Vincotech

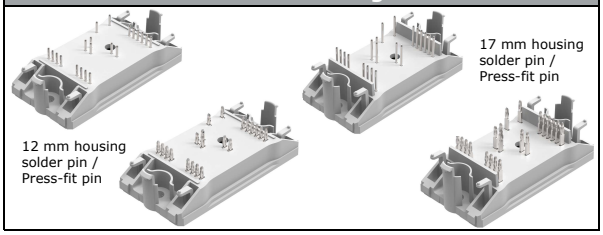
10-FZ122PB100SC02-M819F08
10-PZ122PB100SC02-M819F08Y
10-F0122PB100SC02-M819F09
10-P0122PB100SC02-M819F09Y
datasheet

flowPHASE 0 + NTC — **1200 V / 100 A**

Features

- High efficiency IGBT4 half-bridge
- Full current FWD
- Thermistor

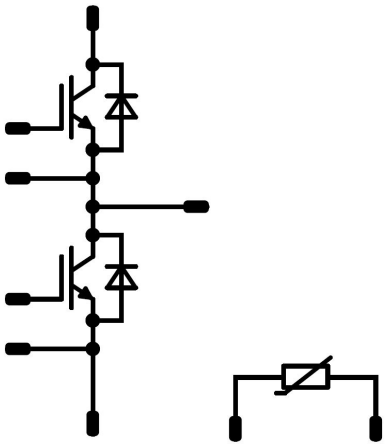
flow 0 housing



Target applications

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

Schematic



Types

- 10-FZ122PB100SC02-M819F08
- 10-PZ122PB100SC02-M819F08Y
- 10-F0122PB100SC02-M819F09
- 10-P0122PB100SC02-M819F09Y

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Half-Bridge Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current	I_C	T_j = T_{jmax} T_s = 80 °C	98	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 °C	199	W
Gate-emitter voltage	V_{GES}		±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V Vcc = 800 V T_j = 150 °C	10	µs
Maximum junction temperature	T_{jmax}		175	°C

Maximum Ratings

T_j = 25 °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	T_j = T_{jmax} T_s = 80 °C	79	A
Repetitive peak forward current	I_{FRM}		200	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	123	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	6000	V
		AC Voltage t_p = 1 min	2500	V
Creepage distance			min. 12,7	mm
Clearance		12 mm housing solder pin / Press-fit pin	9,12 / 9,54	mm
		17 mm housing solder pin / Press-fit 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 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	$R_{th(j-s)}$	λ_{paste}=3,4 W/mK (PSX)						0,48		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	±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}	Q_{rFWD} = 9,1 µC Q_{rFWD} = 16,8 µC				25 125		6,905 10,138		mWs
Turn-off energy (per pulse)	E_{off}					25 125		6,265 9,373		

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datasheet

Characteristic Values

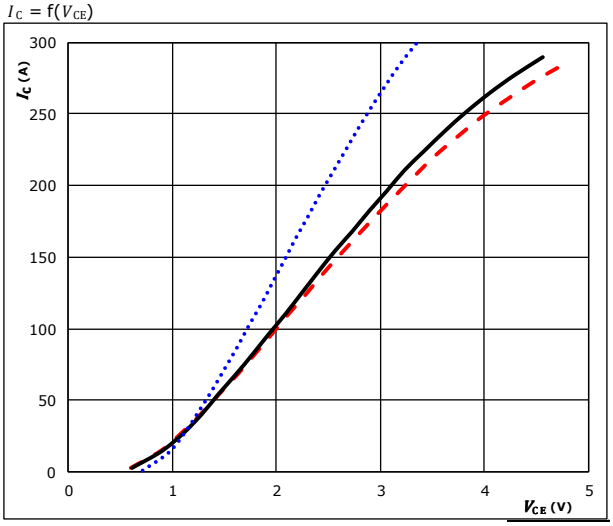
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Half-Bridge Diode										
Static										
Forward voltage	V_F				100	25 125 150		1,77 1,75 1,73	2,05	V
Reverse leakage current	I_R			1200		25			18	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste}=3,4 W/mK (PSX)						0,78		K/W
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	

