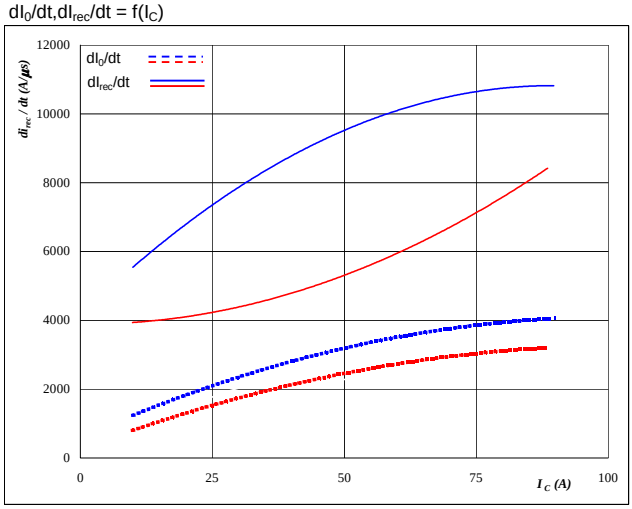
H-Bridge

Figure 17 H-Bridge FWD

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

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



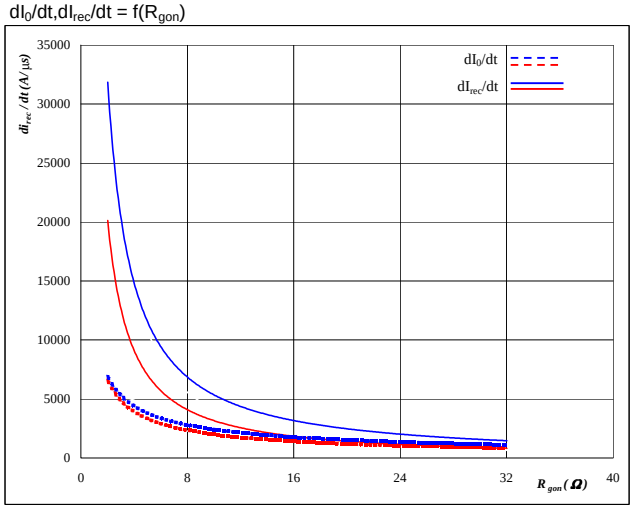
At

T_j =	25/126	°C
V_{CE} =	300	V
V_{GE} =	±15	V
R_{gon} =	8	Ω

Figure 18 H-Bridge FWD

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

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



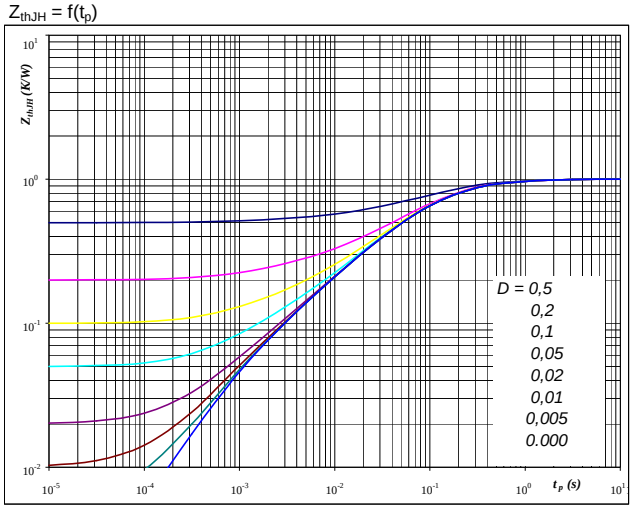
At

T_j =	25/126	°C
V_R =	300	V
I_F =	50	A
V_{GE} =	±15	V

Figure 19 H-Bridge IGBT

IGBT transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D =	t_p / T				
R_{thJH} =	1,00	K/W	R_{thJH} =	1,17	K/W

