



flow PACK 2	1200 V / 75 A
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center; background-color: #ccc; margin: 0;">Features</p> <ul style="list-style-type: none"> IGBT M7 technology with low V_{CEsat} and improved EMC behavior Open emitter configuration Compact and low inductive design Built-in NTC </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center; background-color: #ccc; margin: 0;">Target applications</p> <ul style="list-style-type: none"> Industrial Drives Power Supply UPS </div> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; background-color: #ccc; margin: 0;">Types</p> <ul style="list-style-type: none"> 30-P2126PA075M701-L288F719Y 30-F2126PA075M701-L288F719 </div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center; background-color: #ccc; margin: 0;">flow 2 17 mm housing</p> <div style="display: flex; justify-content: space-around; align-items: center;"> </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> Press-fit pins Solder pins </div> </div> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; background-color: #ccc; 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	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	93	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	191	W
Gate-emitter voltage	V_{GES}		±20	V
Maximum junction temperature	T_{jmax}		175	°C



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	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	89	A
Repetitive peak forward current	I_{FRM}		200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	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_{top}		-40...($T_{jmax} - 25$)	°C

Isolation Properties

Isolation voltage	V_{isol}	DC Test Voltage $t_p = 2\text{ s}$	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_{GS} [V]	V_{GE} [V]	V_{DS} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	

Inverter Switch

Static

Parameter	Symbol	$V_{GE} = V_{CE}$	V_{GS} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Gate-emitter threshold voltage	$V_{GE(th)}$				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}							16000		pF
Output capacitance	C_{oes}		0	10		25		480		
Reverse transfer capacitance	C_{res}							190		
Gate charge	Q_g		15	600	75	25		490		nC

Thermal

Parameter	Symbol	Material	λ [W/mK]	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material	$\lambda = 3,4$ W/mK	K/W

Dynamic

Parameter	Symbol	$R_{goff} = 2 \Omega$ $R_{gon} = 2 \Omega$	± 15	600	75	25 125 150	197 208 212	29 38 39	203 233 242	86 113 111	5,559 7,819 8,496	5,076 6,804 7,285	ns	mWs
Turn-on delay time	$t_{d(on)}$												ns	mWs
Rise time	t_r													
Turn-off delay time	$t_{d(off)}$													
Fall time	t_f													
Turn-on energy (per pulse)	E_{on}	$Q_{t-FWD} = 8,5 \mu C$ $Q_{t-FWD} = 13,4 \mu C$ $Q_{t-FWD} = 15,3 \mu C$												
Turn-off energy (per pulse)	E_{off}													



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			100	25 125 150		1,82 1,96 1,97	2,1	V

Thermal

Parameter	Symbol	Conditions	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material $\lambda = 3,4$ W/mK	0,58	K/W

Dynamic

Parameter	Symbol	Conditions	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Peak recovery current	I_{RRM}					25 125 150		75 77 78		A
Reverse recovery time	t_{rr}					25 125 150		278 432 459		ns
Recovered charge	Q_r	$di/dt = 2268$ A/ μ s $di/dt = 1969$ A/ μ s $di/dt = 1970$ A/ μ s	± 15	600	75	25 125 150		8,539 13,394 15,308		μ C
Reverse recovered energy	E_{rec}					25 125 150		3,195 5,193 5,995		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 125 150		802 614 544		A/ μ s

Thermistor

Parameter	Symbol	Conditions	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
Rated resistance	R					25		22		k Ω
Deviation of R_{100}	$\Delta_{R/R}$	$R_{100} = 1486$ Ω				100	-5		+5	%
Power dissipation	P					25		5		mW
Power dissipation constant						25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 1\%$				25		3962		K
B-value	$B_{(25/100)}$	Tol. $\pm 1\%$				25		4000		K
Vincotech NTC Reference									I	

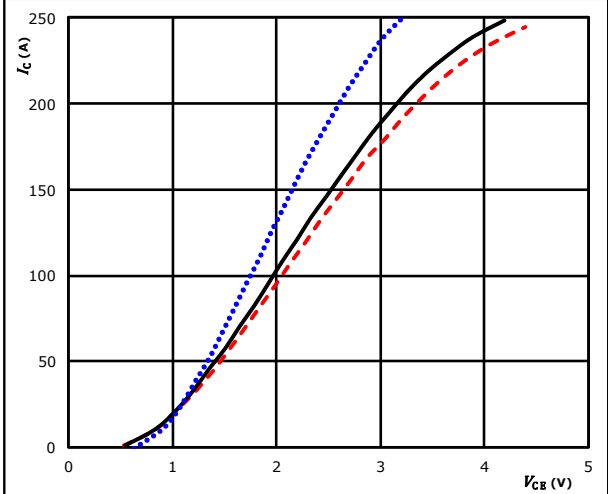


Inverter Switch Characteristics

figure 1. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

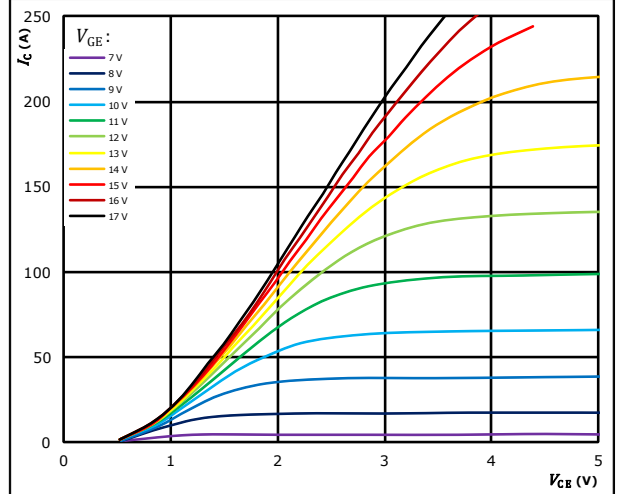


$t_p = 250 \mu s$ $T_j: 25 \text{ }^\circ C$
 $V_{GE} = 15 \text{ V}$ $T_j: 125 \text{ }^\circ C$ ———
 $T_j: 150 \text{ }^\circ C$ - - - -