Half-Bridge Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

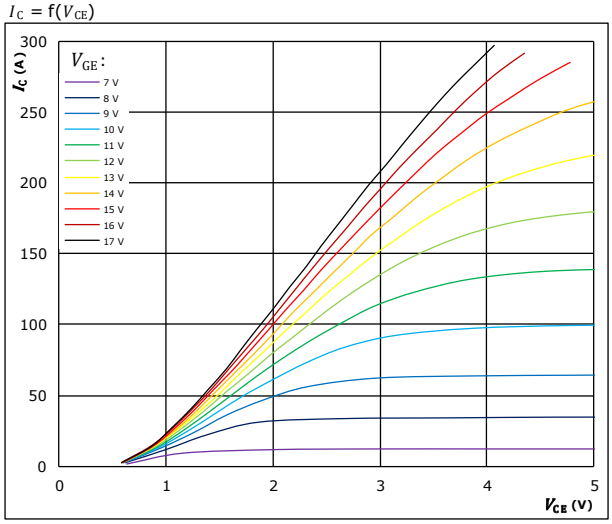


t_p =	250	µs		25 °C	
V_{GE} =	15	V	T_j:	125 °C	
				150 °C	

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

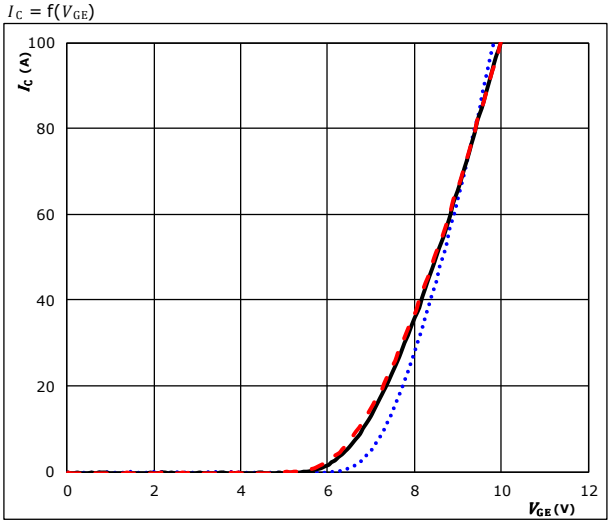


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

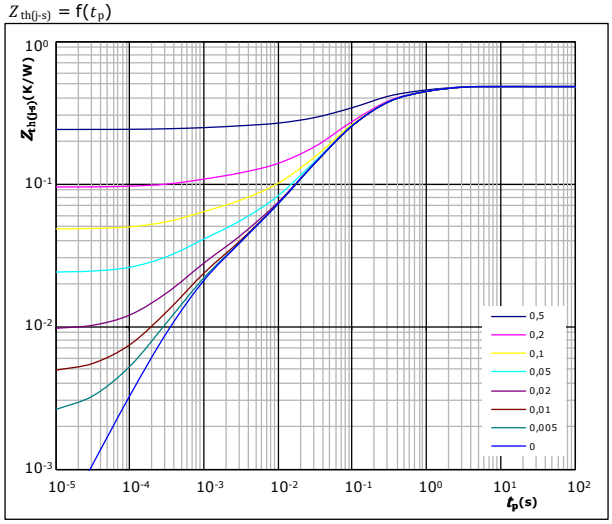


t_p =	100	µs		25 °C	
V_{CE} =	10	V	T_j:	125 °C	
				150 °C	

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,48	K/W

IGBT thermal model values

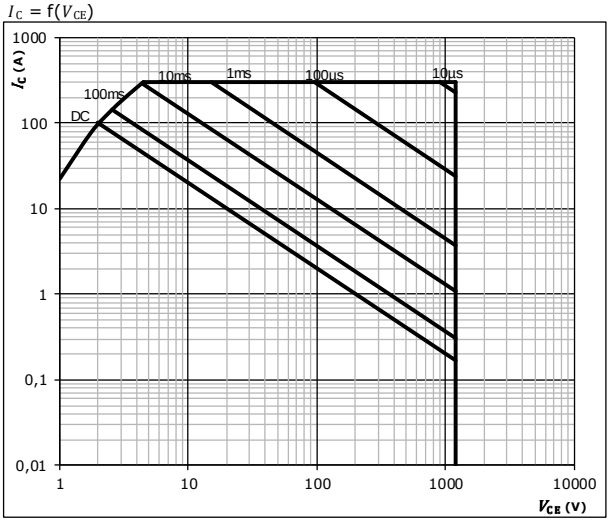
R (K/W)	τ (s)
9,76E-02	9,68E-01
1,99E-01	1,64E-01
1,27E-01	6,12E-02
3,20E-02	1,05E-02
1,66E-02	9,83E-04
4,53E-03	3,89E-04

Half-Bridge Switch Characteristics

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



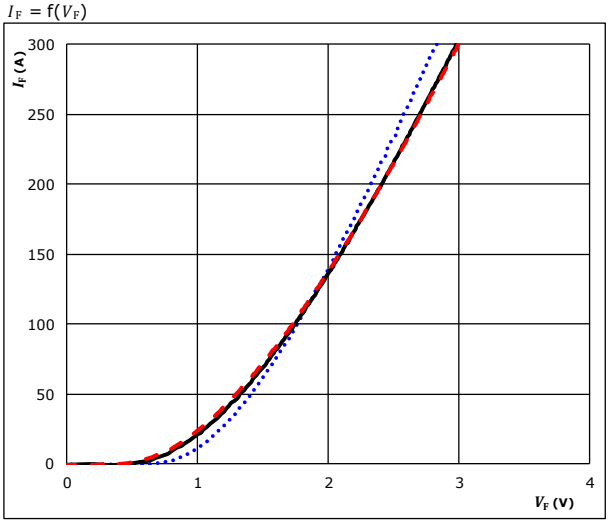
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Half-Bridge Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



