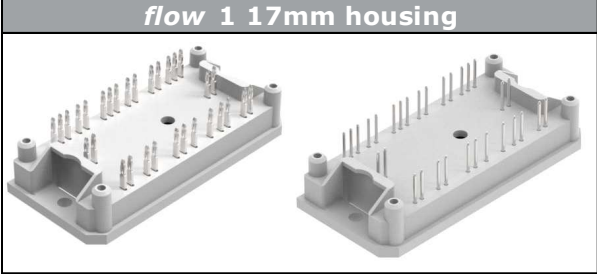
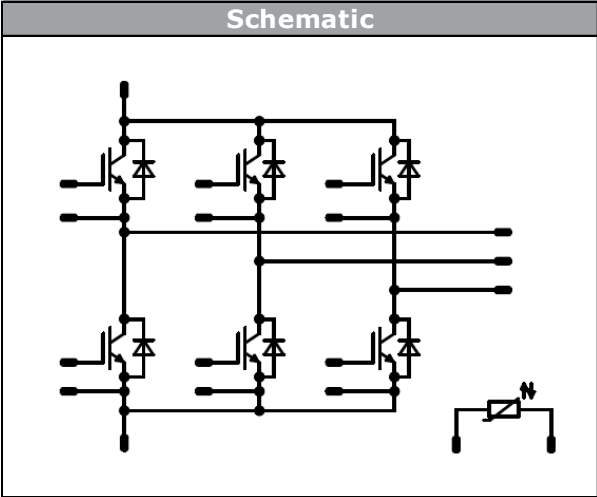




Vincotech

<i>flow</i> PACK 1	1200 V / 75 A
<div style="background-color: #eee; padding: 2px; margin-bottom: 5px;">Features</div> <ul style="list-style-type: none"> IGBT Mitsubishi gen 7 technology with low V_{CEsat} and improved EMC behavior Compact and low inductive design Built-in NTC 	<div style="background-color: #eee; padding: 2px; margin-bottom: 5px;">flow 1 17mm housing</div> 
<div style="background-color: #eee; padding: 2px; margin-bottom: 5px;">Target applications</div> <ul style="list-style-type: none"> Industrial Drives UPS 	<div style="background-color: #eee; padding: 2px; margin-bottom: 5px;">Schematic</div> 
<div style="background-color: #eee; padding: 2px; margin-bottom: 5px;">Types</div> <ul style="list-style-type: none"> 10-P1126PA075M7-L829F09Y 10-F1126PA075M7-L829F09 	

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	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	74	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	135	W
Gate-emitter voltage	V_{GES}		±20	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	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	66	A
Repetitive peak forward current	I_{FRM}		200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	106	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	



Vincotech

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	Conditions	Min	Typ	Max	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material $\lambda = 3,4$ W/mK				0,70 K/W

Dynamic

Parameter	Symbol	Conditions	V_{GS} [V]	V_{CE} [V]	I_D [A]	T_j [°C]	Min	Typ	Max	Unit		
Turn-on delay time	$t_{d(on)}$	$R_{goff} = 2 \Omega$ $R_{gon} = 2 \Omega$				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}		$Q_{t-FWD} = 8,5 \mu C$ $Q_{t-FWD} = 13,4 \mu C$ $Q_{t-FWD} = 15,3 \mu C$				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			



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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			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 $\lambda = 3,4 \text{ W/mK}$	0,90	K/W

Dynamic

Parameter	Symbol	dI/dt	V_{CE}	I_C	T_j	Value	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	$dI/dt = 2268 \text{ A}/\mu\text{s}$ $dI/dt = 1969 \text{ A}/\mu\text{s}$ $dI/dt = 1970 \text{ A}/\mu\text{s}$	± 15	600	75	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

Parameter	Symbol	Value	Unit
Rated resistance	R	25	k Ω
Deviation of R_{100}	$\Delta_{R/R}$	$R_{100} = 426 \Omega$ 100	-12 +11 %
Power dissipation	P	25	mW
Power dissipation constant		25	2 mW/K
B-value	$B_{(25/50)}$	25	3500 K
B-value	$B_{(25/100)}$	25	3560 K
Vincotech NTC Reference			G

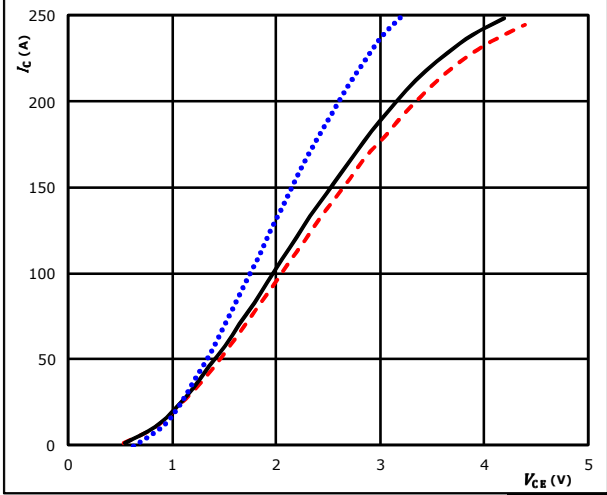


Inverter Switch Characteristics

figure 1. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

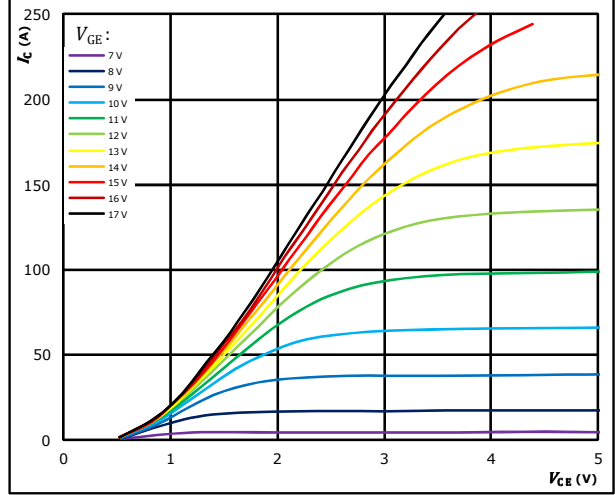


$t_p = 250 \mu s$ $T_j: 25 \text{ }^\circ C$
 $V_{GE} = 15 \text{ V}$ $T_j: 125 \text{ }^\circ C$ ———
 $T_j: 150 \text{ }^\circ C$ - - - -

