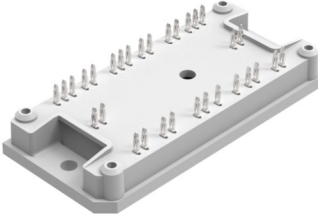
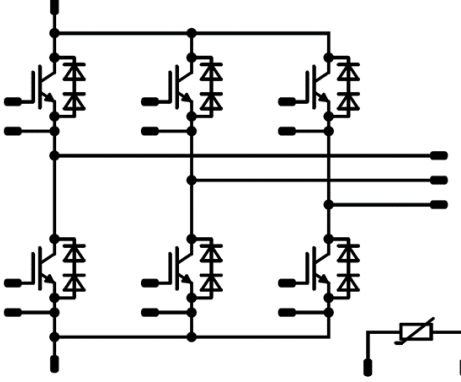




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<i>flowPACK 1</i>	<b>1200 V / 75 A</b>
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center; background-color: #cccccc; margin: 0;"><b>Features</b></p> <ul style="list-style-type: none"> <li>High speed IGBT4</li> <li>Tandem diodes for improved thermal performance</li> <li>Integrated thermal sensor</li> </ul> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center; background-color: #cccccc; margin: 0;"><b>Target applications</b></p> <ul style="list-style-type: none"> <li>Embedded Drives</li> <li>Industrial Drives</li> </ul> </div> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; background-color: #cccccc; margin: 0;"><b>Types</b></p> <ul style="list-style-type: none"> <li>10-PY126TA075SH-L829F68Y</li> </ul> </div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center; background-color: #cccccc; margin: 0;"><i>flow 1 12mm housing</i></p>  </div> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; background-color: #cccccc; margin: 0;"><b>Schematic</b></p>  </div>

## Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
<b>Inverter Switch</b>				
Collector-emitter voltage	$V_{CES}$		1200	V
Collector current	$I_C$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	60	A
Repetitive peak collector current	$I_{CRM}$	$t_p$ limited by $T_{jmax}$	225	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	141	W
Gate-emitter voltage	$V_{GES}$		±20	V
Short circuit ratings	$t_{SC}$	$V_{GE} = 15\text{ V}$ $V_{CE} = 800\text{ V}$ $T_j = 150\text{ °C}$	10	µs
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
<b>Inverter Diode</b>				
Peak repetitive reverse voltage	$V_{RRM}$		1300	V
Continuous (direct) forward current	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	44	A
Repetitive peak forward current	$I_{FRM}$		150	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	107	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 <sub>jmax</sub> - 25)	°C

### Isolation Properties

Isolation voltage	$V_{isol}$	DC Test Voltage* $t_p = 2\text{ s}$	6000	V
		AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			min. 12,7	mm
Clearance			7,9	mm
Comparative Tracking Index	CTI		> 200	

\*100 % tested in production



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## 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	Conditions	$V_{GS}$ [V]	$V_{GE}$ [V]	$V_{DS}$ [V]	$I_D$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
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	1,78	2,16 2,48 2,56	2,42	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	$r_g$								none		Ω
Input capacitance	$C_{ies}$	$f = 1 \text{ Mhz}$	0	25			25		4400		pF
Reverse transfer capacitance	$C_{res}$								235		

#### Thermal

Parameter	Symbol	Conditions	$V_{GS}$ [V]	$V_{GE}$ [V]	$V_{DS}$ [V]	$I_D$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4 \text{ W/mK}$ (PSX)							0,68		K/W

#### Dynamic

Parameter	Symbol	Conditions	$V_{GS}$ [V]	$V_{GE}$ [V]	$V_{DS}$ [V]	$I_D$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Turn-on delay time	$t_{d(on)}$	$R_{gon} = 4 \Omega$ $R_{goff} = 4 \Omega$	±15	600		75		25	63		ns
Rise time	$t_r$							125	63		
Turn-off delay time	$t_{d(off)}$							150	63		
Fall time	$t_f$							25	11		
								125	12		
								150	13		
Turn-on energy (per pulse)	$E_{on}$							25	160		
		125	212								
		150	224								
Turn-off energy (per pulse)	$E_{off}$	25	32								
		125	72								
		150	78								
Turn-on energy (per pulse)	$E_{on}$	25	1,537								
		125	2,356								
		150	2,579								
Turn-off energy (per pulse)	$E_{off}$	25	2,540								
		125	4,327								
		150	4,844								



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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	$V_{GS}$ [V]	$V_{DS}$ [V]	$I_D$ [A]	$T_j$ [°C]	Min	Typ	Max	Unit
Forward voltage	$V_F$			75	25 125 150		3,35 3,10 3,03	3,84	V
Reverse leakage current	$I_R$		1300		25			3,8	μA

#### Thermal

Parameter	Symbol	Conditions	Value	Unit
Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)	0,89	K/W

#### Dynamic

Parameter	Symbol	$dI/dt$ [A/μs]	$I_D$ [A]	$T_j$ [°C]	25	125	150	Unit	
Peak recovery current	$I_{RRM}$				83	96	103	A	
Reverse recovery time	$t_{rr}$				73	113	123	ns	
Recovered charge	$Q_r$	$dI/dt = 8280$ A/μs $dI/dt = 8041$ A/μs $dI/dt = 7429$ A/μs	±15	600	75	2,619	4,803	5,454	μC
Reverse recovered energy	$E_{rec}$				25	1,008	1,907	2,174	mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$				25	2653	1613	1699	A/μs

### Thermistor

Parameter	Symbol	Conditions	25	100	Unit	
Rated resistance	$R$		22		kΩ	
Deviation of $R_{100}$	$\Delta_{R/R}$	$R_{100} = 1484$ Ω		-5	5	%
Power dissipation	$P$		5		mW	
Power dissipation constant			1,5		mW/K	
B-value	$B_{(25/50)}$	Tol. ±1 %	3962		K	
B-value	$B_{(25/100)}$	Tol. ±1 %	4000		K	
Vincotech NTC Reference					I	