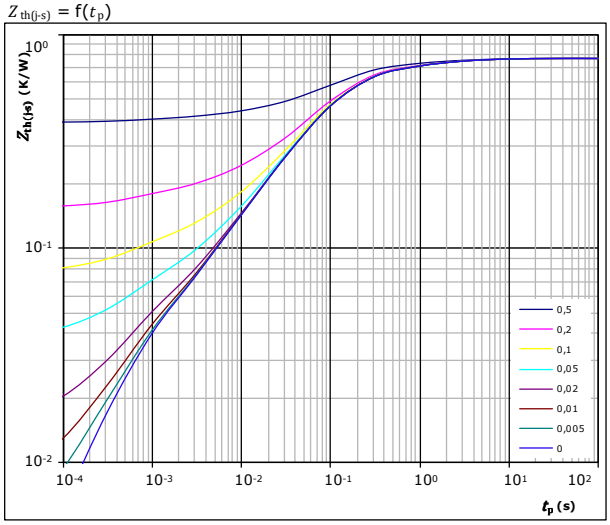
t_p = 250 µs

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

$R_{th(j-s)}$ = 0,78 K/W

FWD thermal model values

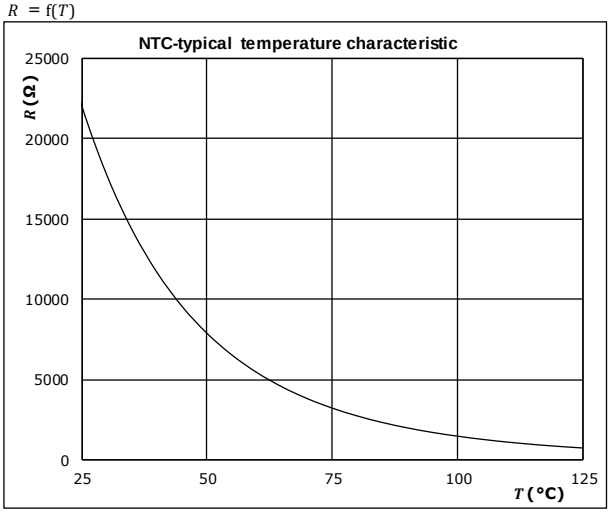
R (K/W)	τ (s)
3,30E-02	5,07E+00
9,76E-02	9,33E-01
3,59E-01	1,37E-01
2,01E-01	4,10E-02
5,37E-02	6,38E-03
3,09E-02	6,30E-04

Thermistor Characteristics

figure 1. **Thermistor**

Typical NTC characteristic as a function of temperature

$R = f(T)$

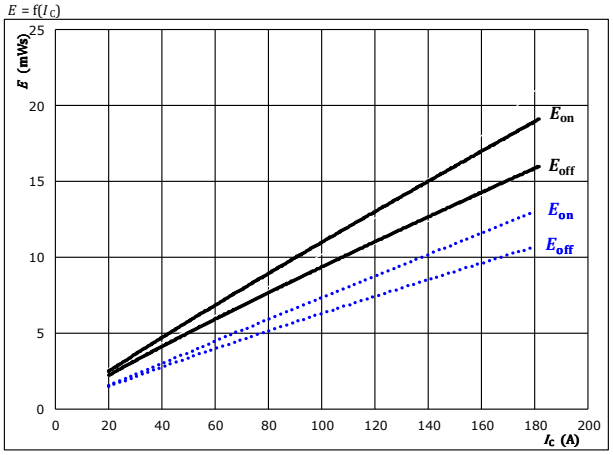


Inverter Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



With an inductive load at

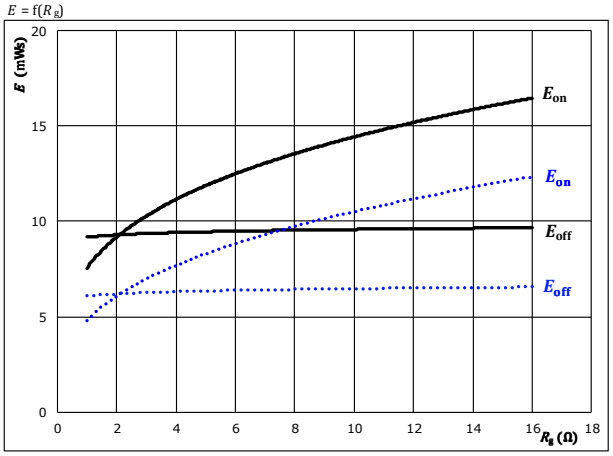
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