figure 2. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

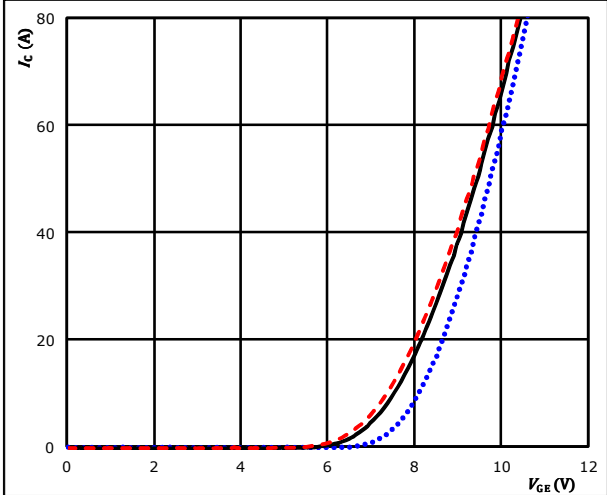


$t_p = 250 \mu s$
 $T_j = 150 \text{ }^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$

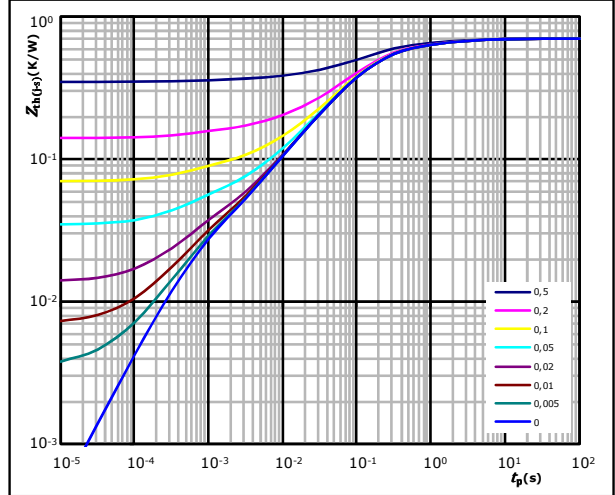


$t_p = 100 \mu s$ $T_j: 25 \text{ }^\circ C$
 $V_{CE} = 10 \text{ V}$ $T_j: 125 \text{ }^\circ C$ ———
 $T_j: 150 \text{ }^\circ C$ - - - -

figure 4. IGBT

Transient thermal impedance as function of pulse duration

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



$D = t_p / T$
 $R_{th(j-s)} = 0,70 \text{ K/W}$

IGBT thermal model values

$R \text{ (K/W)}$	$\tau \text{ (s)}$
3,63E-02	4,77E+00
9,31E-02	1,03E+00
3,22E-01	1,68E-01
1,83E-01	5,28E-02
4,91E-02	8,42E-03
2,13E-02	6,25E-04

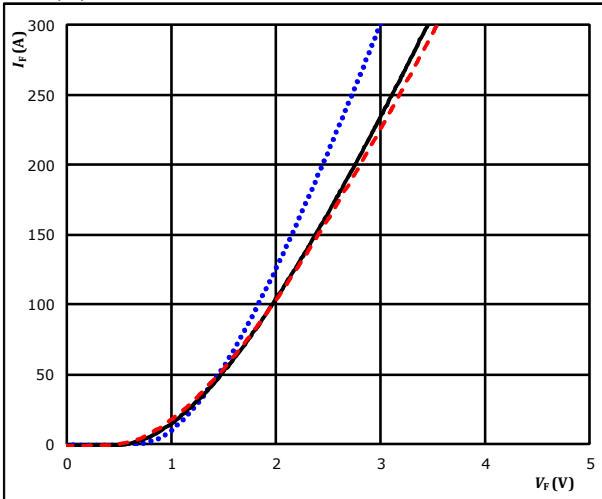


Inverter Diode Characteristics

figure 1. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

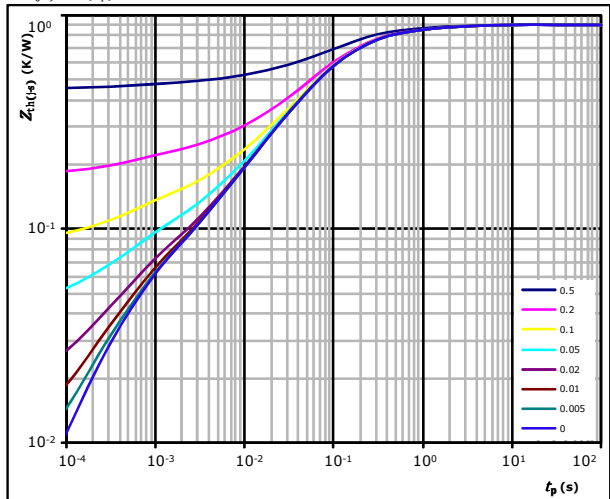


$t_p = 250 \mu s$
 T_j : 25 °C (blue dotted line)
 125 °C (black solid line)
 150 °C (red dashed line)

figure 2. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,90 \text{ K/W}$
 FWD thermal model values

