Vincotech

30-P2126PA075M7-L288F79Y
30-F2126PA075M7-L288F79
datasheet

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

Features

- IGBT M7 technology with low V_{CEsat} and improved EMC behavior
- Open emitter configuration
- Compact and low inductive design
- Builtin NTC

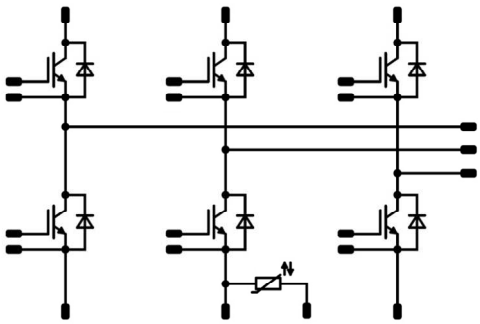
flow 2 17 mm housing

Press-fit pins Solder pins

Target applications

- Industrial Drives
- Power Supply
- UPS

Schematic



Types

- 30-P2126PA075M7-L288F79Y
- 30-F2126PA075M7-L288F79

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	93	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	191	W
Gate-emitter voltage	V_{GES}		±20	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	89	A
Repetitive peak forward current	I_{FRM}		200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	165	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
Creepage distance			min. 12,7	mm
Clearance			min. 12,7	mm
Comparative Tracking Index	CTI		> 200	

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	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0075	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		75	25 125 150		1,55 1,70 1,75	2,05	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			110	µA
Gate-emitter leakage current	I_{GES}		20	0		25			500	nA
Internal gate resistance	r_g							4		Ω
Input capacitance	C_{ies}		0	10		25		16000		pF
Output capacitance	C_{oes}							480		
Reverse transfer capacitance	C_{res}							190		
Gate charge	Q_g		15	600	75	25		490		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						0,50		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 2 Ω R_{gon} = 2 Ω	±15	600	75	25 125 150		197 208 212		ns
Rise time	t_r					25 125 150		29 38 39		
Turn-off delay time	$t_{d(off)}$					25 125 150		203 233 242		
Fall time	t_f					25 125 150		86 113 111		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 8,5 µC Q_{rFWD} = 13,4 µC Q_{rFWD} = 15,3 µC				25 125 150		5,559 7,819 8,496		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		5,076 6,804 7,285		

Characteristic Values

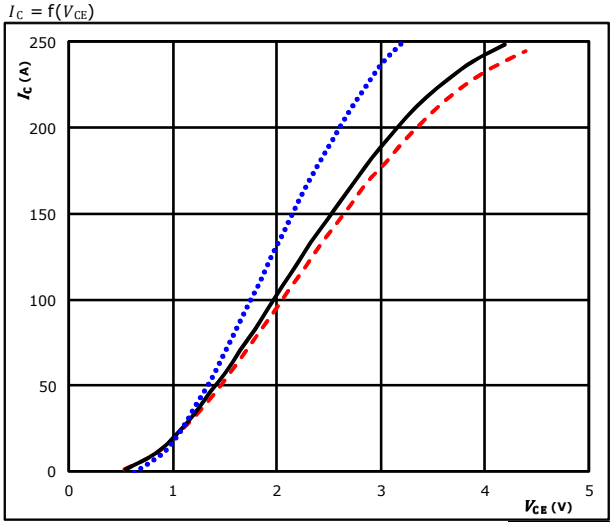
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Inverter Diode										
Static										
Forward voltage	V_F				100	25 125 150		1,82 1,96 1,97	2,1	V
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						0,58		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 2268 A/µs di/dt = 1969 A/µs di/dt = 1970 A/µs	±15	600	75	25 125 150		75 77 78		A
Reverse recovery time	t_{rr}					25 125 150		278 432 459		ns
Recovered charge	Q_r					25 125 150		8,539 13,394 15,308		µC
Reverse recovered energy	E_{rec}					25 125 150		3,195 5,193 5,995		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		802 614 544		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