T_j: 25 °C (dotted) / 125 °C (solid)

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



With an inductive load at

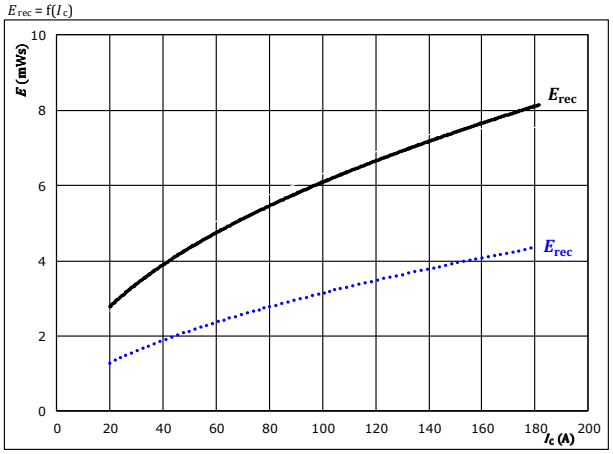
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	100	A

T_j: 25 °C (dotted) / 125 °C (solid)

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



With an inductive load at

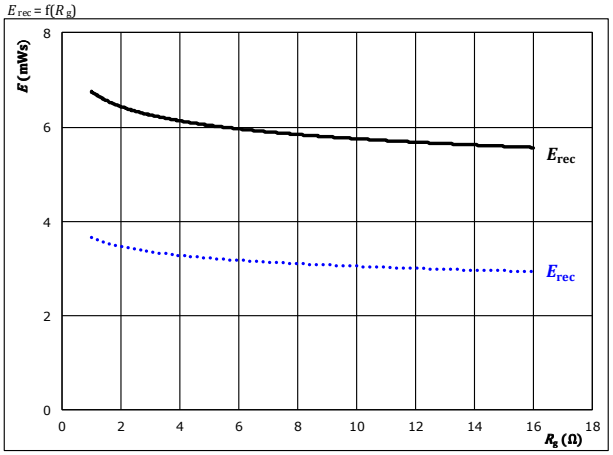
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	4	Ω

T_j: 25 °C (dotted) / 125 °C (solid)

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} =	±15	V
I_C =	100	A

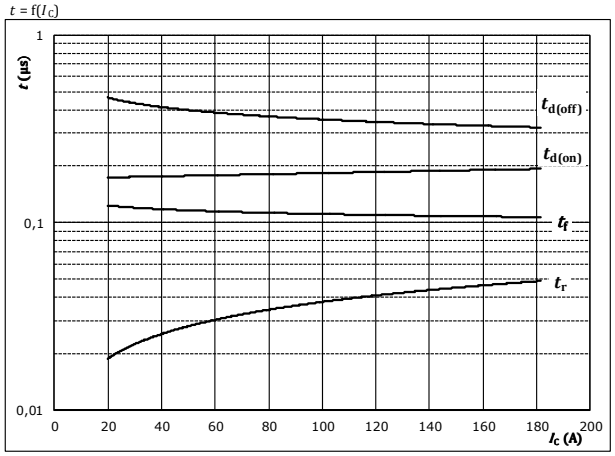
T_j: 25 °C (dotted) / 125 °C (solid)