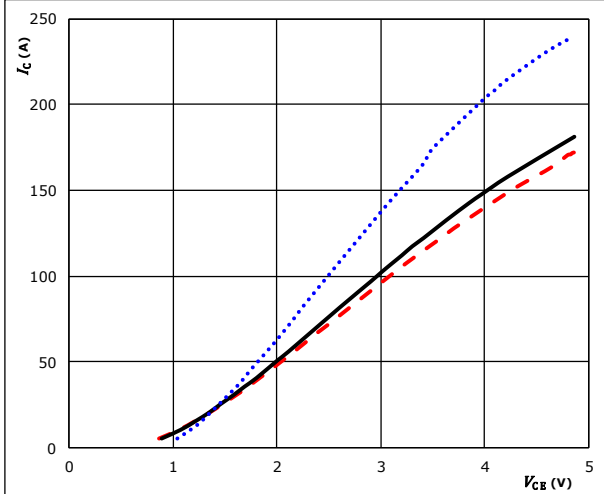


### Inverter Switch Characteristics

**figure 1. IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

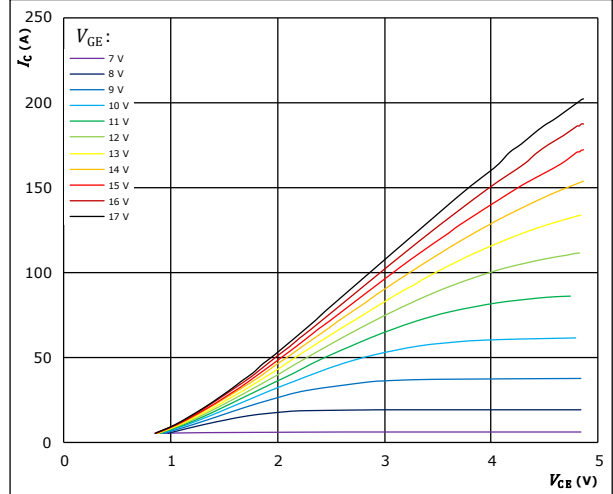


$t_p = 250 \mu s$        $T_j: 25 \text{ }^\circ C$       .....  
 $V_{GE} = 15 \text{ V}$        $T_j: 125 \text{ }^\circ C$       ———  
                           $T_j: 150 \text{ }^\circ C$       - - - -

**figure 2. IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

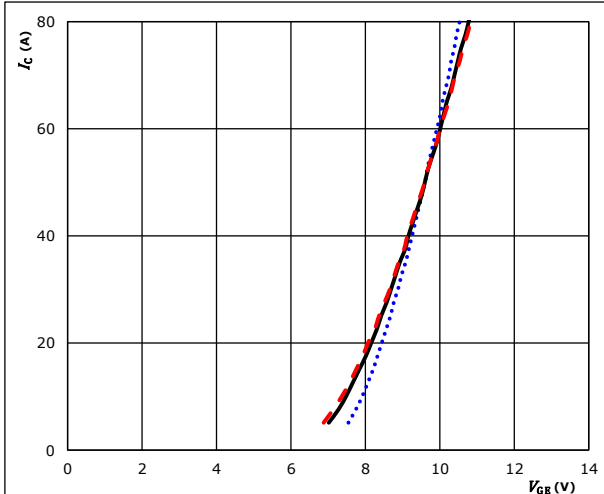


$t_p = 250 \mu s$        $T_j = 125 \text{ }^\circ C$   
 $V_{GE}$  from 7 V to 17 V in steps of 1 V

**figure 3. IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

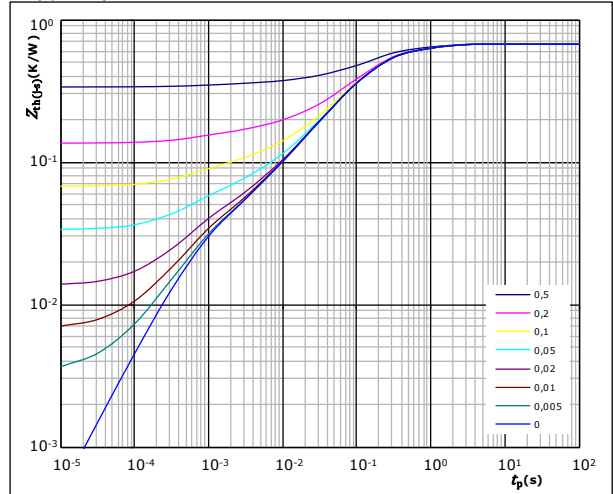


$t_p = 100 \mu s$        $T_j: 25 \text{ }^\circ C$       .....  
 $V_{CE} = 0 \text{ V}$        $T_j: 125 \text{ }^\circ C$       ———  
                           $T_j: 150 \text{ }^\circ C$       - - - -

**figure 4. IGBT**

Transient thermal impedance as function of pulse duration

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



$D = t_p / T$   
 $R_{th(j-s)} = 0,68 \text{ K/W}$

IGBT thermal model values

R (K/W)	$\tau$ (s)
1,22E-01	9,38E-01
3,87E-01	1,40E-01
9,92E-02	4,82E-02
3,95E-02	8,51E-03
2,86E-02	7,35E-04



