
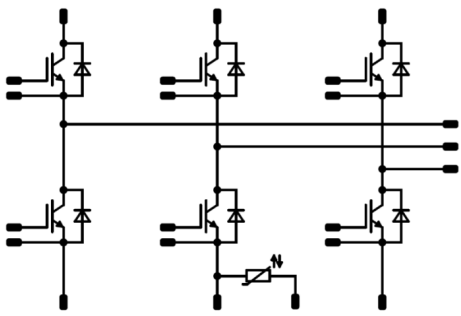




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<i>flow PACK 2</i>	1200 V / 75 A
<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center; background-color: #cccccc; margin: 0;">Features</p> <ul style="list-style-type: none"> IGBT4 (1200V) technology for low saturation losses and improved EMC behavior Compact and low inductive design Integrated temperature sensor </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center; background-color: #cccccc; margin: 0;">Target applications</p> <ul style="list-style-type: none"> Industrial drives </div> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; background-color: #cccccc; margin: 0;">Types</p> <ul style="list-style-type: none"> 30-P2126PA075SC-L288F09Y </div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center; background-color: #cccccc; margin: 0;"><i>flow 2 17 mm housing</i></p>  </div> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; background-color: #cccccc; margin: 0;">Schematic</p>  </div>

Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Inverter Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current	I_C	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	91	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	225	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	232	W
Gate-emitter voltage	V_{GES}		±20	V
Short circuit ratings	t_{SC} V_{CC}	$T_j \leq 150\text{ °C}$ $V_{GE} = 15\text{ V}$	10 800	µs V
Maximum Junction Temperature	T_{jmax}		175	°C



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Maximum Ratings

$T_j = 25\text{ °C}$, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Inverter Diode				
Peak Repetitive Reverse Voltage	V_{RRM}		1200	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ $T_s = 80\text{°C}$	84	A
Repetitive peak forward current	I_{FRM}		150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{°C}$	154	W
Maximum Junction Temperature	T_{jmax}		175	°C

Module Properties

Thermal Properties

Storage temperature	T_{stg}		-40...+125	°C
Operation temperature under switching condition	T_{jop}		-40...($T_{jmax} - 25$)	°C

Isolation Properties

Isolation voltage	V_{isol}	DC Test Voltage* $t_p = 2\text{ s}$	4000	V
		AC Test Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			min. 12,7	mm
Clearance			min. 12,7	mm
Comparative Tracking Index	CTI		> 200	

* 100% tested in production



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Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max		

Inverter Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0026	25	5,3	5,8	6,3	V
Collector-emitter saturation voltage	V_{CEsat}		15		75	25 125 150	1,58	1,83 2,12 2,19	2,07	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			1	μA
Gate-emitter leakage current	I_{GES}		20	0		25			120	nA
Internal gate resistance	r_g							10		Ω
Input capacitance	C_{ies}	$f = 1$ MHz	0	25		25		4300		pF
Reverse transfer capacitance	C_{res}							160		

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material $\lambda = 3,4$ W/mK						0,41		K/W
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IGBT Switching

Turn-on delay time	$t_{d(on)}$	$R_{goff} = 4$ Ω $R_{gon} = 4$ Ω	±15	600	75	25		149		ns
Rise time	t_r					125		160		
						150		164		
						25		39		
Turn-off delay time	$t_{d(off)}$					125		44		
						150		43		
		25		250						
Fall time	t_f	125		312						
		150		329						
		25		76						
Turn-on energy (per pulse)	E_{on}	$Q_{t-FWD} = 7,2$ μC $Q_{t-FWD} = 12,8$ μC $Q_{t-FWD} = 14,8$ μC				25		7,677	mWs	
						125		10,716		
						150		11,421		
Turn-off energy (per pulse)	E_{off}					25		4,222		
						125		6,490		
						150		7,220		



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Characteristic Values

Parameter	Symbol	Conditions					Value			Unit
		V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max		

Inverter Diode

Static

Parameter	Symbol	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Forward voltage	V_F			75	25 125 150		1,74 1,75 1,74	2,05	V
Reverse leakage current	I_r		1200		25 150			14	μA

Thermal

Parameter	Symbol	Conditions	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material $\lambda = 3,4$ W/mK	0,62	K/W

FWD Switching

Parameter	Symbol	Conditions	Value	Unit		
Peak recovery current	I_{RRM}		25 125 150	40 49 52		
Reverse recovery time	t_{rr}		25 125 150	351 497 546		
Recovered charge	Q_r	$di/dt = 2324$ A/μs $di/dt = 1749$ A/μs $di/dt = 1360$ A/μs	±15 600 75	25 125 150	7,180 12,829 14,755	μC
Reverse recovered energy	E_{rec}		25 125 150	2,500 4,587 5,374	mWs	
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$		25 125 150	116 103 99	A/μs	

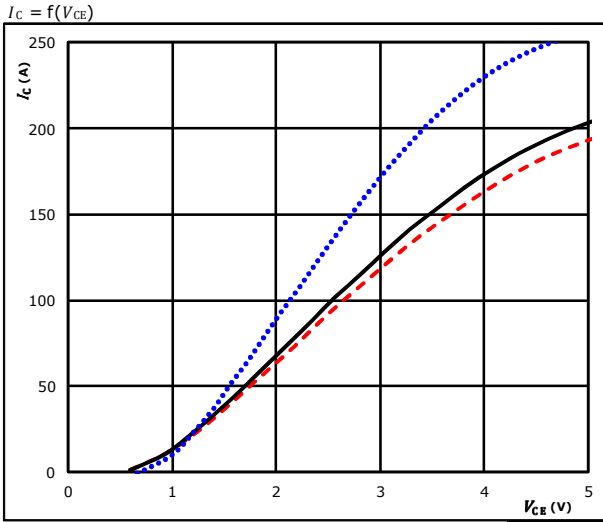
Thermistor

Parameter	Symbol	Conditions	Value	Unit		
Rated resistance	R		25	22	kΩ	
Deviation of R_{100}	$\Delta_{R/R}$	$R_{100} = 1486$ Ω	100	-12	+14	%
Power dissipation	P		25	200	mW	
Power dissipation constant			25	2	mW/K	
B-value	$B_{(25/50)}$	Tol. ±3%	25	3950	K	
B-value	$B_{(25/100)}$	Tol. ±3%	25	3998	K	
Vincotech NTC Reference				B		