Inverter Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



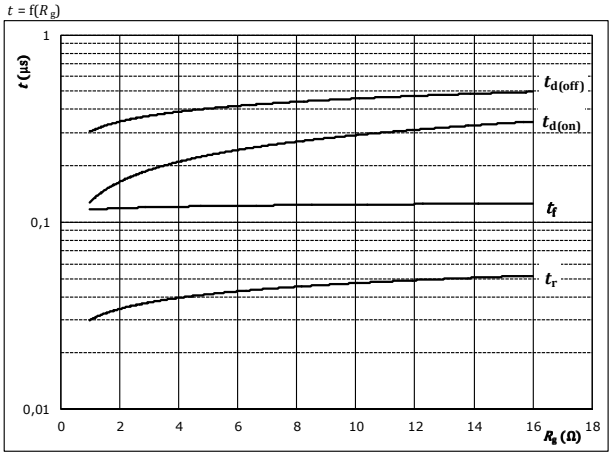
With an inductive load at

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

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



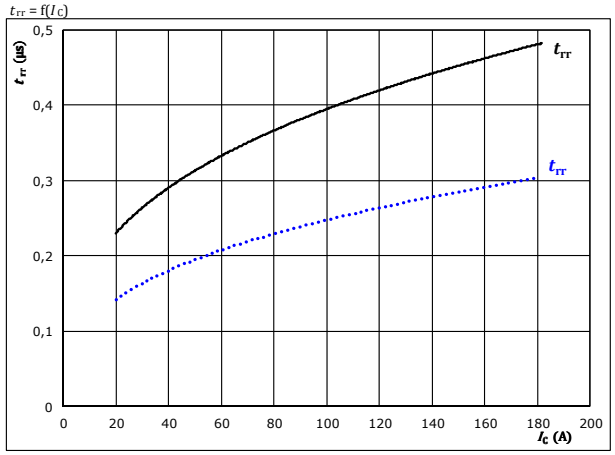
With an inductive load at

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

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

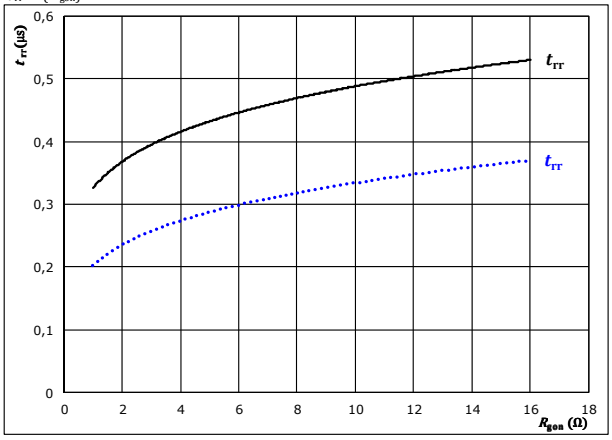


At					
	V_{CE} =	600	V	T_j:	25 °C
	V_{GE} =	±15	V		125 °C
	R_{gon} =	4	Ω		

figure 8. **FWD**

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

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



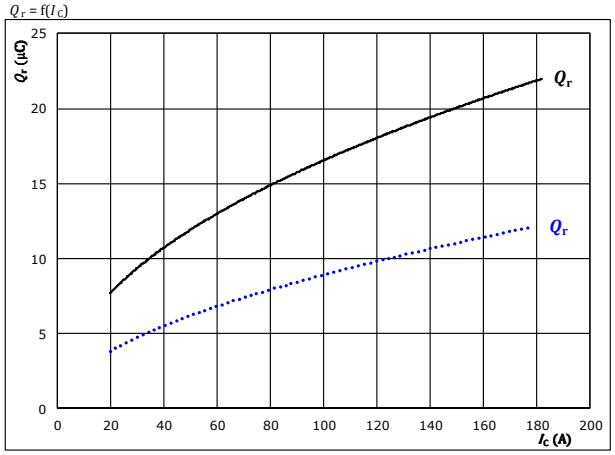
At					
	V_{CE} =	600	V	T_j:	25 °C
	V_{GE} =	±15	V		125 °C
	I_C =	100	A		