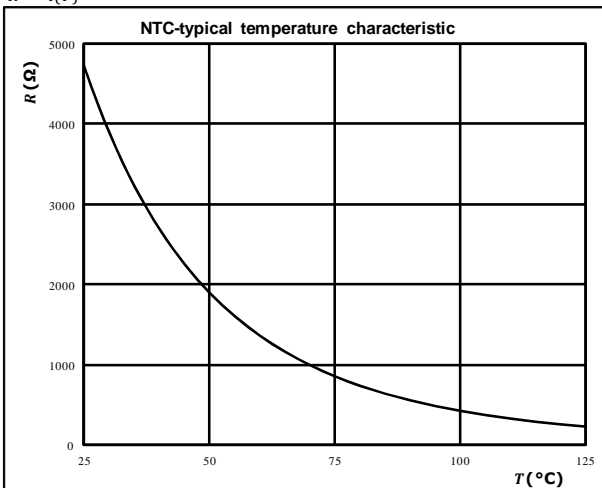
R (K/W)	τ (s)
6,37E-02	2,06E+00
1,71E-01	3,35E-01
4,76E-01	7,87E-02
1,11E-01	1,45E-02
3,47E-02	2,99E-03
4,20E-02	4,52E-04

Thermistor Characteristics

figure 1. Thermistor

Typical NTC characteristic as a function of temperature

$$R = f(T)$$

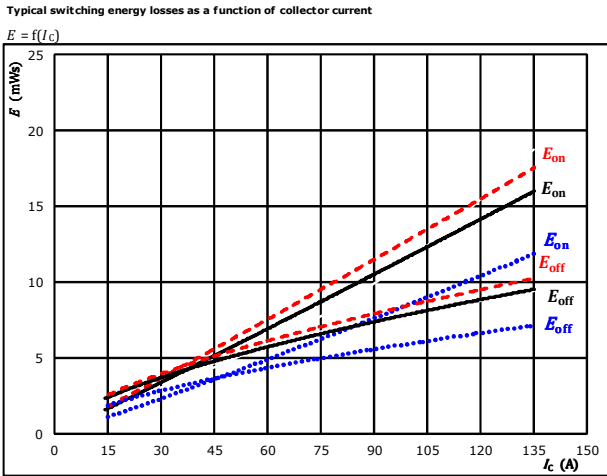




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Inverter Switching Characteristics

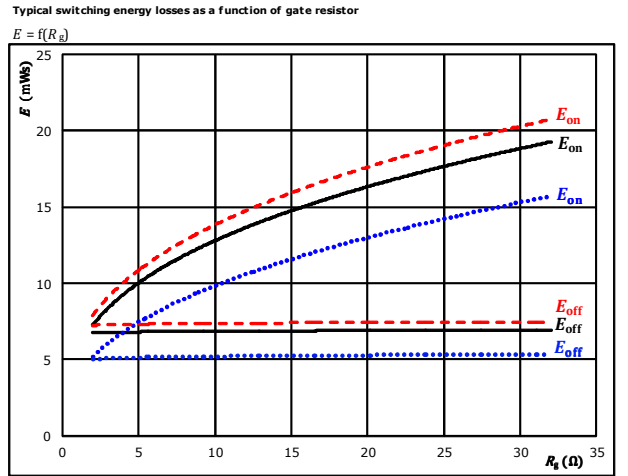
figure 1. IGBT



With an inductive load at

$V_{CE} = 600$ V	$T_j: 25$ °C
$V_{GE} = \pm 15$ V	125 °C	————
$R_{gon} = 2$ Ω	150 °C	-----
$R_{goff} = 2$ Ω		

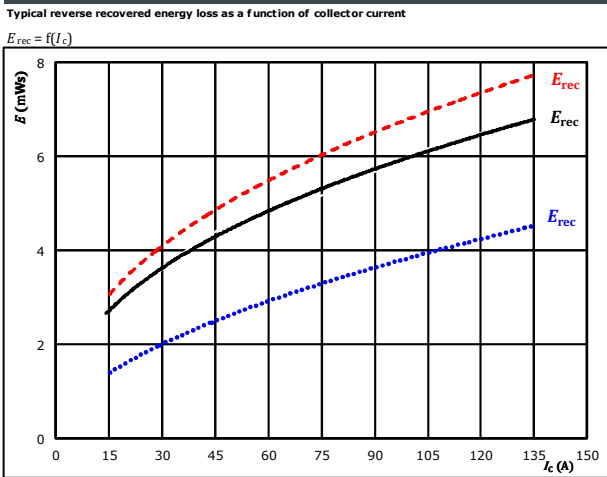
figure 2. IGBT



With an inductive load at

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

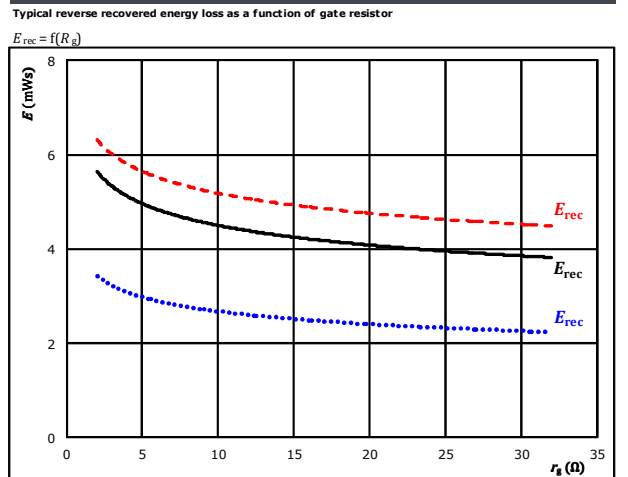
figure 3. FWD



With an inductive load at

$V_{CE} = 600$ V	$T_j: 25$ °C
$V_{GE} = \pm 15$ V	125 °C	————
$R_{gon} = 2$ Ω	150 °C	-----