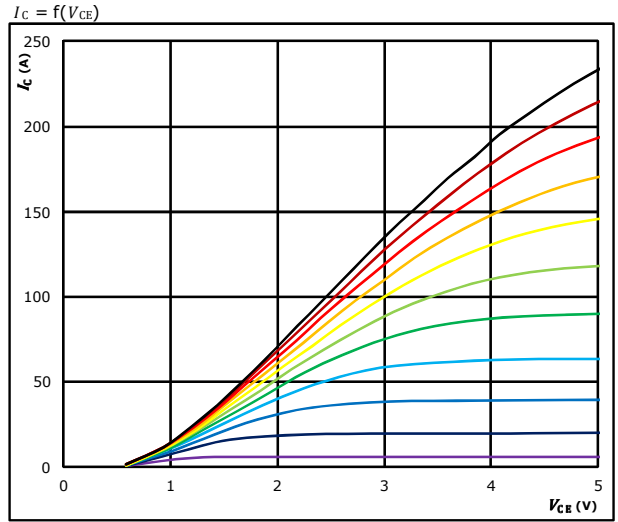
Inverter Switch Characteristics

Typical output characteristics IGBT



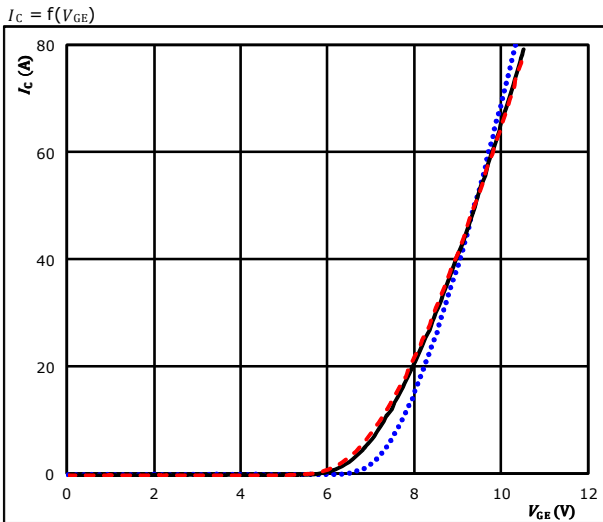
$t_p = 250 \mu s$
 $V_{GE} = 15 V$
 $T_j:$ 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

Typical output characteristics IGBT



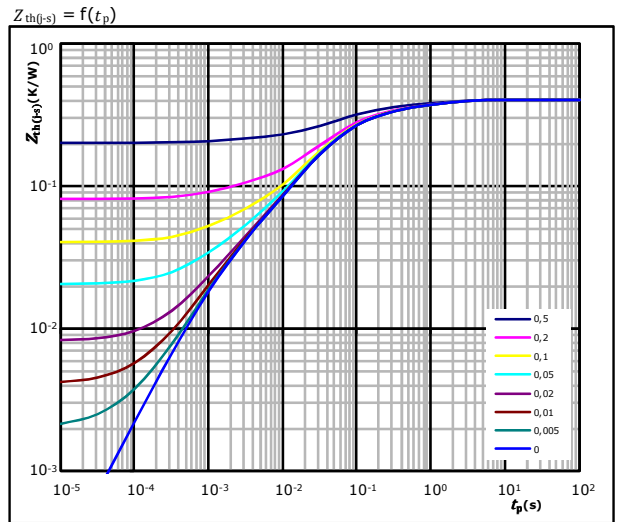
$t_p = 250 \mu s$
 $T_j = 150 \text{ } ^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

Typical transfer characteristics IGBT



$t_p = 100 \mu s$
 $V_{CE} = 10 V$
 $T_j:$ 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

Transient Thermal Impedance as function of Pulse duration IGBT



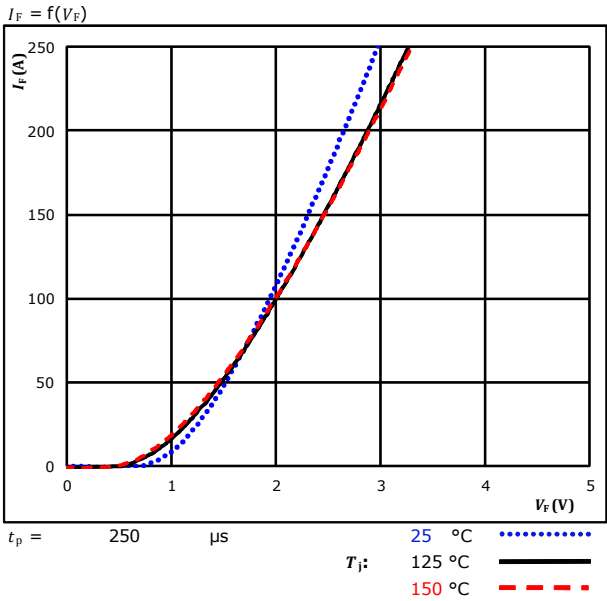
$D = t_p / T$
 $R_{th(j-s)} = 0,41 \text{ K/W}$
 IGBT thermal model values