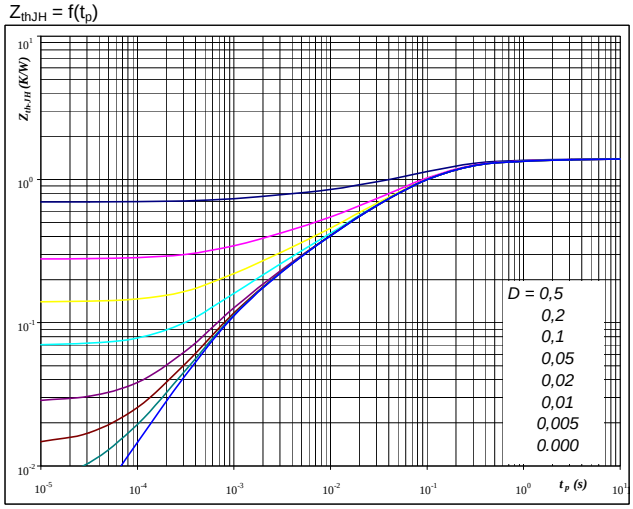
IGBT thermal model values

Phase change interface		Thermal grease	
R (C/W)	Tau (s)	R (C/W)	Tau (s)
0,12	7,7E-01	0,15	7,7E-01
0,46	1,3E-01	0,54	1,3E-01
0,25	4,3E-02	0,29	4,3E-02
0,12	9,4E-03	0,14	9,4E-03
0,04	1,2E-03	0,05	1,2E-03

Figure 20 H-Bridge FWD

FWD transient thermal impedance as a function of pulse width

$Z_{thJH} = f(t_p)$



At

D =	t_p / T				
R_{thJH} =	1,39	K/W	R_{thJH} =	1,64	K/W

FWD thermal model values

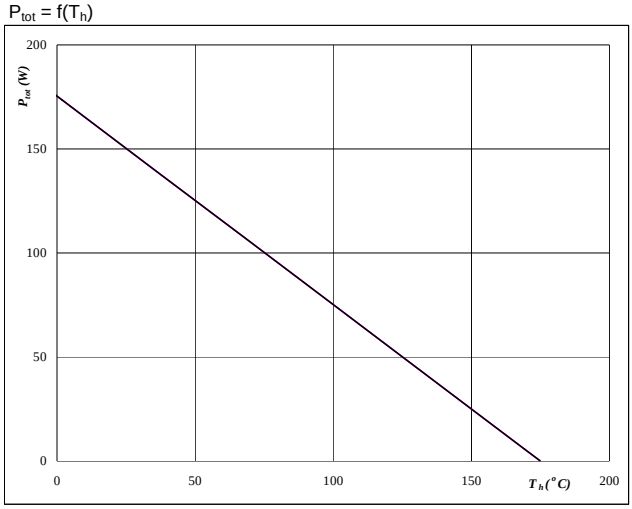
Phase change interface		Thermal grease	
R (C/W)	Tau (s)	R (C/W)	Tau (s)
0,04	4,0E+00	0,04	4,0E+00
0,09	8,3E-01	0,10	8,3E-01
0,56	1,3E-01	0,65	1,3E-01
0,40	3,6E-02	0,47	3,6E-02
0,20	7,3E-03	0,24	7,3E-03
0,12	1,1E-03	0,14	1,1E-03

