Vincotech

30-P2126PA075SC-L288F09Y
datasheet

flow **PACK 2** **1200 V / 75 A**

Features

- IGBT4 (1200V) technology for low saturation losses and improved EMC behavior
- Compact and low inductive design
- Integrated temperature sensor

Target applications

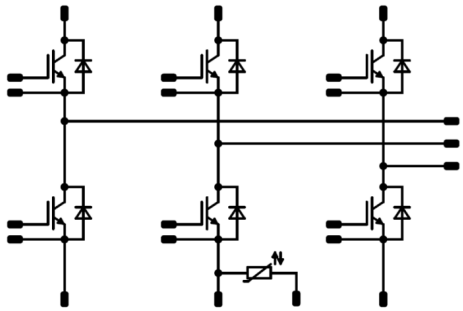
- Industrial drives

Types

- 30-P2126PA075SC-L288F09Y

flow 2 17 mm housing

Schematic



Maximum Ratings

T_j = 25 °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 °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 °C	232	W
Gate-emitter voltage	V_{GES}		±20	V
Short circuit ratings	t_{SC} V_{CC}	$T_j \leq$ 150 °C V_{GE} = 15 V	10 800	µs V
Maximum Junction Temperature	T_{jmax}		175	°C

Maximum Ratings

T_j = 25 °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°C	84	A
Repetitive peak forward current	I_{FRM}			150	A
Total power dissipation	P_{tot}	T_j = T_{jmax}	T_s = 80°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 s	4000	V
		AC Test Voltage	t_p = 1 min	2500	V
Creepage distance				min. 12,7	mm
Clearance				min. 12,7	mm
Comparative Tracking Index	CTI			> 200	

* 100% tested in production

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 λ = 3,4 W/mK						0,41		K/W
IGBT Switching										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 4 Ω R_{gon} = 4 Ω	±15	600	75	25 125 150		149 160 164		ns
Rise time	t_r					25 125 150		39 44 43		
Turn-off delay time	$t_{d(off)}$					25 125 150		250 312 329		
Fall time	t_f					25 125 150		76 122 136		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 7,2 µC Q_{rFWD} = 12,8 µC Q_{rFWD} = 14,8 µC				25 125 150		7,677 10,716 11,421		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		4,222 6,490 7,220		

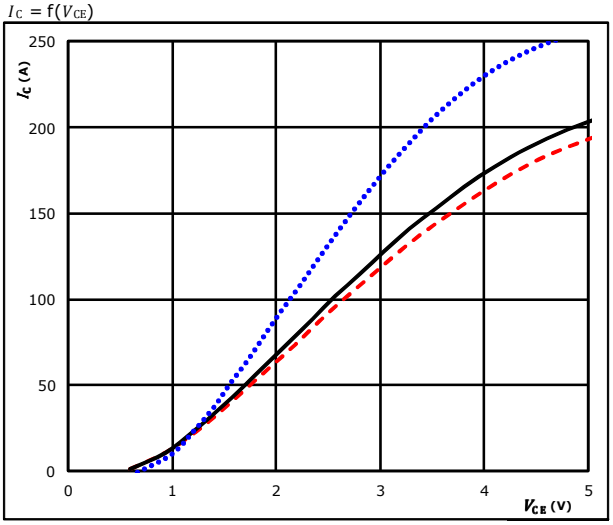
Characteristic Values

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 Diode										
Static										
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										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						0,62		K/W
FWD Switching										
Peak recovery current	I_{RRM}	di/dt = 2324 A/µs di/dt = 1749 A/µs di/dt = 1360 A/µs	±15	600	75	25 125 150		40 49 52		A
Reverse recovery time	t_{rr}					25 125 150		351 497 546		ns
Recovered charge	Q_r					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										
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**