R (K/W)	τ (s)
6,08E-02	1,41E+00
9,91E-02	1,99E-01
1,78E-01	4,61E-02
5,03E-02	1,41E-02
2,16E-02	1,42E-03

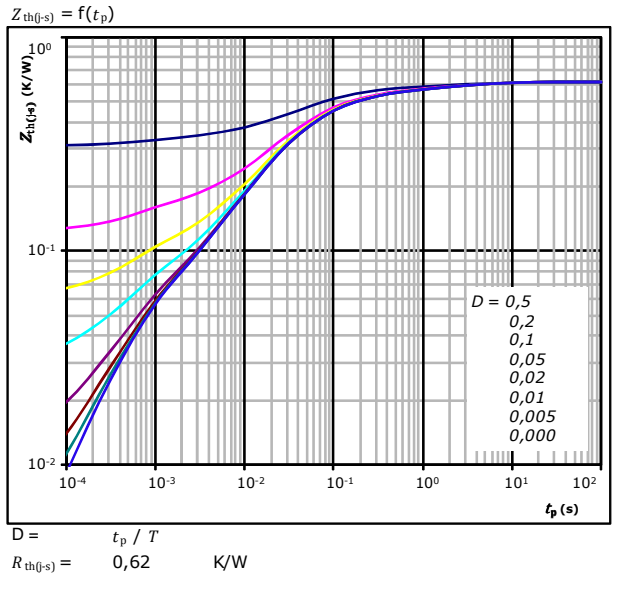


Inverter Diode Characteristics

Typical forward characteristics FWD



Transient thermal impedance as a function of pulse width FWD



FWD thermal model values

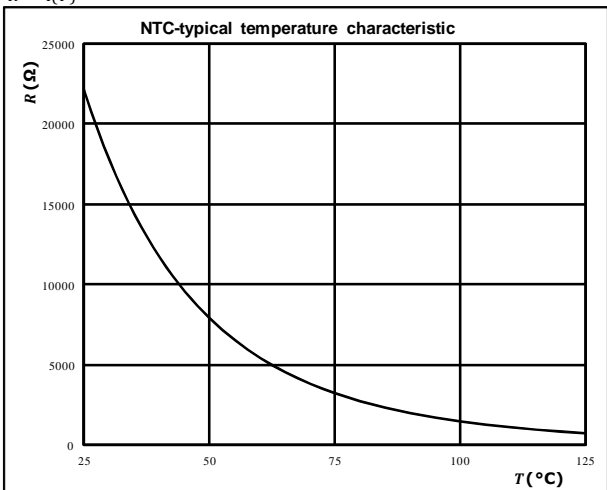
R (K/W)	τ (s)
4,35E-02	4,66E+00
7,48E-02	5,44E-01
1,95E-01	8,13E-02
2,13E-01	2,26E-02
4,51E-02	5,48E-03
4,51E-02	5,92E-04

Thermistor Characteristics

figure 1. Thermistor

Typical NTC characteristic as a function of temperature

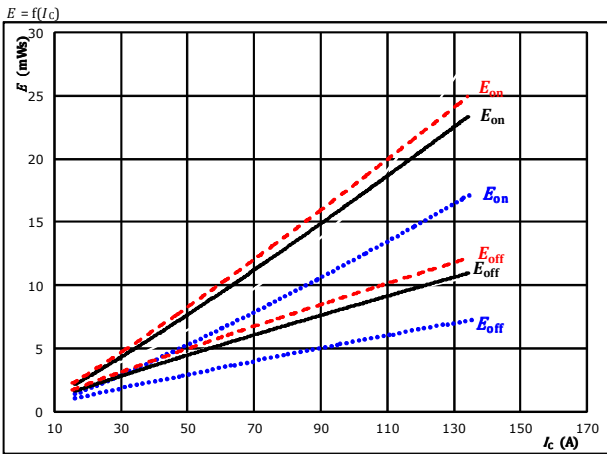
$R = f(T)$





Switching Characteristics

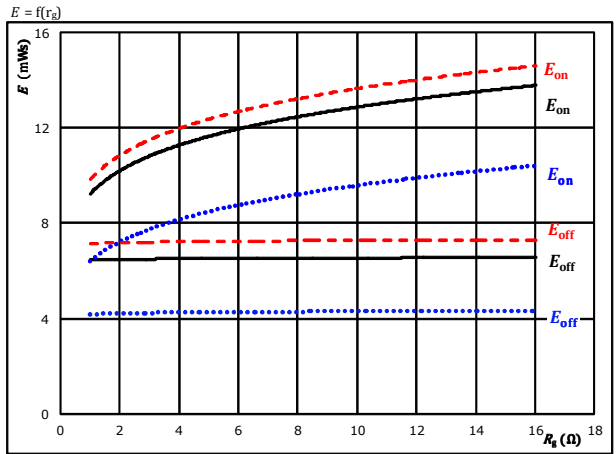
Figure 1. IGBT
Typical switching energy losses as a function of collector current



With an inductive load at

$V_{CE} = 600$ V	$T_j: 25^\circ\text{C}$ (dotted blue)
$V_{GE} = \pm 15$ V	$T_j: 125^\circ\text{C}$ (solid black)
$R_{gon} = 4$ Ω	$T_j: 150^\circ\text{C}$ (dashed red)
$R_{goff} = 4$ Ω	

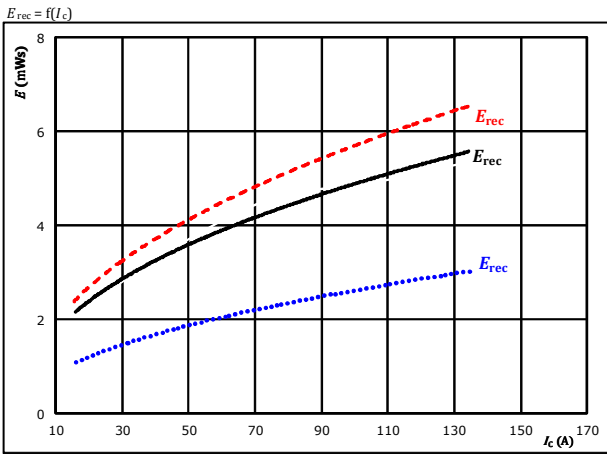
Figure 2. IGBT
Typical switching energy losses as a function of gate resistor



With an inductive load at

$V_{CE} = 600$ V	$T_j: 25^\circ\text{C}$ (dotted blue)
$V_{GE} = \pm 15$ V	$T_j: 125^\circ\text{C}$ (solid black)
$I_C = 75$ A	$T_j: 150^\circ\text{C}$ (dashed red)

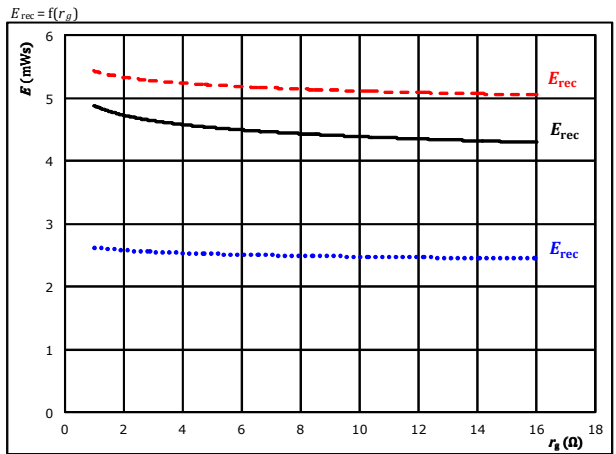
Figure 3. FWD
Typical reverse recovered energy loss as a function of collector current