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

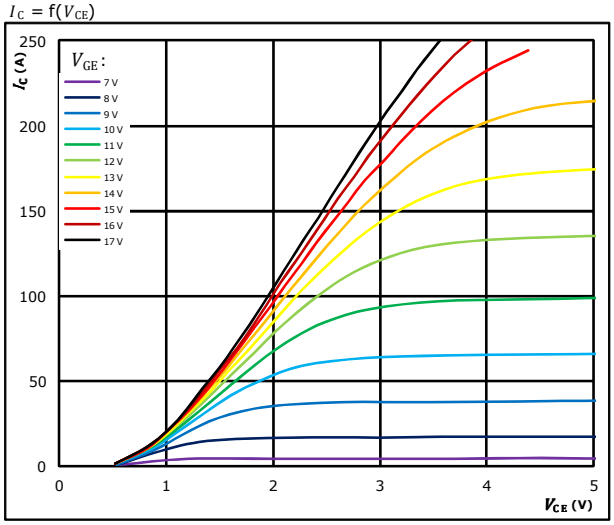


t_p =	250	µs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

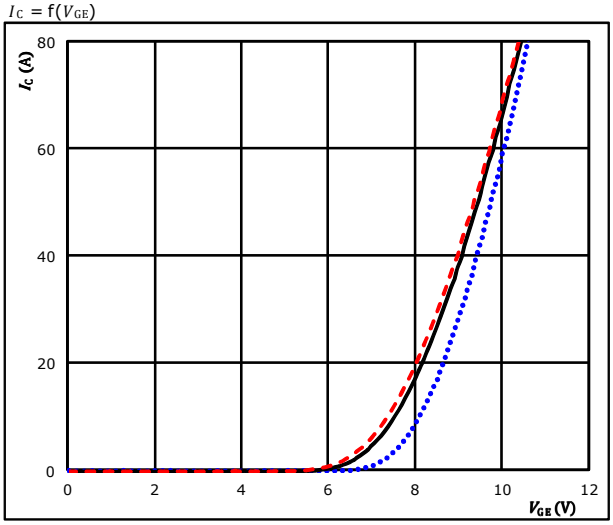


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

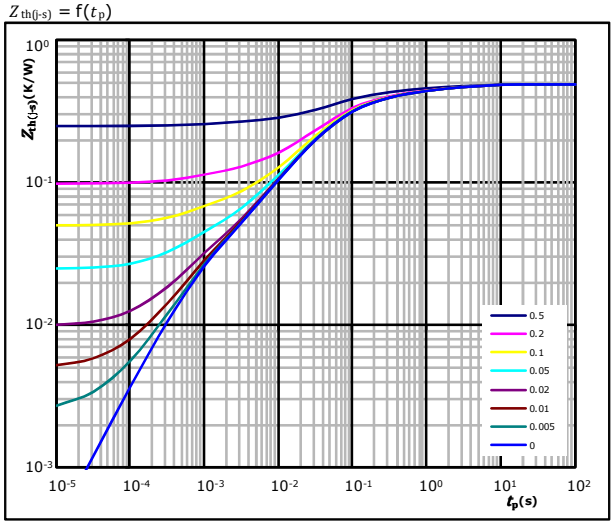


t_p =	100	µs		25 °C
V_{CE} =	10	V	T_j:	125 °C
				150 °C

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,50	K/W

IGBT thermal model values

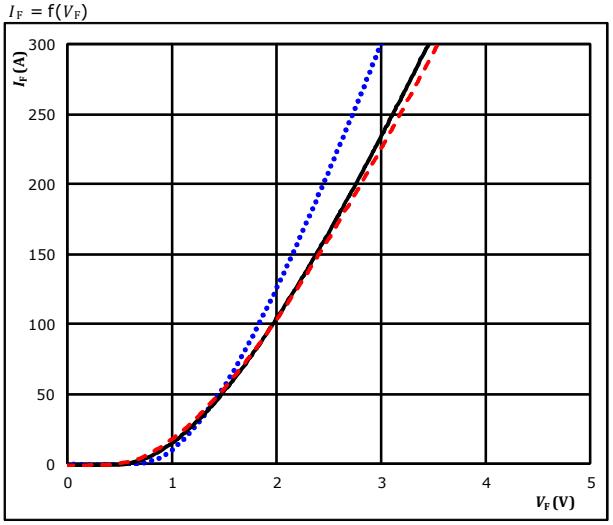
R (K/W)	τ (s)
4,16E-02	4,25E+00
5,55E-02	8,53E-01
1,25E-01	1,69E-01
2,12E-01	3,95E-02
4,29E-02	8,08E-03
2,08E-02	7,43E-04

Inverter Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



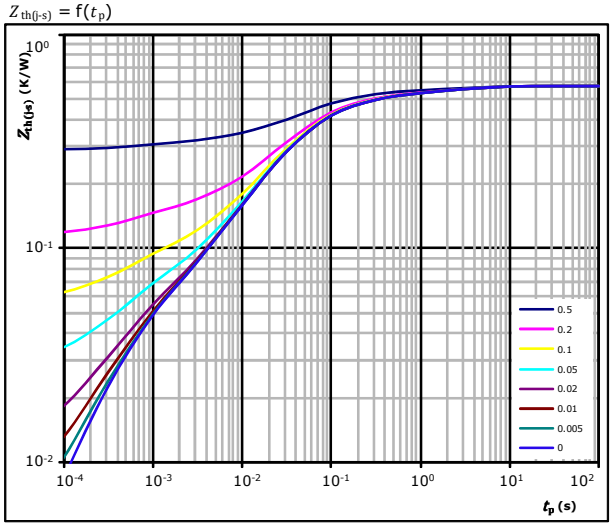
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,58 K/W

FWD thermal model values

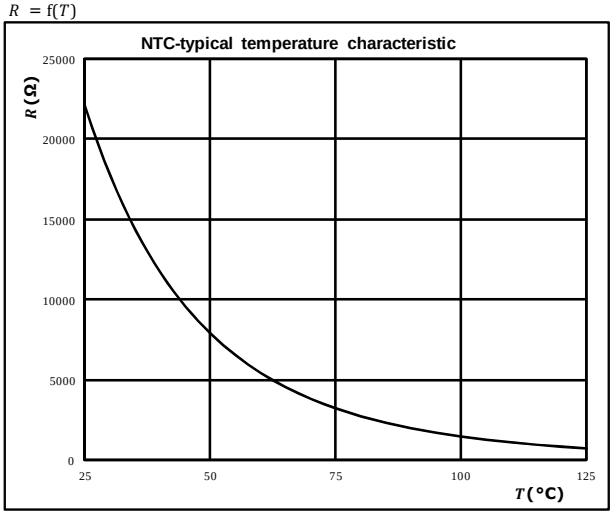
R (K/W)	τ (s)
4,89E-02	3,41E+00
7,07E-02	4,06E-01
2,02E-01	7,46E-02
1,90E-01	2,27E-02
3,24E-02	3,47E-03
3,35E-02	4,78E-04

