



Vincotech

10-FZ122PB100SC03-M819F18
10-PZ122PB100SC03-M819F18Y
10-F0122PB100SC03-M819F19
10-P0122PB100SC03-M819F19Y
datasheet

flowPHASE 0 + NTC

1200 V / 100 A

Features

- High efficiency IGBT4 half-bridge
- Full current FWD
- Improved R_{th} with AlN DCB
- Thermistor

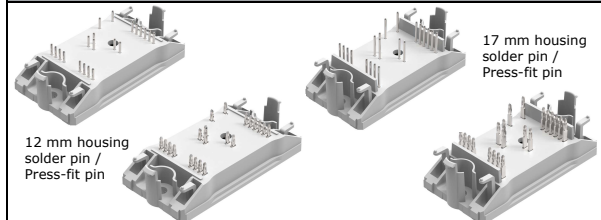
Target applications

- Industrial Drives
- Power Supply
- Solar Inverters
- UPS
- Welding & Cutting

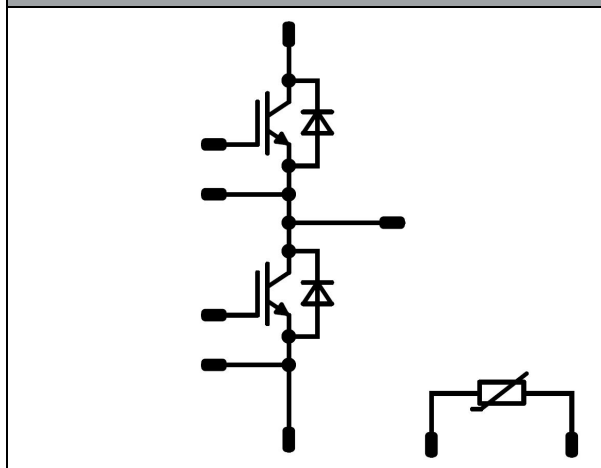
Types

- 10-FZ122PB100SC03-M819F18
- 10-PZ122PB100SC03-M819F18Y
- 10-F0122PB100SC03-M819F19
- 10-P0122PB100SC03-M819F19Y

flow 0 housing



Schematic



Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
Half-Bridge Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current	I_C		100	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	268	W
Gate-emitter voltage	V_{GES}		±20	V
Short circuit ratings	t_{SC}	$V_{GE} = 15\text{ V}$ $V_{CC} = 800\text{ V}$ $T_j = 150\text{ °C}$	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
Half-Bridge Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Continuous (direct) forward current	I_F		100	A
Repetitive peak forward current	I_{FRM}		200	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	172	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* $t_p = 2\text{ s}$	6000	V
		AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			min. 12,7	mm
Clearance		12 mm housing solder pin / pressfit pin	9,12 / 9,54	mm
		17 mm housing solder pin / pressfit pin	min. 12,7	



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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	

Half-Bridge Switch

Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0038	25	5,1	5,8	6,4	V
Collector-emitter saturation voltage	V_{CEsat}		15		100	25 125 150	1,53	1,72 1,97 2,01	1,97	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			1,3	μA
Gate-emitter leakage current	I_{GES}		20	0		25			120	nA
Internal gate resistance	r_g							7,5		Ω
Input capacitance	C_{ies}	$f = 1 \text{ Mhz}$	0	25		25		6300		pF
Reverse transfer capacitance	C_{res}							270		
Gate charge	Q_g		15			25		800		nC

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{foil} = 220 \text{ W/mK}$ (KU-ALF5)						0,35		K/W
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Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 4 \Omega$ $R_{goff} = 4 \Omega$	± 15	600	100	25 125		171 184		ns
Rise time	t_r					25 125		33 37		
Turn-off delay time	$t_{d(off)}$					25 125		293 365		
Fall time	t_f					25 125		60 121		
Turn-on energy (per pulse)	E_{on}					25 125		6,905 10,138		mWs
Turn-off energy (per pulse)	E_{off}					25 125		6,265 9,373		



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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	

Half-Bridge Diode

Static

Forward voltage	V_F				100	25 125 150		1,77 1,75 1,73	2,05	V
Reverse leakage current	I_R			1200		25			18	μA

Thermal

Thermal resistance junction to sink	$R_{th(j-s)}$	$\lambda_{foil} = 220$ W/mk (KU-ALF5)						0,55		K/W
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Dynamic

Peak recovery current	I_{RRM}	$di/dt = 3987$ A/μs $di/dt = 3060$ A/μs	± 15	600	100	25 125		104 119		A
Reverse recovery time	t_{rr}					25 125		247 392		ns
Recovered charge	Q_r					25 125		9,064 16,837		μC
Reverse recovered energy	E_{rec}					25 125		3,237 6,304		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		3017 1630		A/μs