With an inductive load at

$V_{CE} = 600$ V	$T_j: 25^\circ\text{C}$ (dotted blue)
$V_{GE} = \pm 15$ V	$T_j: 125^\circ\text{C}$ (solid black)
$R_{gon} = 4$ Ω	$T_j: 150^\circ\text{C}$ (dashed red)

Figure 4. FWD
Typical reverse recovered energy loss as a function of gate resistor



With an inductive load at

$V_{CE} = 600$ V	$T_j: 25^\circ\text{C}$ (dotted blue)
$V_{GE} = \pm 15$ V	$T_j: 125^\circ\text{C}$ (solid black)
$I_C = 75$ A	$T_j: 150^\circ\text{C}$ (dashed red)

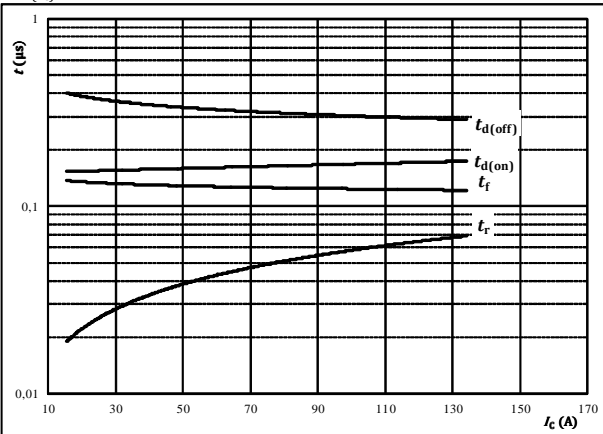


Switching Characteristics

Figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



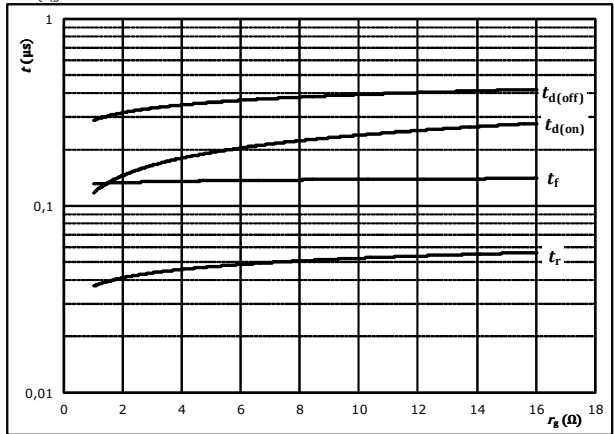
With an inductive load at

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

Figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(r_g)$$



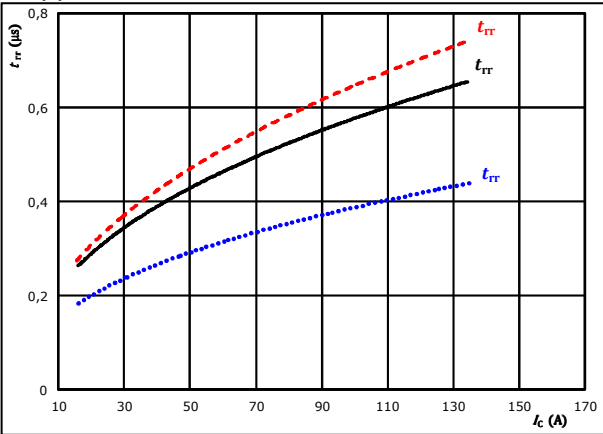
With an inductive load at

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

Figure 7. FWD

Typical reverse recovery time as a function of collector current

$$t_{rr} = f(I_C)$$

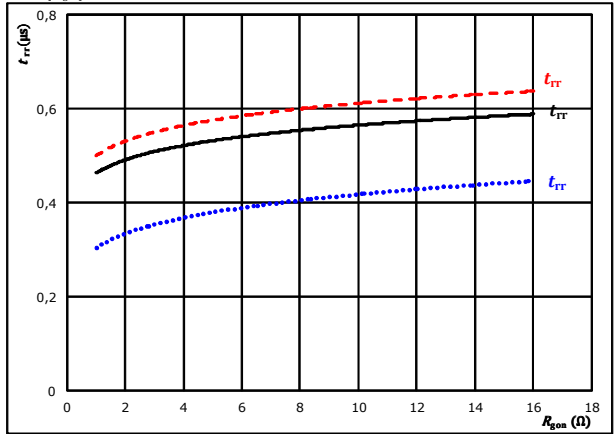


At	$V_{CE} =$	600	V	$T_j:$	25 °C
	$V_{GE} =$	±15	V		125 °C	————
	$R_{gon} =$	4	Ω		150 °C	- - - -