figure 4. FWD



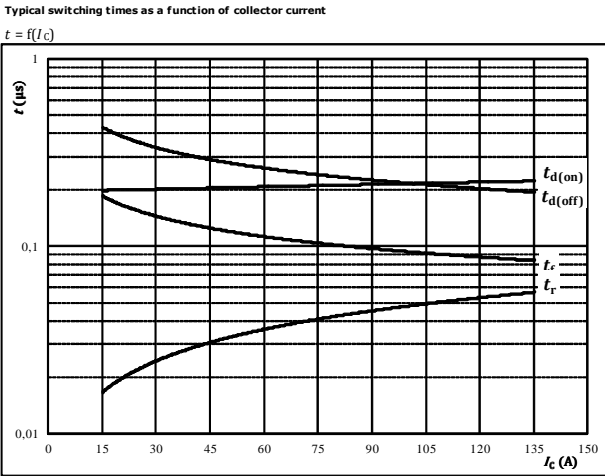
With an inductive load at

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



Inverter Switching Characteristics

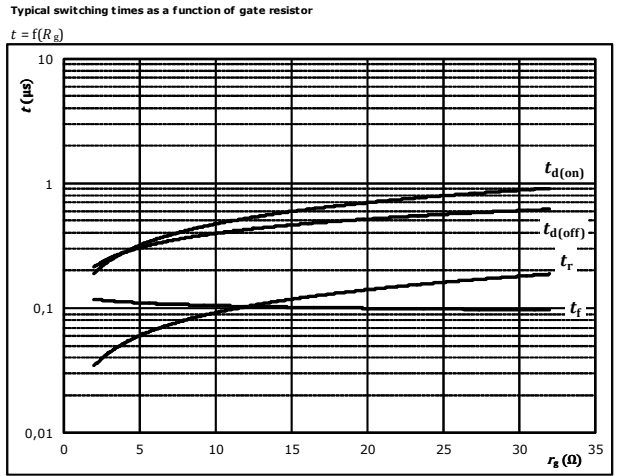
figure 5. IGBT
 Typical switching times as a function of collector current



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

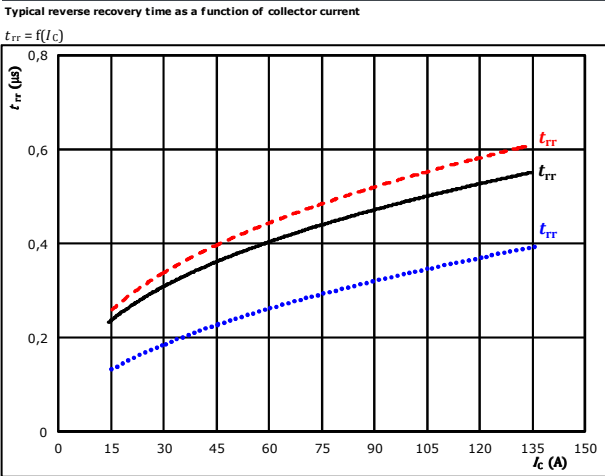
figure 6. IGBT
 Typical switching times as a function of gate resistor



With an inductive load at

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

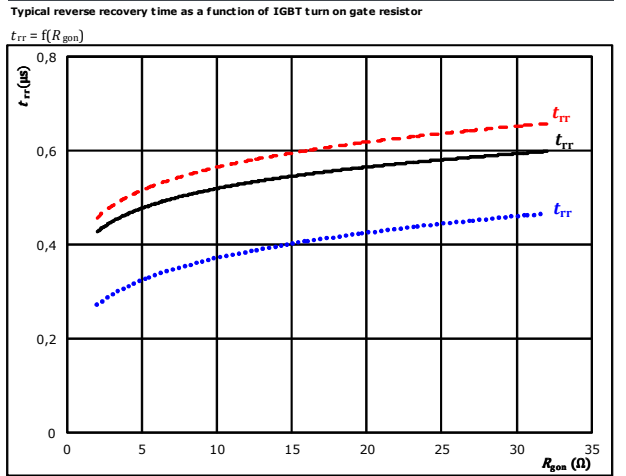
figure 7. FWD
 Typical reverse recovery time as a function of collector current



At

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

figure 8. FWD
 Typical reverse recovery time as a function of IGBT turn on gate resistor



