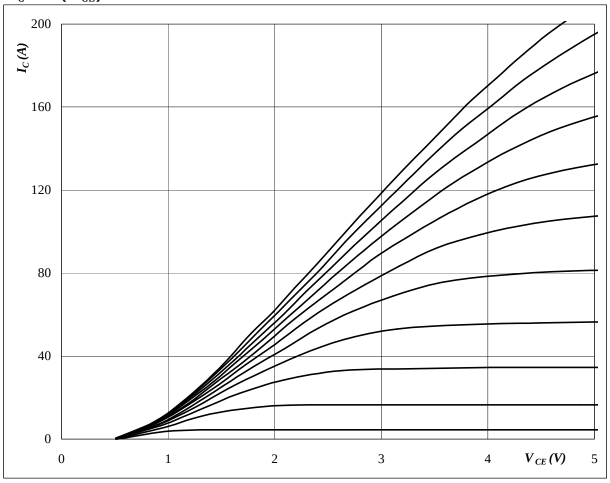
At

t_p =	350	μs
T_j =	25	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 2. **Output inverter IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



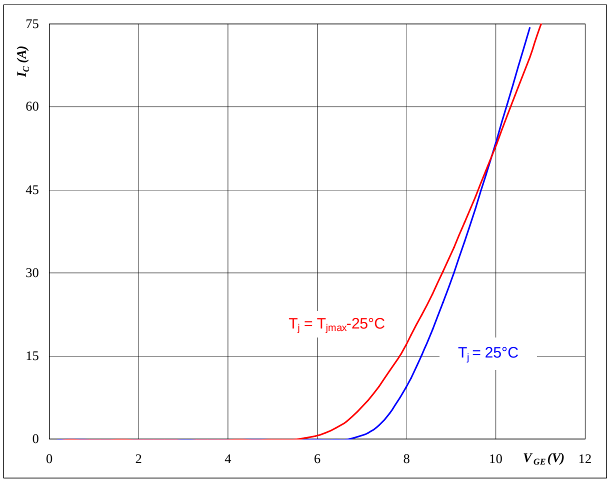
At

t_p =	350	μs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **Output inverter IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$



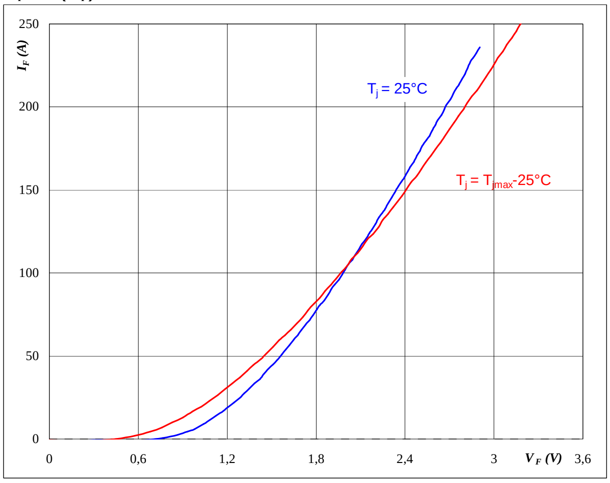
At

t_p =	350	μs
V_{CE} =	10	V

figure 4. **Output inverter FWD**

Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



At

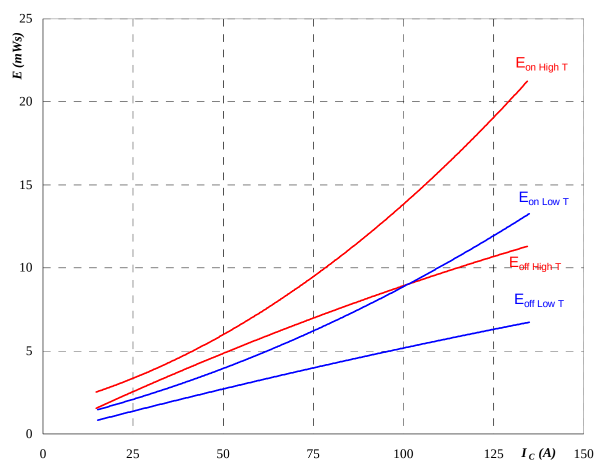
t_p =	350	μs

Output Inverter

figure 5. **Output inverter IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



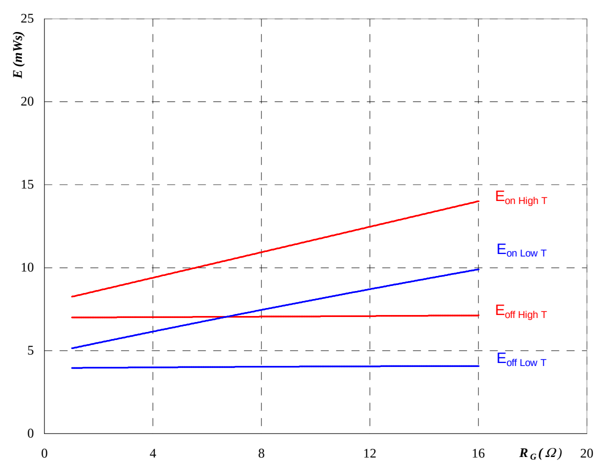
With an inductive load at

T_j =	25/150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 6. **Output inverter IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_G)$