figure 2. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

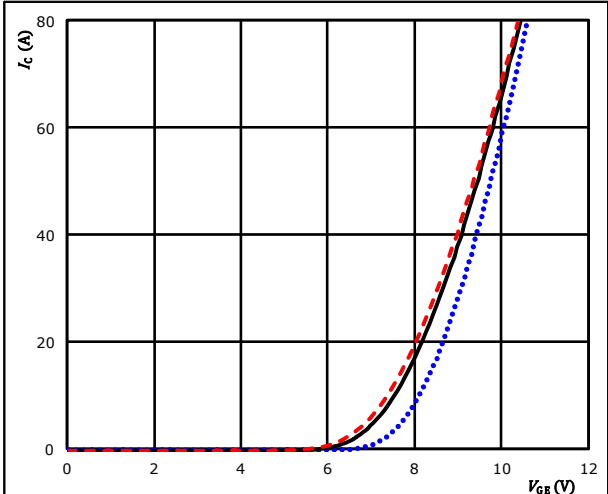


$t_p = 250 \mu s$
 $T_j = 150 \text{ }^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$

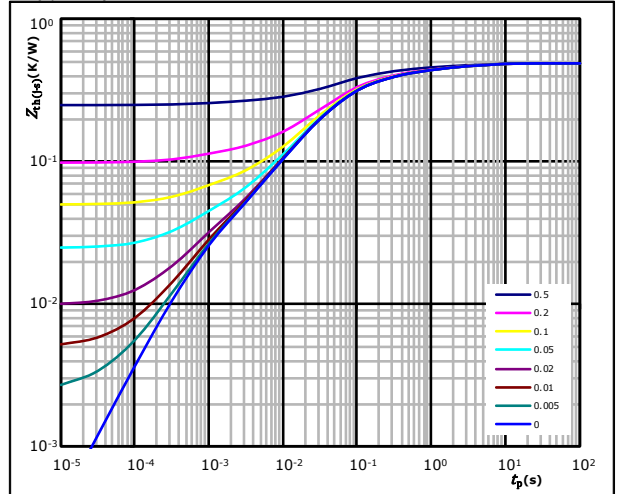


$t_p = 100 \mu s$ $T_j: 25 \text{ }^\circ C$
 $V_{CE} = 10 \text{ V}$ $T_j: 125 \text{ }^\circ C$ ———
 $T_j: 150 \text{ }^\circ C$ - - - -