Inverter Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

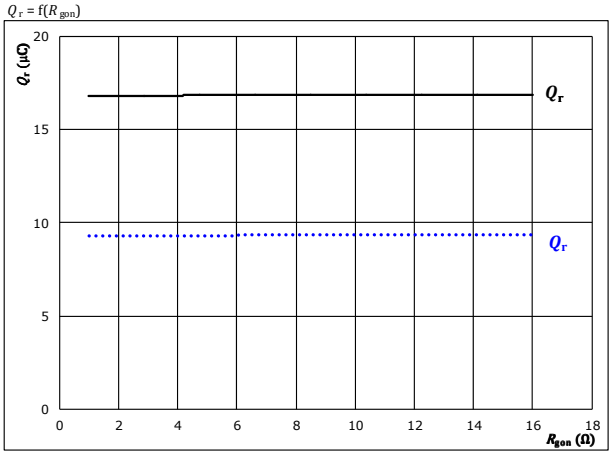


At					
V_{CE} =	600	V	T_j:	25 °C	
V_{GE} =	±15	V		125 °C	
R_{gon} =	4	Ω			

figure 10. FWD

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

$Q_r = f(R_{gon})$

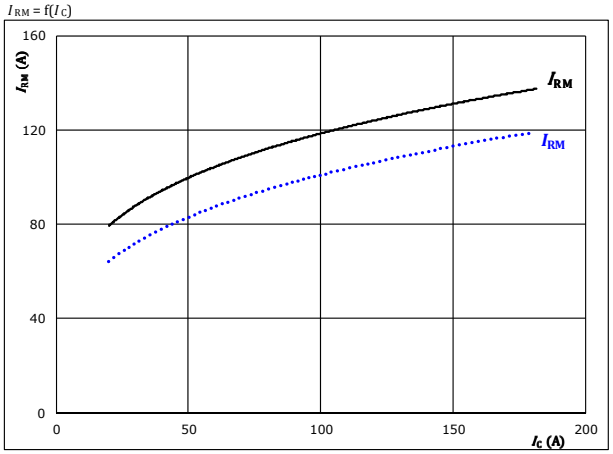


At					
V_{CE}=	600	V	T_j:	25 °C	
V_{GE} =	±15	V		125 °C	
I_C=	100	A			

figure 11. FWD

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

$I_{RM} = f(I_C)$

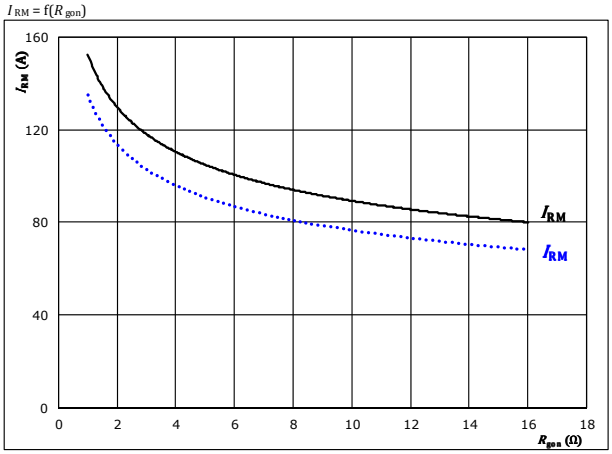


At					
V_{CE}:	600	V	T_j:	25 °C	
V_{GE} =	±15	V		125 °C	
R_{gon} =	4	Ω			

figure 12. FWD

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

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



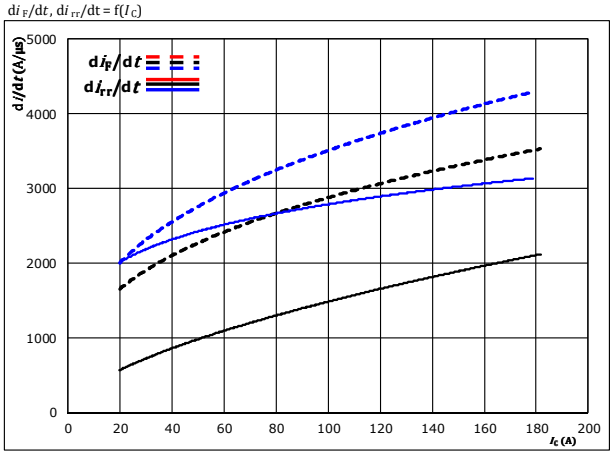
At					
V_{CE} =	600	V	T_j:	25 °C	
V_{GE} =	±15	V		125 °C	
I_C =	100	A			