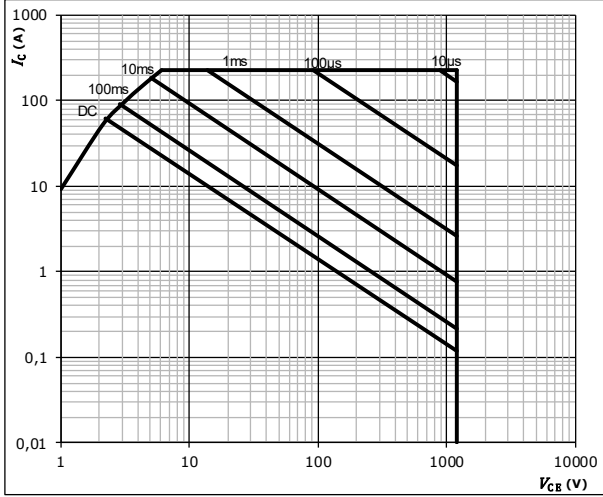
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## Inverter Switch Characteristics

figure 5. IGBT

Safe operating area

$$I_C = f(V_{CE})$$



$D =$  single pulse  
 $T_s =$  80 °C  
 $V_{GE} =$  0 V  
 $T_j = T_{jmax}$

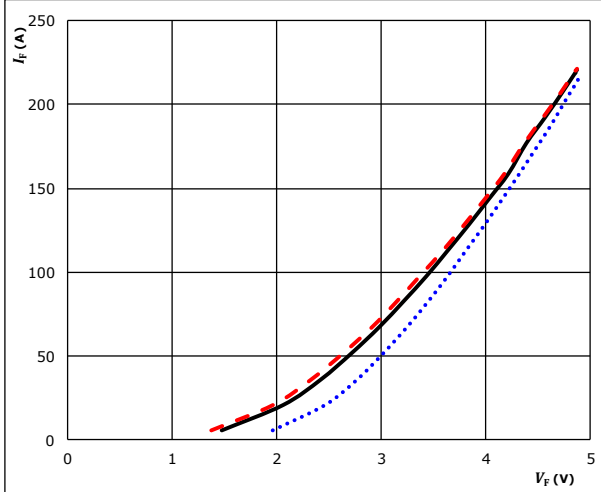


## Inverter Diode Characteristics

**figure 1.** FWD

Typical forward characteristics

$$I_F = f(V_F)$$

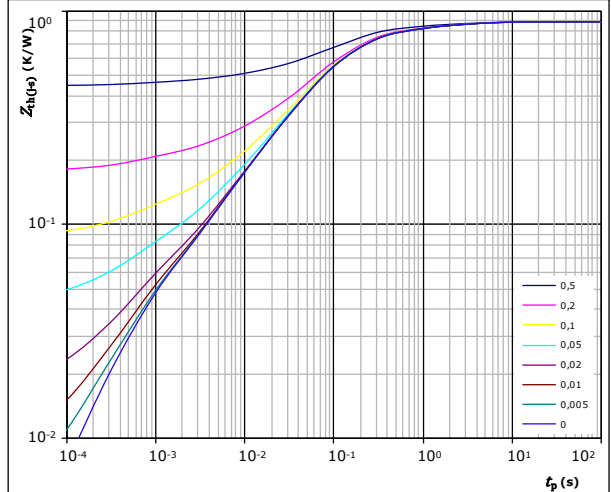


$t_p = 250 \mu s$   
 $T_j$ : 25 °C .....  
 125 °C ———  
 150 °C - - - -

**figure 2.** FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$   
 $R_{th(j-s)} = 0,89 \text{ K/W}$   
 FWD thermal model values

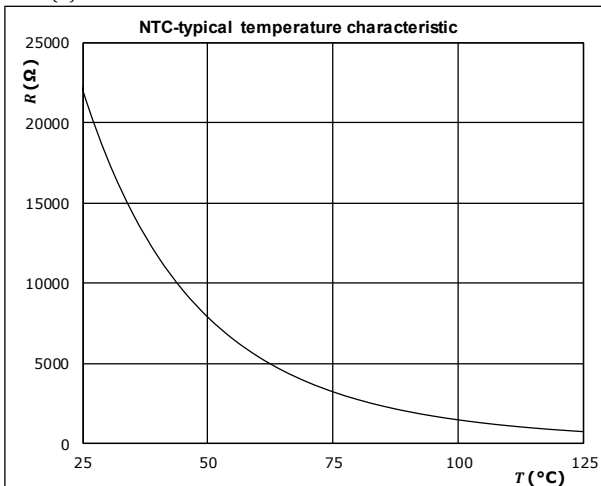
$R$ (K/W)	$\tau$ (s)
5,36E-02	3,53E+00
1,18E-01	6,10E-01
4,31E-01	1,15E-01
1,85E-01	3,40E-02
6,73E-02	5,82E-03
3,31E-02	5,88E-04