Figure 8. FWD

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

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

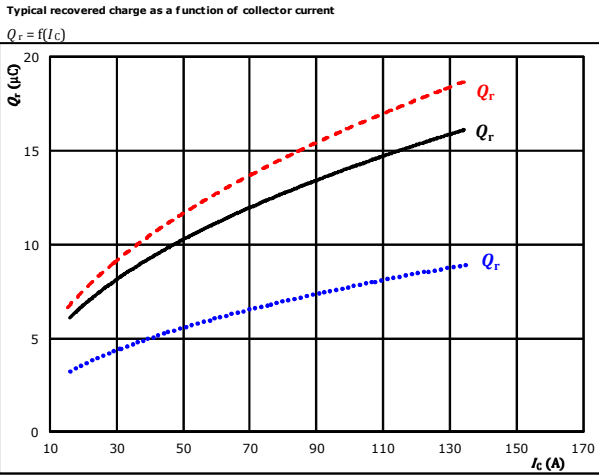


At	$V_{CE} =$	600	V	$T_j:$	25 °C
	$V_{GE} =$	±15	V		125 °C	————
	$I_C =$	75	A		150 °C	- - - -



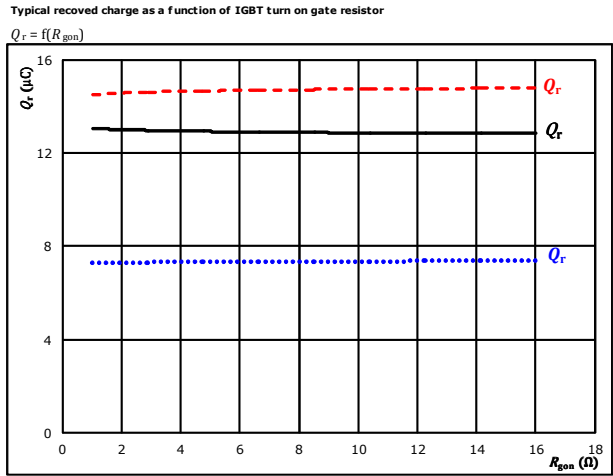
Switching Characteristics

Figure 9. FWD
Typical recovered charge as a function of collector current



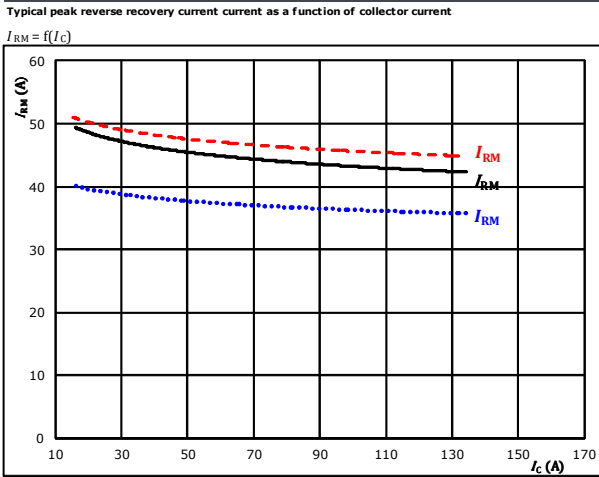
At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gpn} = 4$ Ω
 $T_j: 25$ °C (dotted blue)
 125 °C (solid black)
 150 °C (dashed red)

Figure 10. FWD
Typical recovered charge as a function of IGBT turn on gate resistor



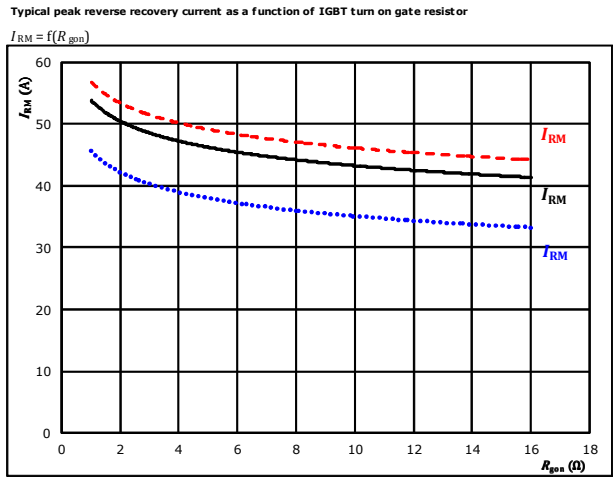
At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 75$ A
 $T_j: 25$ °C (dotted blue)
 125 °C (solid black)
 150 °C (dashed red)

Figure 11. FWD
Typical peak reverse recovery current as a function of collector current



At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gpn} = 4$ Ω
 $T_j: 25$ °C (dotted blue)
 125 °C (solid black)
 150 °C (dashed red)

Figure 12. FWD
Typical peak reverse recovery current as a function of IGBT turn on gate resistor



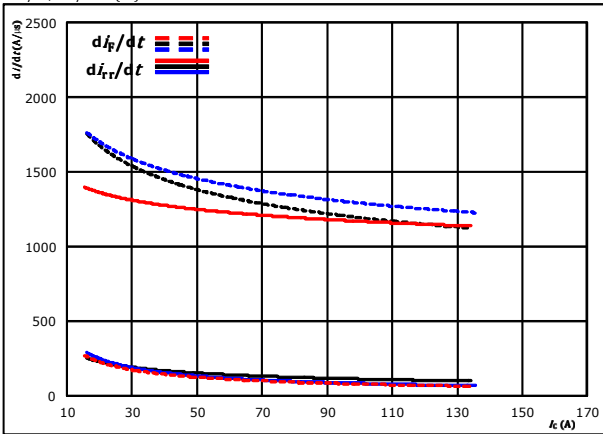
At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_c = 75$ A
 $T_j: 25$ °C (dotted blue)
 125 °C (solid black)
 150 °C (dashed red)



Switching Characteristics

Figure 13. FWD

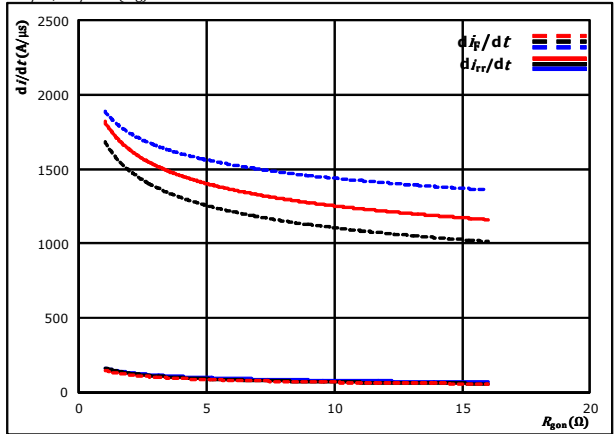
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_{rr}/dt = f(I_c)$



At $V_{CE} = 600$ V $T_j = 25$ °C
 $V_{GE} = \pm 15$ V $T_j = 125$ °C ———
 $R_{gon} = 4$ Ω $T_j = 150$ °C - - - - -

Figure 14. FWD

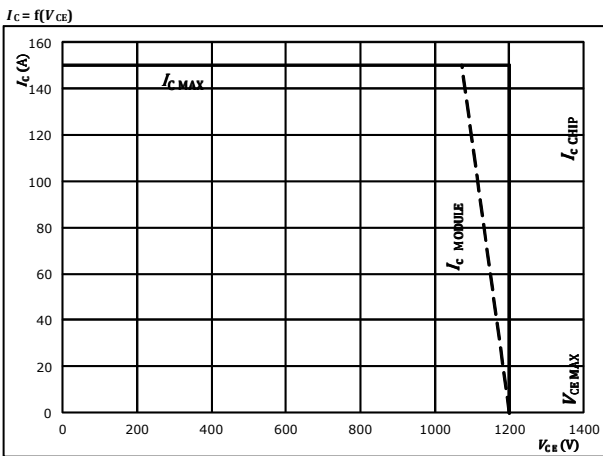
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
 $di_f/dt, di_{rr}/dt = f(R_g)$