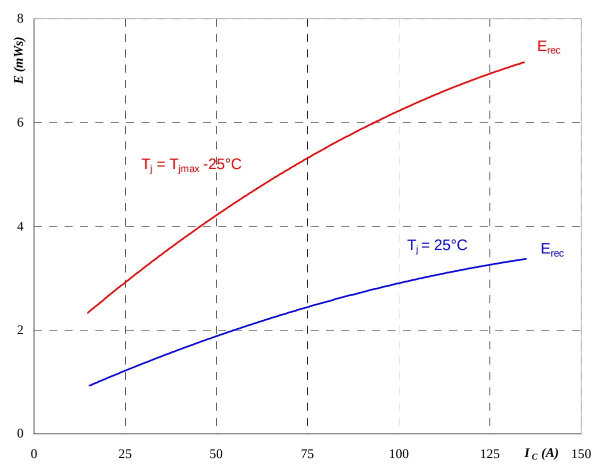
With an inductive load at

T_j =	25/150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	75	A

figure 7. **Output inverter IGBT**

Typical reverse recovery energy loss as a function of collector current

$E_{rec} = f(I_C)$



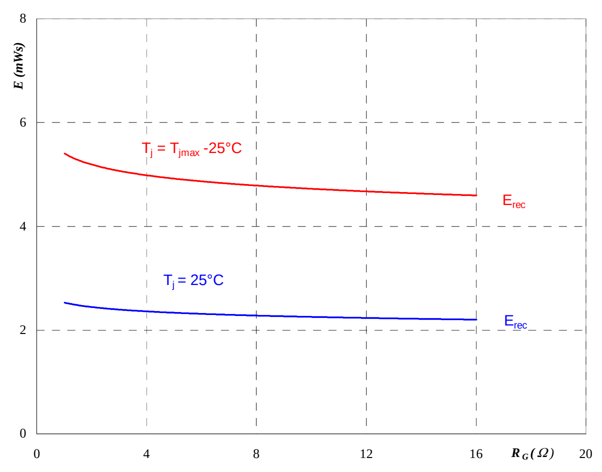
With an inductive load at

T_j =	25/150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	4	Ω

figure 8. **Output inverter IGBT**

Typical reverse recovery energy loss as a function of gate resistor

$E_{rec} = f(R_G)$



With an inductive load at

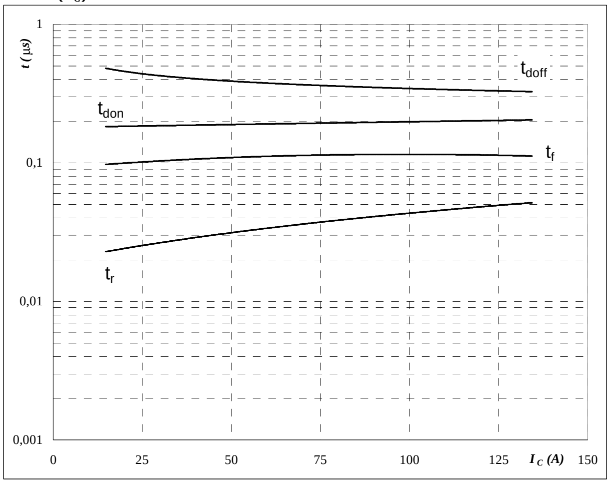
T_j =	25/150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	75	A

Output Inverter

figure 9. **Output inverter IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



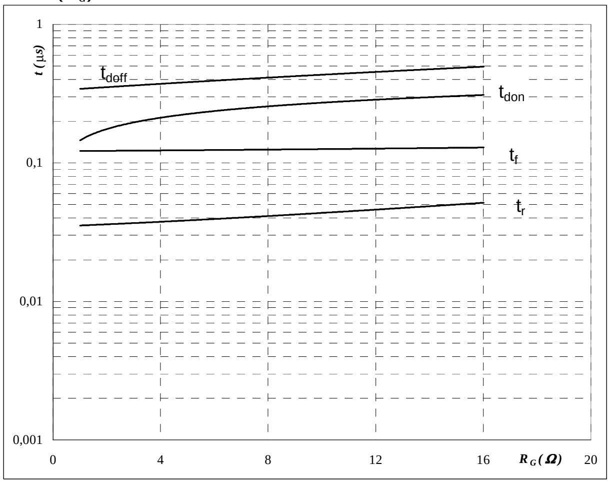
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 10. **Output inverter IGBT**

Typical switching times as a function of gate resistor

$t = f(R_G)$



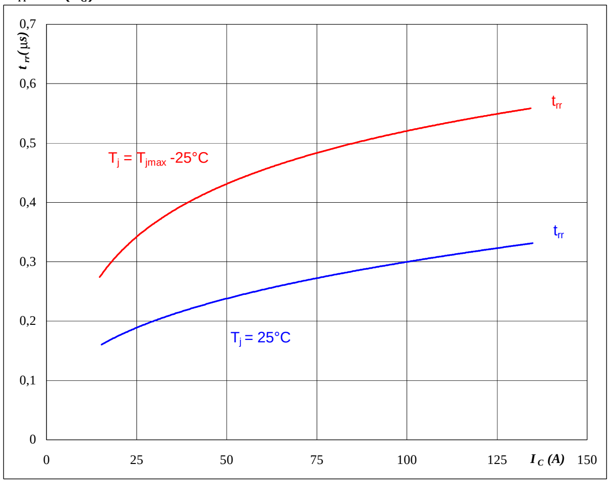
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	75	A

figure 11. **Output inverter FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