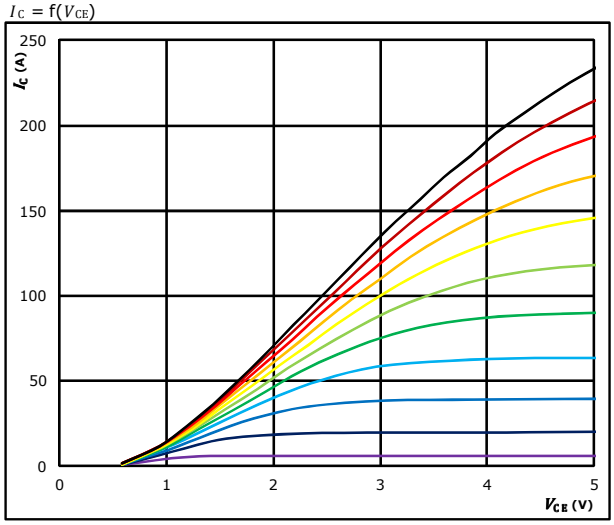
$I_C = f(V_{CE})$



t_p =	250	µs	T_j:	25 °C
V_{GE} =	15	V		125 °C
				150 °C

Typical output characteristics **IGBT**

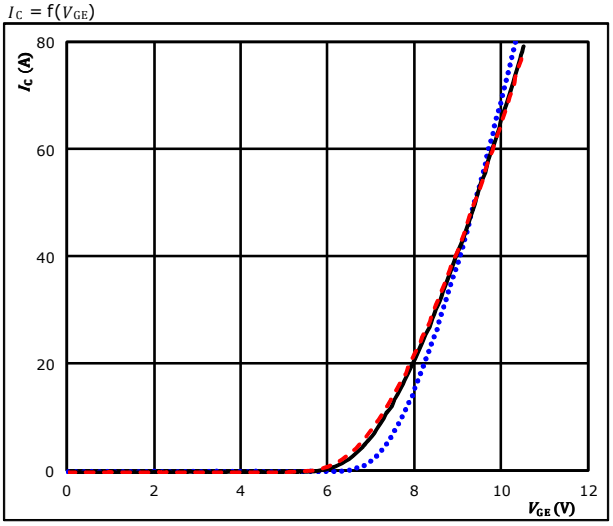
$I_C = f(V_{CE})$



t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

Typical transfer characteristics **IGBT**

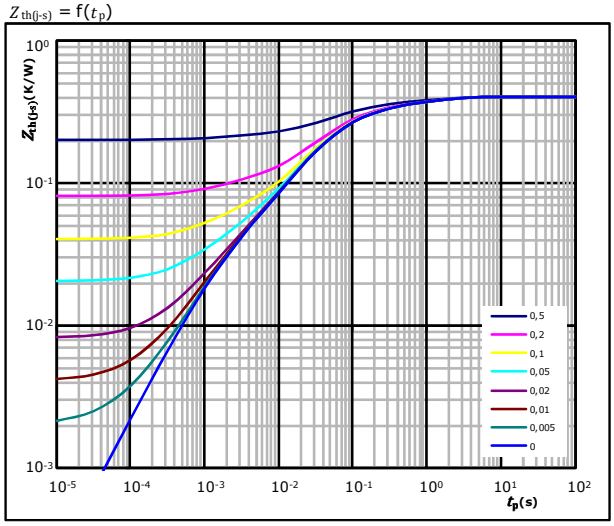
$I_C = f(V_{GE})$



t_p =	100	µs	T_j:	25 °C
V_{CE} =	10	V		125 °C
				150 °C

Transient Thermal Impedance as function of Pulse duration **IGBT**

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,41	K/W

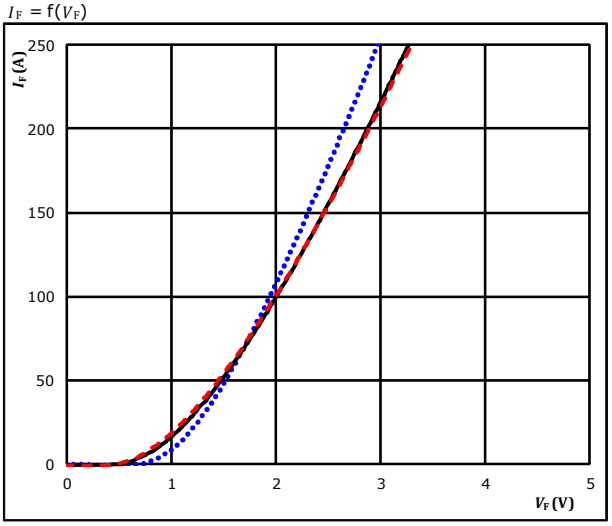
IGBT thermal model values

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**

$I_F = f(V_F)$

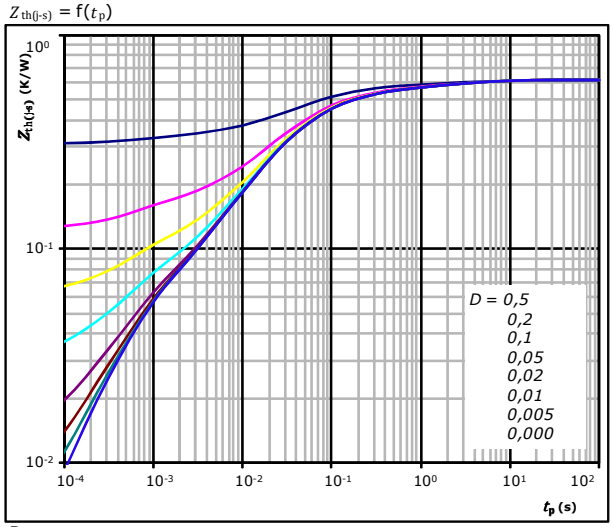


t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

Transient thermal impedance as a function of pulse width **FWD**

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



D = t_p / T

$R_{th(j-s)}$ = 0,62 K/W

FWD thermal model values

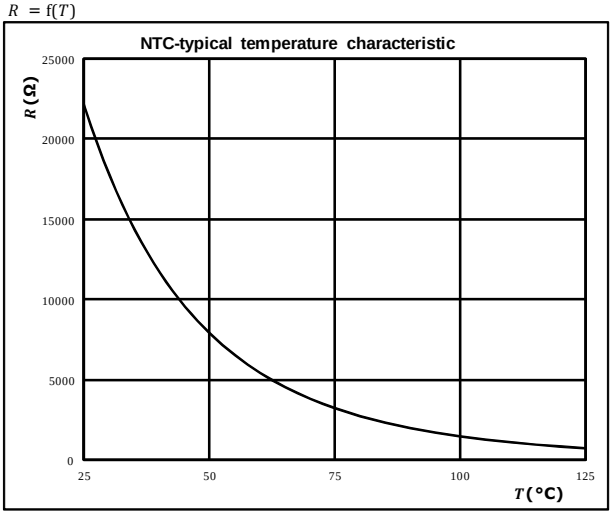
R (K/W)	τ (s)
4,35E-02	4,66E+00
7,48E-02	5,44E-01
1,95E-01	8,13E-02
2,13E-01	2,26E-02
4,51E-02	5,48E-03
4,51E-02	5,92E-04