At

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



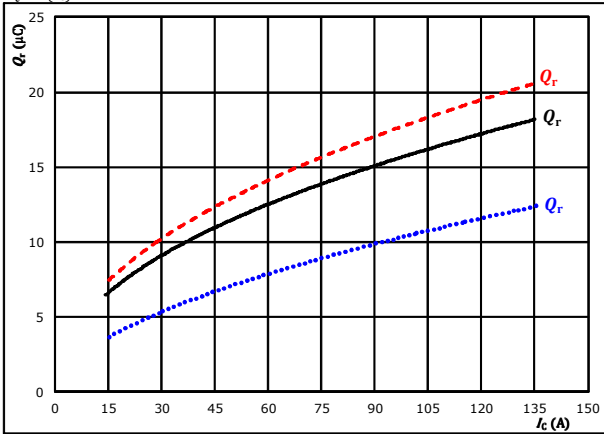
Vincotech

Inverter Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$

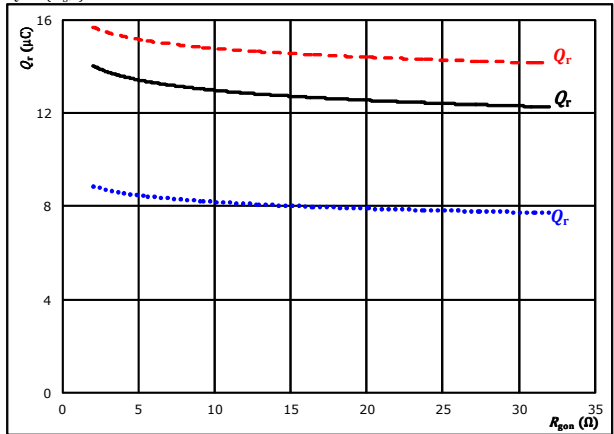


At $V_{CE} = 600$ V $T_j = 25$ °C (dotted blue)
 $V_{GE} = \pm 15$ V $T_j = 125$ °C (solid black)
 $R_{gpn} = 2$ Ω $T_j = 150$ °C (dashed red)

figure 10. FWD

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

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

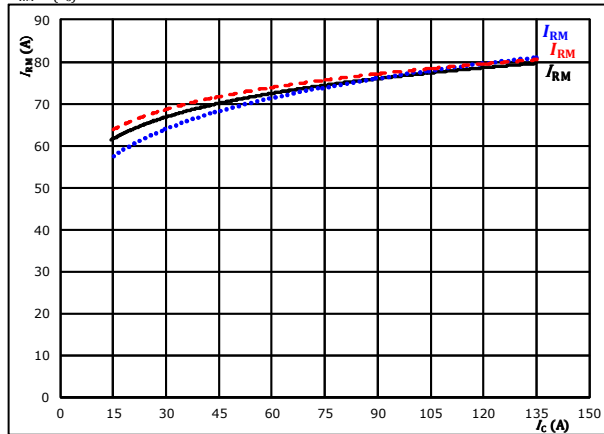


At $V_{CE} = 600$ V $T_j = 25$ °C (dotted blue)
 $V_{GE} = \pm 15$ V $T_j = 125$ °C (solid black)
 $I_c = 75$ A $T_j = 150$ °C (dashed red)

figure 11. FWD

Typical peak reverse recovery current as a function of collector current

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

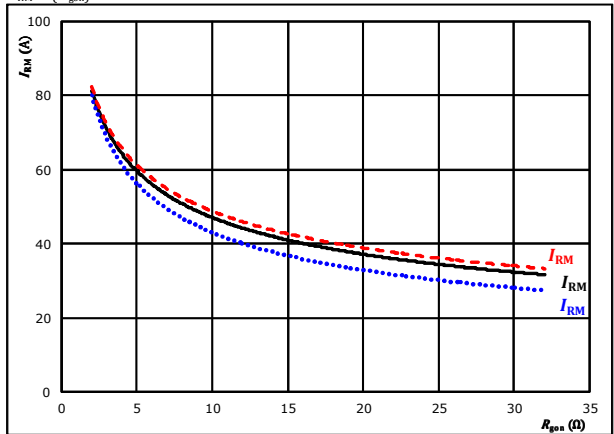


At $V_{CE} = 600$ V $T_j = 25$ °C (dotted blue)
 $V_{GE} = \pm 15$ V $T_j = 125$ °C (solid black)
 $R_{gpn} = 2$ Ω $T_j = 150$ °C (dashed red)

figure 12. FWD

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

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



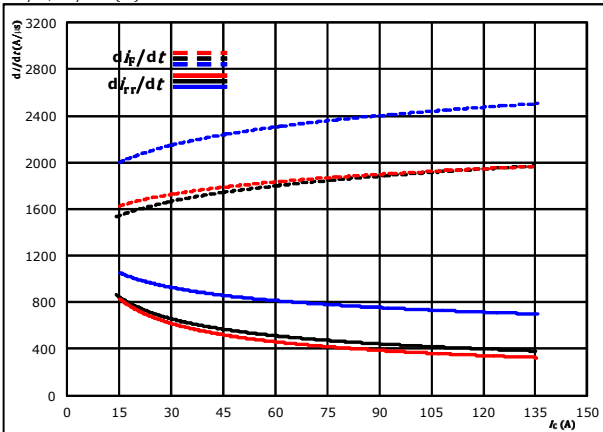
At $V_{CE} = 600$ V $T_j = 25$ °C (dotted blue)
 $V_{GE} = \pm 15$ V $T_j = 125$ °C (solid black)
 $I_c = 75$ A $T_j = 150$ °C (dashed red)



Inverter Switching Characteristics

figure 13. FWD

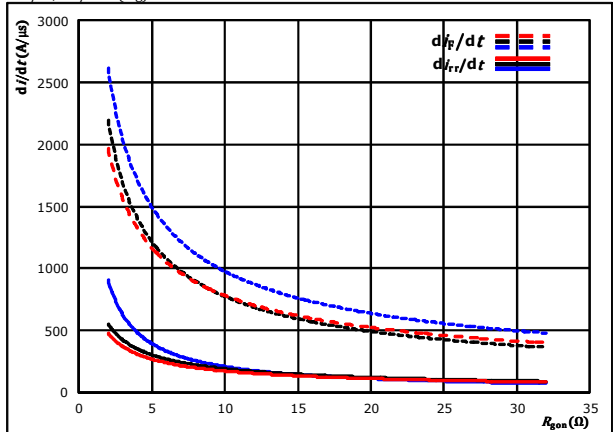
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_{rr}/dt = f(I_c)$