Inverter Switching Characteristics

figure 13. FWD

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

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

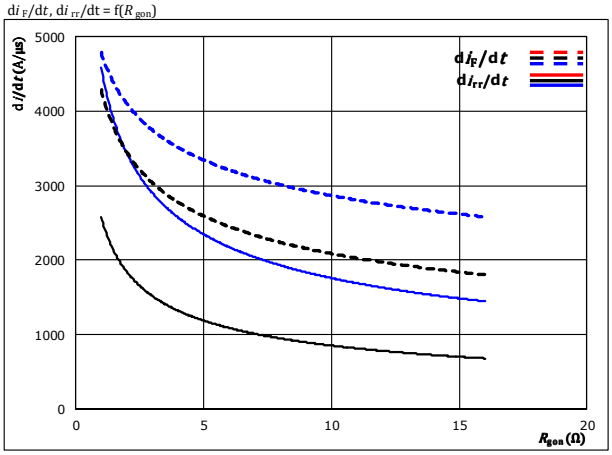


At						
	V_{CE} =	600	V		25	°C
	V_{GE} =	±15	V	T_j:	125	°C
	R_{gon} =	4	Ω			

figure 14. FWD

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

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

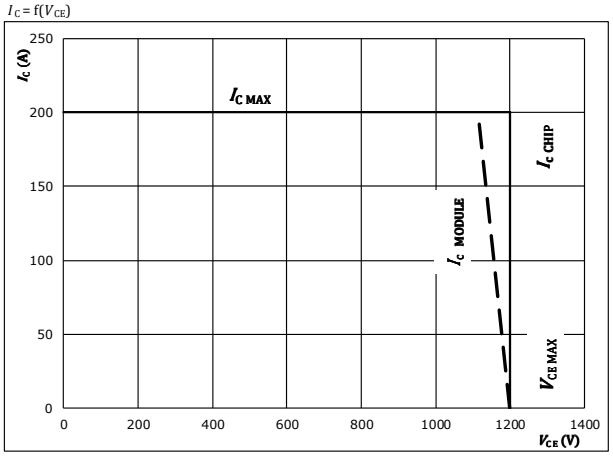


At						
	V_{CE} =	600	V		25	°C
	V_{GE} =	±15	V	T_j:	125	°C
	I_C =	100	A			

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	

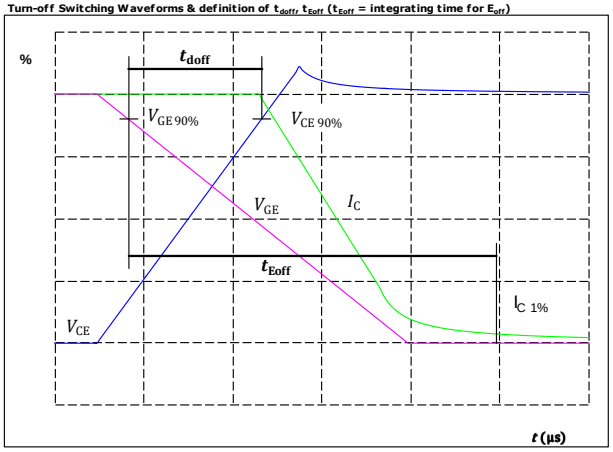
Inverter Switching Definitions

General conditions

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

figure 1. IGBT

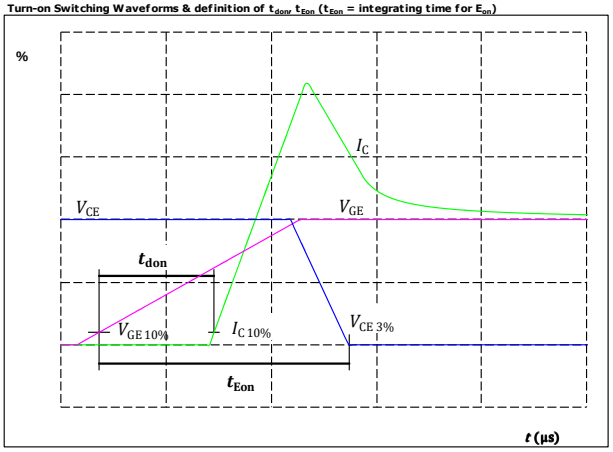
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



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

figure 2. IGBT

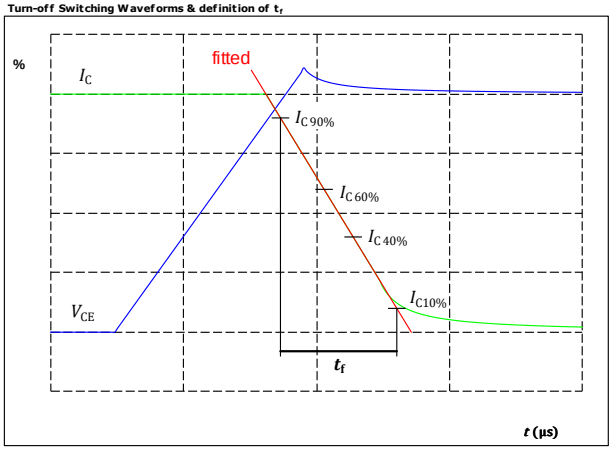
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



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

figure 3. IGBT

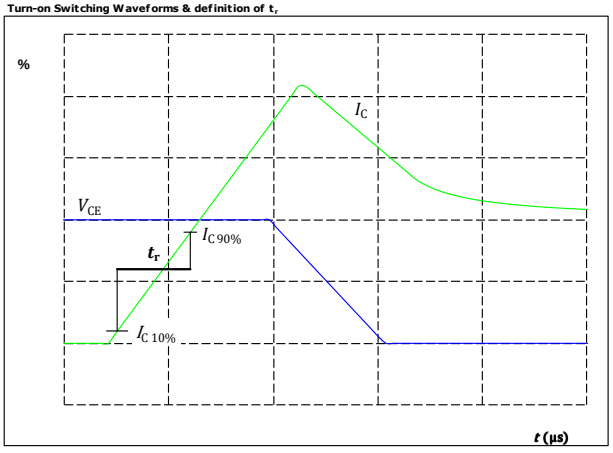
Turn-off Switching Waveforms & definition of t_f