Thermistor Characteristics

figure 1. **Thermistor**

Typical NTC characteristic as a function of temperature

$R = f(T)$

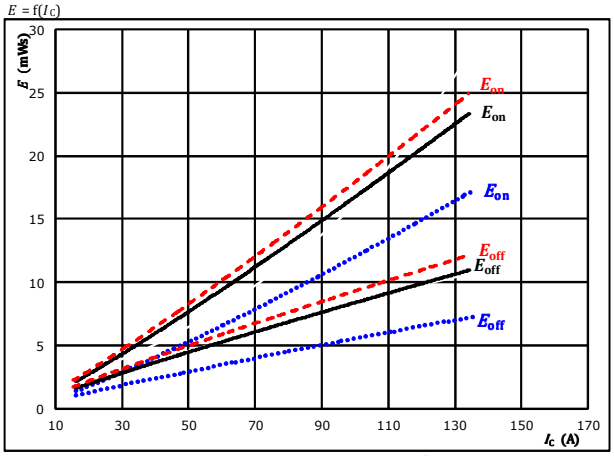


Switching Characteristics

Figure 1. IGBT

Typical switching energy losses as a function of collector current

$E = f(I_C)$



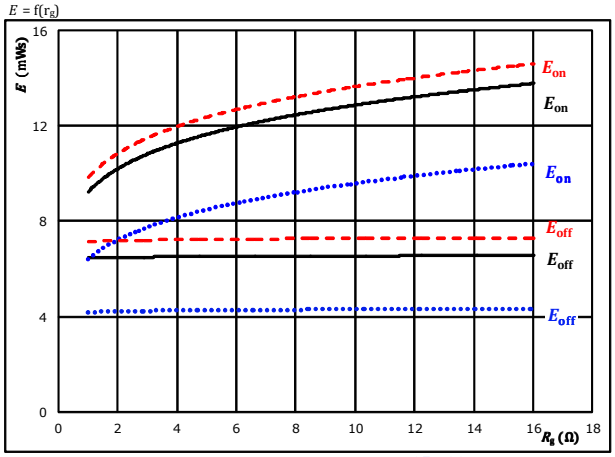
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C	·····
V_{GE} =	±15	V		125 °C	———
R_{gon} =	4	Ω		150 °C	– – –
R_{goff} =	4	Ω			

Figure 2. IGBT

Typical switching energy losses as a function of gate resistor

$E = f(r_G)$



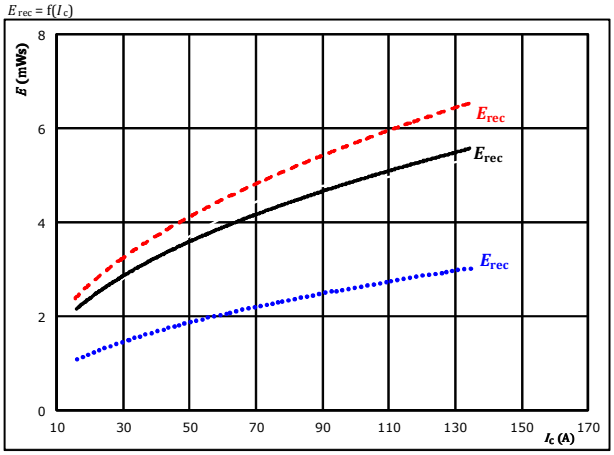
With an inductive load at

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

Figure 3. FWD

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



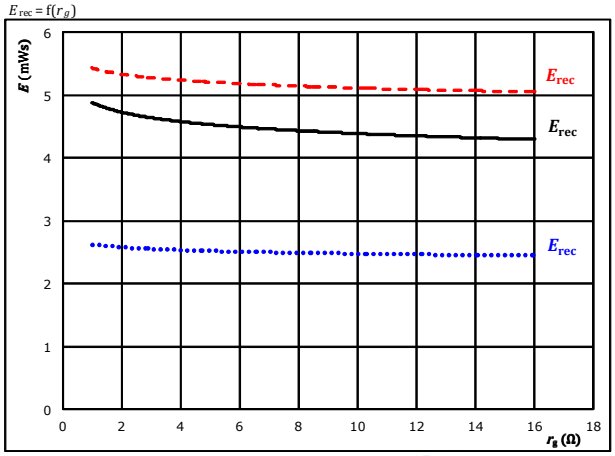
With an inductive load at

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

Figure 4. FWD

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(r_g)$



With an inductive load at

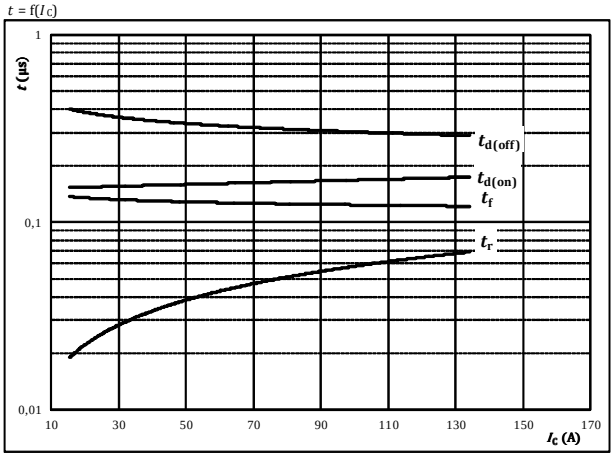
V_{CE} =	600	V	T_j:	25 °C	·····
V_{GE} =	±15	V		125 °C	———
I_C =	75	A		150 °C	– – –