Thermistor

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



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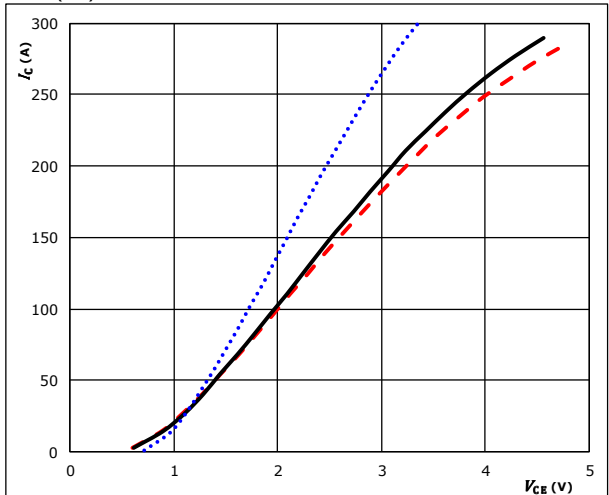
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Half-Bridge Switch Characteristics

figure 1. IGBT

Typical output characteristics

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

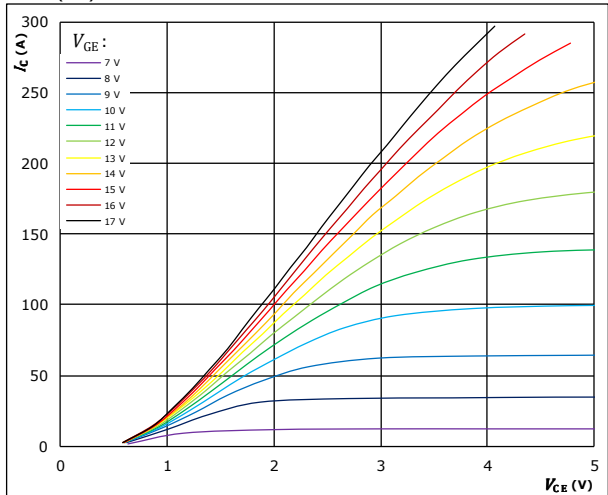


$t_p = 250 \mu s$
 $V_{GE} = 15 V$
 $T_j: 25 \text{ } ^\circ C$ (dotted blue line)
 $125 \text{ } ^\circ C$ (solid black line)
 $150 \text{ } ^\circ C$ (dashed red line)

figure 2. IGBT

Typical output characteristics

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

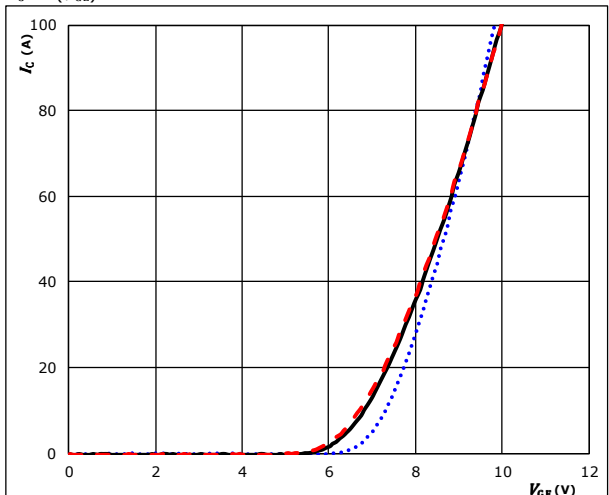


$t_p = 250 \mu s$
 $T_j = 150 \text{ } ^\circ C$
 V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

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

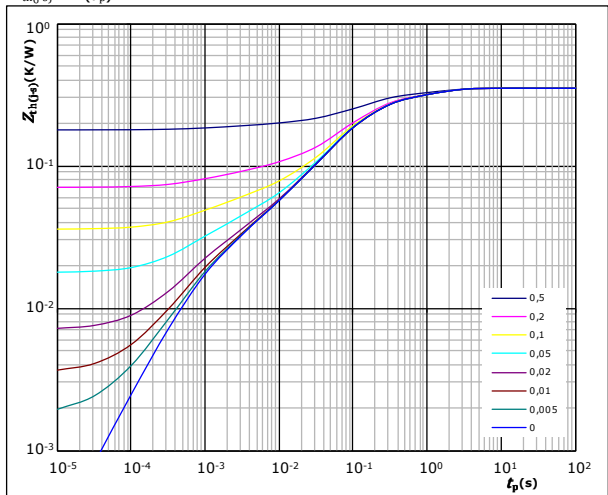


$t_p = 100 \mu s$
 $V_{CE} = 10 V$
 $T_j: 25 \text{ } ^\circ C$ (dotted blue line)
 $125 \text{ } ^\circ C$ (solid black line)
 $150 \text{ } ^\circ C$ (dashed red line)

figure 4. IGBT

Transient thermal impedance as function of pulse duration

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



$D = t_p / T$
 $R_{th(j-s)} = 0,35 \text{ K/W}$
 IGBT thermal model values

$R \text{ (K/W)}$	$\tau \text{ (s)}$
8,19E-02	1,13E+00
1,49E-01	1,47E-01
8,75E-02	5,44E-02
1,88E-02	5,31E-03
1,69E-02	8,35E-04