At $V_{CE} = 600$ V $T_j = 25$ °C
 $V_{GE} = \pm 15$ V $T_j = 125$ °C ———
 $R_{gpn} = 2$ 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
 $di_f/dt, di_{rr}/dt = f(R_{gon})$



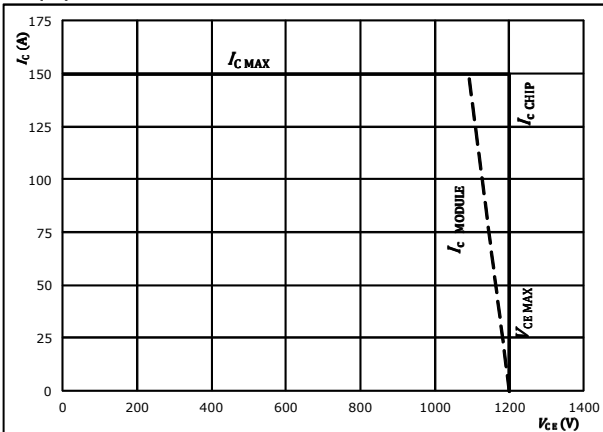
At $V_{CE} = 600$ V $T_j = 25$ °C
 $V_{GE} = \pm 15$ V $T_j = 125$ °C ———
 $I_c = 75$ A $T_j = 150$ °C - - - - -

Inverter Switching Characteristics

figure 15. IGBT

Reverse bias safe operating area

$I_c = f(V_{CE})$



At $T_j = 175$ °C
 $R_{gpn} = 2$ Ω
 $R_{goff} = 2$ Ω



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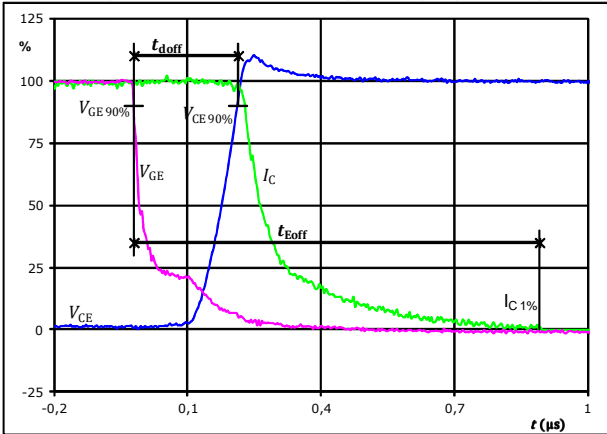
Inverter Switching Definitions

General conditions

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

figure 1. IGBT

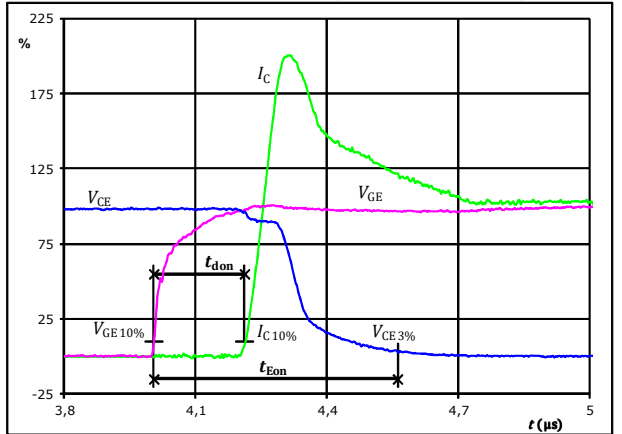
Turn-off Switching Waveforms & definition of t_{doff} , t_{Eoff} (t_{Eoff} = integrating time for E_{off})



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

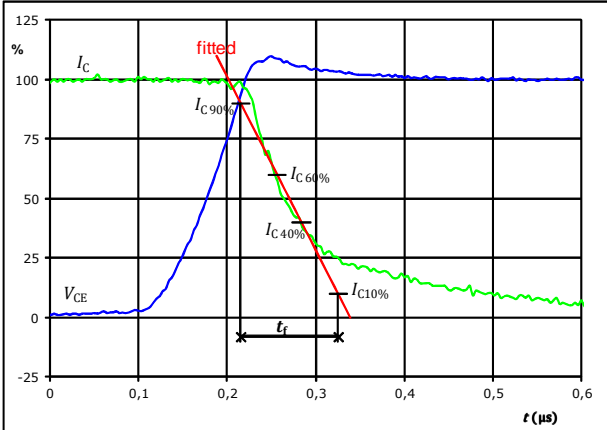
Turn-on Switching Waveforms & definition of t_{don} , t_{Eon} (t_{Eon} = integrating time for E_{on})



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

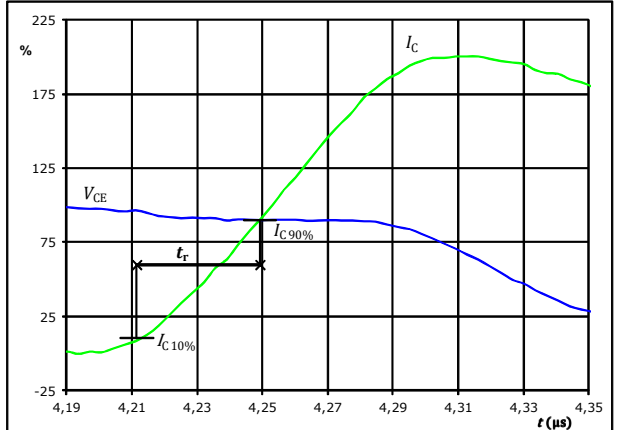
Turn-off Switching Waveforms & definition of t_f