figure 4. IGBT

Transient thermal impedance as function of pulse duration

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



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

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

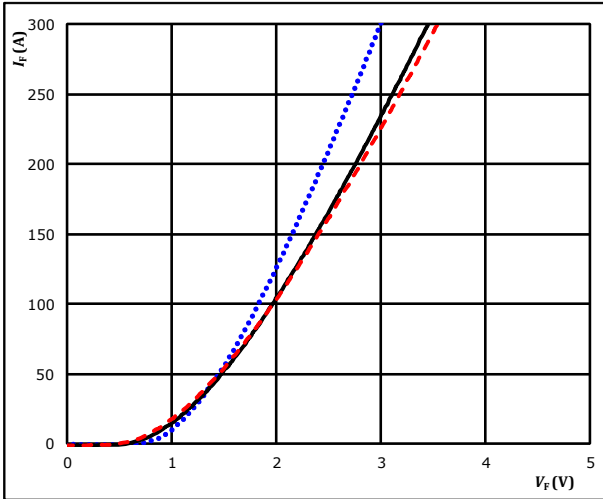


Inverter Diode Characteristics

figure 1. FWD

Typical forward characteristics

$$I_F = f(V_F)$$



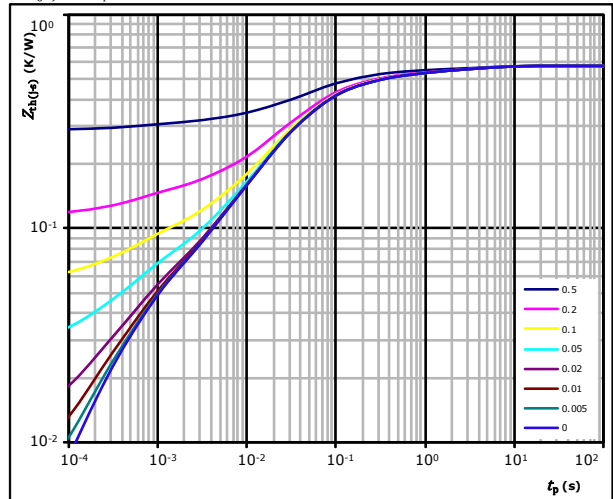
$t_p = 250 \mu s$

T_j : 25 °C ●●●●●●
125 °C —————
150 °C - - - - -

figure 2. FWD

Transient thermal impedance as a function of pulse width

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



$$D = \frac{t_p}{T}$$

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

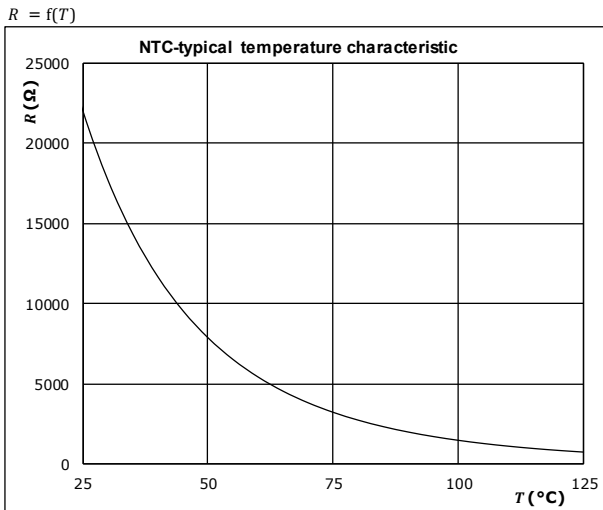
FWD thermal model values

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

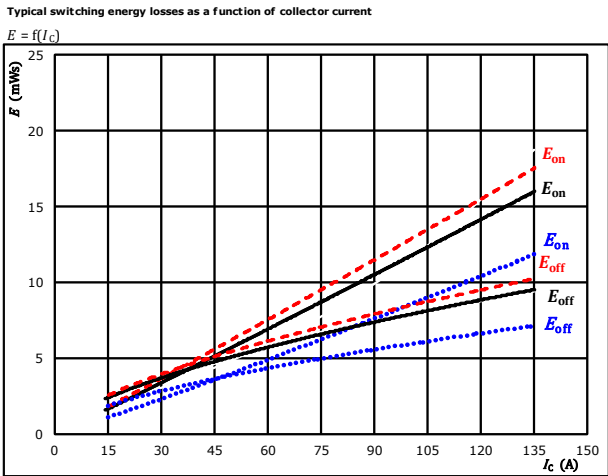
figure 1. Thermistor
Typical NTC characteristic as a function of temperature





Switching Characteristics

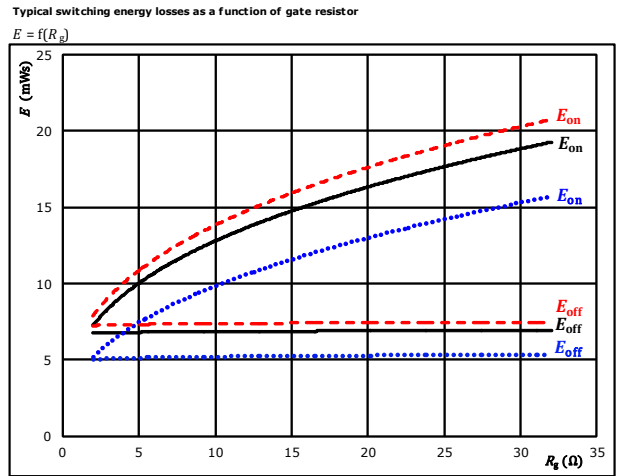
figure 1. IGBT



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω
 $R_{goff} = 2$ Ω

T_j : 25 °C (dotted), 125 °C (solid), 150 °C (dashed)

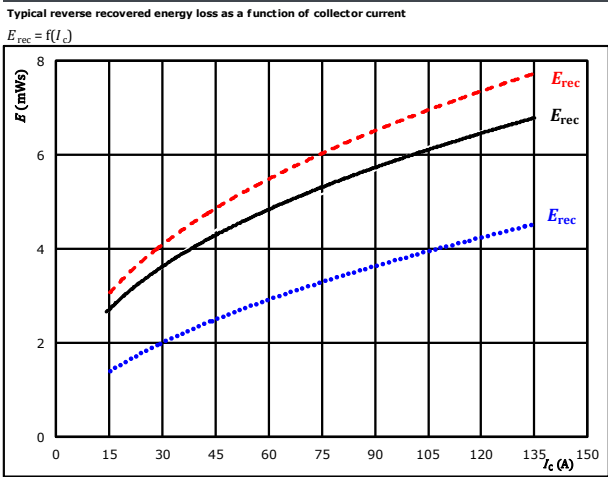
figure 2. IGBT



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 75$ A

T_j : 25 °C (dotted), 125 °C (solid), 150 °C (dashed)

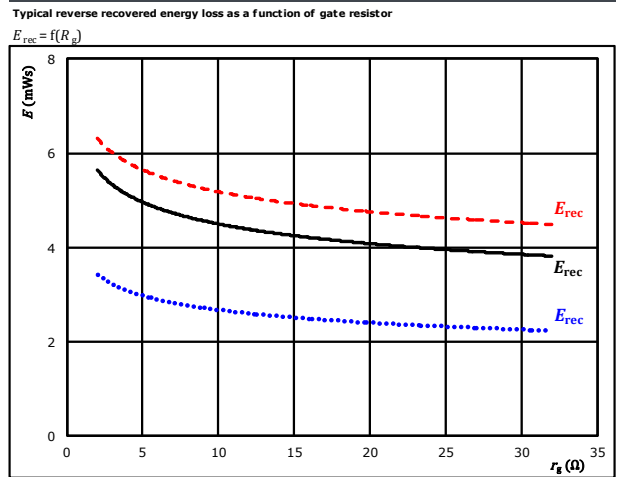
figure 3. FWD



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 2$ Ω

T_j : 25 °C (dotted), 125 °C (solid), 150 °C (dashed)

figure 4. FWD



With an inductive load at
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 75$ A