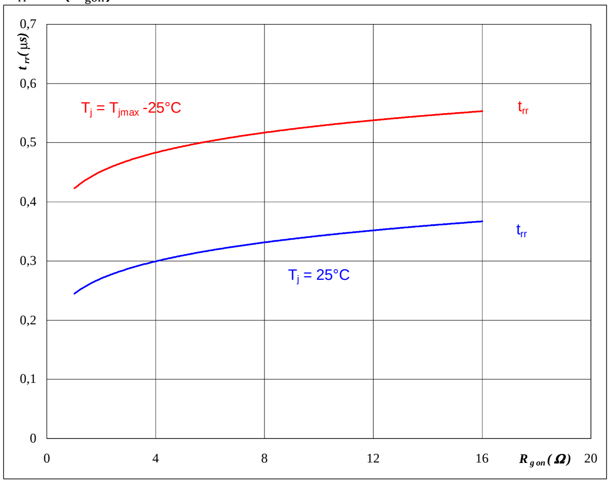
At

T_j =	25/150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	4	Ω

figure 12. **Output inverter FWD**

Typical reverse recovery time as a function of IGBT turn on gate resistor

$t_{rr} = f(R_{gon})$



At

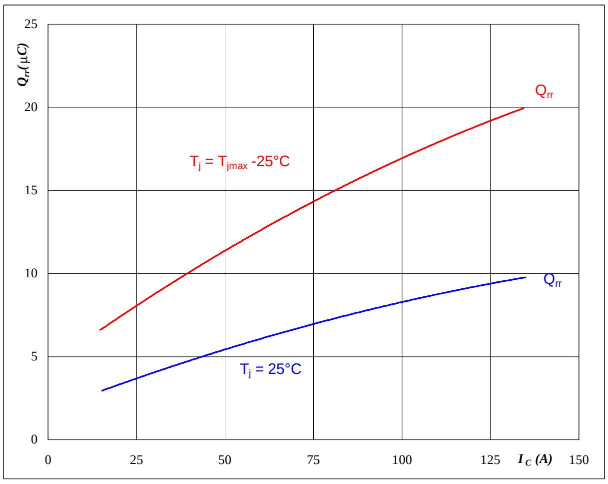
T_j =	25/150	°C
V_R =	600	V
I_F =	75	A
V_{GE} =	±15	V

Output Inverter

figure 13. **Output inverter FWD**

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$



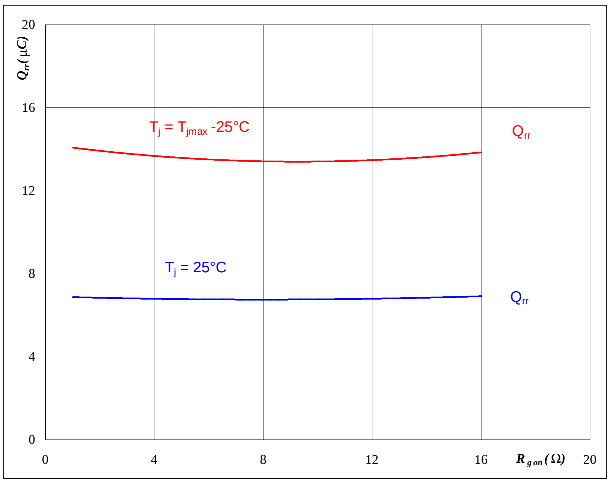
At

T_j =	25/150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	4	Ω

figure 14. **Output inverter FWD**

Typical reverse recovery charge as a function of IGBT turn on gate resistor

$Q_{rr} = f(R_{gon})$



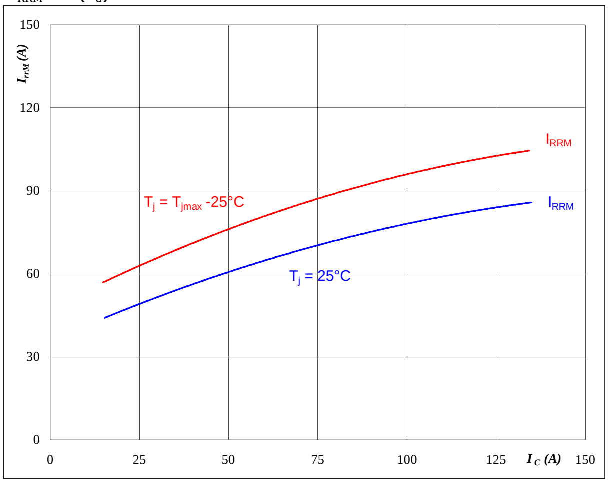
At

T_j =	25/150	°C
V_R =	600	V
I_F =	75	A
V_{GE} =	±15	V

figure 15. **Output inverter FWD**

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$



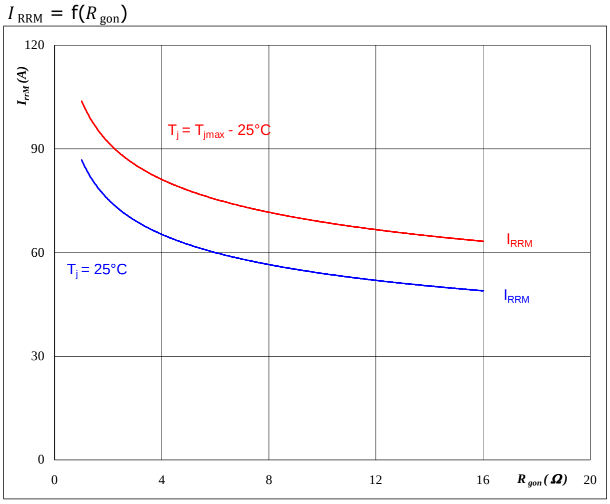
At

T_j =	25/150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	4	Ω

figure 16. **Output inverter FWD**

Typical reverse recovery current as a function of IGBT turn on gate resistor

$I_{RRM} = f(R_{gon})$



At

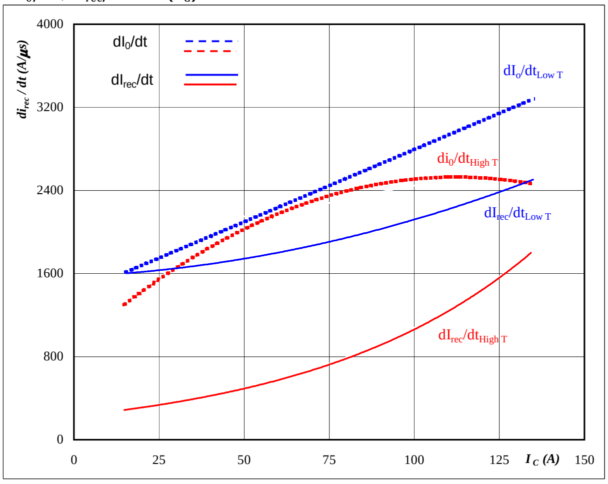
T_j =	25/150	°C
V_R =	600	V
I_F =	75	A
V_{GE} =	±15	V