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

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

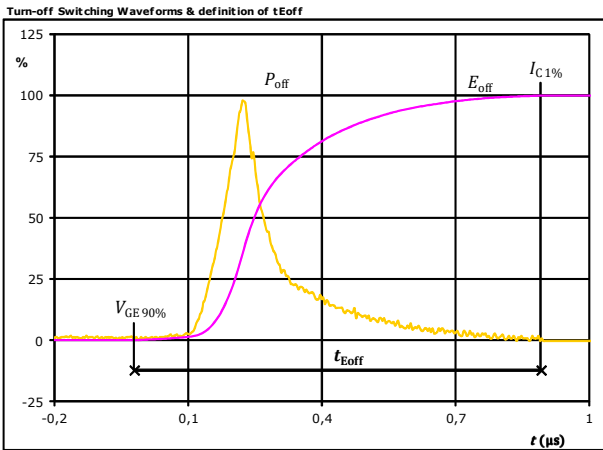


$V_C(100\%) =$	600	V
$I_C(100\%) =$	76	A
$t_r =$	0,038	μs



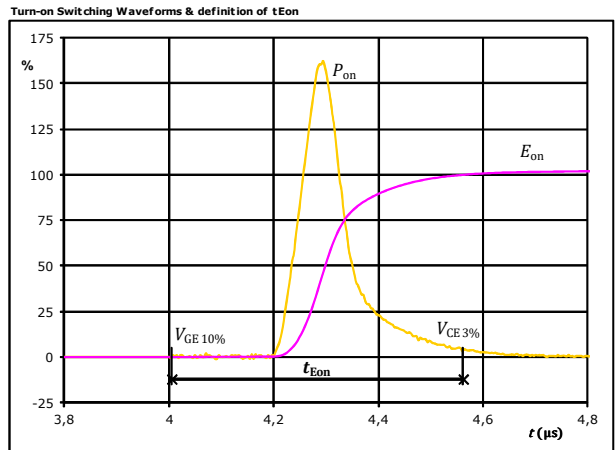
Inverter Switching Characteristics

figure 5. IGBT



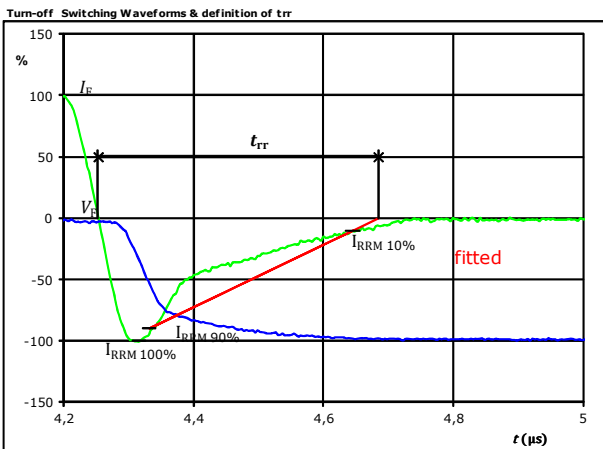
$P_{off}(100\%) = 45,36$ kW
 $E_{off}(100\%) = 6,80$ mJ
 $t_{Eoff} = 0,91$ μs

figure 6. IGBT



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

figure 7. FWD

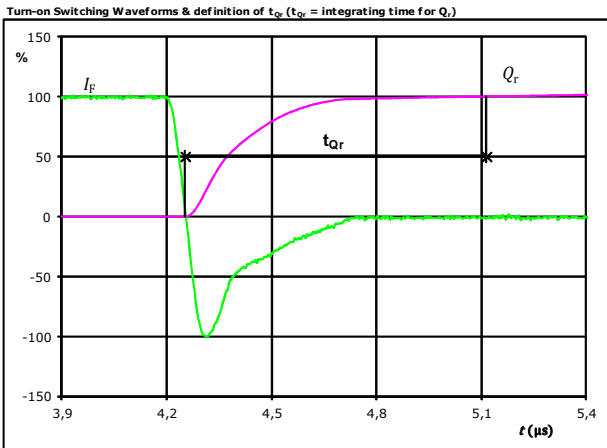


$V_F(100\%) = 600$ V
 $I_F(100\%) = 76$ A
 $I_{RRM}(100\%) = -77$ A
 $t_{rr} = 0,432$ μs



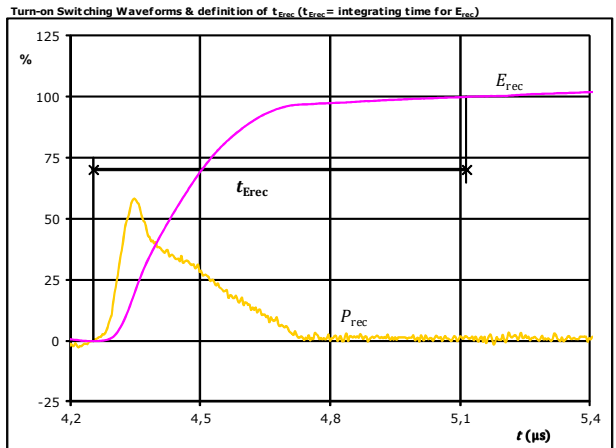
Inverter Switching Characteristics

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



Vincotech

10-F1126PA075M7-L829F09
10-P1126PA075M7-L829F09Y
 datasheet

Ordering Code & Marking						
Version			Ordering Code			
without thermal paste 17mm housing with Press-fit pins			10-P1126PA075M7-L829F09Y			
with thermal paste 17mm housing with Press-fit pins			10-P1126PA075M7-L829F09Y- /3/			
without thermal paste 17mm housing with solder pins			10-F1126PA075M7-L829F09			
NN-NNNNNNNNNNNNNN TTTTTVV WWYY UL VIN LLLLL SSSS		Text Name NN-NNNNNNNNNNNNNN-TTTTTVV WWYY UL VIN LLLLL SSSS	Date code WWYY	UL & VIN UL VIN	Lot LLLLL	Serial SSSS