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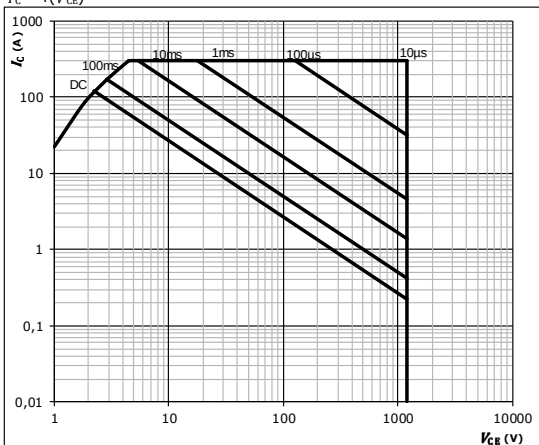
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Half-Bridge Switch Characteristics

figure 6. IGBT

Safe operating area

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



$D =$ single pulse
 $T_s = 80$ °C
 $V_{GE} = \pm 15$ V
 $T_j = T_{jmax}$



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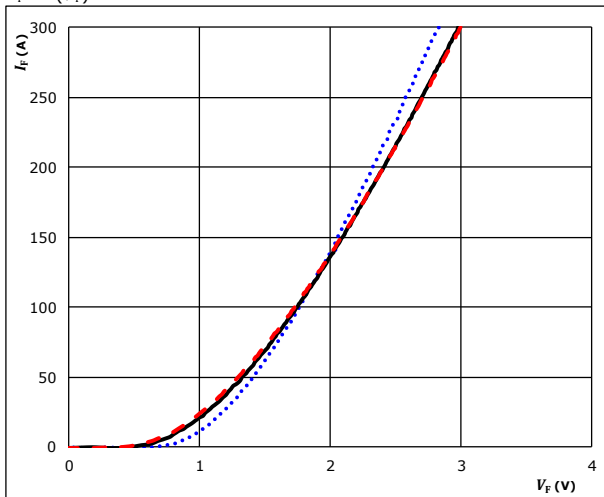
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Half-Bridge Diode Characteristics

figure 1. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

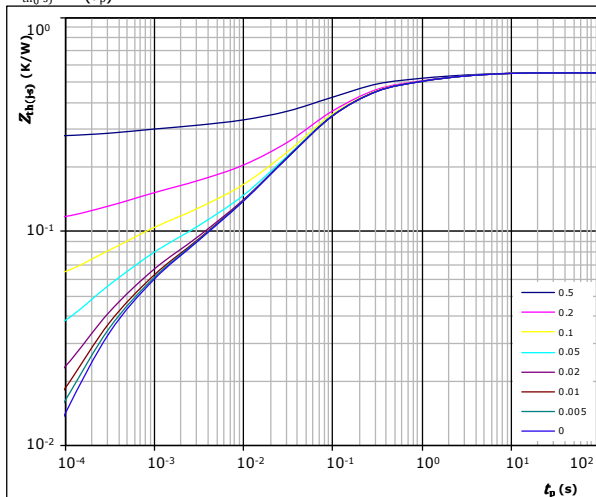


$t_p = 250 \mu s$
 T_j : 25 °C
 125 °C ———
 150 °C - - - -

figure 2. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$
 $R_{th(j-s)} = 0,55 \text{ K/W}$
 FWD thermal model values

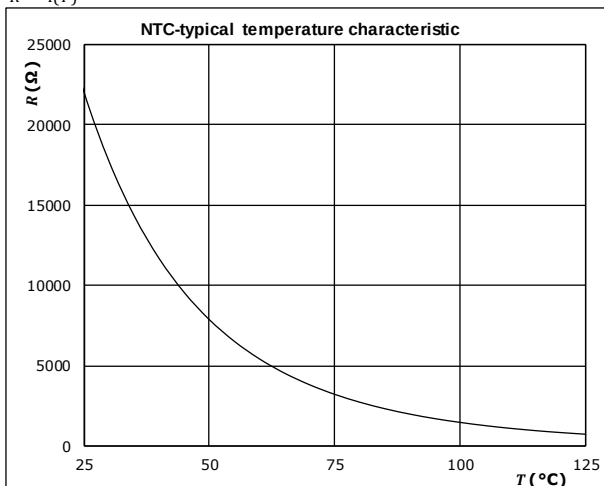
$R \text{ (K/W)}$	$\tau \text{ (s)}$
3,57E-02	3,79E+00
7,05E-02	7,57E-01
1,67E-01	1,35E-01
1,68E-01	4,93E-02
4,43E-02	8,46E-03
3,16E-02	1,40E-03
3,63E-02	2,61E-04

Thermistor Characteristics

figure 1. Thermistor

Typical NTC characteristic as a function of temperature

$$R = f(T)$$





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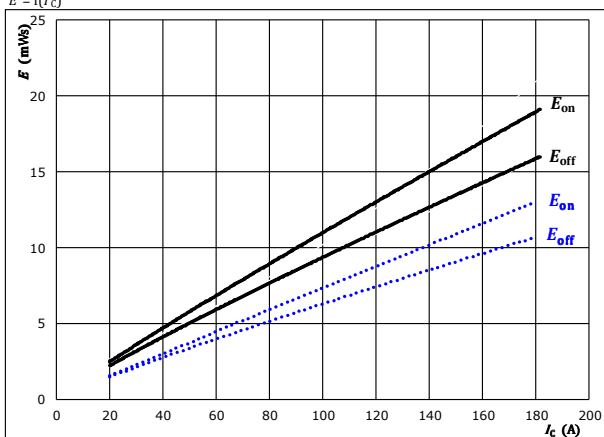
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Inverter Switching Characteristics