H-Bridge

Figure 21 H-Bridge IGBT

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



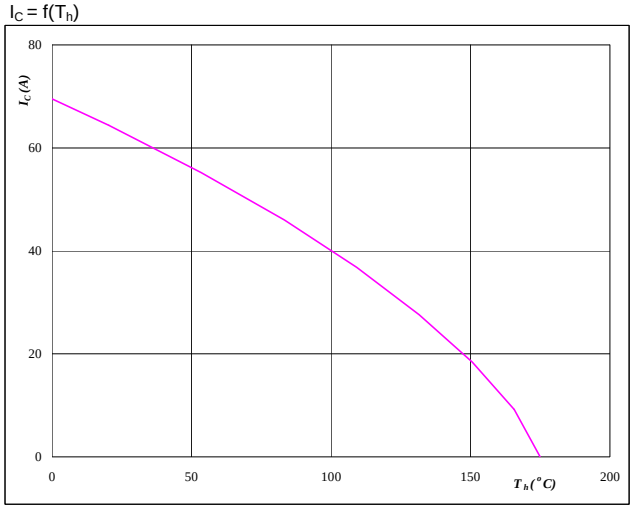
At

T_j = 175 °C

Figure 22 H-Bridge IGBT

Collector current as a function of heatsink temperature

$I_C = f(T_h)$



At

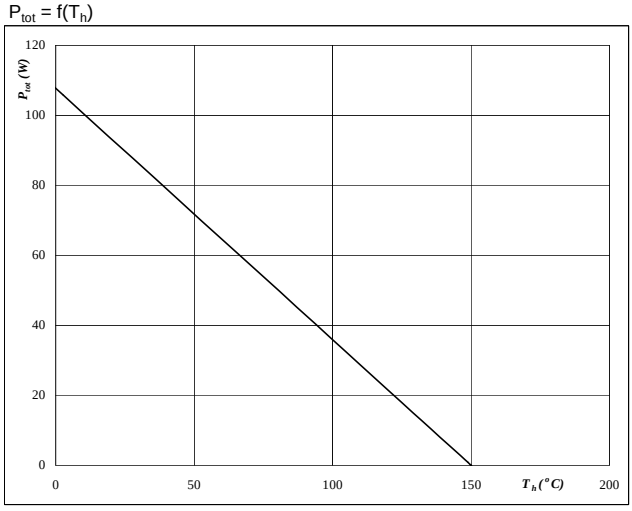
T_j = 175 °C

V_{GE} = 15 V

Figure 23 H-Bridge FWD

Power dissipation as a function of heatsink temperature

$P_{tot} = f(T_h)$



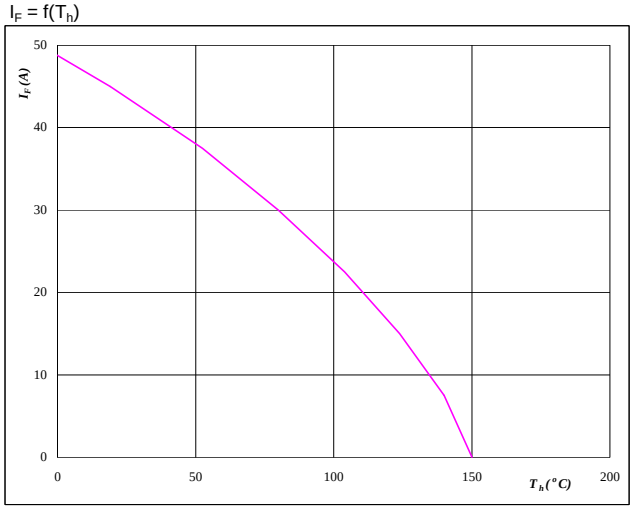
At

T_j = 150 °C

Figure 24 H-Bridge FWD

Forward current as a function of heatsink temperature

$I_F = f(T_h)$



At

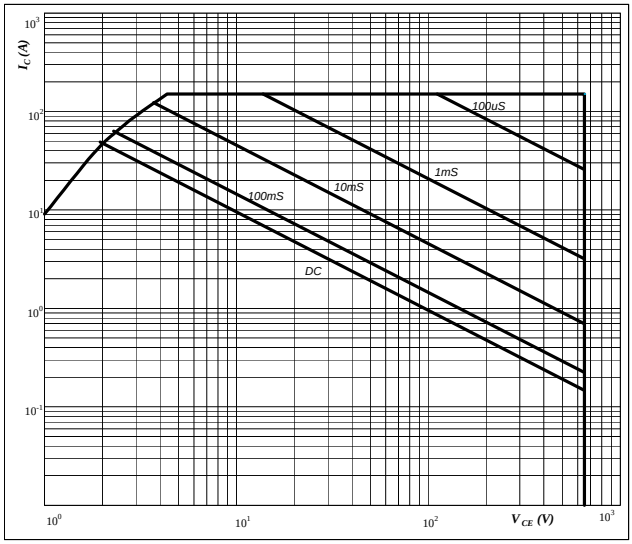
T_j = 150 °C

H-Bridge

Figure 25 H-Bridge IGBT

Safe operating area as a function of collector-emitter voltage