At $V_{CE} = 600$ V $T_j = 25$ °C
 $V_{GE} = \pm 15$ V $T_j = 125$ °C ———
 $I_c = 75$ A $T_j = 150$ °C - - - - -

Figure 15. IGBT

Reverse bias safe operating area



At $T_j = 175$ °C
 $R_{gon} = 4$ Ω
 $R_{goff} = 4$ Ω



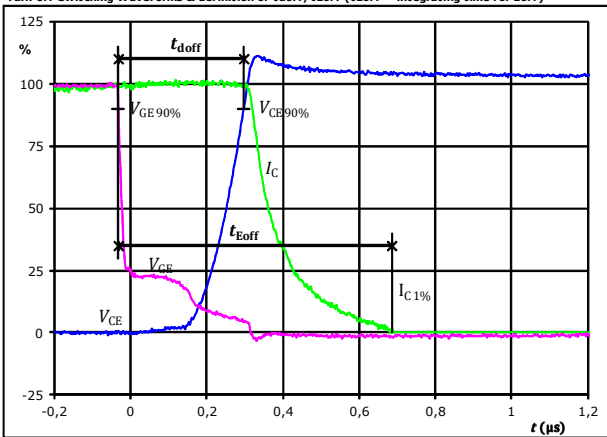
Switching Definitions

General conditions

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

Figure 1. IGBT

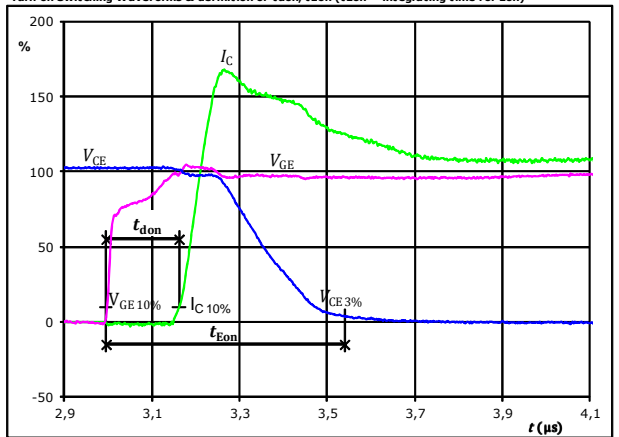
Turn-off Switching Waveforms & definition of t_{doff} , t_{Eoff} (t_{Eoff} = integrating time for Eoff)



$V_{GE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	600	V
$I_C(100\%) =$	75	A
$t_{doff} =$	0,329	μs
$t_{Eoff} =$	0,718	μs

Figure 2. IGBT

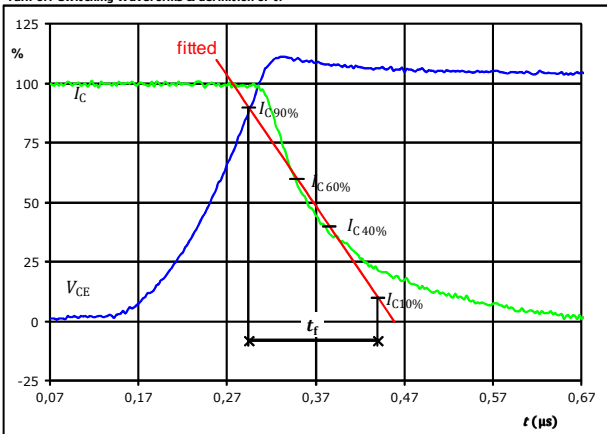
Turn-on Switching Waveforms & definition of t_{don} , t_{Eon} (t_{Eon} = integrating time for Eon)



$V_{GE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	600	V
$I_C(100\%) =$	75	A
$t_{don} =$	0,164	μs
$t_{Eon} =$	0,544	μs

Figure 3. IGBT

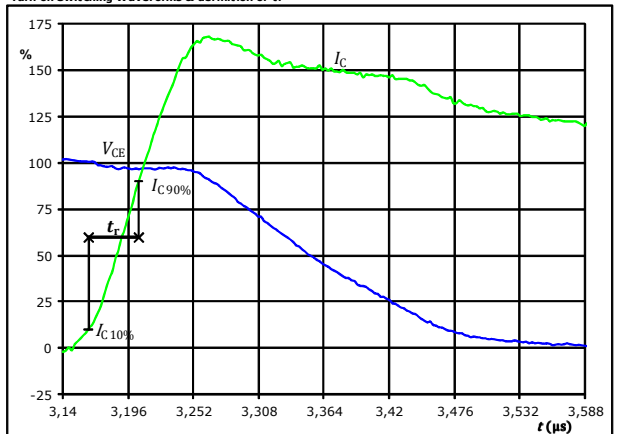
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%) =$	600	V
$I_C(100\%) =$	75	A
$t_f =$	0,136	μs

Figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

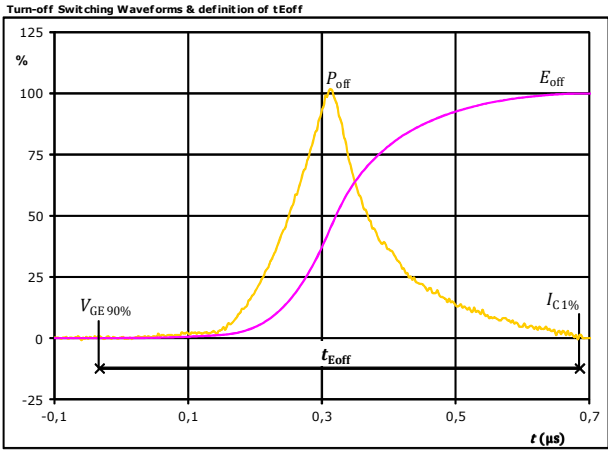


$V_C(100\%) =$	600	V
$I_C(100\%) =$	75	A
$t_r =$	0,043	μs



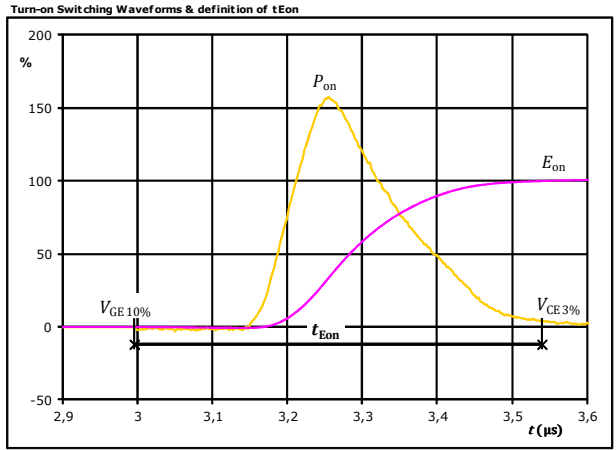
Switching Characteristics

Figure 5. IGBT



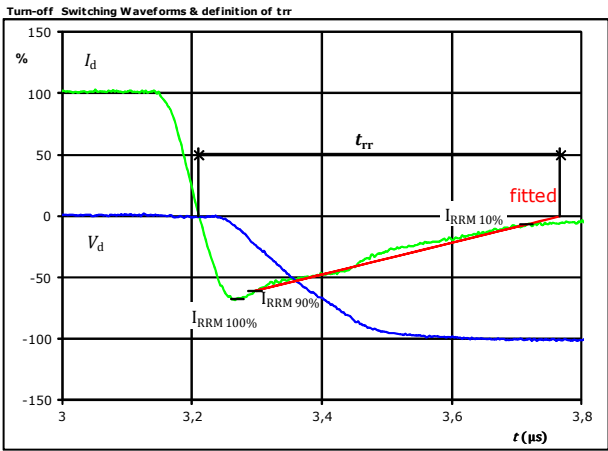
$P_{off}(100\%) =$	44,90	kW
$E_{off}(100\%) =$	7,22	mJ
$t_{Eoff} =$	0,72	µs

Figure 6. IGBT



$P_{on}(100\%) =$	44,90	kW
$E_{on}(100\%) =$	11,42	mJ
$t_{Eon} =$	0,54	µs

Figure 7. FWD

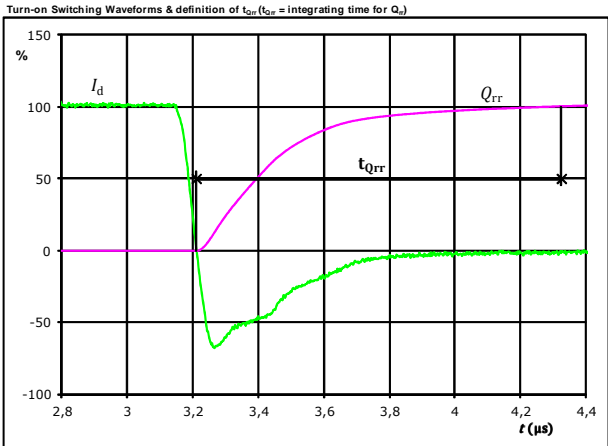


$V_d(100\%) =$	600	V
$I_d(100\%) =$	75	A
$I_{RRM}(100\%) =$	-52	A
$t_{tr} =$	0,546	µs



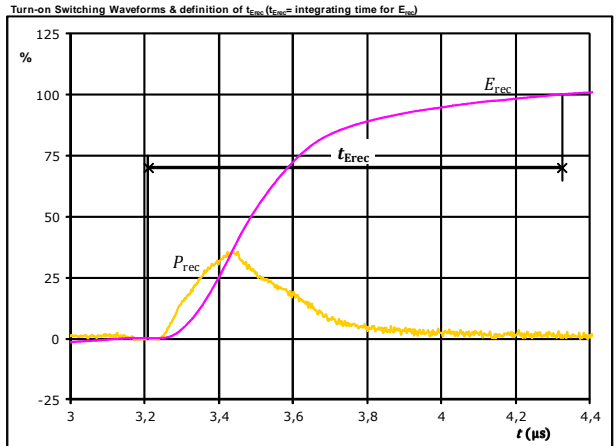
Switching Characteristics

Figure 8. FWD



I_d (100%) =	75	A
Q_{rr} (100%) =	14,76	μC
t_{Qrr} =	1,11	μs

Figure 9. FWD



P_{rec} (100%) =	44,90	kW
E_{rec} (100%) =	5,37	mJ
t_{Erec} =	1,11	μs



Vincotech

Ordering Code & Marking																																
Version			Ordering Code																													
without thermal paste 17mm housing			30-P2126PA075SC-L288F09Y																													
<table border="1"> <thead> <tr> <th rowspan="2">Text</th> <th colspan="2">Name</th> <th>Date code</th> <th>UL & VIN</th> <th>Lot</th> <th>Serial</th> </tr> <tr> <th>Type&Ver</th> <th>Lot number</th> <th>Serial</th> <th>Date code</th> <td></td> <td></td> </tr> </thead> <tbody> <tr> <td rowspan="2"> NN-NNNNNNNNNNNN TTTTIVVWWYY UL VIN LLLLL SSSS </td> <td colspan="2">N-NNNNNNNNNNNNNN-TTTTTV</td> <td>WWYY</td> <td>UL VIN</td> <td>LLLLL</td> <td>SSSS</td> </tr> <tr> <td>TTTTTIVV</td> <td>LLLLL</td> <td>SSSS</td> <td>WWYY</td> <td></td> <td></td> </tr> </tbody> </table>							Text	Name		Date code	UL & VIN	Lot	Serial	Type&Ver	Lot number	Serial	Date code			NN-NNNNNNNNNNNN TTTTIVVWWYY UL VIN LLLLL SSSS	N-NNNNNNNNNNNNNN-TTTTTV		WWYY	UL VIN	LLLLL	SSSS	TTTTTIVV	LLLLL	SSSS	WWYY		
Text	Name		Date code	UL & VIN	Lot	Serial																										
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	TTTTTIVV	LLLLL	SSSS	WWYY																												