## Thermistor Characteristics

**figure 1.** Thermistor

Typical NTC characteristic as a function of temperature

$$R = f(T)$$



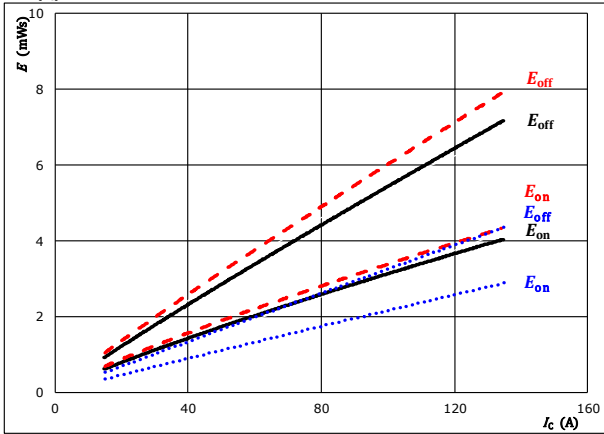


## Inverter Switching Characteristics

**figure 1.** IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_c)$$

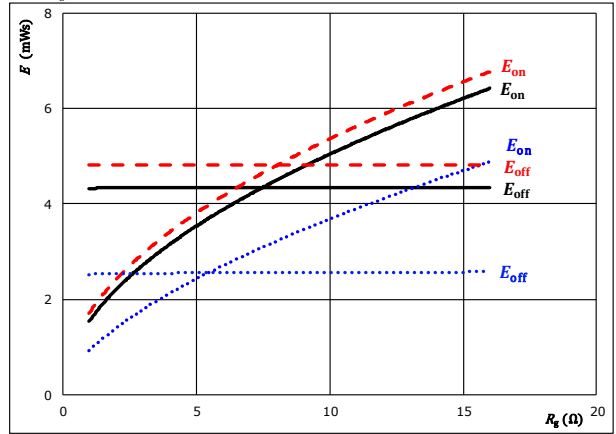


With an inductive load at  
 $V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 4$   $\Omega$   
 $R_{goff} = 4$   $\Omega$   
 $T_j: 25$  °C  
 $125$  °C  
 $150$  °C

**figure 2.** IGBT

Typical switching energy losses as a function of gate resistor

$$E = f(R_g)$$

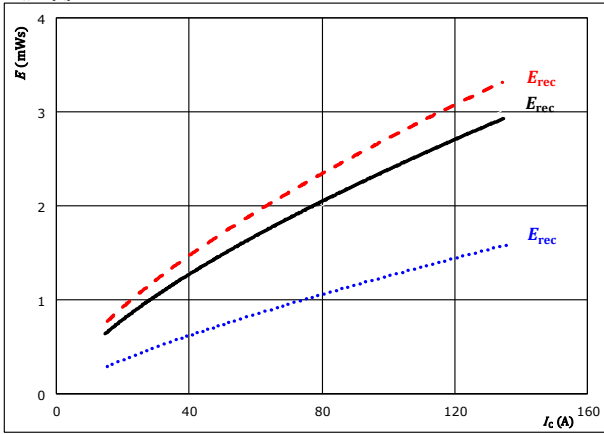


With an inductive load at  
 $V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 75$  A  
 $T_j: 25$  °C  
 $125$  °C  
 $150$  °C

**figure 3.** FWD

Typical reverse recovered energy loss as a function of collector current

$$E_{rec} = f(I_c)$$

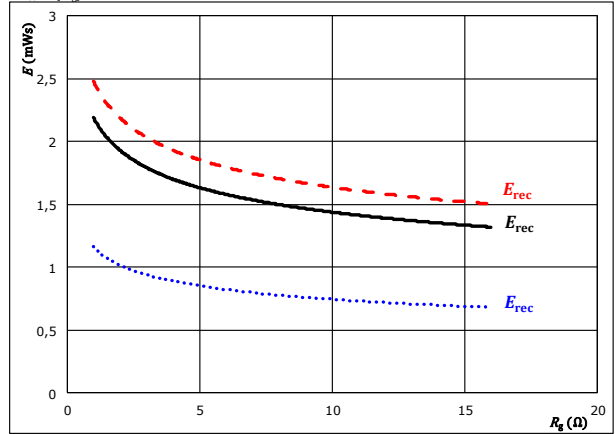


With an inductive load at  
 $V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 4$   $\Omega$   
 $T_j: 25$  °C  
 $125$  °C  
 $150$  °C