$I_C = f(V_{CE})$



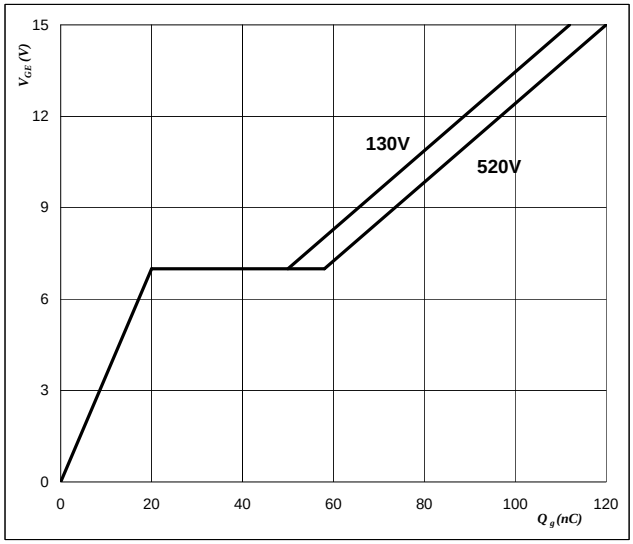
At

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

Figure 26 H-Bridge IGBT

Gate voltage vs Gate charge

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



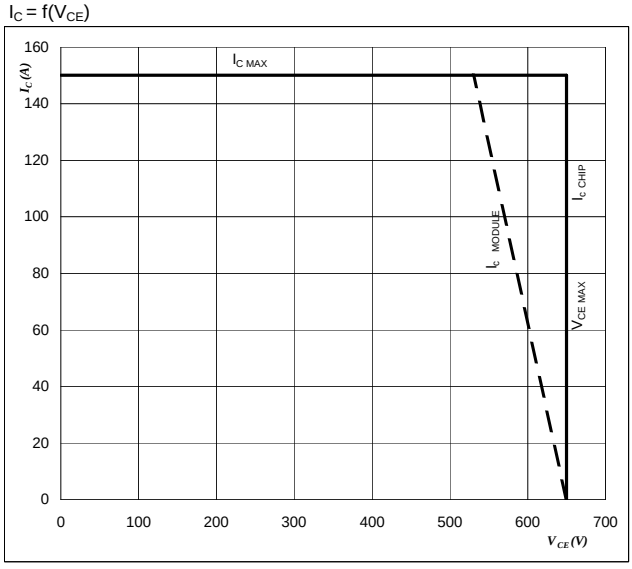
At

I_C =	50	A

Figure 29 H-Bridge IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

T_j =	T_{jmax}-25	ºC

Switching mode : 3phase SPWM

Thermistor

Figure 1 Thermistor

Typical NTC characteristic as a function of temperature

$R_T = f(T)$

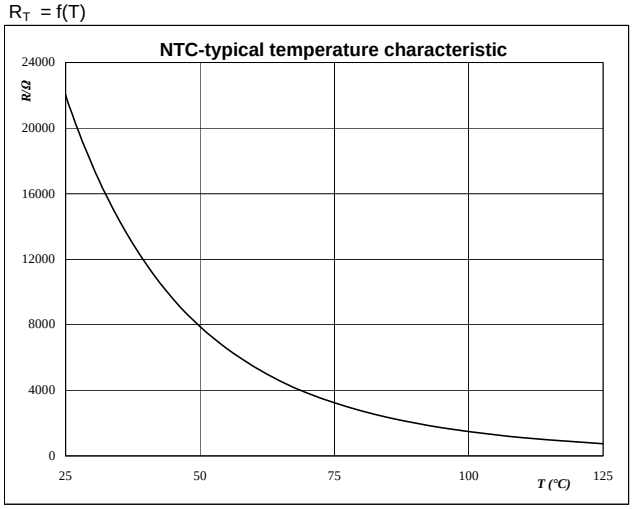


Figure 2 Thermistor

Typical NTC resistance values

$$R(T) = R_{25} \cdot e^{\left(B_{25/100}\left(\frac{1}{T}-\frac{1}{T_{25}}\right)\right)} \quad [\Omega]$$