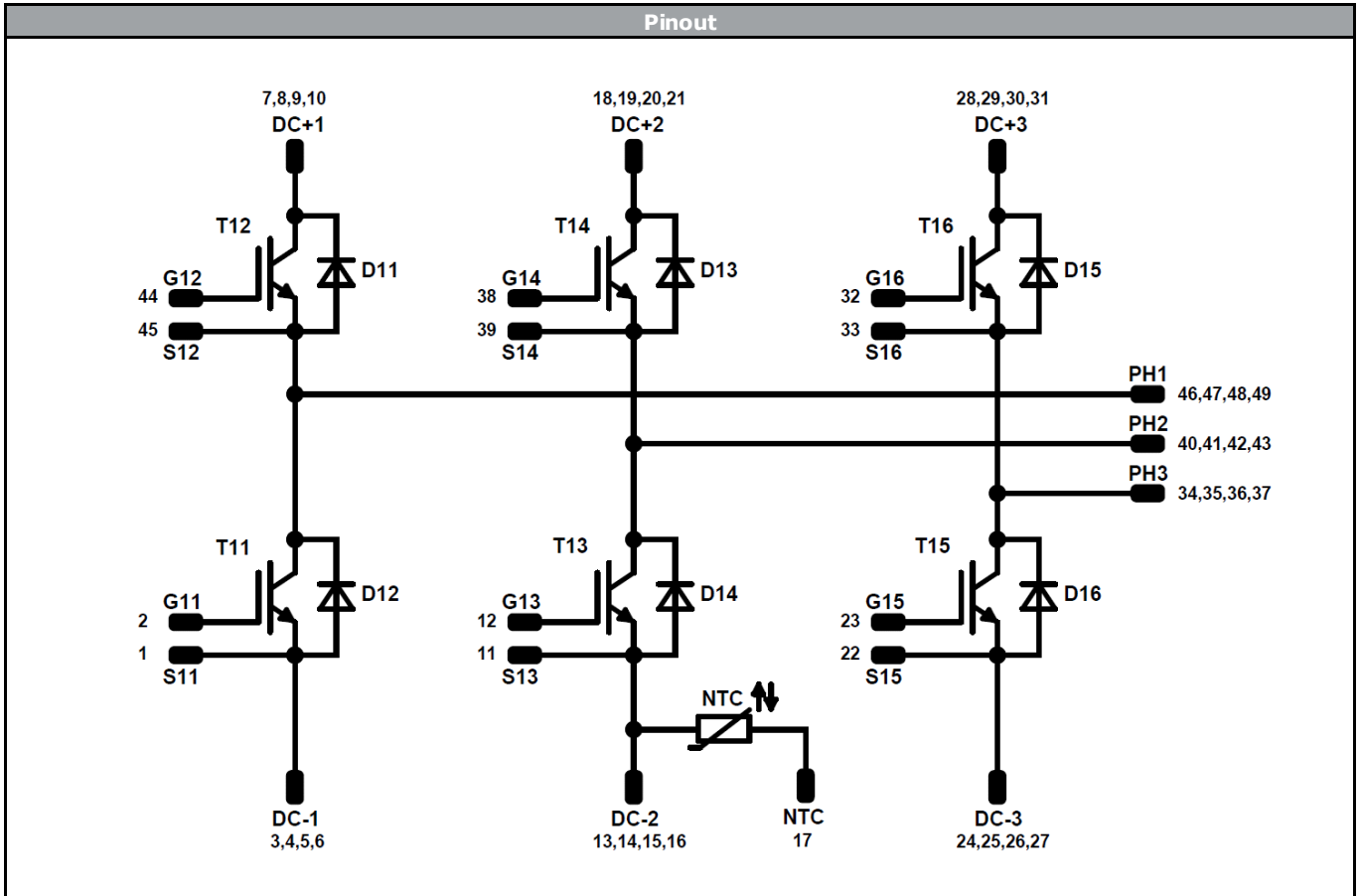
Pin table [mm]			
Pin	X	Y	Function
1	0,9	0	S11
2	0,9	3	G11
3	3,9	0	DC-1
4	3,9	2,7	DC-1
5	3,9	5,4	DC-1
6	6,6	0	DC-1
7	15,2	0	DC+1
8	15,2	2,7	DC+1
9	17,9	0	DC+1
10	17,9	2,7	DC+1
11	26,2	0	S13
12	26,2	3	G13
13	29,2	0	DC-2
14	29,2	2,7	DC-2
15	29,2	5,4	DC-2
16	31,9	0	DC-2
17	32,2	4,05	NTC
18	40,5	0	DC+2
19	40,5	2,7	DC+2
20	43,2	0	DC+2
21	43,2	2,7	DC+2
22	51,5	0	S15
23	51,5	3	G15
24	54,5	0	DC-3
25	54,5	2,7	DC-3
26	54,5	5,4	DC-3
27	57,2	0	DC-3
28	65,8	0	DC+3
29	65,8	2,7	DC+3
30	68,5	0	DC+3
31	68,5	2,7	DC+3
32	64,7	36	G16
33	61,7	36	S16
34	58,7	36	PH3
35	56	36	PH3
36	53,3	36	PH3
37	50,6	36	PH3
38	39,4	36	G14
39	36,4	36	S14
40	33,4	36	PH2
41	30,7	36	PH2
42	28	36	PH2
43	25,3	36	PH2
44	14,1	36	G12
45	11,1	36	S12
46	8,1	36	PH1
47	5,4	36	PH1
48	2,7	36	PH1
49	0	36	PH1

Outline

The side view shows a component with a height of 21,4 ±0,5 mm and a base width of 18,08 ±0,21 mm. The top view shows a rectangular component with a width of 34,25 mm and a height of 18 mm. Pin locations are marked with numbers 1 through 49. A tolerance of ±0,5 mm is specified for pin positions at the end of pins. The coordinate axes X and Y are shown, with X being the horizontal axis and Y being the vertical axis.



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Identification					
ID	Component	Voltage	Current	Function	Comment
T11 , T12 , T13 , T14 , T15 , T16	IGBT	1200 V	75 A	Inverter Switch	
D11 , D12 , D13 , D14 , T15 , T16	FWD	1200 V	75 A	Inverter Diode	
NTC	Thermistor			Thermistor	




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Packaging instruction			
Standard packaging quantity (SPQ)	36	>SPQ	Standard
		<SPQ	Sample

Handling instruction
Handling instructions for <i>flow 2</i> packages see vincotech.com website.

Package data
Package data for <i>flow 2</i> 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
30-x2126PA075SC-L288F09x-D3-14	31 May 2017	New package quantity	All

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.