Switching Characteristics

Figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



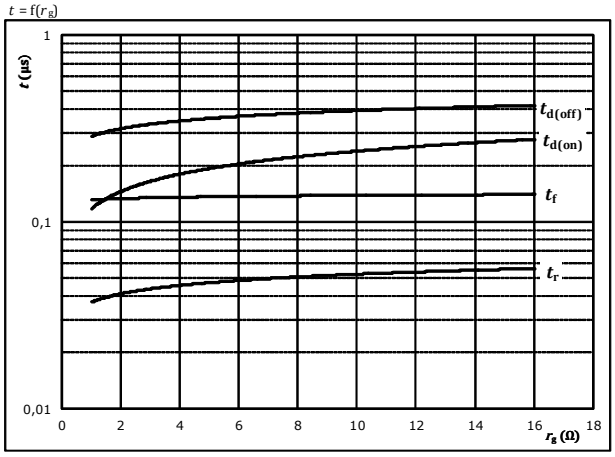
With an inductive load at

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

$t = f(r_g)$



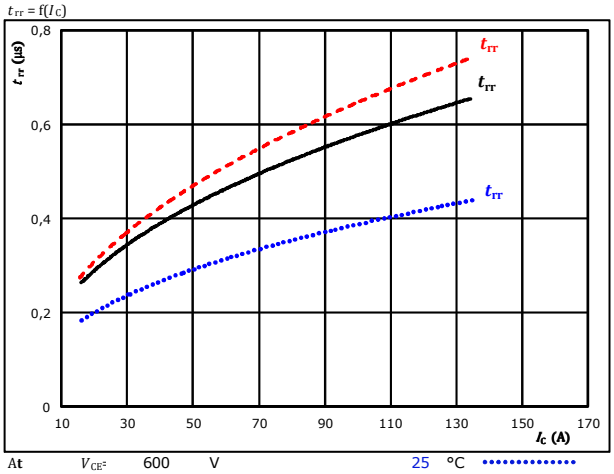
With an inductive load at

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

$t_{rr} = f(I_C)$

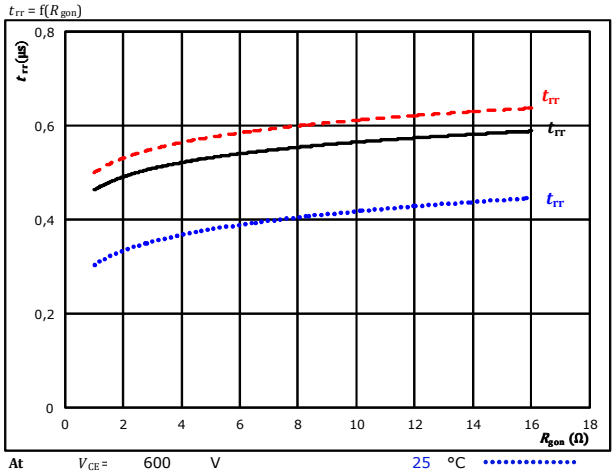


At					
V_{CE} =	600	V	T_j:	25 °C	·····
V_{GE} =	±15	V		125 °C	———
R_{gon} =	4	Ω		150 °C	– – –

Figure 8. **FWD**

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

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



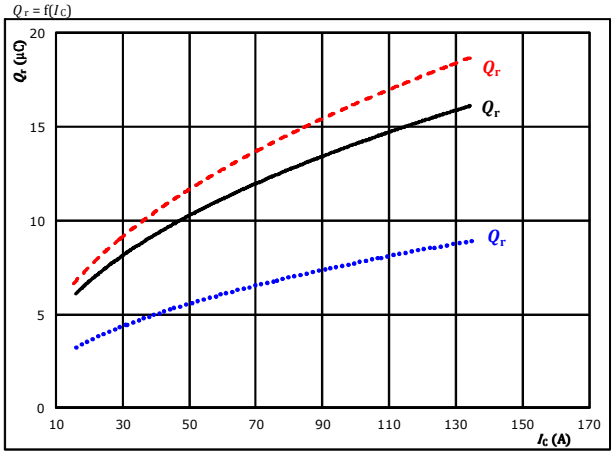
At					
V_{CE} =	600	V	T_j:	25 °C	·····
V_{GE} =	±15	V		125 °C	———
I_C =	75	A		150 °C	– – –

Switching Characteristics

Figure 9. FWD

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

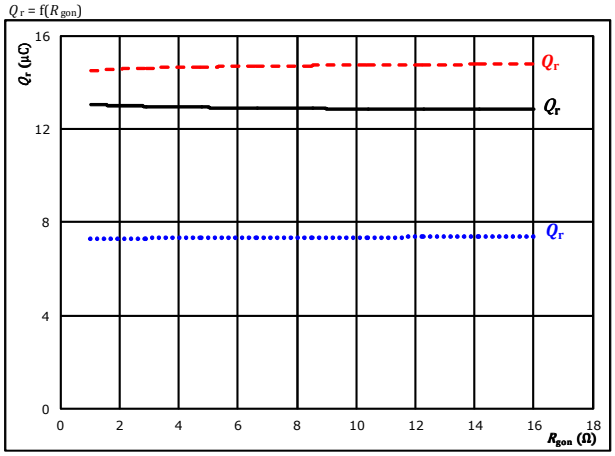


At	V_{CE} =	600	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	R_{gon} =	4	Ω		150 °C	