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



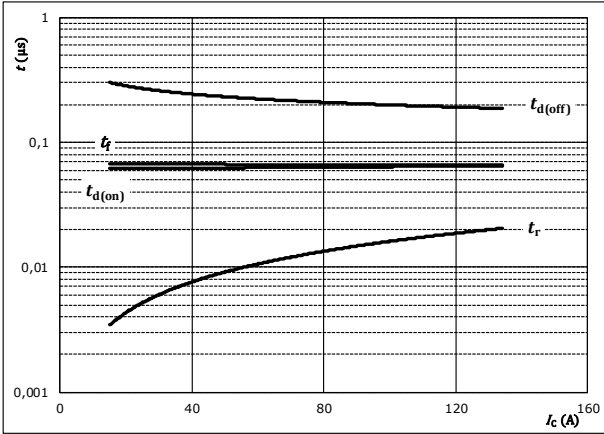


## Inverter Switching Characteristics

**figure 5.** IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



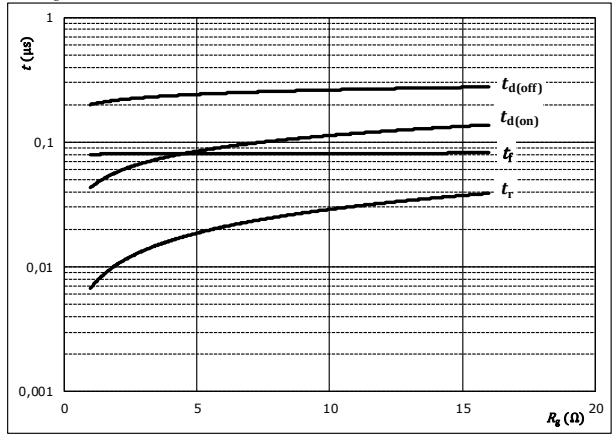
With an inductive load at

$T_j =$	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

$$t = f(R_g)$$



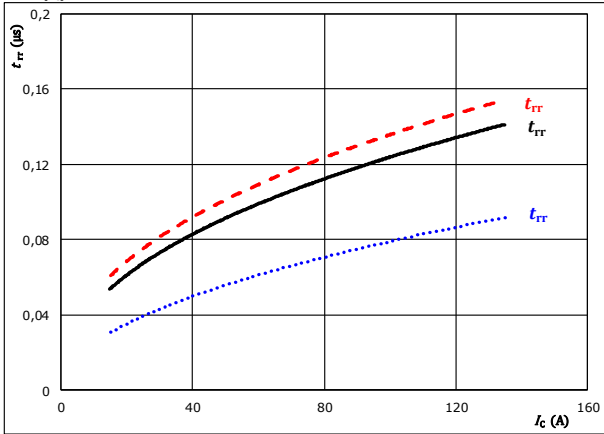
With an inductive load at

$T_j =$	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

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



With an inductive load at

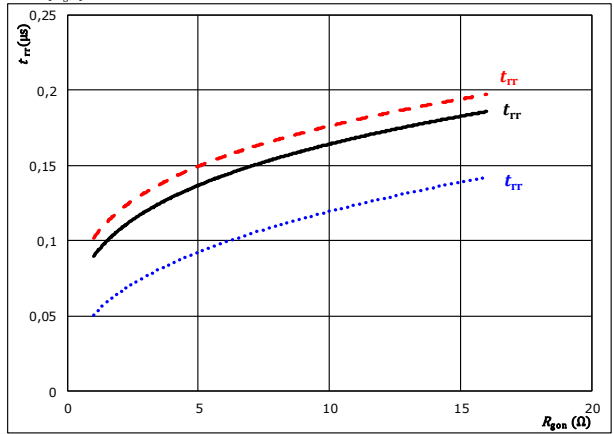
$V_{CE} =$	600	V
$V_{GE} =$	±15	V
$R_{gon} =$	4	Ω

$T_j:$	25 °C	.....
	125 °C	————
	150 °C	-----

**figure 8.** FWD

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

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



With an inductive load at

$V_{CE} =$	600	V
$V_{GE} =$	±15	V
$I_C =$	75	A

$T_j:$	25 °C	.....
	125 °C	————
	150 °C	-----

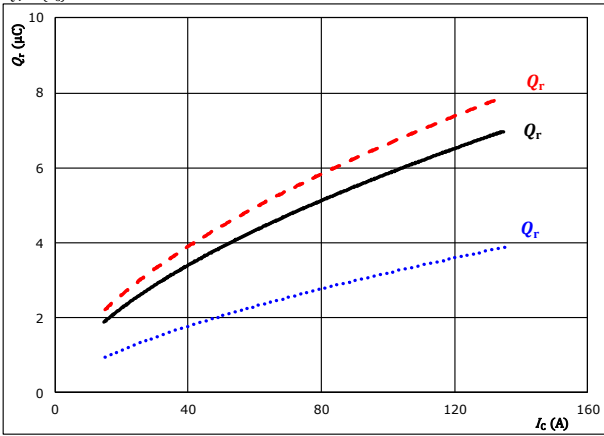


## Inverter Switching Characteristics

**figure 9.** FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$

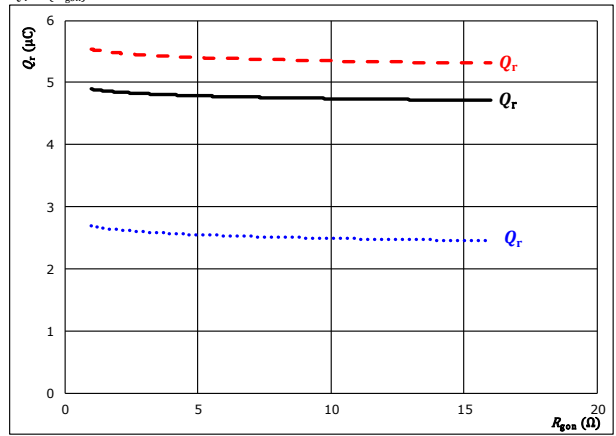


With an inductive load at  
 $V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 4$   $\Omega$   
 $T_j$ : 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

**figure 10.** FWD

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

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

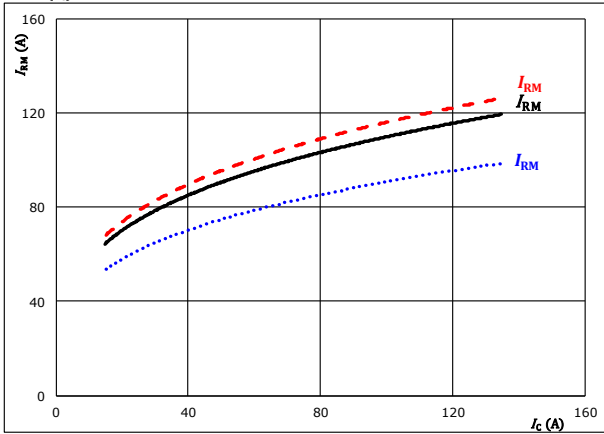


With an inductive load at  
 $V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $I_C = 75$  A  
 $T_j$ : 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

**figure 11.** FWD

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

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

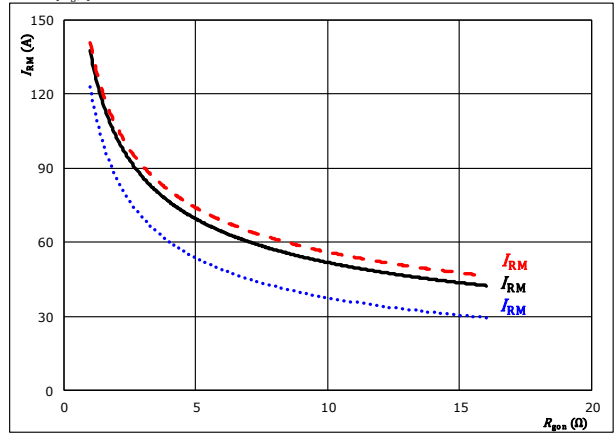


With an inductive load at  
 $V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 4$   $\Omega$   
 $T_j$ : 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)