T_j : 25 °C (dotted), 125 °C (solid), 150 °C (dashed)

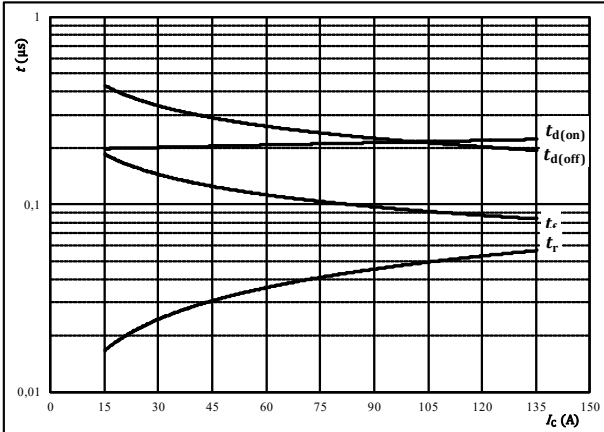


Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



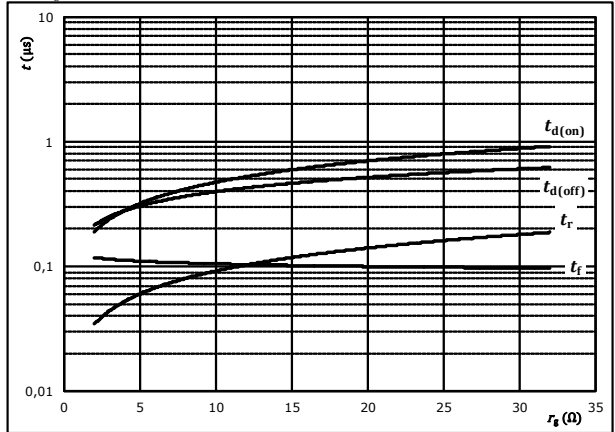
With an inductive load at

$T_j =$	150	°C
$V_{CE} =$	600	V
$V_{GE} =$	±15	V
$R_{g(on)} =$	2	Ω
$R_{g(off)} =$	2	Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



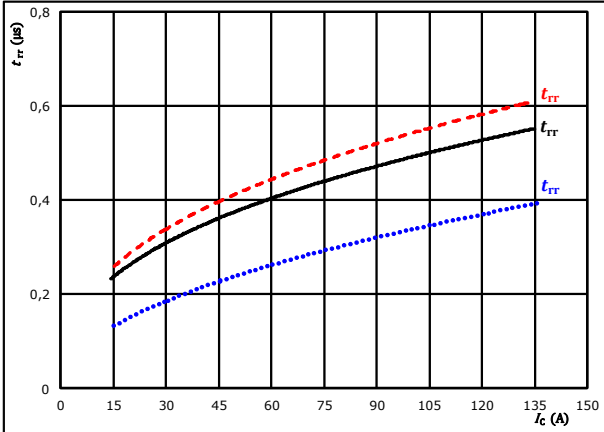
With an inductive load at

$T_j =$	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

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

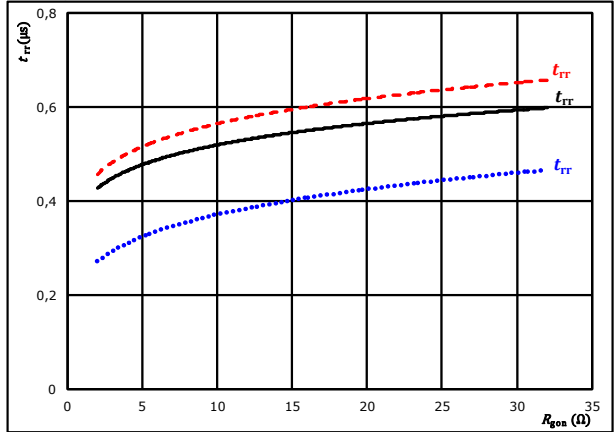


At	$V_{CE} =$	600	V	$T_j:$	25 °C
	$V_{GE} =$	±15	V		125 °C	————
	$R_{g(on)} =$	2	Ω		150 °C	-----