Output Inverter

figure 17. **Output inverter FWD**

Typical rate of fall of forward and reverse recovery current as a function of collector current

$dI_0/dt, dI_{rec}/dt = f(I_C)$



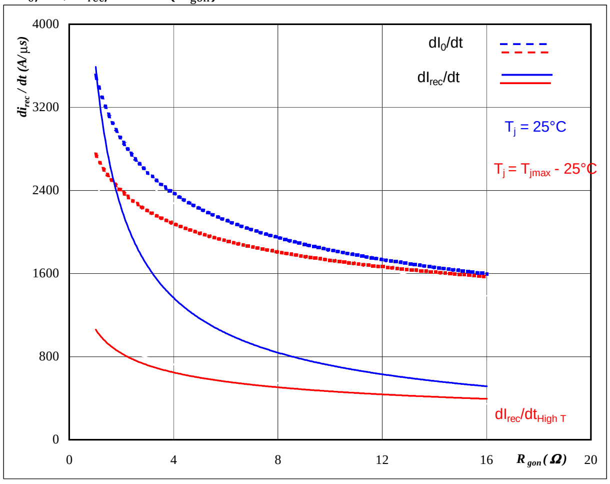
At

T_j =	25/150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	4	Ω

figure 18. **Output inverter FWD**

Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor

$dI_0/dt, dI_{rec}/dt = f(R_{gon})$



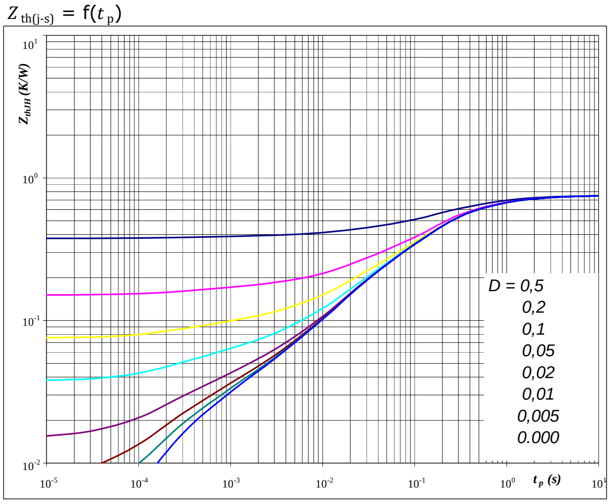
At

T_j =	25/150	°C
V_R =	600	V
I_F =	75	A
V_{GE} =	±15	V

figure 19. **Output inverter IGBT**

IGBT transient thermal impedance as a function of pulse width

$Z_{th(j-s)} = f(t_p)$



At

D =	t_p / T	
$R_{th(j-s)}$ =	0,75	K/W

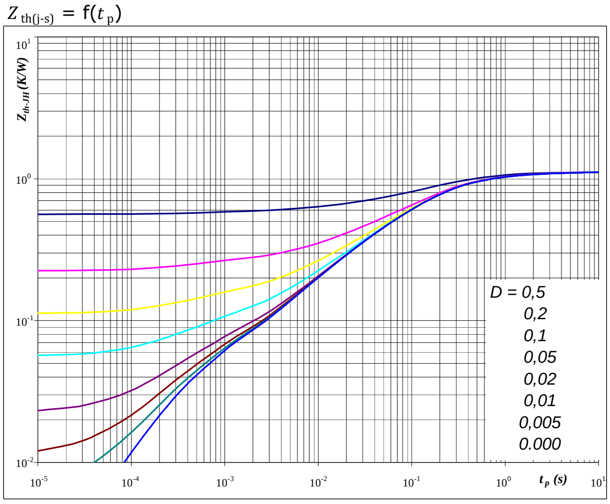
IGBT thermal model values

R (K/W)	Tau (s)
0,05	4,2E+00
0,17	7,6E-01
0,39	1,7E-01
0,11	2,2E-02
0,02	2,2E-03
0,02	2,9E-04

figure 20. **Output inverter FWD**

FWD transient thermal impedance as a function of pulse width

$Z_{th(j-s)} = f(t_p)$



At

D =	t_p / T	
$R_{th(j-s)}$ =	1,12	K/W

FWD thermal model values

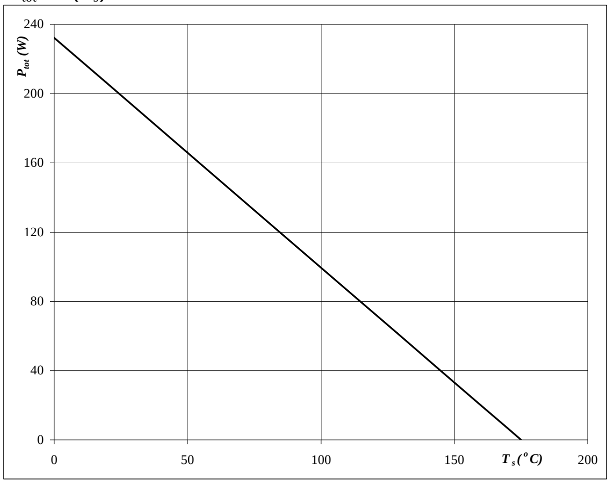
R (K/W)	Tau (s)
0,03	9,3E+00
0,17	1,1E+00
0,57	1,8E-01
0,24	3,1E-02
0,07	5,5E-03
0,04	4,0E-04