**figure 12.** FWD

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

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



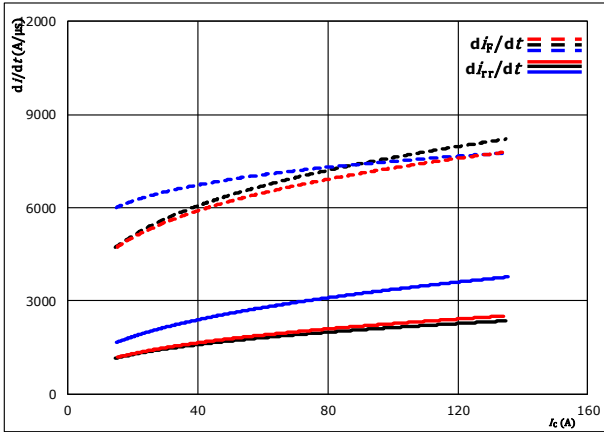
With an inductive load at  
 $V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $I_C = 75$  A  
 $T_j$ : 25 °C (dotted blue), 125 °C (solid black), 150 °C (dashed red)



## Inverter Switching Characteristics

**figure 13.** FWD

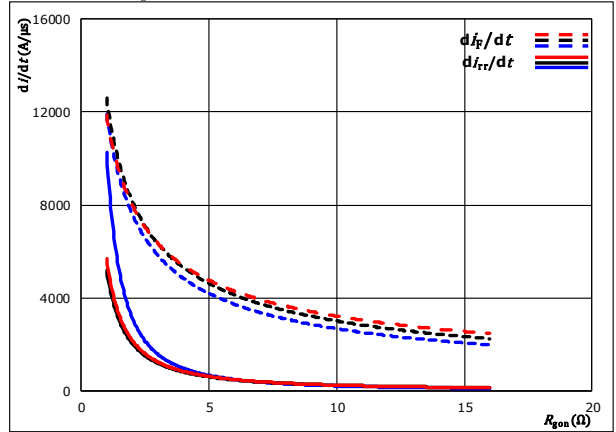
Typical rate of fall of forward and reverse recovery current as a function of collector current  
 $di_f/dt, di_{rr}/dt = f(I_C)$



With an inductive load at 25 °C  
 $V_{CE} = 600$  V  $T_j = 125$  °C  
 $V_{GE} = \pm 15$  V 150 °C  
 $R_{g\text{on}} = 4$  Ω

**figure 14.** FWD

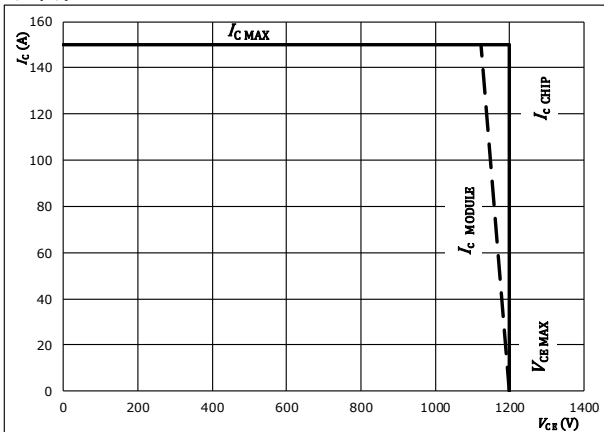
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor  
 $di_f/dt, di_{rr}/dt = f(R_{g\text{on}})$



With an inductive load at 25 °C  
 $V_{CE} = 600$  V  $T_j = 125$  °C  
 $V_{GE} = \pm 15$  V 150 °C  
 $I_C = 75$  A

**figure 15.** IGBT

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



At  $T_j = 125$  °C  
 $R_{g\text{on}} = 4$  Ω  
 $R_{g\text{off}} = 4$  Ω

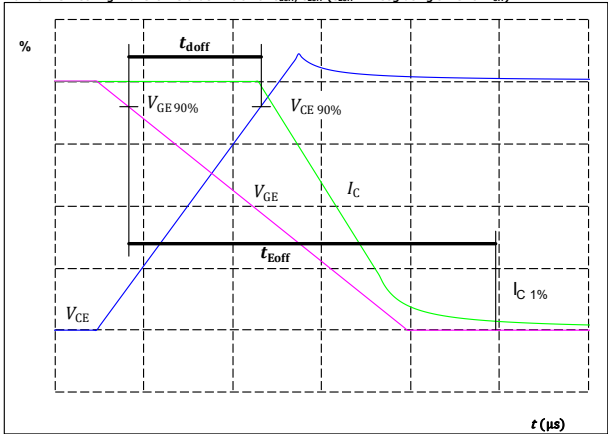


## Inverter Switching Definitions

General conditions		
$T_j$	=	125 °C
$R_{gon}$	=	4 $\Omega$
$R_{goff}$	=	4 $\Omega$

**figure 1.** IGBT

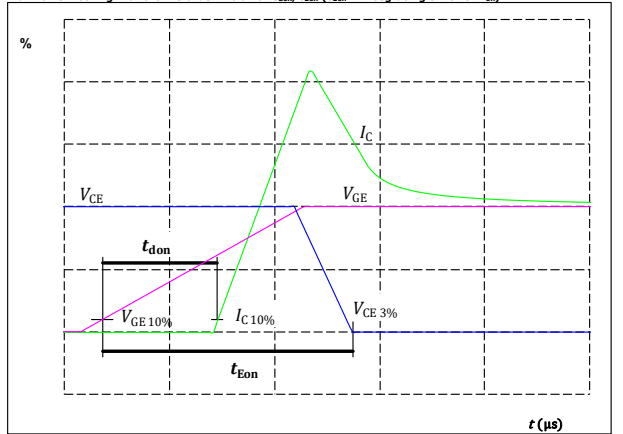
Turn-off Switching Waveforms & definition of  $t_{doff}$ ,  $t_{Eoff}$  ( $t_{Eoff}$  = integrating time for  $E_{off}$ )