Figure 10. FWD

Typical recoved charge as a function of IGBT turn on gate resistor

$Q_r = f(R_{gon})$

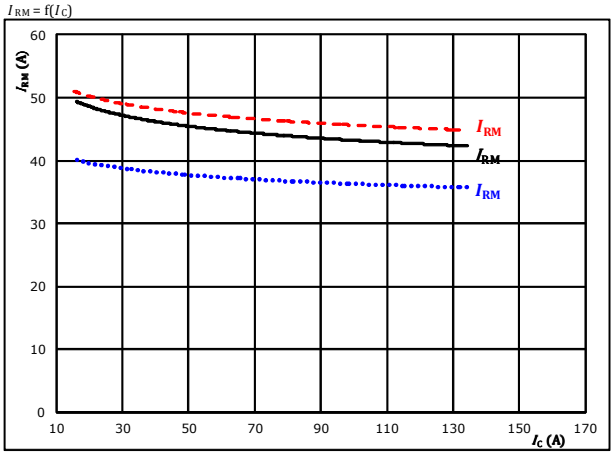


At	V_{CE}=	600	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	I_C=	75	A		150 °C	

Figure 11. FWD

Typical peak reverse recovery current current as a function of collector current

$I_{RM} = f(I_C)$

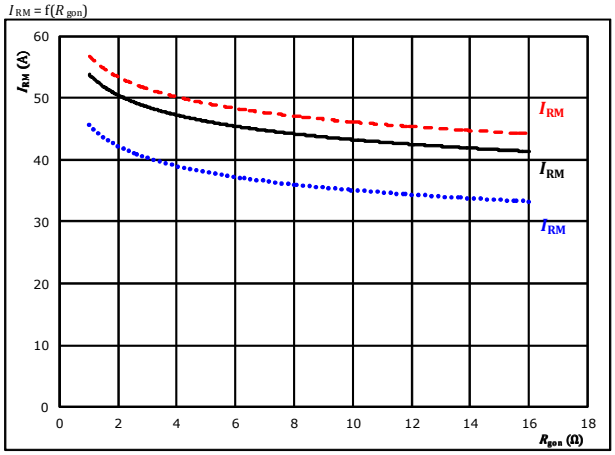


At	V_{CE}:	600	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	R_{gon} =	4	Ω		150 °C	

Figure 12. FWD

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

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



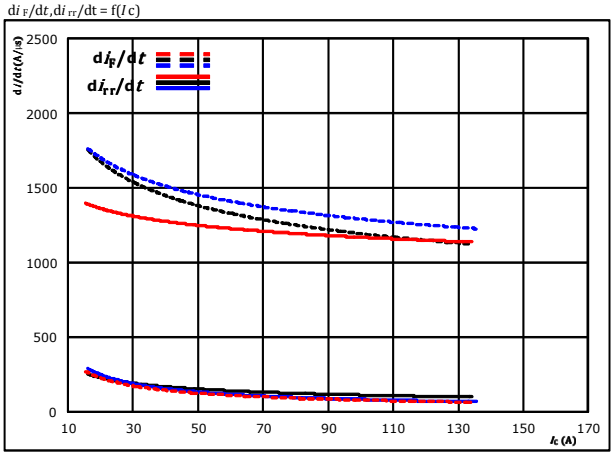
At	V_{CE} =	600	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	I_C =	75	A		150 °C	

Switching Characteristics

Figure 13. **FWD**

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

$di_F/dt, di_{rr}/dt = f(I_C)$

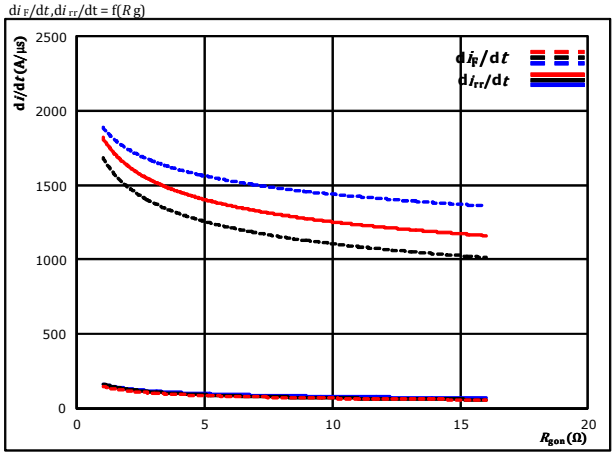


At						
V_{CE} =	600	V		25	°C	
V_{GE} =	±15	V	T_j:	125	°C	
R_{gon} =	4	Ω		150	°C	