figure 8. FWD

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

$$t_{rr} = f(R_{g(on)})$$



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

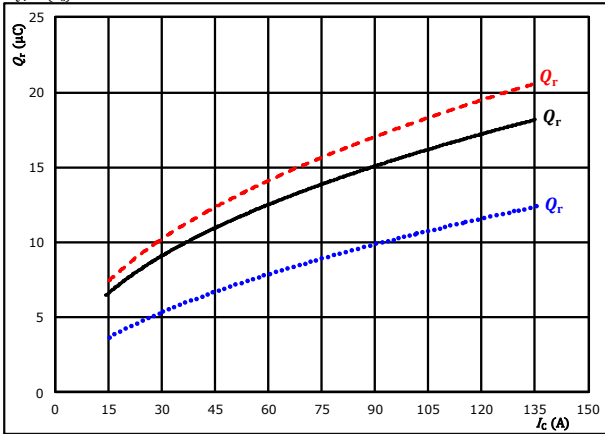


Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$

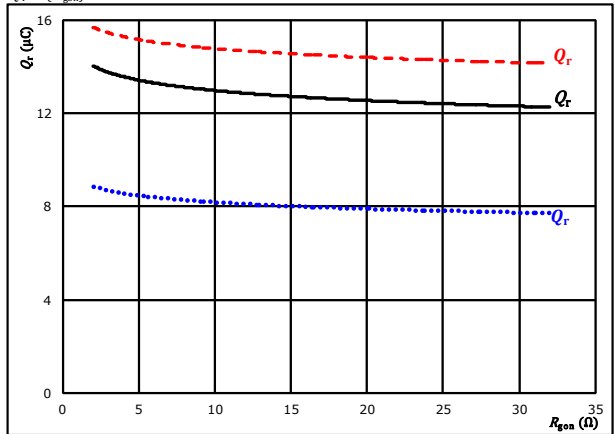


At $V_{CE} = 600$ V $T_j: 25$ °C (dotted blue)
 $V_{GE} = \pm 15$ V $T_j: 125$ °C (solid black)
 $R_{gpn} = 2$ Ω $T_j: 150$ °C (dashed red)

figure 10. FWD

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

$$Q_r = f(R_{gpn})$$

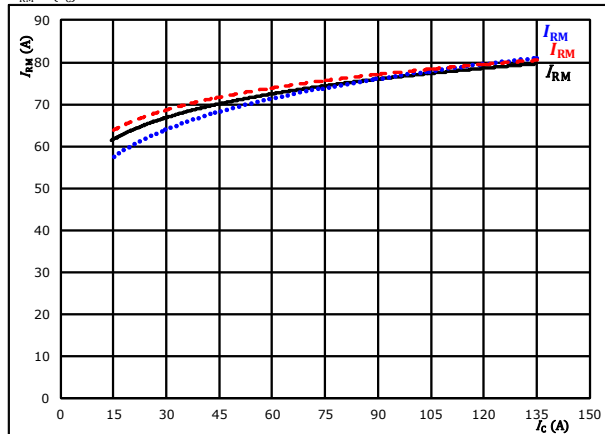


At $V_{CE} = 600$ V $T_j: 25$ °C (dotted blue)
 $V_{GE} = \pm 15$ V $T_j: 125$ °C (solid black)
 $I_c = 75$ A $T_j: 150$ °C (dashed red)

figure 11. FWD

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

$$I_{RM} = f(I_c)$$

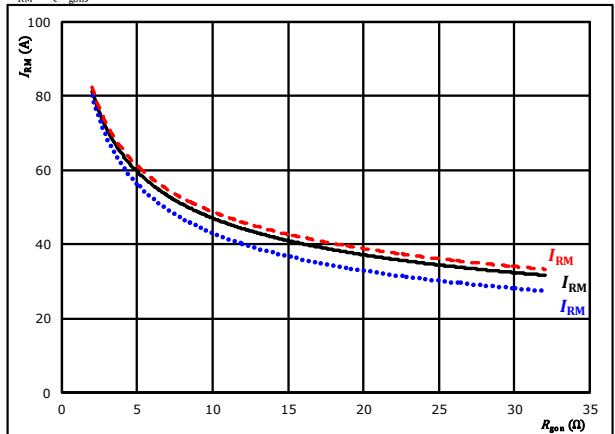


At $V_{CE} = 600$ V $T_j: 25$ °C (dotted blue)
 $V_{GE} = \pm 15$ V $T_j: 125$ °C (solid black)
 $R_{gpn} = 2$ Ω $T_j: 150$ °C (dashed red)

figure 12. FWD

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

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



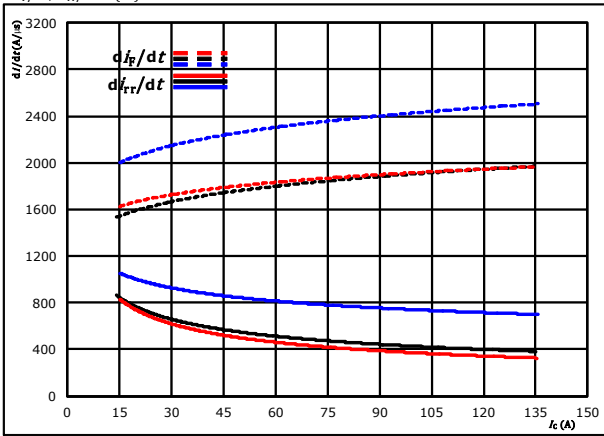
At $V_{CE} = 600$ V $T_j: 25$ °C (dotted blue)
 $V_{GE} = \pm 15$ V $T_j: 125$ °C (solid black)
 $I_c = 75$ A $T_j: 150$ °C (dashed red)



Switching Characteristics

figure 13. FWD

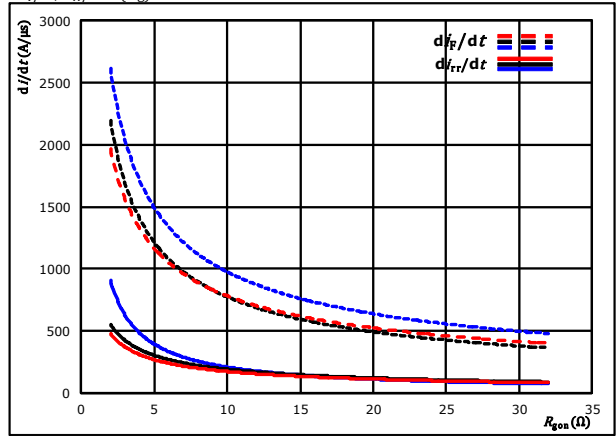
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_F/dt, di_{rr}/dt = f(I_C)$