figure 1. IGBT

Typical switching energy losses as a function of collector current

$$E = f(I_C)$$



With an inductive load at

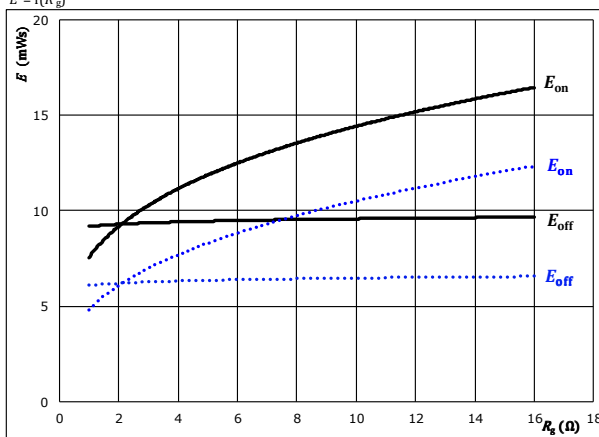
$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω
 $R_{goff} = 4$ Ω

T_j : 25 °C
 125 °C

figure 2. IGBT

Typical switching energy losses as a function of gate resistor

$$E = f(R_g)$$



With an inductive load at

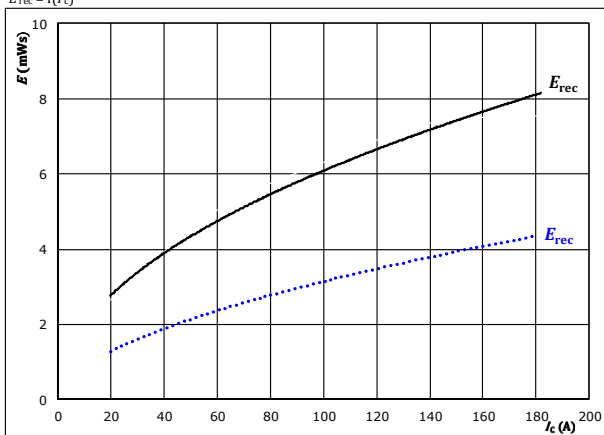
$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 100$ A

T_j : 25 °C
 125 °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

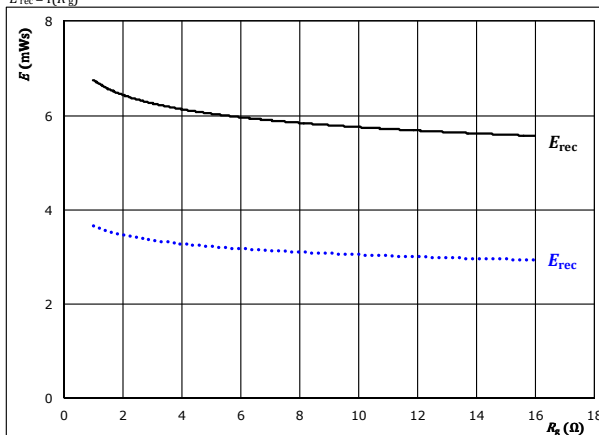
$V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω

T_j : 25 °C
 125 °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
 $I_C = 100$ A

T_j : 25 °C
 125 °C



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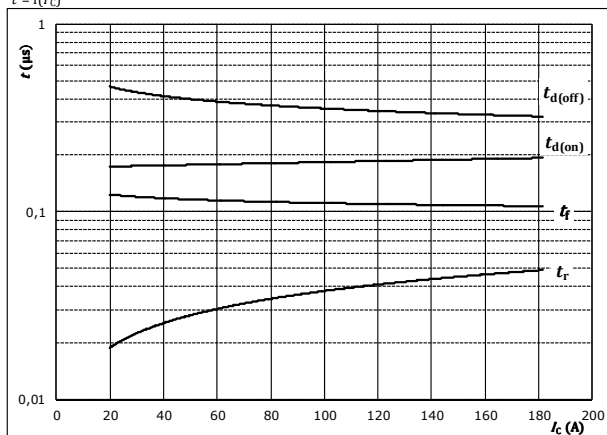
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Inverter Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$$t = f(I_C)$$