Thermistor Characteristics

figure 1. **Thermistor**

Typical NTC characteristic as a function of temperature

$R = f(T)$

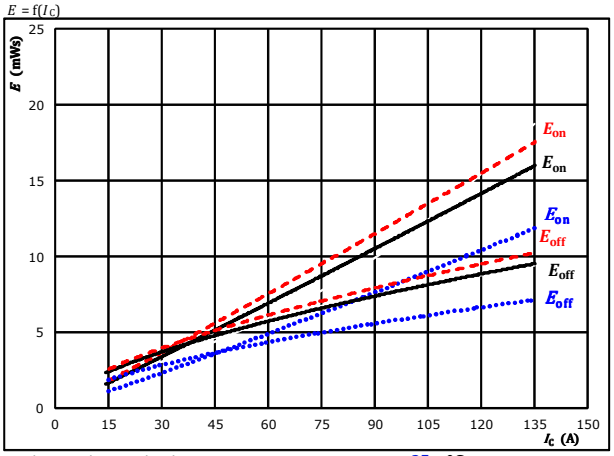


Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



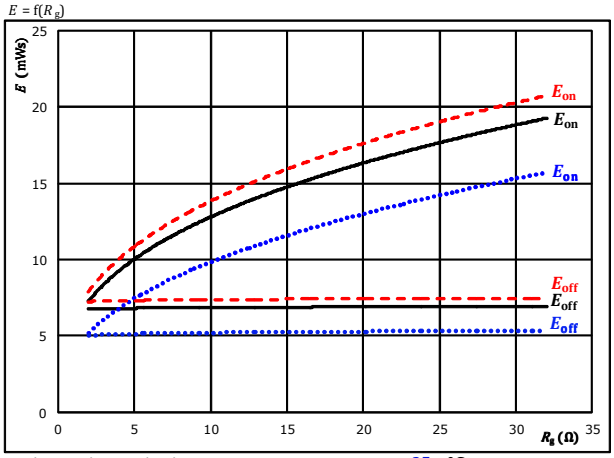
With an inductive load at

V_{CE} =	600	V	T_J:	25 °C	·····
V_{GE} =	±15	V		125 °C	———
R_{gon} =	2	Ω		150 °C	- - -
R_{goff} =	2	Ω			

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



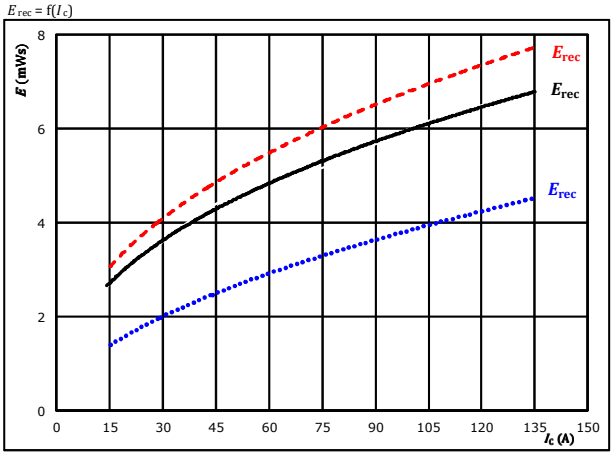
With an inductive load at

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

$E_{rec} = f(I_c)$



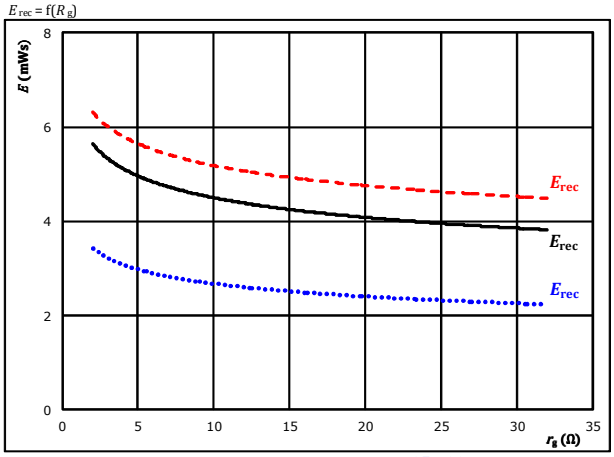
With an inductive load at

V_{CE} =	600	V	T_J:	25 °C	·····
V_{GE} =	±15	V		125 °C	———
R_{gon} =	2	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

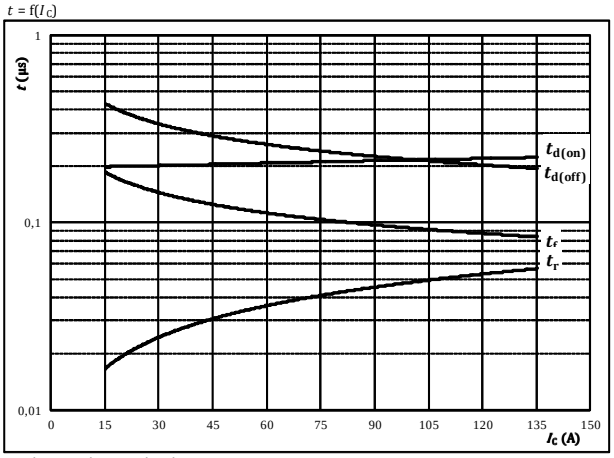
V_{CE} =	600	V	T_J:	25 °C	·····
V_{GE} =	±15	V		125 °C	———
I_C =	75	A		150 °C	- - -

Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



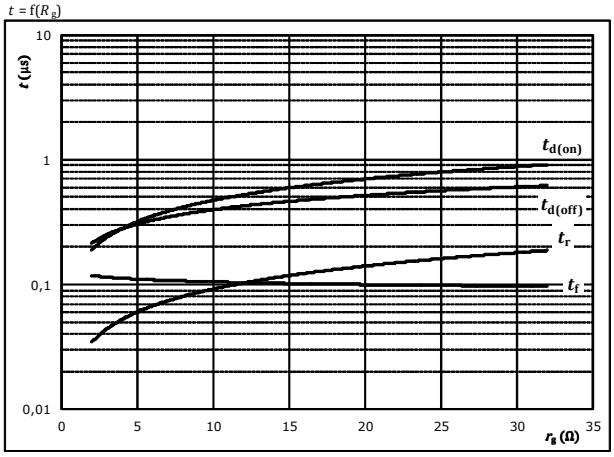
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



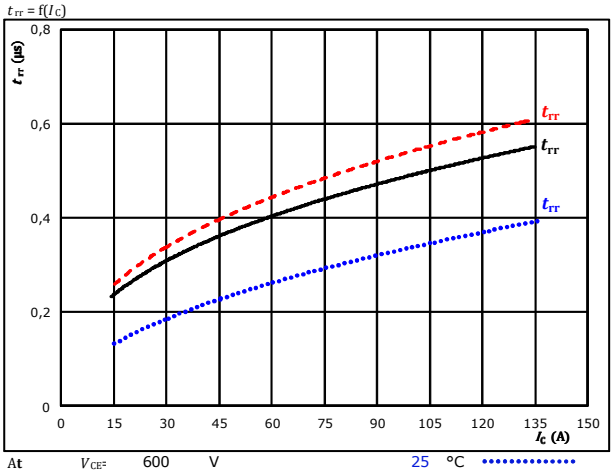
With an inductive load at

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

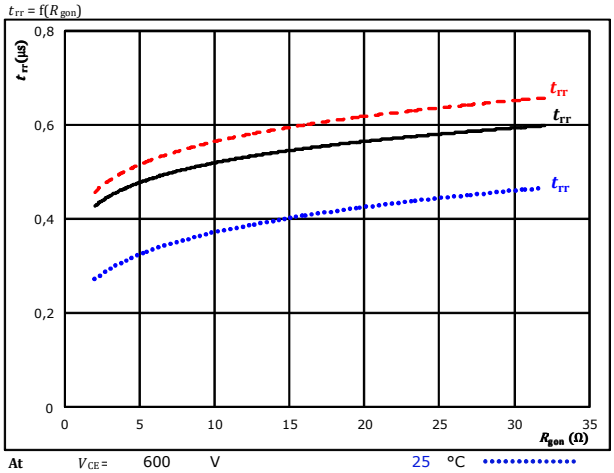
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

T_j: 25 °C, 125 °C, 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
V_{GE} =	±15	V
I_C =	75	A

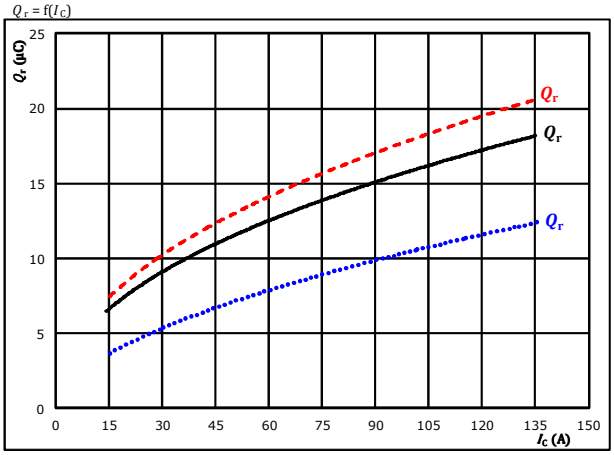
T_j: 25 °C, 125 °C, 150 °C

Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

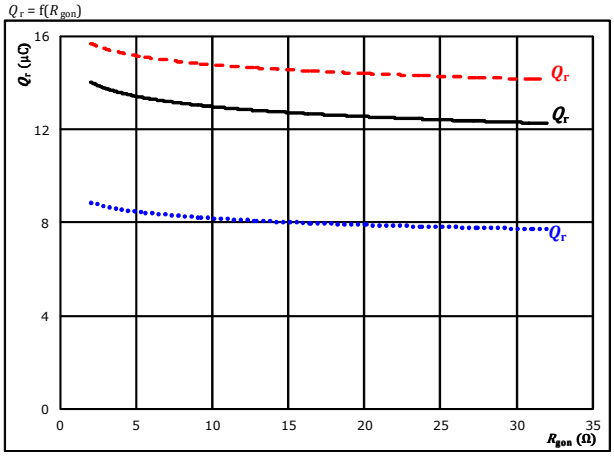


At						
	V_{CE} =	600	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	R_{gon} =	2	Ω		150 °C	