Switching Definitions H-Bridge

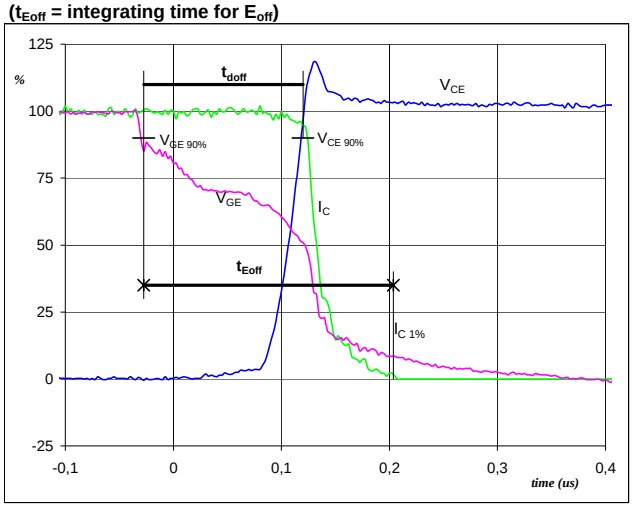
General conditions

T_j	=	125 °C
R_{gon}	=	8 Ω
R_{goff}	=	8 Ω

Figure 1 H-Bridge IGBT

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

(t_{Eoff} = integrating time for E_{off})

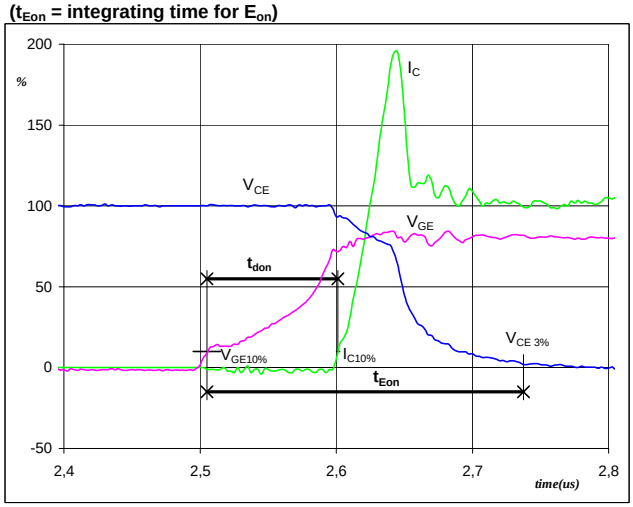


V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	300	V
I_C (100%) =	50	A
t_{doff} =	0,15	µs
t_{Eoff} =	0,23	µs

Figure 2 H-Bridge IGBT

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

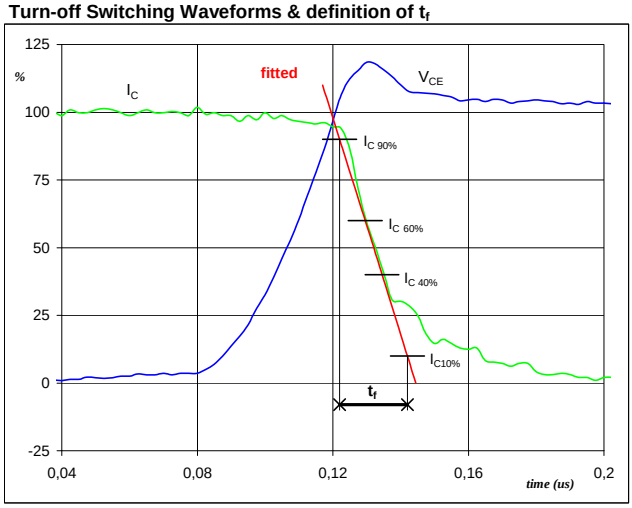
(t_{Eon} = integrating time for E_{on})



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	300	V
I_C (100%) =	50	A
t_{don} =	0,10	µs
t_{Eon} =	0,23	µs