Output Inverter

figure 21.	Output inverter IGBT

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_s)$



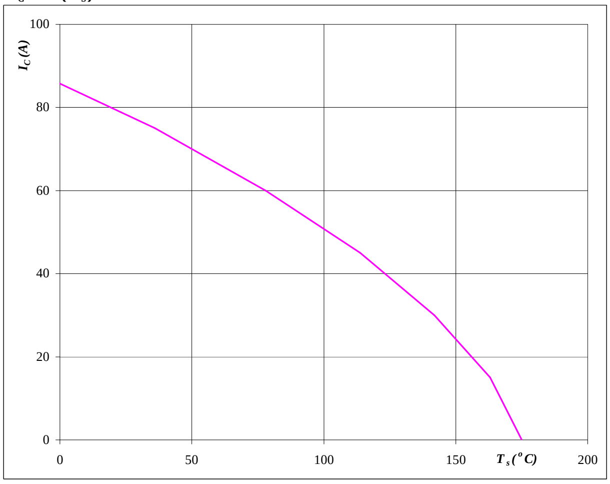
At

T_j = 175 °C

figure 22.	Output inverter IGBT

Collector current as a function of heatsink temperature

$I_C = f(T_s)$



At

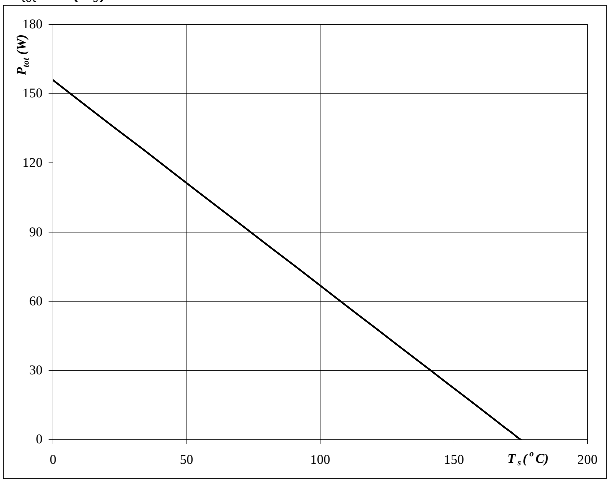
T_j = 175 °C

V_{GE} = 15 V

figure 23.	Output inverter FWD

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_s)$



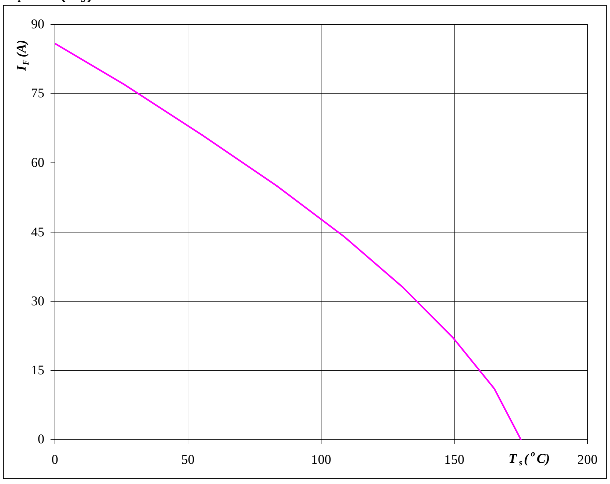
At

T_j = 175 °C

figure 24.	Output inverter FWD

Forward current as a function of heatsink temperature

$I_F = f(T_s)$



At

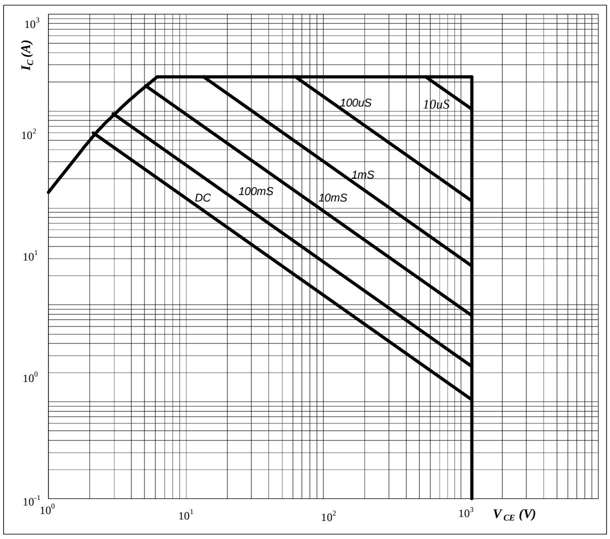
T_j = 175 °C

Output Inverter

figure 25. **Output inverter IGBT**

Safe operating area as a function of collector-emitter voltage

$I_C = f(V_{CE})$



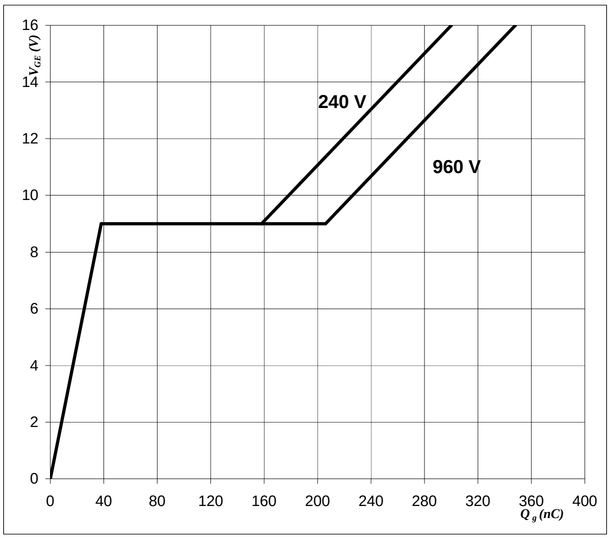
At

D =	single pulse	
T_h =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

figure 26. **Output inverter IGBT**

Gate voltage vs Gate charge

$V_{GE} = f(Q_{GE})$



At

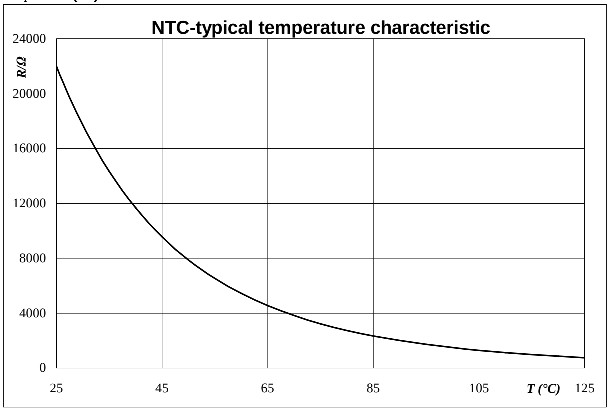