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

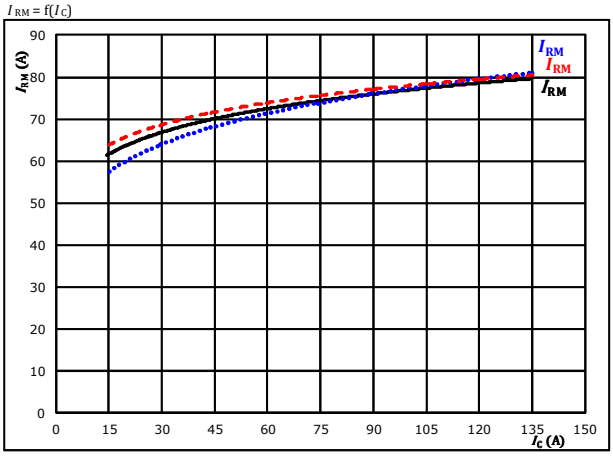


At						
	V_{CE}=	600	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	I_C=	75	A		150 °C	

figure 11. **FWD**

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

$I_{RM} = f(I_C)$

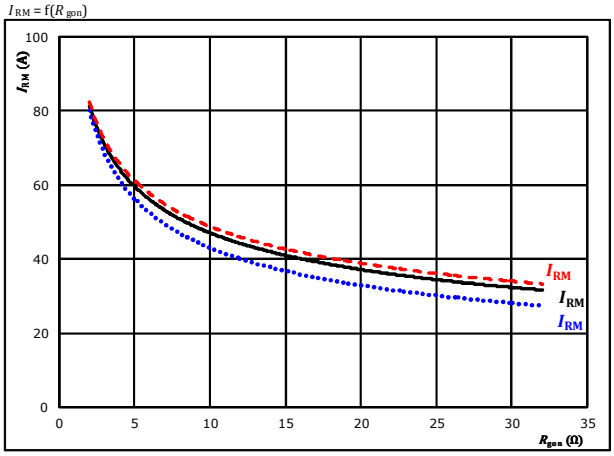


At						
	V_{CE}:	600	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	R_{gon} =	2	Ω		150 °C	

figure 12. **FWD**

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

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



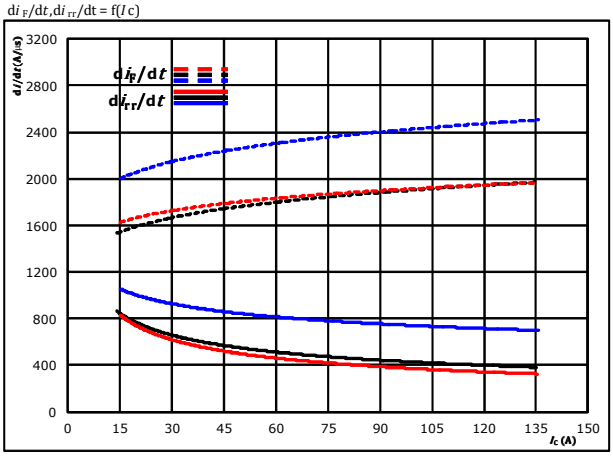
At						
	V_{CE} =	600	V		25 °C	
	V_{GE} =	±15	V	T_j:	125 °C	
	I_C =	75	A		150 °C	

Switching Characteristics

figure 13. **FWD**

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

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

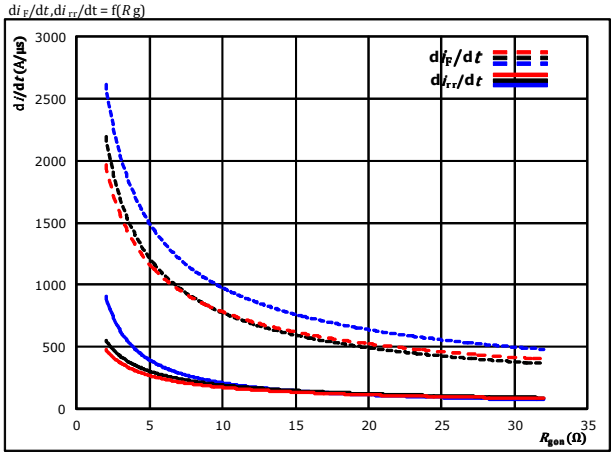


At						
V_{CE}:	600	V	T_j:	25 °C	·····
V_{GE} =	±15	V		125 °C	———
R_{gon} =	2	Ω		150 °C	- - -