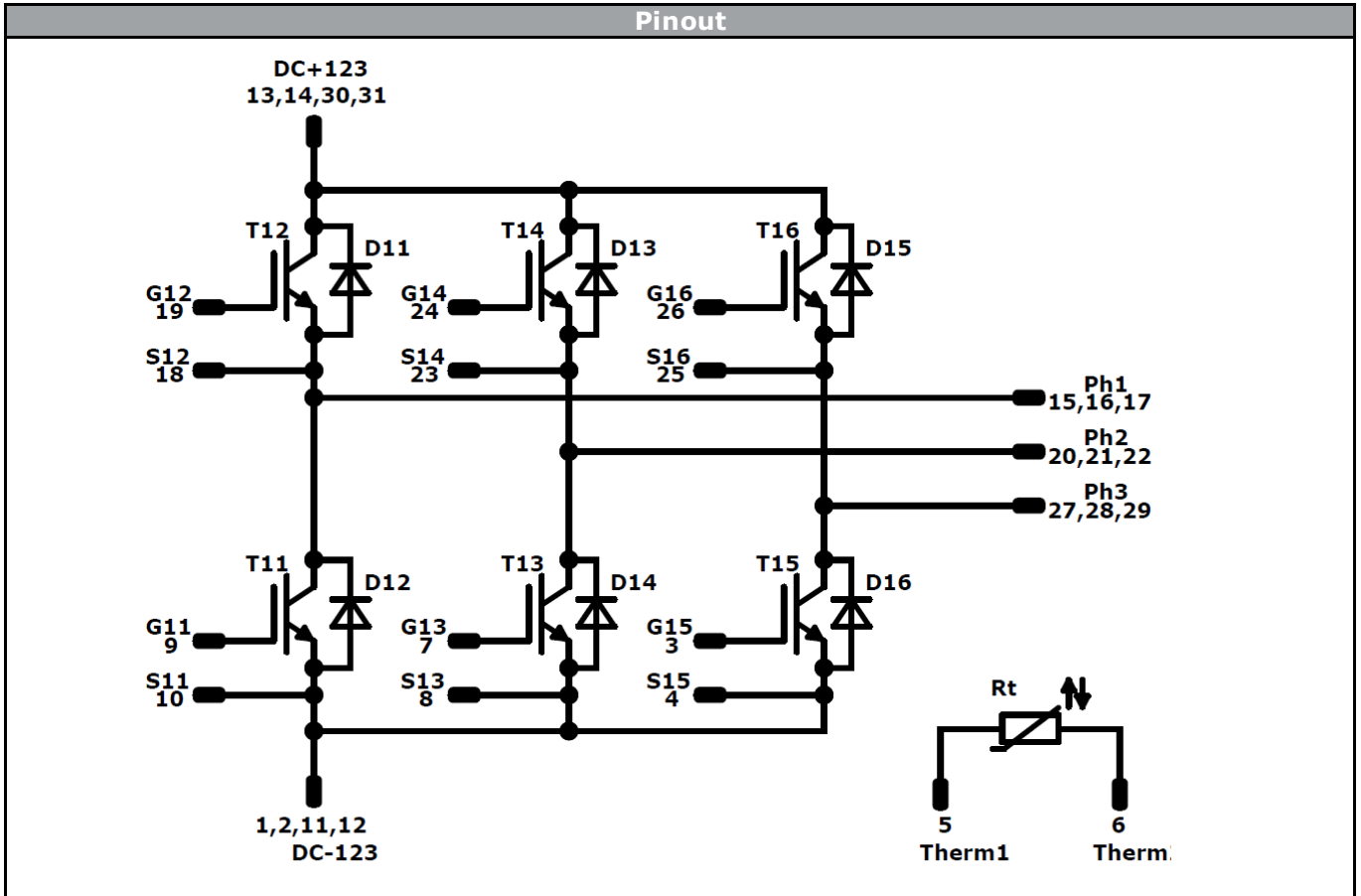
Pin table [mm]			
Pin	X	Y	Function
1	52,6	0	DC-
2	49,9	0	DC-
3	42,65	0	G6
4	39,65	0	S6
5	35,15	0	NTC1
6	28,4	0	NTC2
7	24	0	G4
8	21	0	S4
9	12,2	0	G2
10	9,2	0	S2
11	2,7	0	DC-
12	0	0	DC-
13	0	14,65	DC+
14	2,7	14,65	DC+
15	0	28,6	U
16	2,7	28,6	U
17	5,4	28,6	U
18	9,6	28,6	S1
19	12,6	28,6	G1
20	19,6	28,6	V
21	22,3	28,6	V
22	25	28,6	V
23	29,7	28,6	S3
24	32,7	28,6	G3
25	39,7	28,6	S5
26	42,7	28,6	G5
27	47,2	28,6	W
28	49,9	28,6	W
29	52,6	28,6	W
30	52,6	14,65	DC+
31	49,9	14,65	DC+

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

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



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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,D15,D16	FWD	1200 V	100 A	Inverter Diode	
Rt	Thermistor			NTC	




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Packaging instruction			
Standard packaging quantity (SPQ) 100	>SPQ	Standard	<SPQ Sample

Handling instruction
Handling instructions for <i>flow 1</i> packages see vincotech.com website.

Package data
Package data for <i>flow 1</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
10-x1126PA075M7-L829F09x-D1-14	07 Mar. 2017		

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1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in labelling can be reasonably expected to result in significant injury to the user.
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.