I_C =	75	A

Thermistor

figure 1. **Thermistor**

Typical NTC characteristic as a function of temperature

$R_T = f(T)$



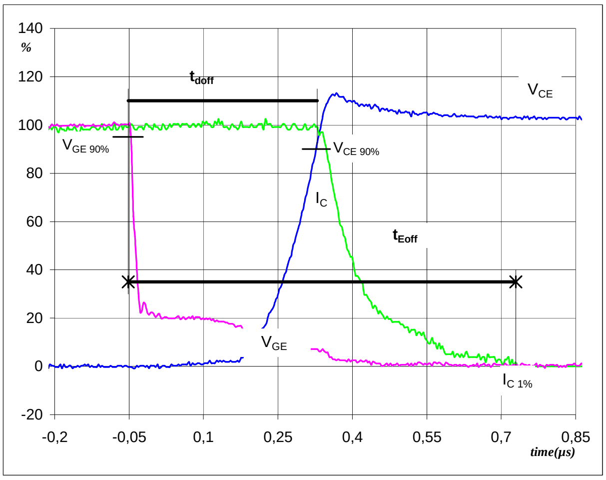
Switching Definitions Output Inverter

General conditions

T_j	=	150 °C
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

figure 1. **Output inverter IGBT**

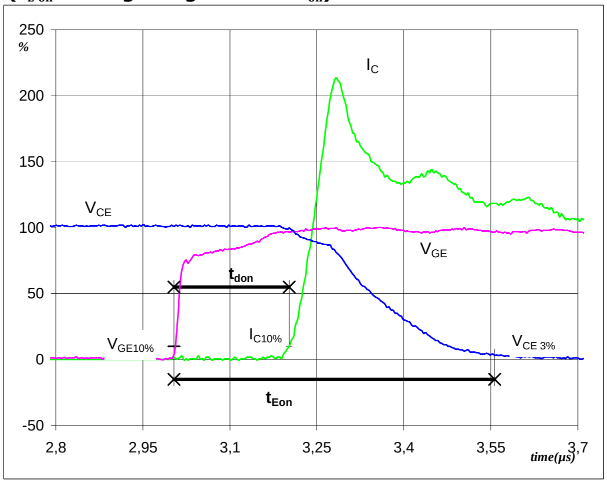
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff}
($t_{E\,off}$ = integrating time for E_{off})



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	600	V
I_C (100%) =	75	A
t_{doff} =	0,37	μs
$t_{E\,off}$ =	0,78	μs

figure 2. **Output inverter IGBT**

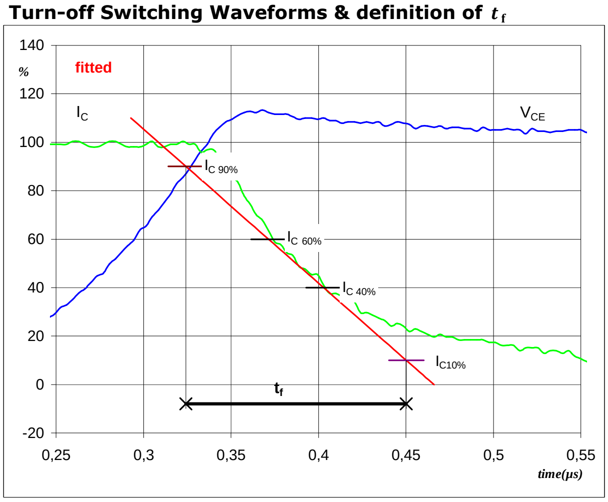
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon}
($t_{E\,on}$ = integrating time for E_{on})



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	600	V
I_C (100%) =	75	A
t_{don} =	0,20	μs
$t_{E\,on}$ =	0,55	μs

figure 3. **Output inverter IGBT**

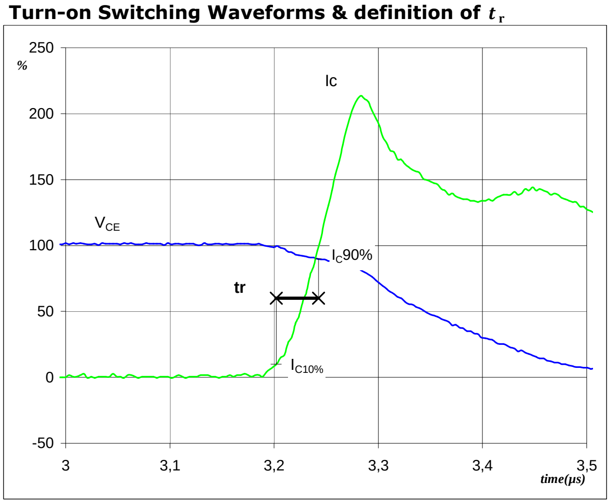
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	600	V
I_C (100%) =	75	A
t_f =	0,12	μs