figure 14. **FWD**

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

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

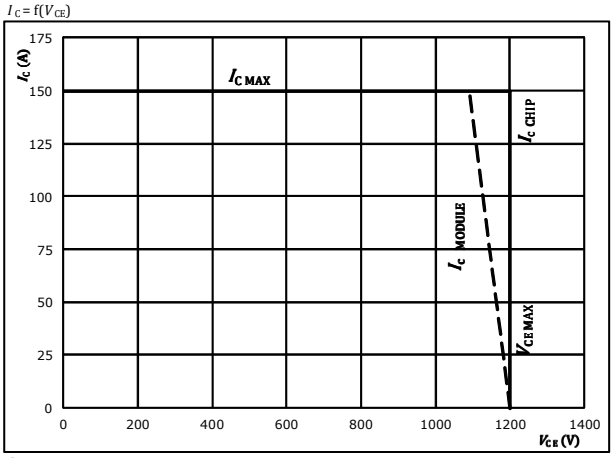


At						
V_{CE} =	600	V	T_j:	25 °C	·····
V_{GE} =	±15	V		125 °C	———
I_C=	75	A		150 °C	- - -

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

T_j =	175	°C
R_{gon} =	2	Ω
R_{goff} =	2	Ω

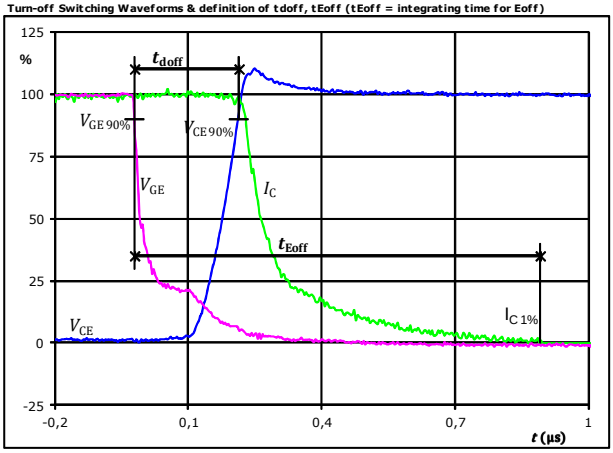
Switching Definitions

General conditions

T_j	=	**125 °C**
R_{gon}	=	**2 Ω**
R_{goff}	=	**2 Ω**

figure 1. **IGBT**

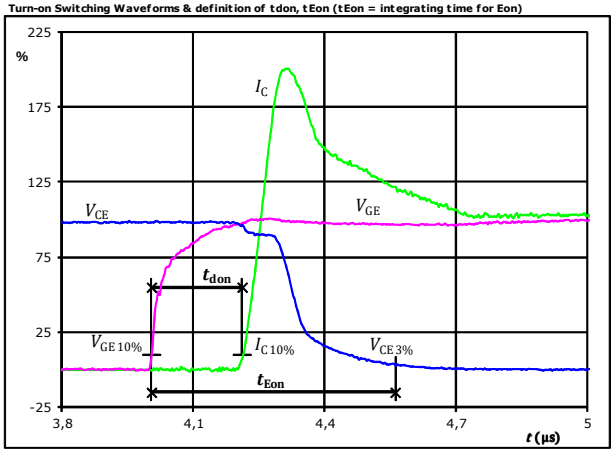
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	76	A
t_{doff} =	0,233	µs
t_{Eoff} =	0,913	µs

figure 2. **IGBT**

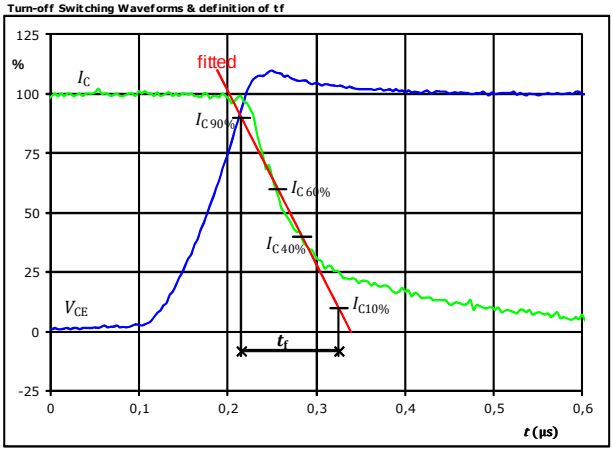
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	76	A
t_{don} =	0,208	µs
t_{Eon} =	0,556	µs

figure 3. **IGBT**

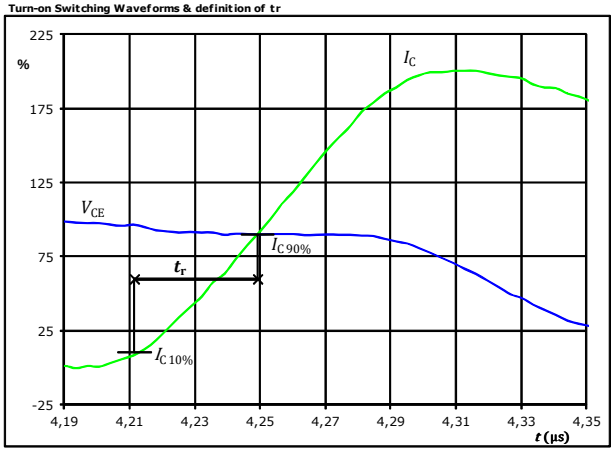
Turn-off Switching Waveforms & definition of tf



$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	76	A
t_f =	0,113	µs

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of tr

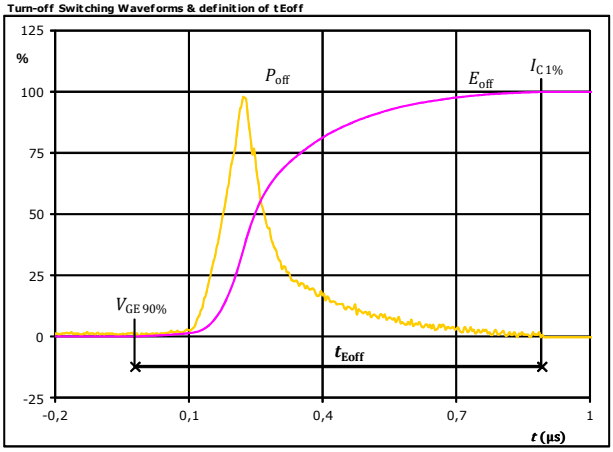


$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	76	A
t_r =	0,038	µs

Switching Characteristics

figure 5. **IGBT**

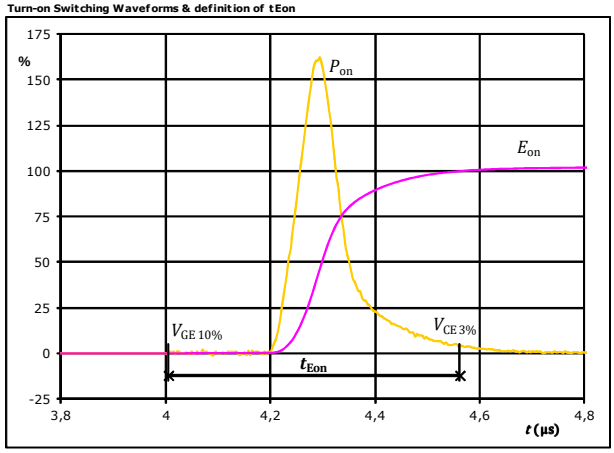
Turn-off Switching Waveforms & definition of tEoff