At $V_{CE} = 600$ V $T_j = 25$ °C (dotted blue)
 $V_{GE} = \pm 15$ V $T_j = 125$ °C (solid black)
 $R_{g(on)} = 2$ Ω $T_j = 150$ °C (dashed red)

figure 14. FWD

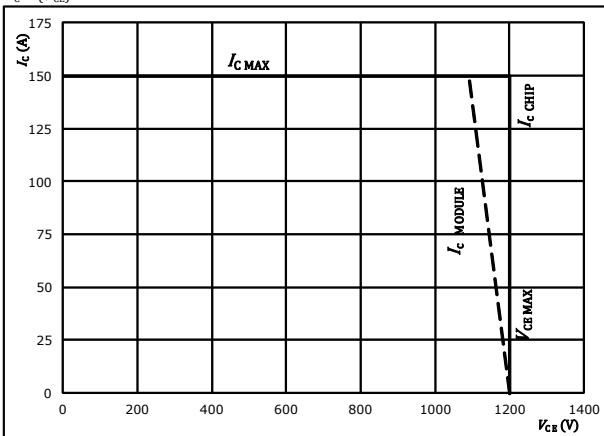
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor
 $di_F/dt, di_{rr}/dt = f(R_{g(on)})$



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

figure 15. IGBT

Reverse bias safe operating area
 $I_C = f(V_{CB})$



At $T_j = 175$ °C
 $R_{g(on)} = 2$ Ω
 $R_{g(off)} = 2$ Ω



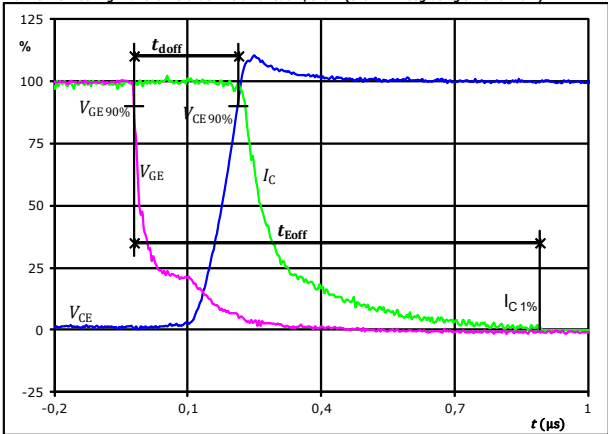
Switching Definitions

General conditions

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

figure 1. IGBT

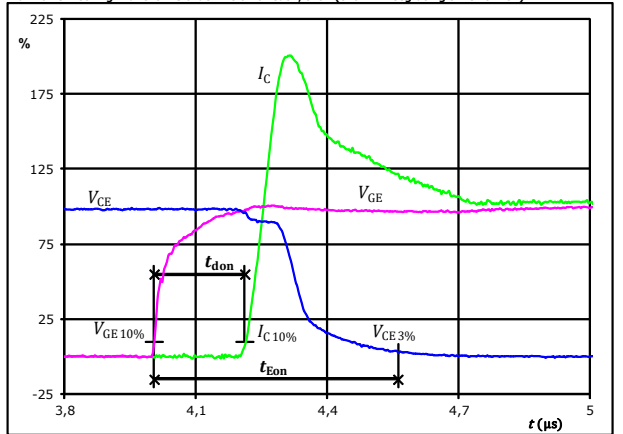
Turn-off Switching Waveforms & definition of t_{doff} , t_{Eoff} (t_{Eoff} = integrating time for E_{off})



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

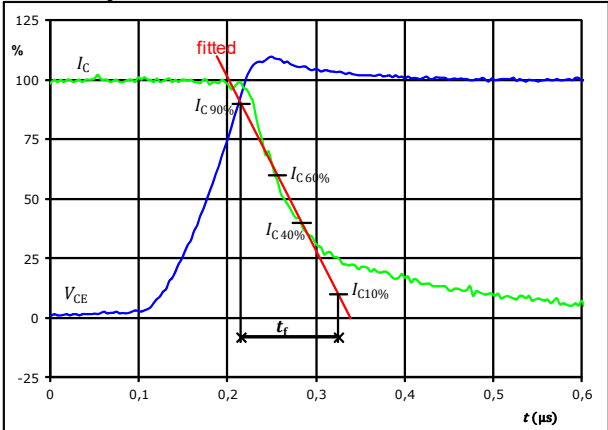
Turn-on Switching Waveforms & definition of t_{don} , t_{Eon} (t_{Eon} = integrating time for E_{on})



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

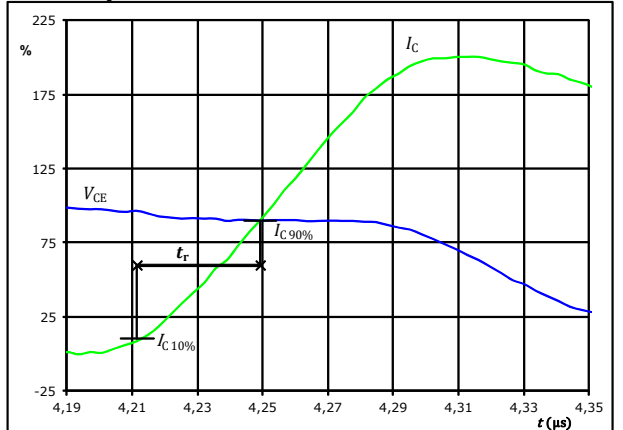
Turn-off Switching Waveforms & definition of t_f