Figure 14. **FWD**

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

$di_F/dt, di_{rr}/dt = f(R_g)$

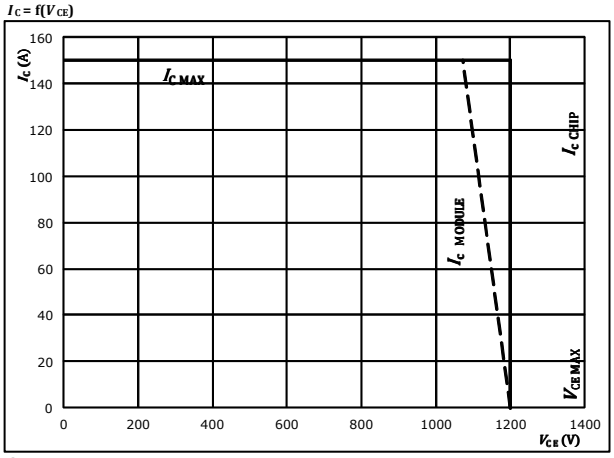


At						
V_{CE} =	600	V		25	°C	
V_{GE} =	±15	V	T_j:	125	°C	
I_C =	75	A		150	°C	

Figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

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

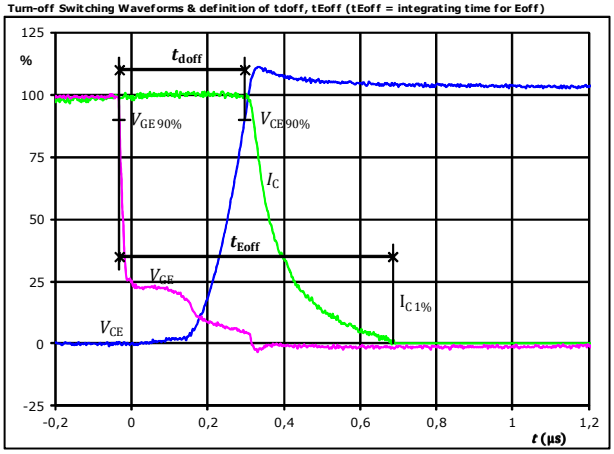
Switching Definitions

General conditions

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

Figure 1. IGBT

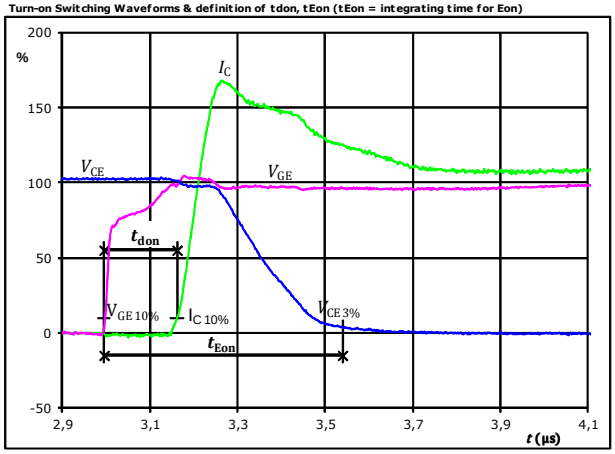
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



$V_{GE}(0\%)$ =	-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

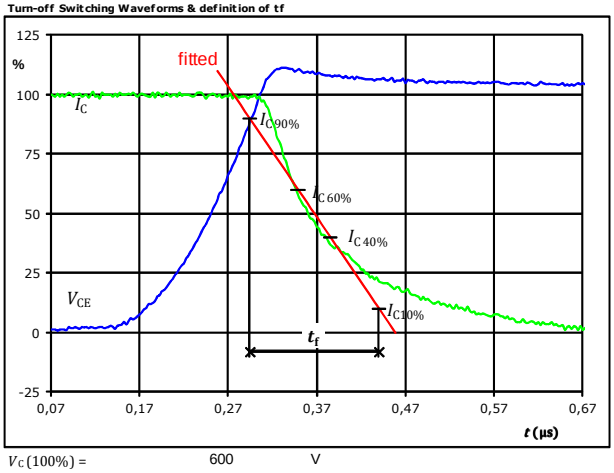
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



$V_{GE}(0\%)$ =	-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

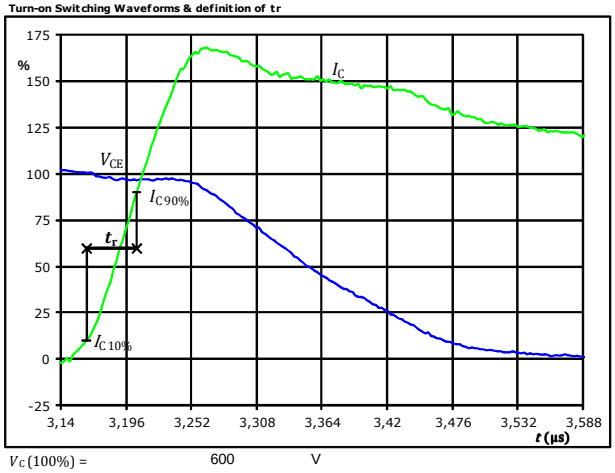
Turn-off Switching Waveforms & definition of tf