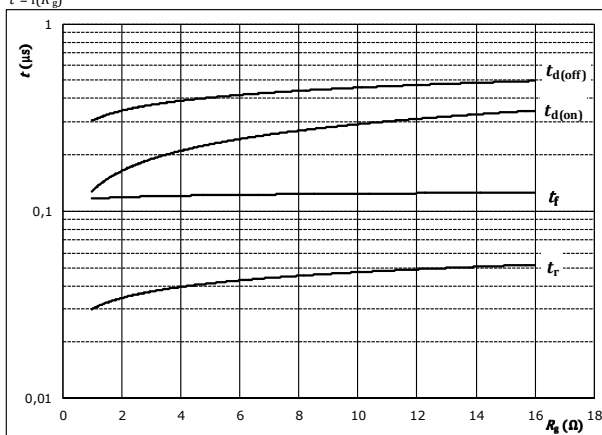
With an inductive load at

$T_j = 125$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω
 $R_{goff} = 4$ Ω

figure 6. IGBT

Typical switching times as a function of gate resistor

$$t = f(R_g)$$



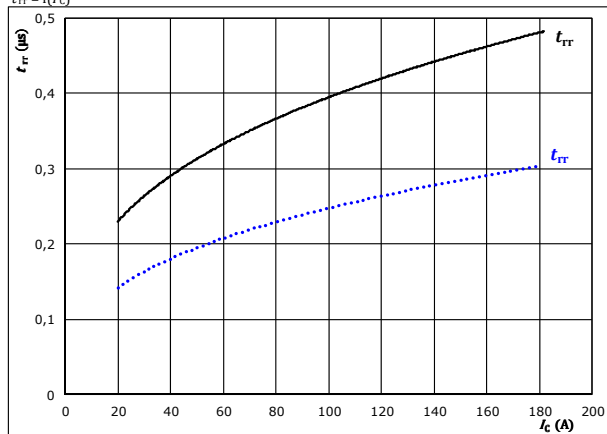
With an inductive load at

$T_j = 125$ °C
 $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 100$ A

figure 7. FWD

Typical reverse recovery time as a function of collector current

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

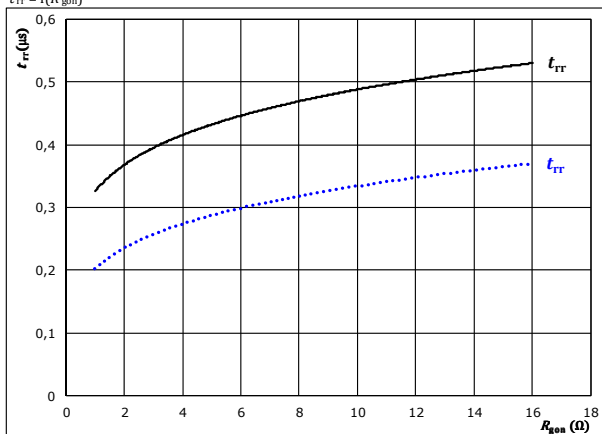


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω
 T_j : 25 °C (dotted line), 125 °C (solid line)

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
 $V_{GE} = \pm 15$ V
 $I_C = 100$ A
 T_j : 25 °C (dotted line), 125 °C (solid line)



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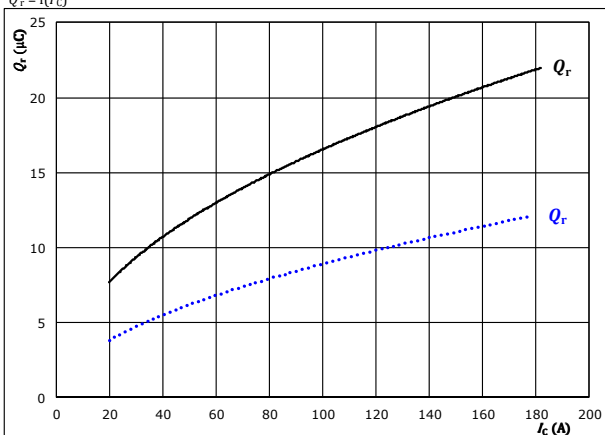
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 datasheet

Inverter Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_C)$$

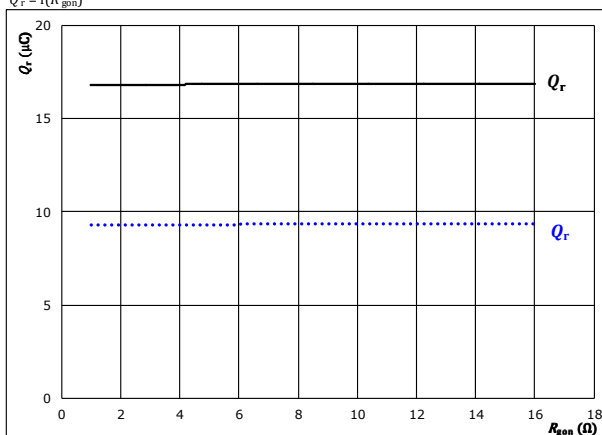


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gdn} = 4$ Ω
 $T_j: 25$ °C (solid line), 125 °C (dotted line)

figure 10. FWD

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

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

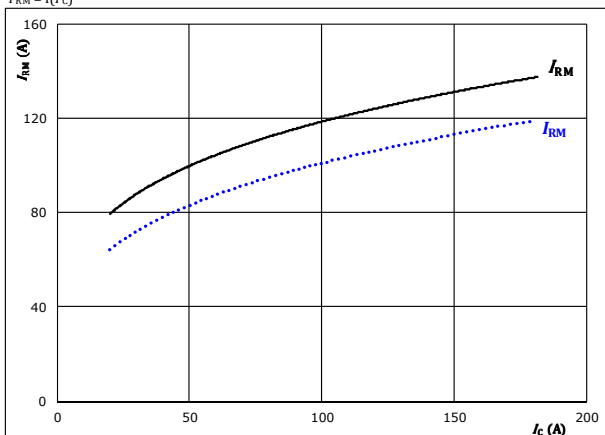


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 100$ A
 $T_j: 25$ °C (solid line), 125 °C (dotted line)