$V_{CE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	600	V
$I_C(100\%) =$	75	A
$t_{doff} =$	212	ns

**figure 2.** IGBT

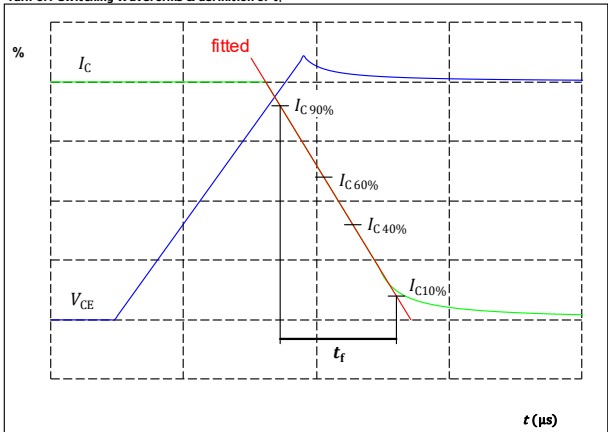
Turn-on Switching Waveforms & definition of  $t_{don}$ ,  $t_{Eon}$  ( $t_{Eon}$  = integrating time for  $E_{on}$ )



$V_{CE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	600	V
$I_C(100\%) =$	75	A
$t_{don} =$	63	ns

**figure 3.** IGBT

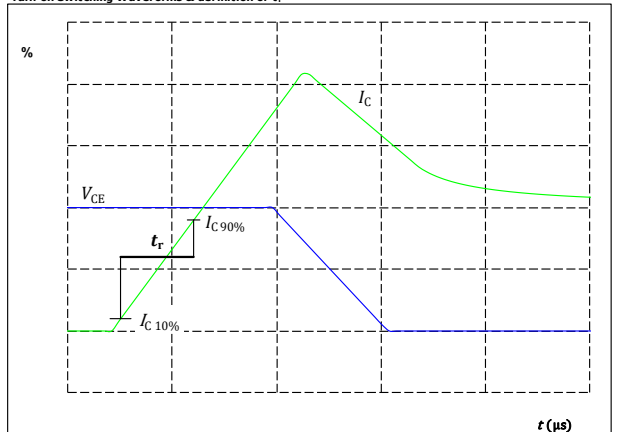
Turn-off Switching Waveforms & definition of  $t_f$



$V_C(100\%) =$	600	V
$I_C(100\%) =$	75	A
$t_f =$	72	ns

**figure 4.** IGBT

Turn-on Switching Waveforms & definition of  $t_r$



$V_C(100\%) =$	600	V
$I_C(100\%) =$	75	A
$t_r =$	12	ns

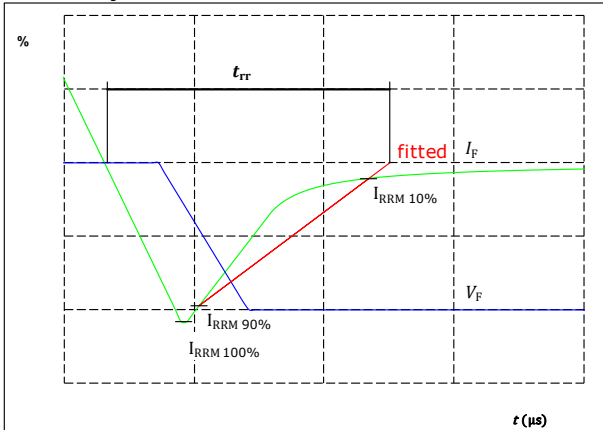


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## Inverter Switching Characteristics

figure 5. FWD

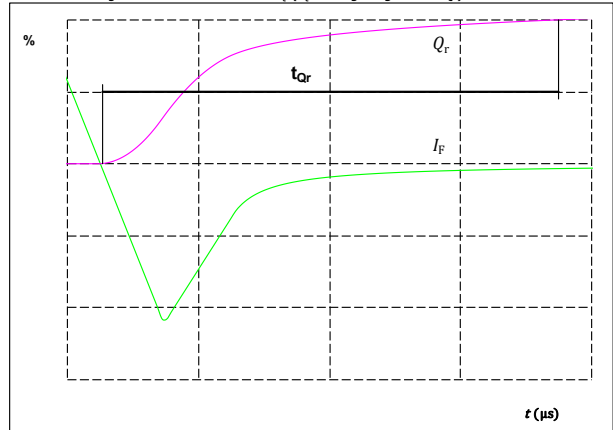
Turn-off Switching Waveforms & definition of  $t_{rr}$



$V_F(100\%) =$	600	V
$I_F(100\%) =$	75	A
$I_{RRM}(100\%) =$	96	A
$t_{rr} =$	113	ns

figure 6. FWD

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



$I_F(100\%) =$	75	A
$Q_r(100\%) =$	4,80	$\mu\text{C}$



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Ordering Code & Marking						
<b>Version</b>			<b>Ordering Code</b>			
without thermal paste 12mm housing with Press-fit pins			10-PY126TA075SH-L829F68Y			
with thermal paste 12mm housing with Press-fit pins			10-PY126TA075SH-L829F68Y-/3/			
NN-NNNNNNNNNNNN TTTTITW WWYY UL VIN LLLL SSSS						
<b>Text</b>	<b>Name</b>		<b>Date code</b>	<b>UL &amp; VIN</b>	<b>Lot</b>	<b>Serial</b>
	NN-NNNNNNNNNNNN-TTTTITW		WWYY	UL VIN	LLLLL	SSSS
<b>Datamatrix</b>	<b>Type&amp;Ver</b>	<b>Lot number</b>	<b>Serial</b>	<b>Date code</b>		
	TTTTITW	LLLLL	SSSS	WWYY		