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

Figure 4. IGBT

Turn-on Switching Waveforms & definition of tr

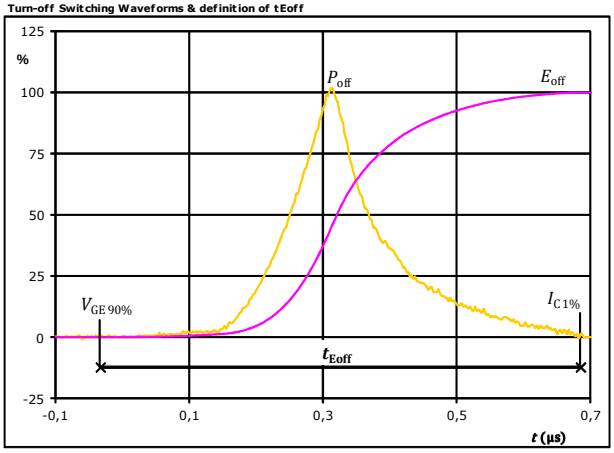


$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	75	A
t_r =	0,043	µs

Switching Characteristics

Figure 5. **IGBT**

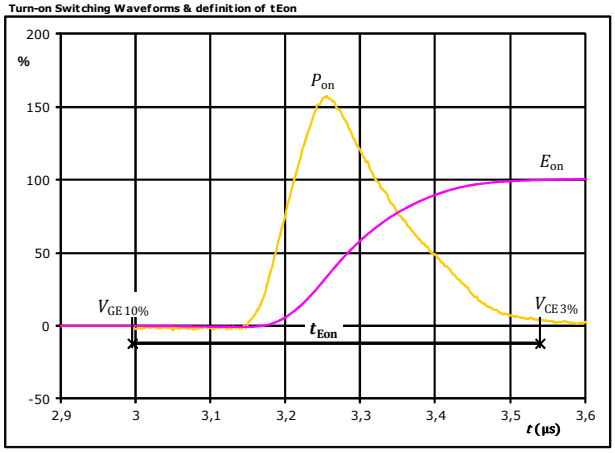
Turn-off Switching Waveforms & definition of tEoff



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

Figure 6. **IGBT**

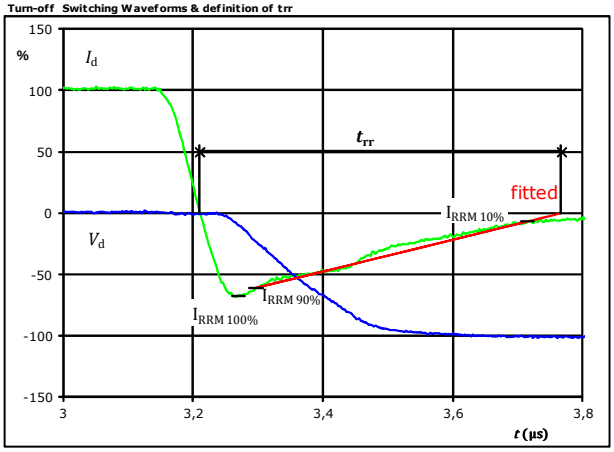
Turn-on Switching Waveforms & definition of tEon



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

Figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

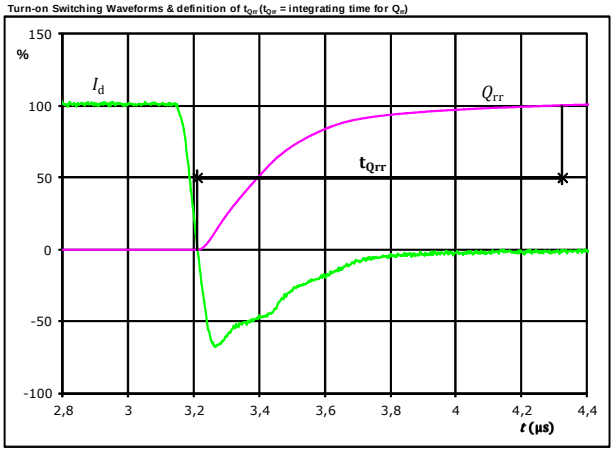


$V_d(100\%)$ =	600	V
$I_d(100\%)$ =	75	A
$I_{RRM}(100\%)$ =	-52	A
t_{rr} =	0,546	µs

Switching Characteristics

Figure 8. **FWD**

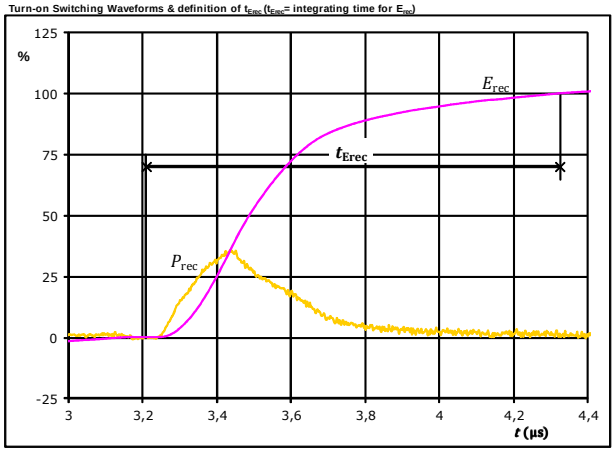
Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})