figure 11. FWD

Typical peak reverse recovery current as a function of collector current

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

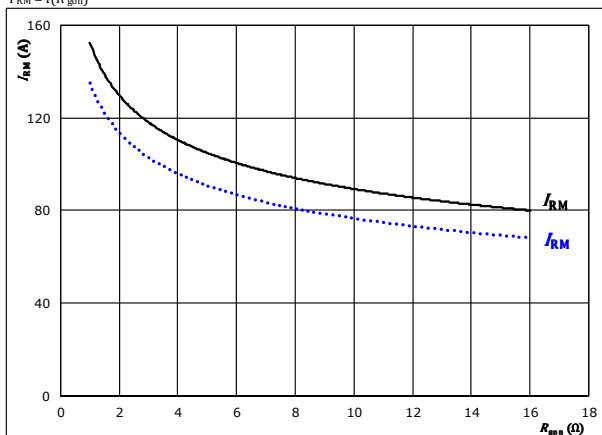


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gdn} = 4$ Ω
 $T_j: 25$ °C (solid line), 125 °C (dotted line)

figure 12. FWD

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

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



At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 100$ A
 $T_j: 25$ °C (solid line), 125 °C (dotted line)



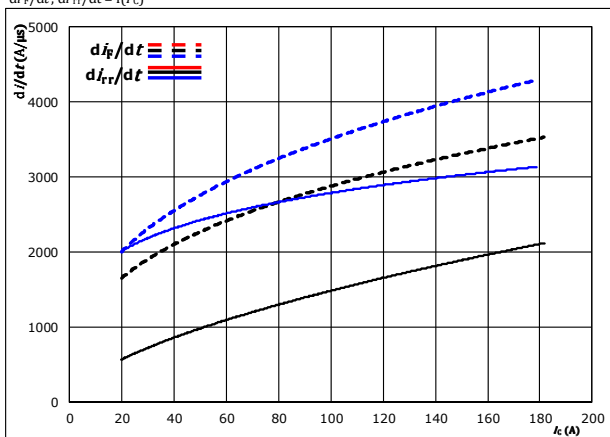
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Inverter Switching Characteristics

figure 13. FWD

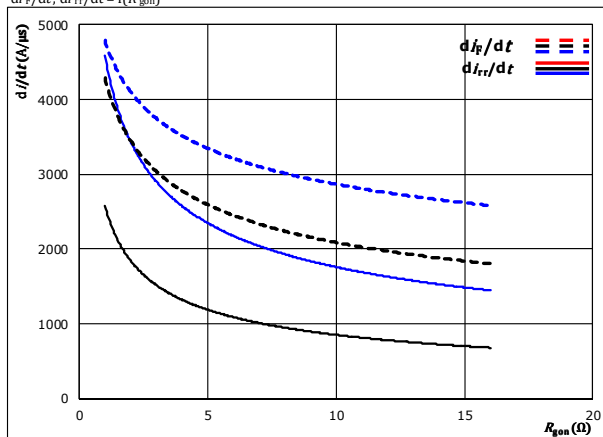
Typical rate of fall of forward and reverse recovery current as a function of collector current
 $di_f/dt, di_{rr}/dt = f(I_C)$



At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $R_{gon} = 4$ Ω
 $T_j = 25$ °C
 $T_j = 125$ °C

figure 14. FWD

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

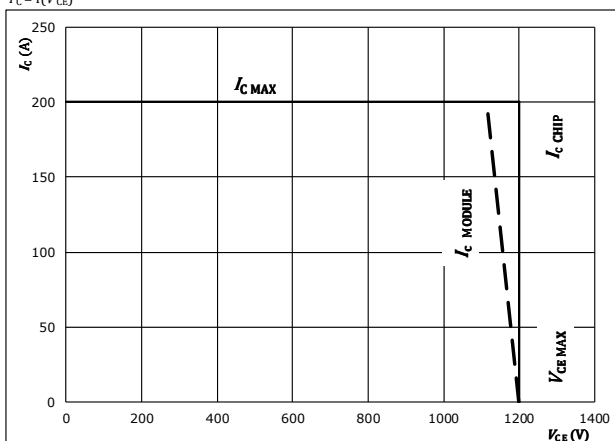


At $V_{CE} = 600$ V
 $V_{GE} = \pm 15$ V
 $I_C = 100$ A
 $T_j = 25$ °C
 $T_j = 125$ °C

figure 15. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At $T_j = 125$ °C
 $R_{gon} = 4$ Ω
 $R_{goff} = 4$ Ω