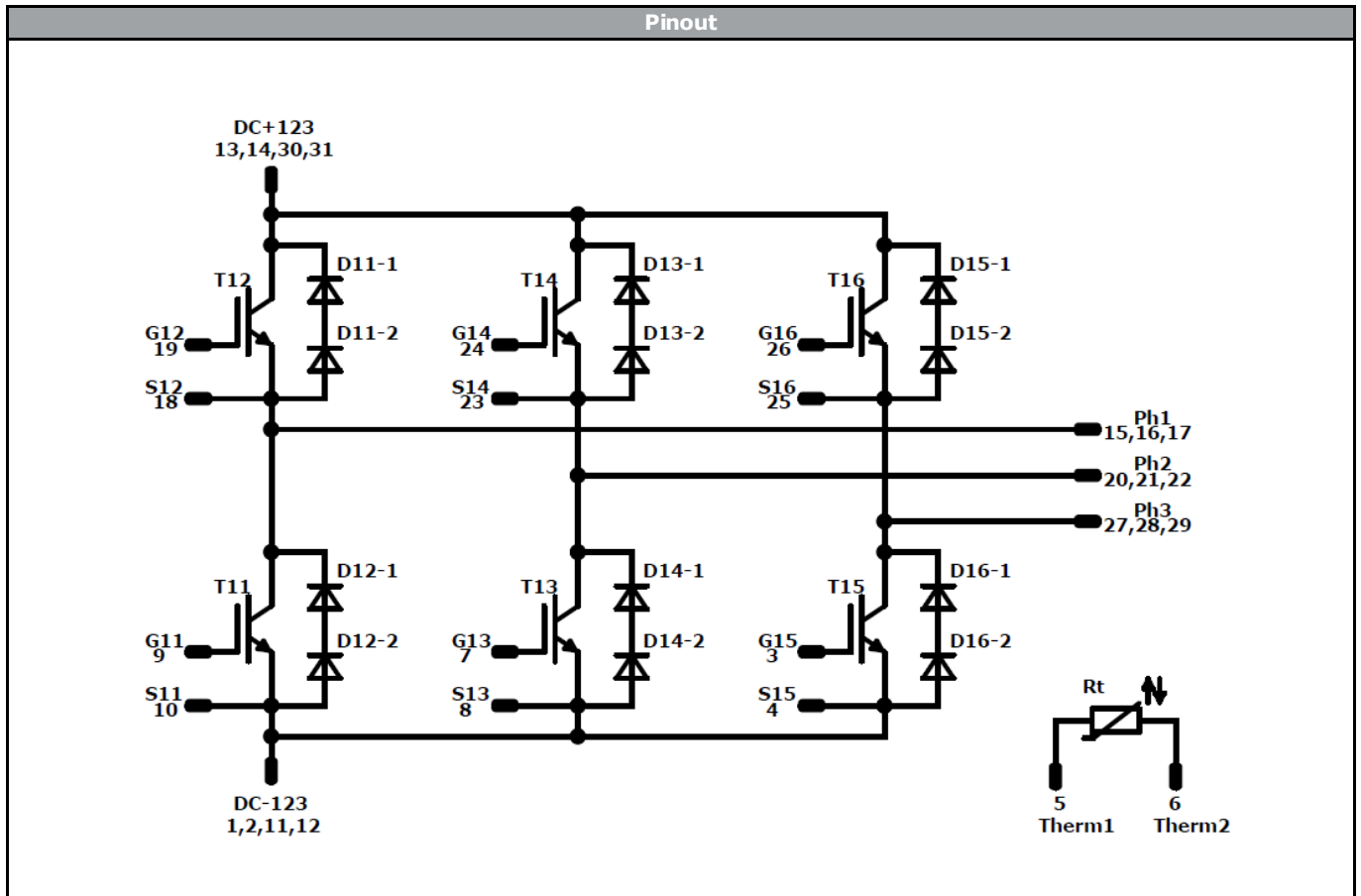
Pin table			
Pin	X	Y	Functions
1	52,6	0	DC-123
2	49,9	0	DC-123
3	42,65	0	G15
4	39,65	0	S15
5	35,15	0	Therm1
6	28,4	0	Therm2
7	24	0	G13
8	21	0	S13
9	12,2	0	G11
10	9,2	0	S11
11	2,7	0	DC-123
12	0	0	DC-123
13	0	14,65	DC+123
14	2,7	14,65	DC+123
15	0	28,6	Ph1
16	2,7	28,6	Ph1
17	5,4	28,6	Ph1
18	9,6	28,6	S12
19	12,6	28,6	G12
20	19,6	28,6	Ph2
21	22,3	28,6	Ph2
22	25	28,6	Ph2
23	29,7	28,6	S14
24	32,7	28,6	G14
25	39,7	28,6	S16
26	42,7	28,6	G16
27	47,2	28,6	Ph3
28	49,9	28,6	Ph3
29	52,6	28,6	Ph3
30	52,6	14,65	DC+123
31	49,9	14,65	DC+123

**Outline**

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



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<b>Identification</b>					
<b>ID</b>	<b>Component</b>	<b>Voltage</b>	<b>Current</b>	<b>Function</b>	<b>Comment</b>
T11, T12, T13, T14, T15, T16	IGBT	1200 V	75 A	Inverter Switch	
D11, D12, D13, D14, D15, D16	FWD	1300 V	75 A	Inverter Diode	
Rt	NTC			Thermistor	




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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-PY126TA075SH-L829F68Y-D2-14	11 Dec. 2018	Correct static values of Inverter Diode	2, 4, 7

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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.