$P_{off}(100\%)$ =	45,36	kW
$E_{off}(100\%)$ =	6,80	mJ
t_{Eoff} =	0,91	µs

figure 6. **IGBT**

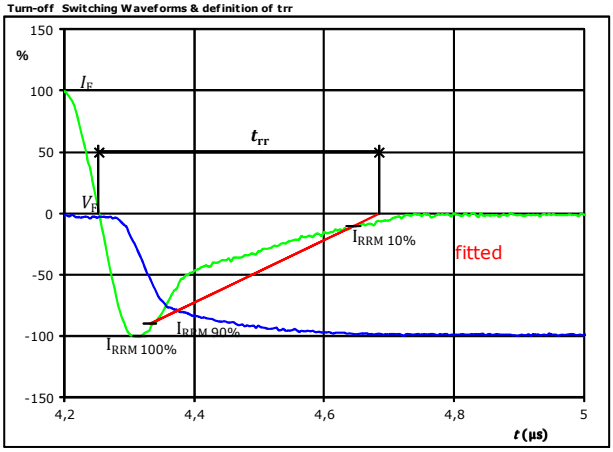
Turn-on Switching Waveforms & definition of tEon



$P_{on}(100\%)$ =	45,36	kW
$E_{on}(100\%)$ =	7,82	mJ
t_{Eon} =	0,56	µs

figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

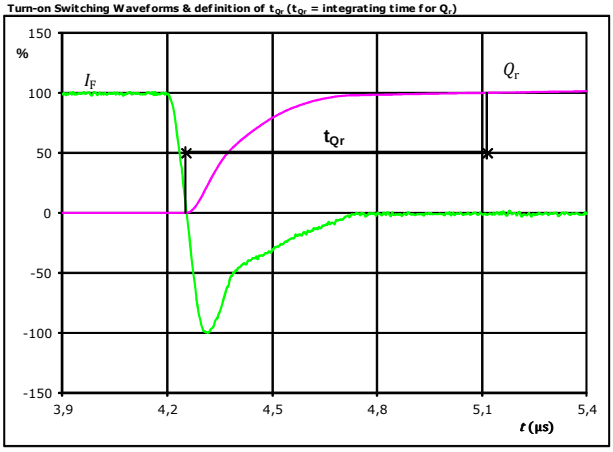


$V_F(100\%)$ =	600	V
$I_F(100\%)$ =	76	A
$I_{RRM}(100\%)$ =	-77	A
t_{rr} =	0,432	µs

Switching Characteristics

figure 8. **FWD**

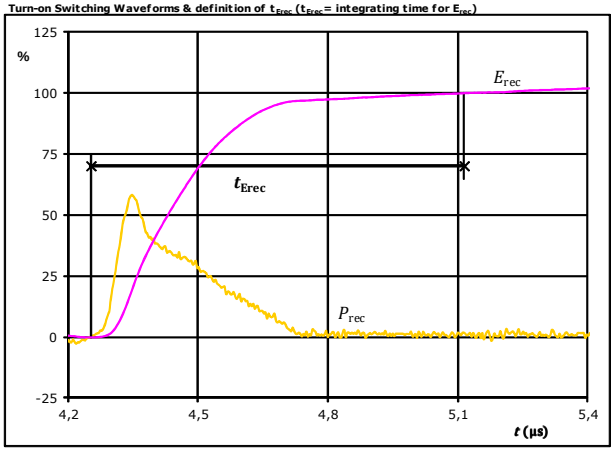
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	76	A
Q_r (100%) =	13,39	µC
t_{Qr} =	0,86	µs