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

Figure 9. **FWD**

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



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

Vincotech

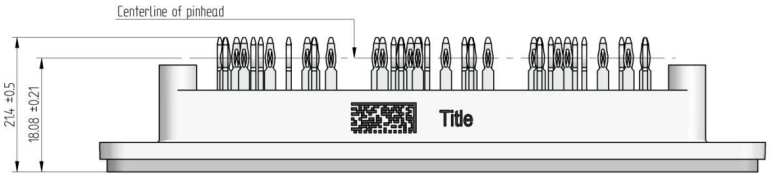
Ordering Code & Marking

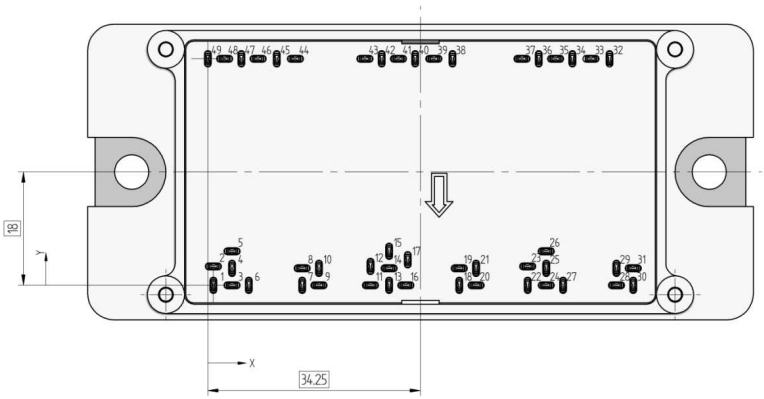
Version	Ordering Code
without thermal paste 17mm housing	30-P2126PA075SC-L288F09Y

Text	Name		Date code	UL & VIN	Lot	Serial
	N-NNNNNNNNNNNNN-TTTTTTV		WWYY	UL VIN	LLLLL	SSSS
Datamatrix	**Type&Ver**	**Lot number**	**Serial**	**Date code**		
	TTTTTTTVV	LLLLL	SSSS	WWYY		

Outline

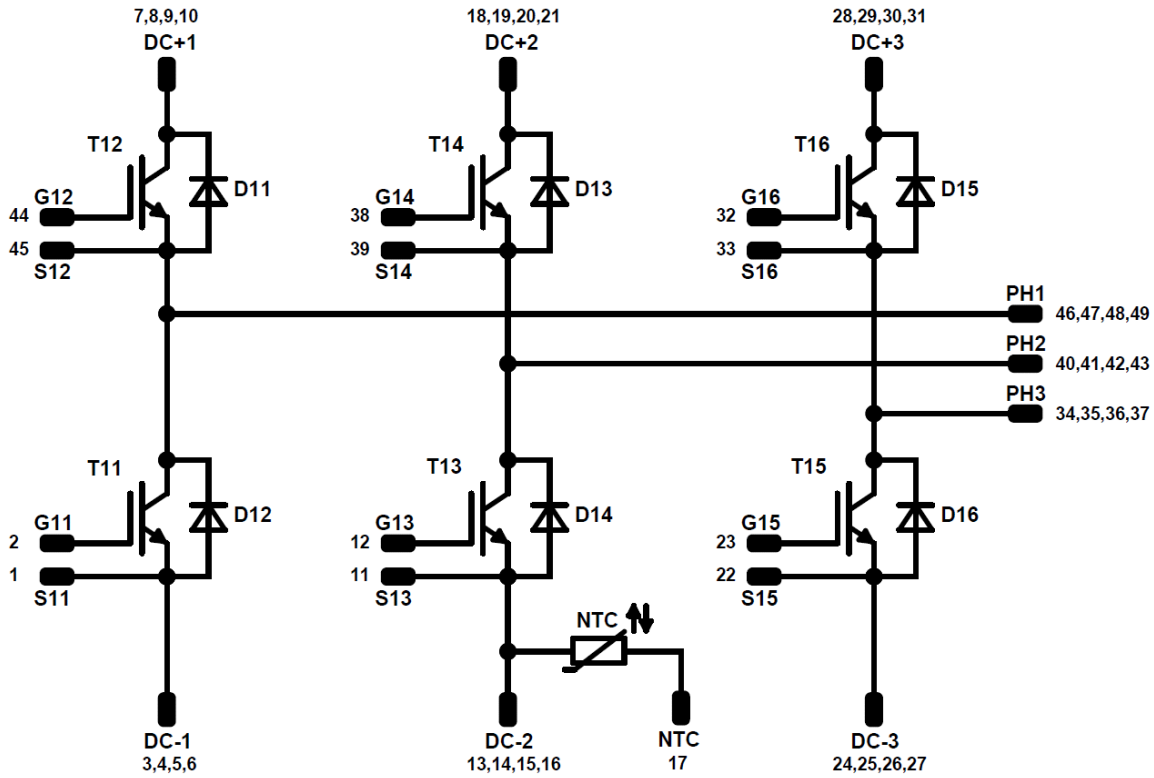
Pin table [mm]			
Pin	X	Y	Function
1	0,9	0	S11
2	0,9	3	G11
3	3,9	0	DC-1
4	3,9	2,7	DC-1
5	3,9	5,4	DC-1
6	6,6	0	DC-1
7	15,2	0	DC+1
8	15,2	2,7	DC+1
9	17,9	0	DC+1
10	17,9	2,7	DC+1
11	26,2	0	S13
12	26,2	3	G13
13	29,2	0	DC-2
14	29,2	2,7	DC-2
15	29,2	5,4	DC-2
16	31,9	0	DC-2
17	32,2	4,05	NTC
18	40,5	0	DC+2
19	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





Tolerance of pinpositions ±0,5 mm at the end of pins
Dimension of coordinate axis is only offset without tolerance

Pinout



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	

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

Handling instruction
Handling instructions for *flow* 2 packages see vincotech.com website.

Package data
Package data for *flow* 2 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