Figure 3 H-Bridge IGBT

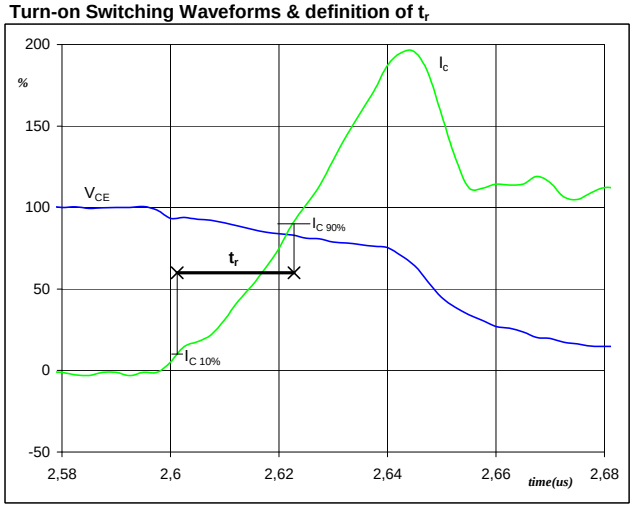
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	300	V
I_C (100%) =	50	A
t_f =	0,024	µs

Figure 4 H-Bridge IGBT

Turn-on Switching Waveforms & definition of t_r

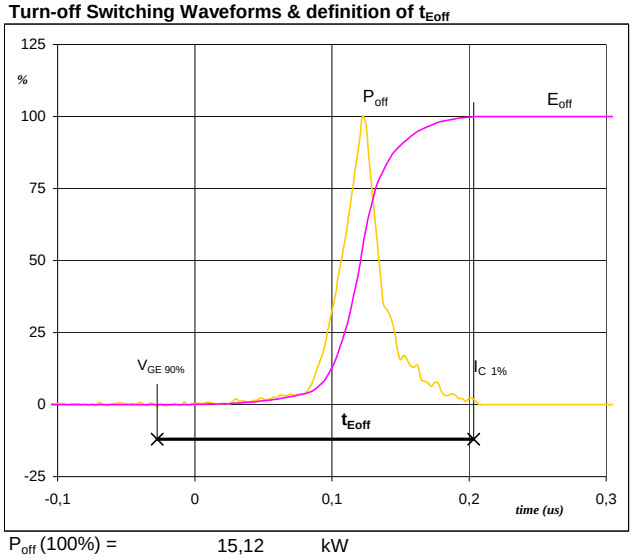


V_C (100%) =	300	V
I_C (100%) =	50	A
t_r =	0,021	µs

Switching Definitions H-Bridge

Figure 5 H-Bridge IGBT

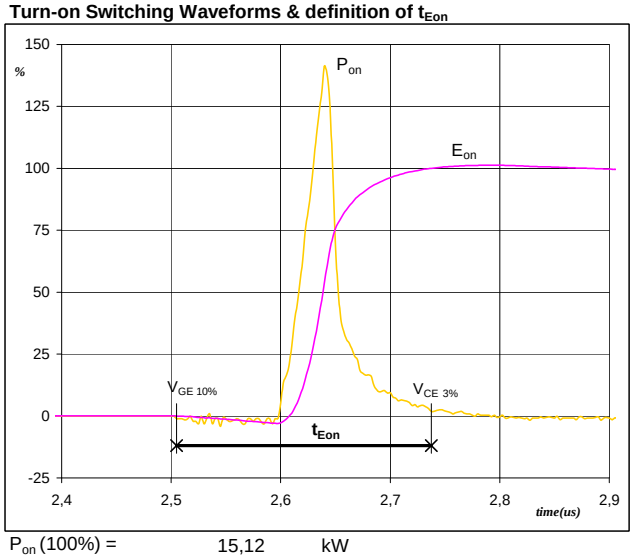
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	15,12	kW
E_{off} (100%) =	0,57	mJ
t_{Eoff} =	0,23	µs