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

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r



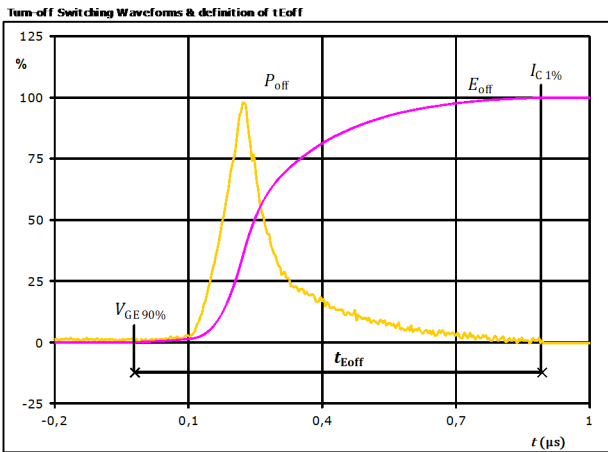
$V_C(100\%) =$	600	V
$I_C(100\%) =$	76	A
$t_r =$	0,038	μs



Vincotech

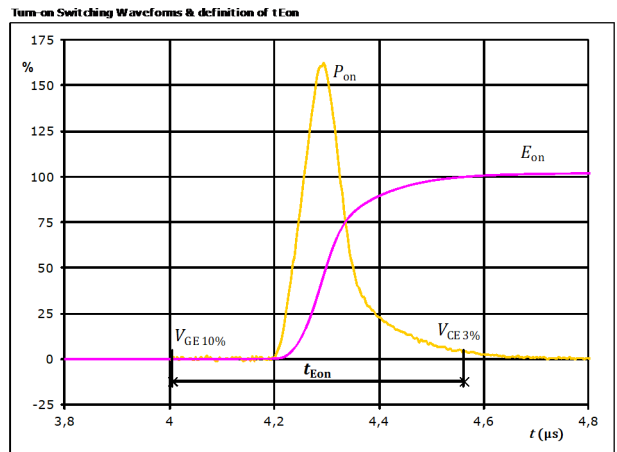
Switching Characteristics

figure 5. IGBT



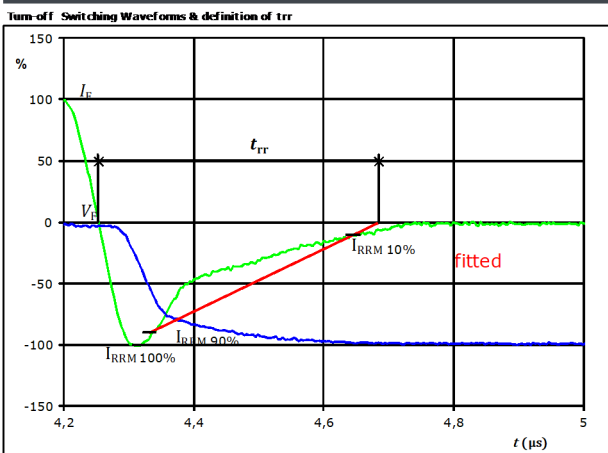
$P_{off}(100\%) = 45,36$ kW
 $E_{off}(100\%) = 6,80$ mJ
 $t_{Eoff} = 0,91$ µs

figure 6. IGBT



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

figure 7. FWD

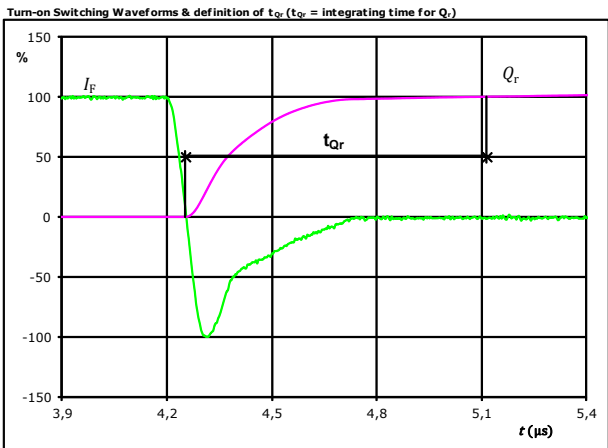


$V_F(100\%) = 600$ V
 $I_F(100\%) = 76$ A
 $I_{RRM}(100\%) = -77$ A
 $t_{rr} = 0,432$ µs