figure 9. **FWD**

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



P_{rec} (100%) =	45,36	kW
E_{rec} (100%) =	5,19	mJ
t_{Erec} =	0,86	µs

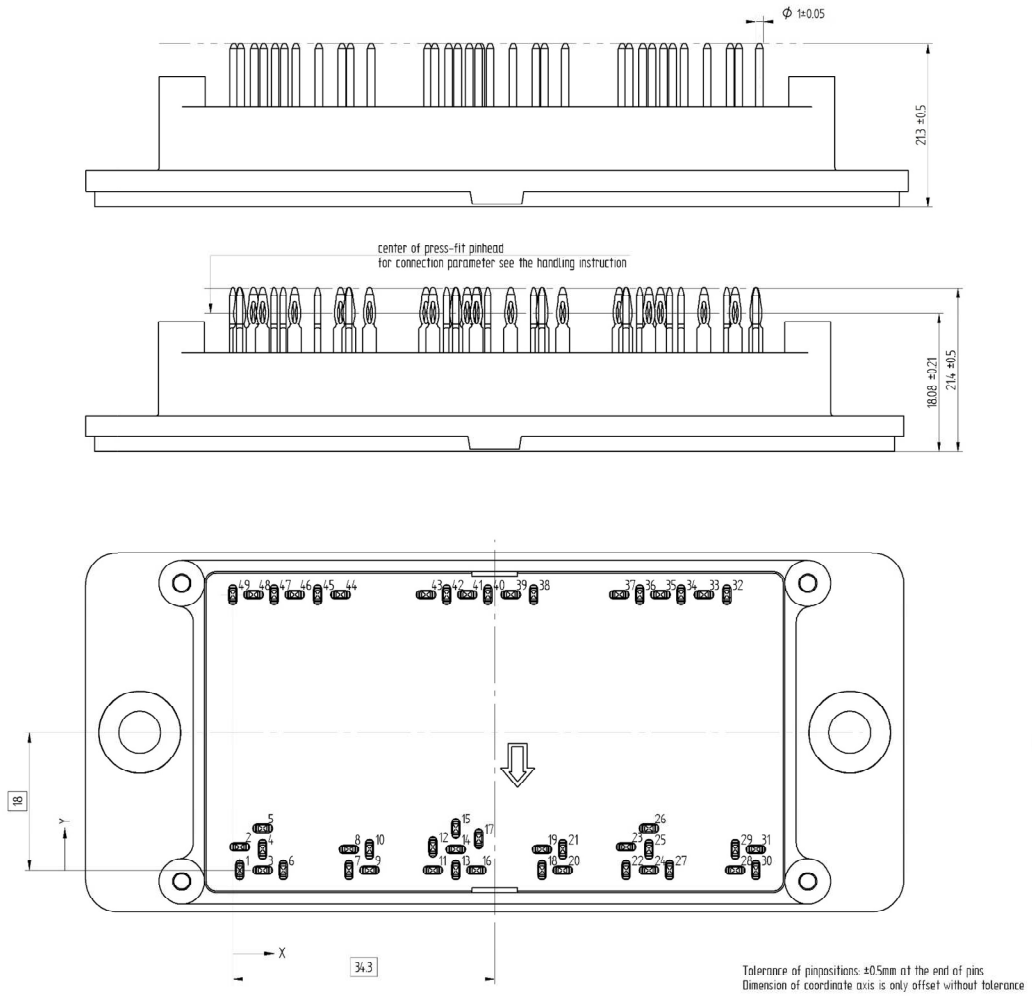
Ordering Code & Marking

Version	Ordering Code
without thermal paste 17mm housing Press-fit pins	30-P2126PA075M7-L288F79Y
with thermal paste 17mm housing Press-fit pins	30-P2126PA075M7-L288F79Y-/3/
without thermal paste 17mm housing Solder pins	30-F2126PA075M7-L288F79
with thermal paste 17mm housing Solder pins	30-F2126PA075M7-L288F79-/3/

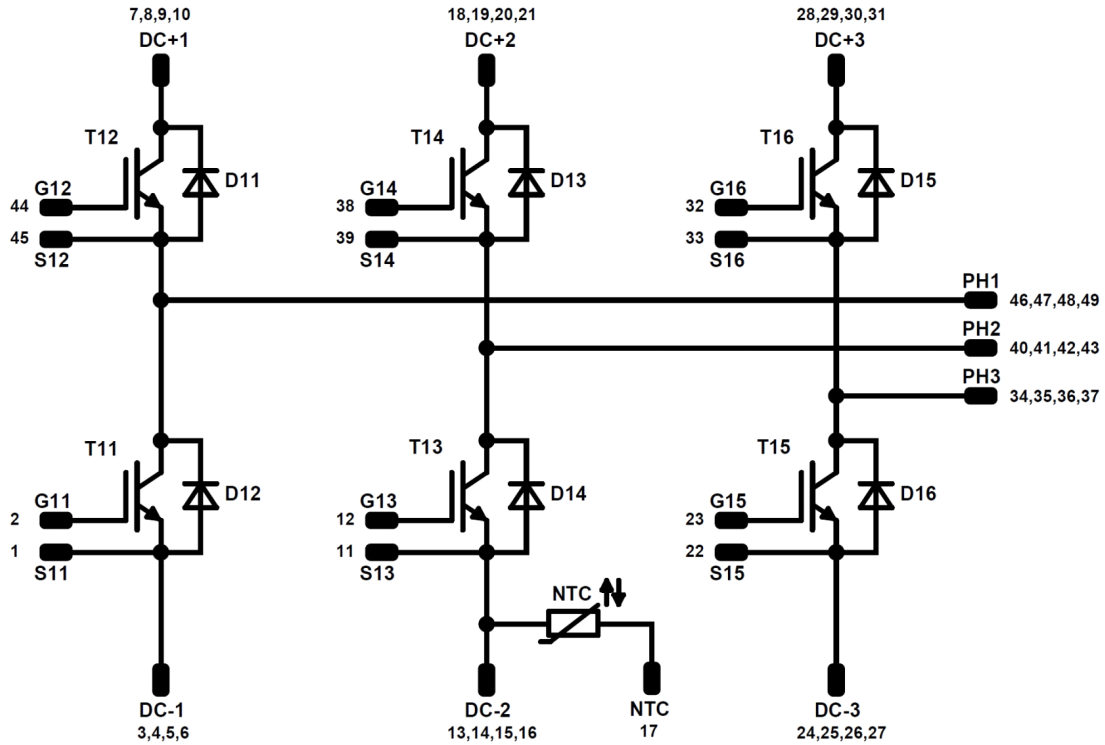
	Name		Date code	UL & VIN	Lot	Serial
Text	N-NNNNNNNNNNNNN-TTTTTTV		WWYY	UL VIN	LLLLL	SSSS
	Type&Ver	**Lot number**	**Serial**	**Date code**		
Datamatrix	TTTTTTTVV	LLLLL	SSSS	WWYY		

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



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 , D15 , D16	FWD	1200 V	100 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-x2126PA075M7-L288F79x-D2-14	07 Mar. 2019	flow2 frame modification Added solder pin variant	1,15

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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.