Figure 6 H-Bridge IGBT

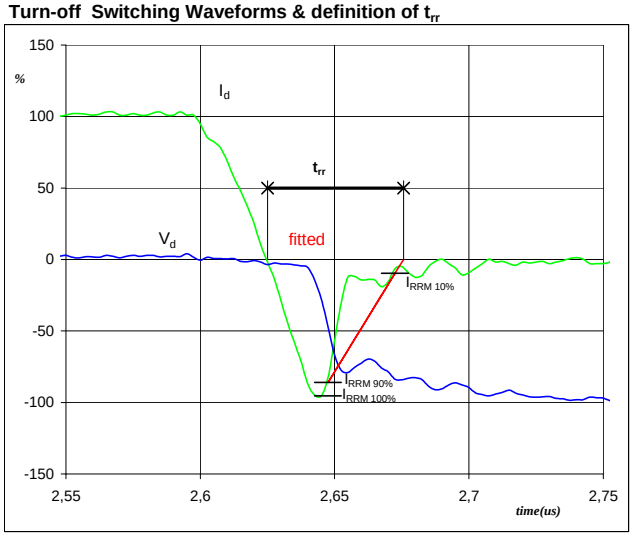
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	15,12	kW
E_{on} (100%) =	0,79	mJ
t_{Eon} =	0,23	µs

Figure 7 H-Bridge IGBT

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



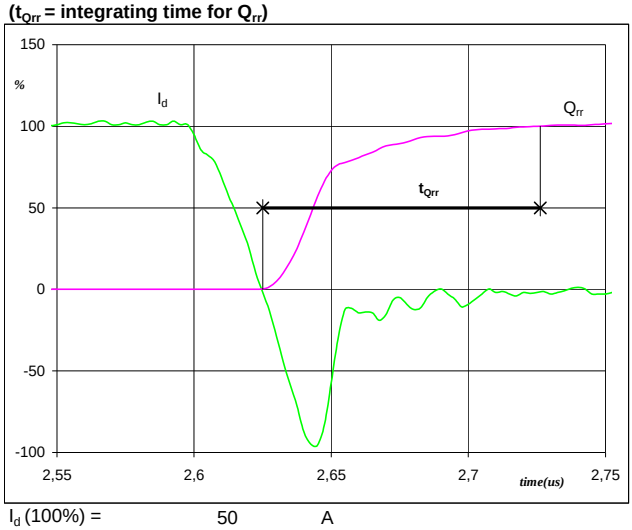
V_d (100%) =	300	V
I_d (100%) =	50	A
I_{RRM} (100%) =	-49	A
t_{rr} =	0,05	µs

Switching Definitions H-Bridge

Figure 8 H-Bridge FWD

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

(t_{Qrr} = integrating time for Q_{rr})

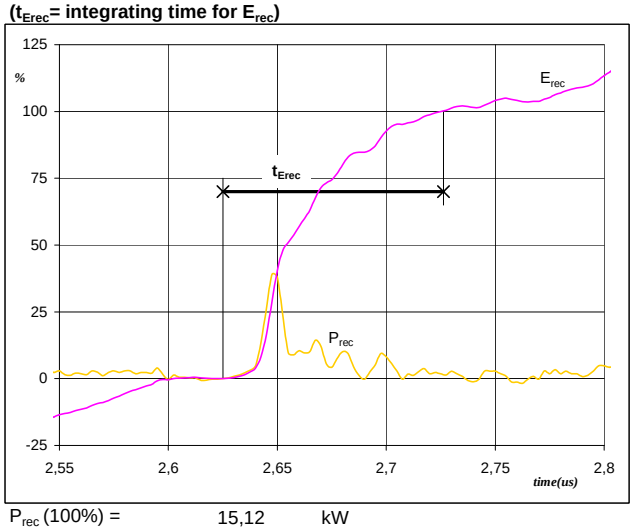


I_d (100%) =	50	A
Q_{rr} (100%) =	1,10	µC
t_{Qrr} =	0,10	µs

Figure 9 H-Bridge FWD

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

(t_{Erec}= integrating time for E_{rec})