figure 4. **Output inverter IGBT**

Turn-on Switching Waveforms & definition of t_r

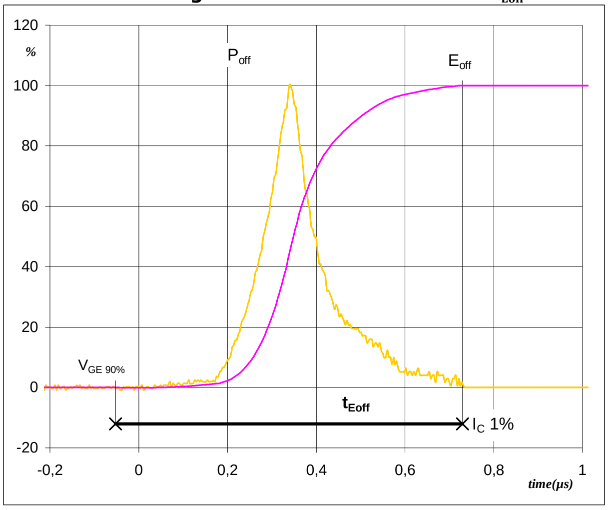


V_C (100%) =	600	V
I_C (100%) =	75	A
t_r =	0,04	μs

Switching Definitions Output Inverter

figure 5. **Output inverter IGBT**

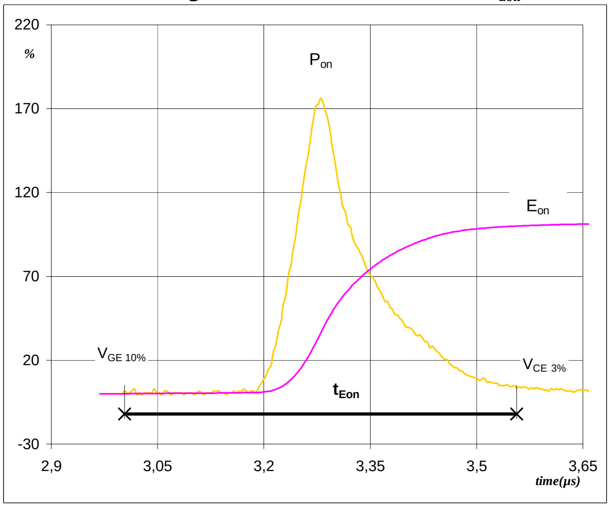
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	44,97	kW
E_{off} (100%) =	7,03	mJ
$t_{E\,off}$ =	0,78	μs

figure 6. **Output inverter IGBT**

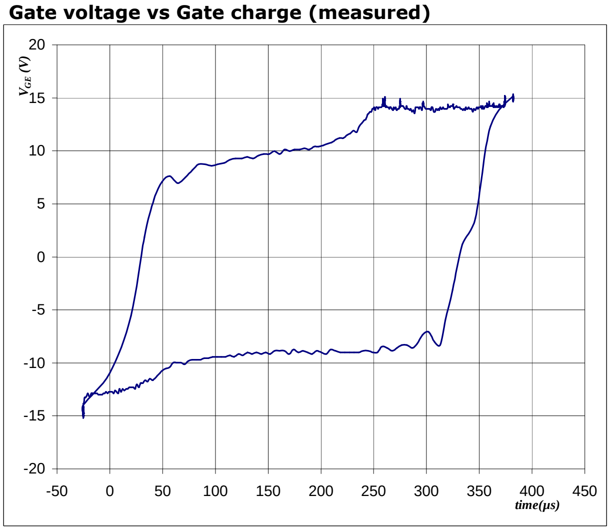
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	44,97	kW
E_{on} (100%) =	9,36	mJ
$t_{E\,on}$ =	0,55	μs

figure 7. **Output inverter FWD**

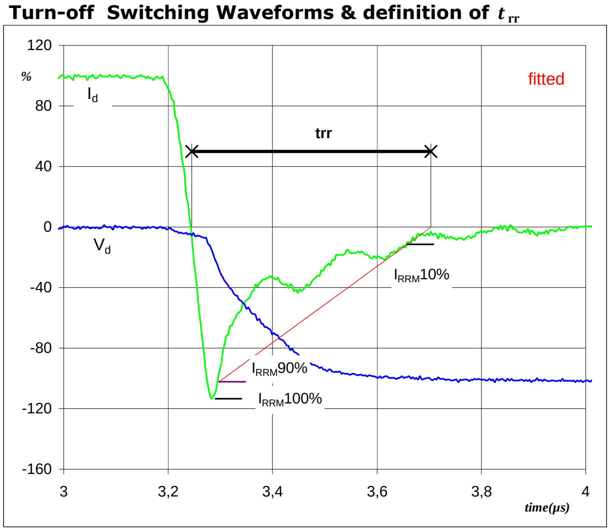
Gate voltage vs Gate charge (measured)