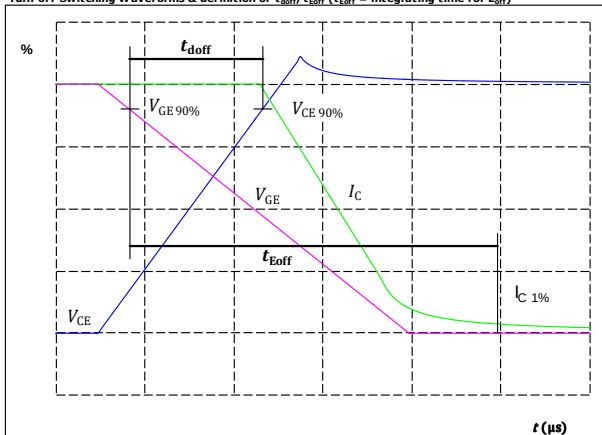
Inverter Switching Definitions

General conditions

T_j	=	125 °C
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

figure 1. IGBT

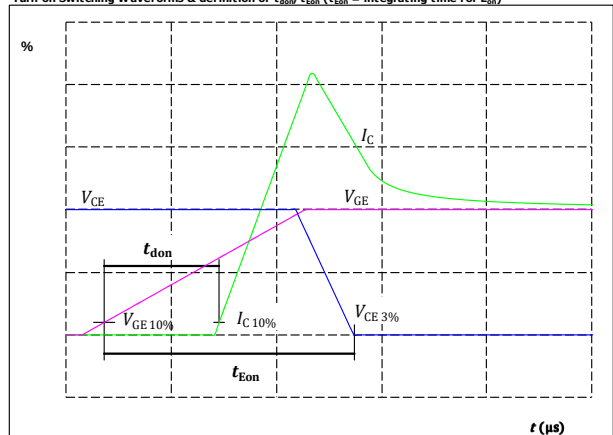
Turn-off Switching Waveforms & definition of t_{doff} , t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	600	V
$I_C(100\%) =$	100	A
$t_{doff} =$	365	ns

figure 2. IGBT

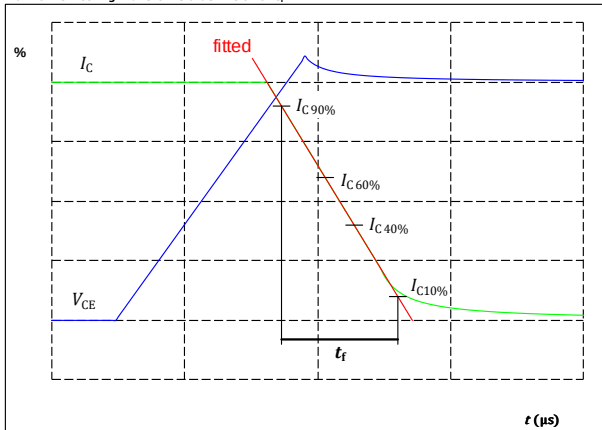
Turn-on Switching Waveforms & definition of t_{don} , t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%) =$	-15	V
$V_{GE}(100\%) =$	15	V
$V_C(100\%) =$	600	V
$I_C(100\%) =$	100	A
$t_{don} =$	184	ns

figure 3. IGBT

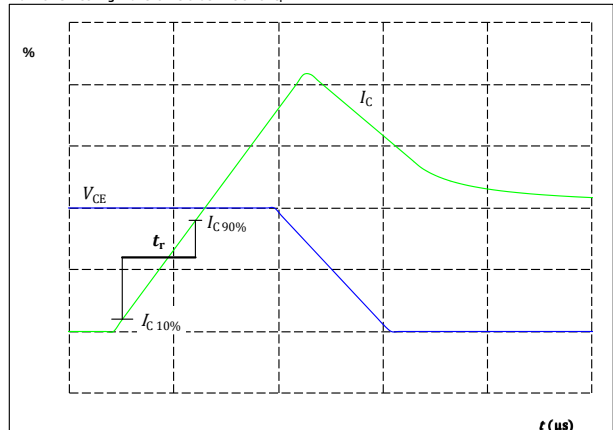
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%) =$	600	V
$I_C(100\%) =$	100	A
$t_f =$	121	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r



$V_C(100\%) =$	600	V
$I_C(100\%) =$	100	A
$t_r =$	37	ns



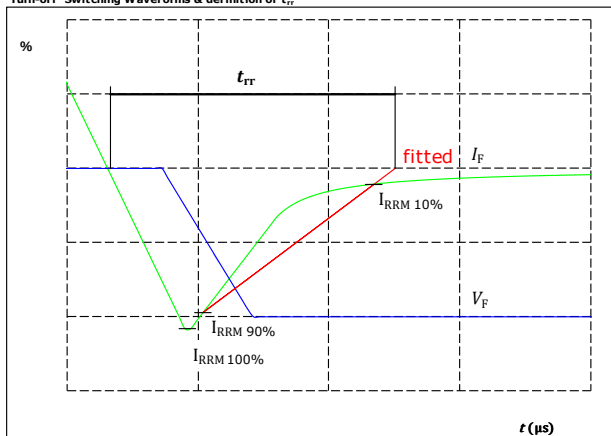
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Inverter Switching Characteristics

figure 5. FWD

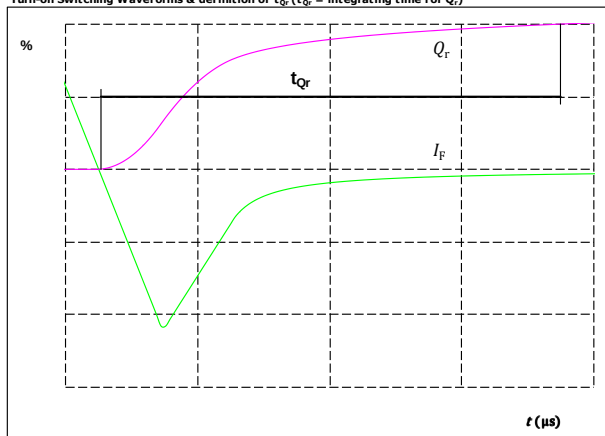
Turn-off Switching Waveforms & definition of t_{rr}