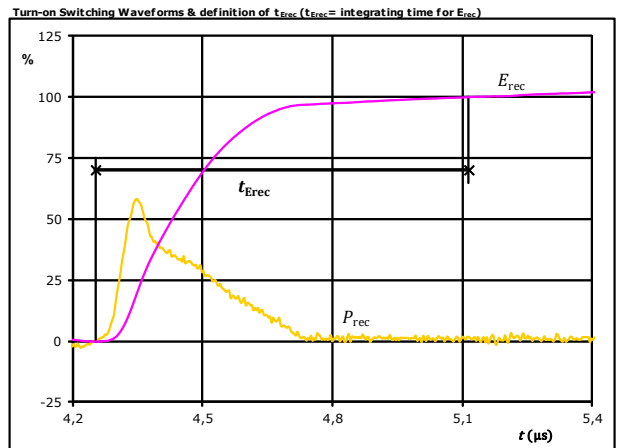
Switching Characteristics

figure 8. FWD



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

figure 9. FWD



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



30-P2126PA075M701-L288F719Y
30-F2126PA075M701-L288F719
 datasheet

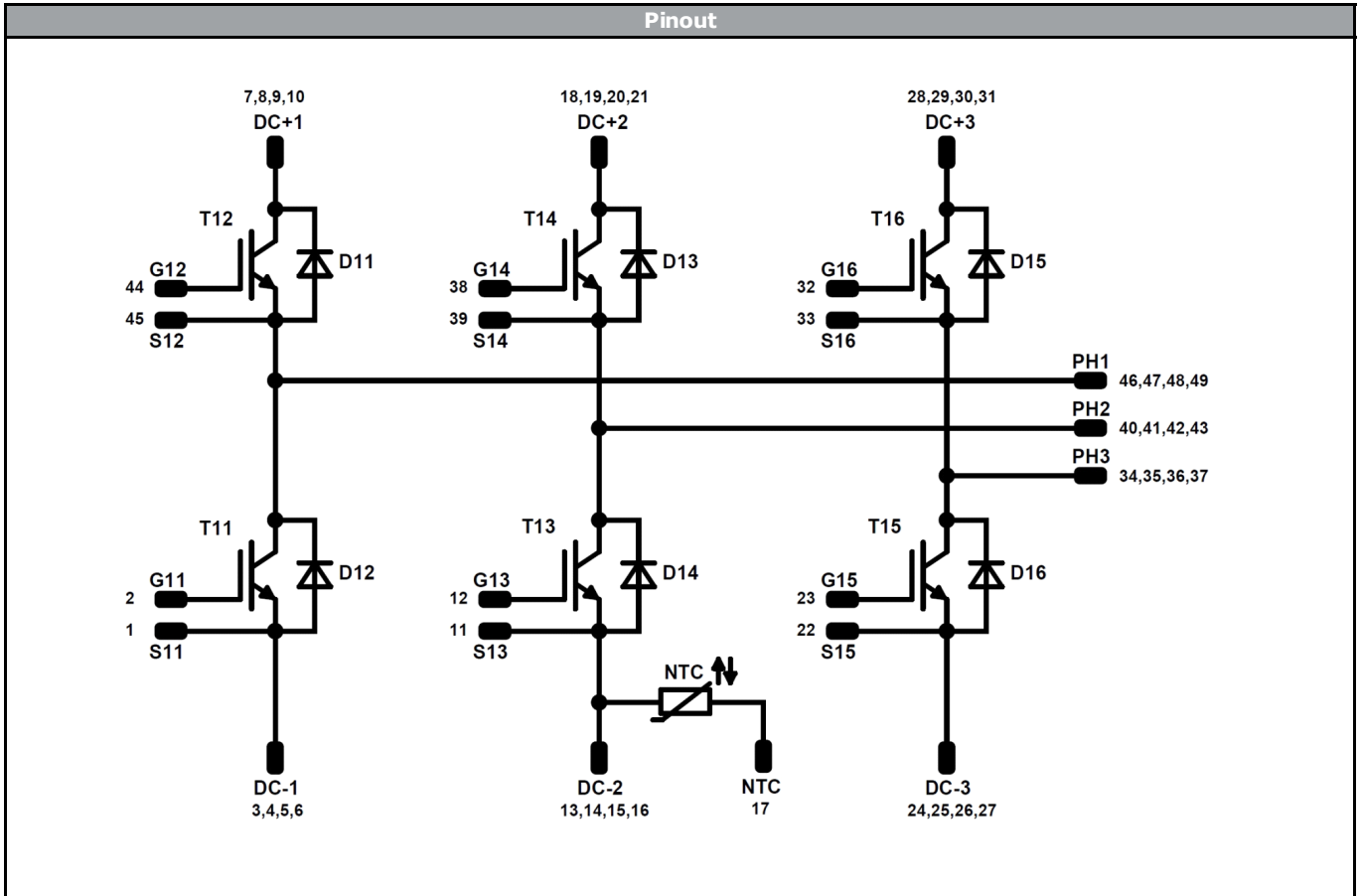
Vincotech

Ordering Code & Marking								
Version			Ordering Code					
without thermal paste 17mm housing Press-fit pins			30-P2126PA075M701-L288F719Y					
with thermal paste 17mm housing Press-fit pins			30-P2126PA075M701-L288F719Y-/3/					
without thermal paste 17mm housing solder pins			30-F2126PA075M701-L288F719					
with thermal paste 17mm housing solder pins			30-F2126PA075M701-L288F719-/3/					
NN-NNNNNNNNNNNN TTTTWW WWYY UL VIN LLLL SSSS			Text	Name	Date code	UL & VIN	Lot	Serial
				N-NNNNNNNNNNNN-TTTTWW	WWYY	UL VIN	LLLL	SSSS
	Datamatrix		Type&Ver	Lot number	Serial	Date code		
			TTTTTWW	LLLL	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

Tolerance of pinpositions: ±0.5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance



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	




Vincotech

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-x2126PA075M701-L288F719x-D1-14	26 Aug. 2019		

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