$V_{GE\,off}$ =	-15	V
$V_{GE\,on}$ =	15	V
V_C (100%) =	600	V
I_C (100%) =	75	A
Q_g =	6601,20	nC

figure 8. **Output inverter IGBT**

Turn-off Switching Waveforms & definition of t_{rr}

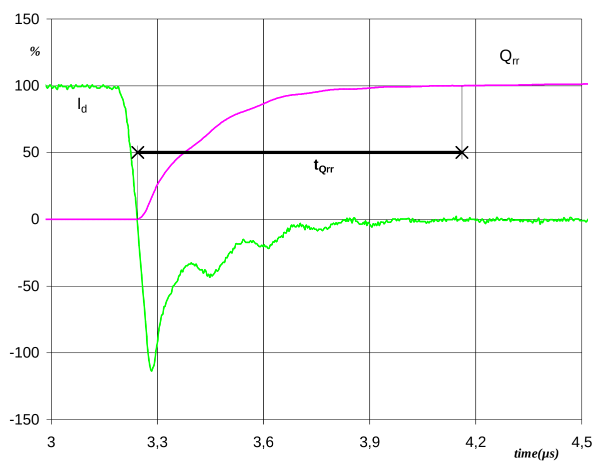


V_d (100%) =	600	V
I_d (100%) =	75	A
I_{RRM} (100%) =	-85	A
t_{rr} =	0,46	μs

Switching Definitions Output Inverter

figure 9. Output inverter FWD

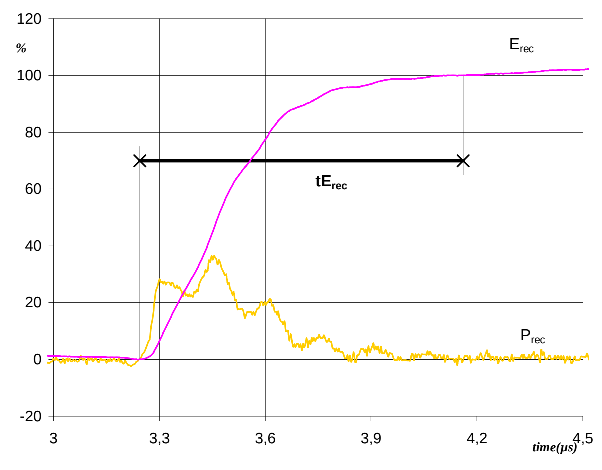
Turn-on Switching Waveforms & definition of t_{Qrr}
($t_{Q rr}$ = integrating time for Q_{rr})



I_d (100%) =	75	A
Q_{rr} (100%) =	13,41	μC
$t_{Q rr}$ =	0,92	μs

figure 10. Output inverter FWD

Turn-on Switching Waveforms & definition of t_{Erec}
(t_{Erec}= integrating time for E_{rec})



P_{rec} (100%) =	44,97	kW
E_{rec} (100%) =	4,88	mJ
$t_{E rec}$ =	0,92	μs

Ordering Code and Marking - Outline - Pinout

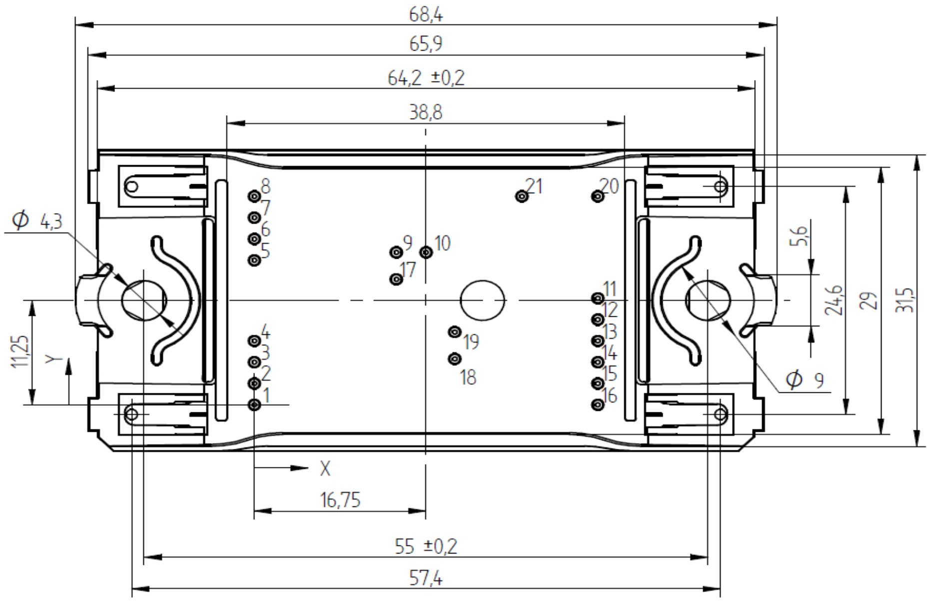
Ordering Code & Marking

Version	Ordering Code	in DataMatrix as	in packaging barcode as
without thermal paste 12mm housing	10-FZ122PB075SC-M818F08	M818F08	M818F08

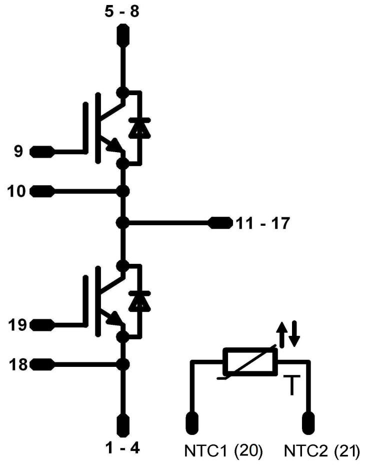
Outline

Pin table

Pin	X	Y
1	0	0
2	0	2,3
3	0	4,6
4	0	6,9
5	0	15,6
6	0	17,9
7	0	20,2
8	0	22,5
9	13,85	16,45
10	16,75	16,45
11	33,5	11,5
12	33,5	9,2
13	33,5	6,9
14	33,5	4,6
15	33,5	2,3
16	33,5	0
17	13,85	13,55
18	19,55	4,95
19	19,55	7,85
20	33,5	22,5
21	26,1	22,5



Pinout



Packaging instruction					
Standard packaging quantity (SPQ)	**135**	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* 0 packages see vincotech.com website.

Package data
Package data for *flow* 0 packages see vincotech.com website.

UL recognition and file number
This device is certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
10-FZ122PB075SC-M818F08-D3-14	28.febr.17	new brand	