$V_F(100\%) =$	600	V
$I_F(100\%) =$	100	A
$I_{RRM}(100\%) =$	119	A
$t_{rr} =$	392	ns

figure 6. FWD

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



$I_F(100\%) =$	100	A
$Q_r(100\%) =$	16,84	μC



datasheet

Pin table

Pin	X	Y	Function
1	0	0	DC-
2	0	2,3	DC-
3	0	4,6	DC-
4	0	6,9	DC-
5	0	15,6	DC+
6	0	17,9	DC+
7	0	20,2	DC+
8	0	22,5	DC+
9	13,85	16,45	G12
10	16,75	16,45	S12
11	33,5	11,5	Ph
12	33,5	9,2	Ph
13	33,5	6,9	Ph
14	33,5	4,6	Ph
15	33,5	2,3	Ph
16	33,5	0	Ph
17	13,85	13,55	Ph
18	19,55	4,95	S11
19	19,55	7,85	G11
20	33,5	22,5	Therm1
21	26,1	22,5	Therm2

Outline

The technical drawing illustrates the PCB outline with the following dimensions and features:

- Top View:** Shows the overall rectangular shape with a width of 212 ±0.5 mm and a length of 162 ±0.5 mm. A central horizontal slot is indicated.
- Front View:** Shows the profile of the board with a height of 17.93 ±0.1 mm. The top surface is flat, and the bottom surface shows the mounting pads for the pins.
- Bottom View:** Shows the layout of the pins and components. The pins are numbered 1 through 21, corresponding to the pin table. The dimensions 12.93 ±0.1 mm and 16.2 ±0.5 mm are indicated for the bottom surface.
- Pin Locations:** The pins are arranged in a specific pattern, with some pins (1-8) located along the top edge and others (9-21) along the bottom edge.
- Coordinate System:** The X and Y axes are defined, with the origin at the top-left corner. The X-axis ranges from 0 to 33.5 mm, and the Y-axis ranges from 0 to 22.5 mm.

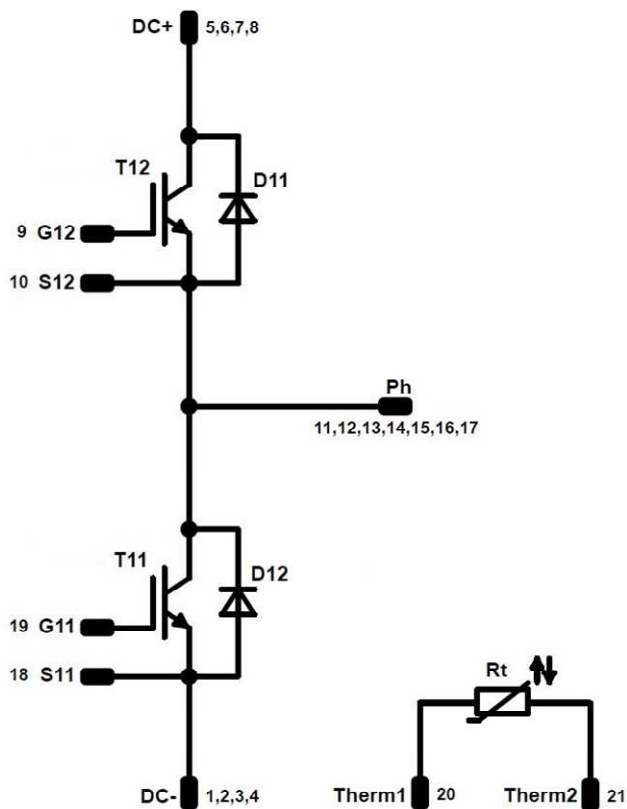
Tolerance of pinpositions: ±0.5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance



Vincotech

10-FZ122PB100SC03-M819F18
10-PZ122PB100SC03-M819F18Y
10-F0122PB100SC03-M819F19
10-P0122PB100SC03-M819F19Y
datasheet

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12	IGBT	1200 V	100 A	Half-Bridge Switch	
D11, D12	FWD	1200 V	100 A	Half-Bridge Diode	
Rt	NTC			Thermistor	

Packaging instruction			
Standard packaging quantity (SPQ) 135	>SPQ	Standard	<SPQ Sample

Handling instruction
Handling instructions for <i>flow 0</i> packages see vincotech.com website.

Package data
Package data for <i>flow 0</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-xx122PB100SC03-M819F1xx-D1-14	13 Sep. 2018	Initial release	

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