P_{rec} (100%) =	15,12	kW
E_{rec} (100%) =	0,13	mJ
t_{Erec} =	0,10	µs

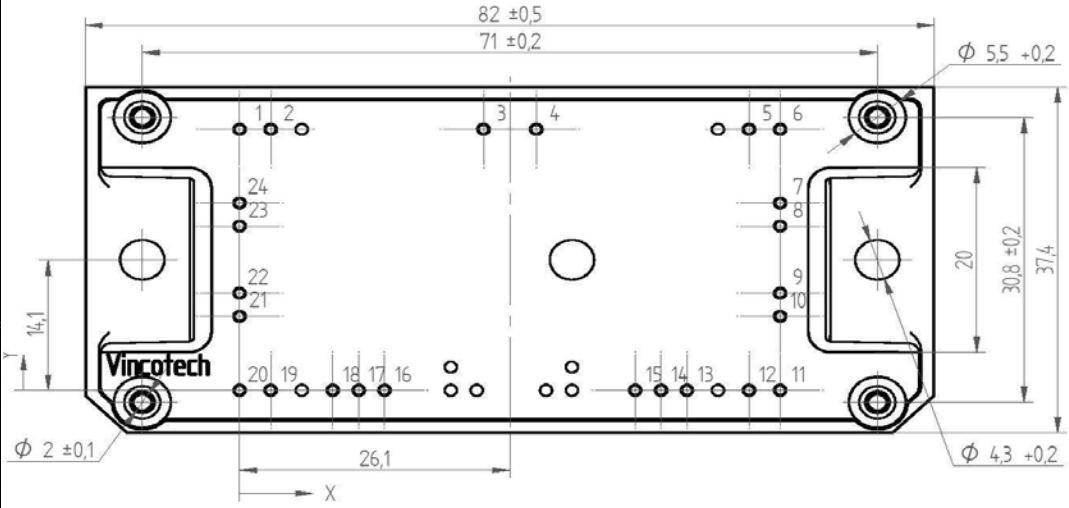
Ordering Code and Marking - Outline - Pinout

Ordering Code & Marking

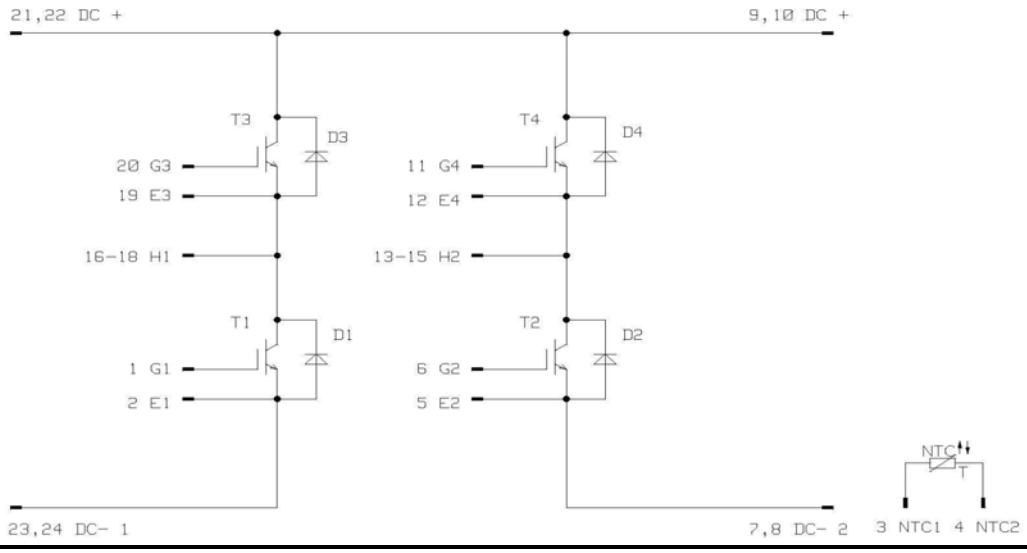
Version	Ordering Code	in DataMatrix as	in packaging barcode as
without thermal paste 12mm housing	10-FY064PA050SG10-M582F08	M582F08	M582F08

Outline

Pin table		
Pin	X	Y
1	0	28,2
2	3	28,2
3	23,55	28,2
4	28,65	28,2
5	49,2	28,2
6	52,2	28,2
7	52,2	20,25
8	52,2	17,75
9	52,2	10,5
10	52,2	8
11	52,2	0
12	49,2	0
13	43,2	0
14	40,7	0
15	38,2	0
16	14	0
17	11,5	0
18	9	0
19	3	0
20	0	0
21	0	8
22	0	10,5
23	0	17,75
24	0	20,25



Pinout



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