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

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

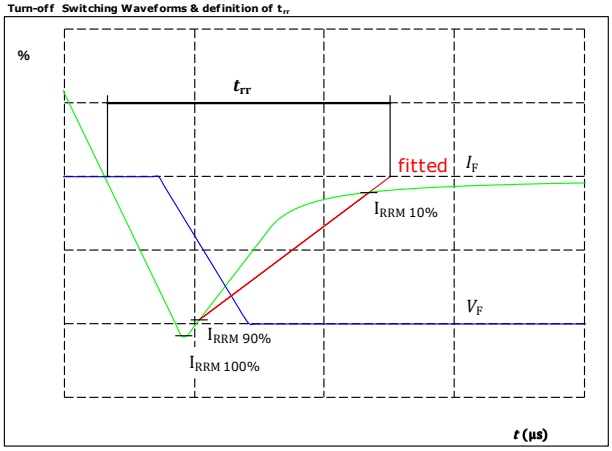


$V_C(100\%)$ =	600	V
$I_C(100\%)$ =	100	A
t_r =	37	ns

Inverter Switching Characteristics

figure 5. **FWD**

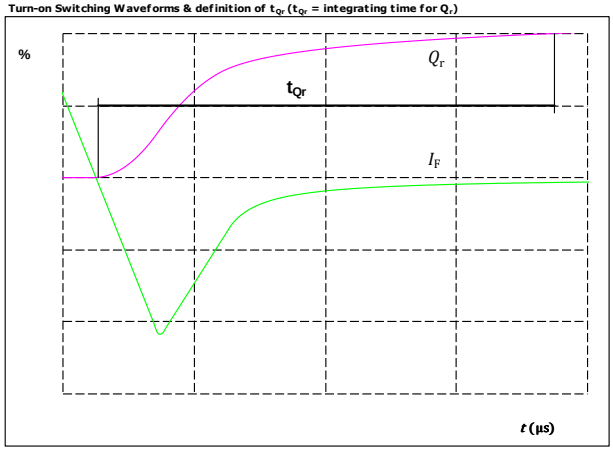
Turn-off Switching Waveforms & definition of t_{rr}



$V_F(100\%)$ =	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

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10-FZ122PB100SC02-M819F08
10-PZ122PB100SC02-M819F08Y
10-F0122PB100SC02-M819F09
10-P0122PB100SC02-M819F09Y
datasheet

Ordering Code & Marking

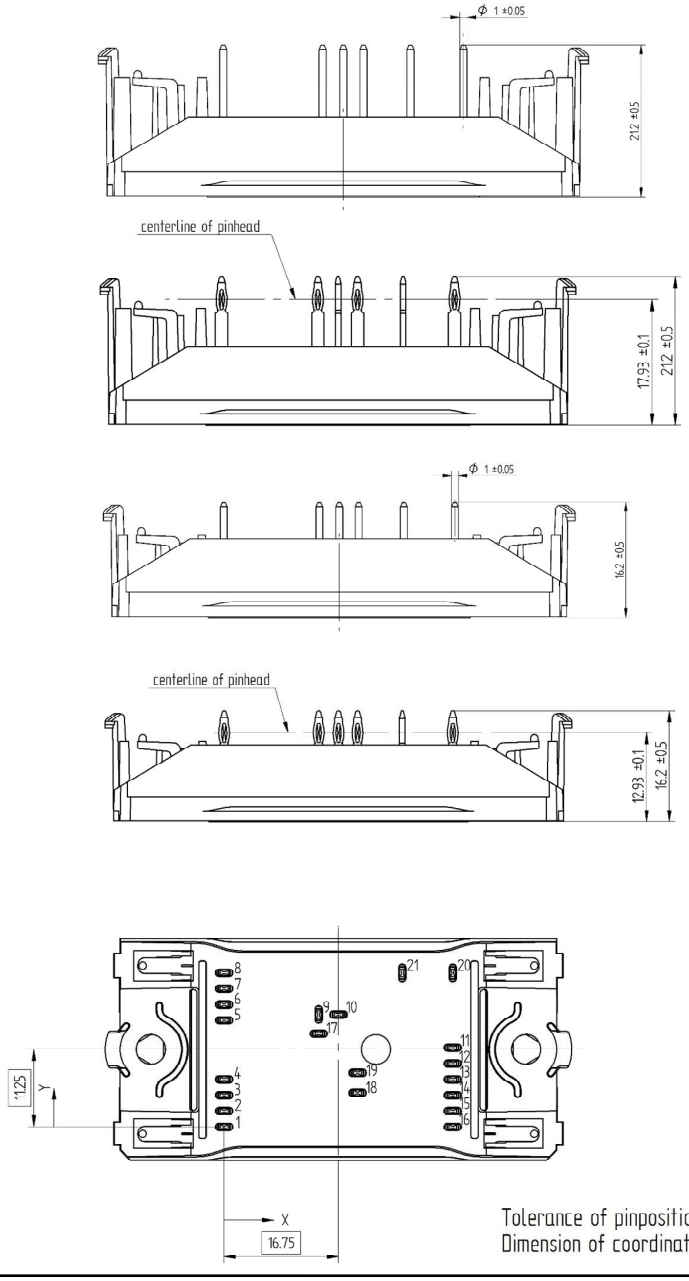
Version	Ordering Code
without thermal paste 12 mm housing with solder pins	10-FZ122PB100SC02-M819F08
with thermal paste 12 mm housing with solder pins	10-FZ122PB100SC02-M819F08-/3/
without thermal paste 12 mm housing with Press-fit pins	10-PZ122PB100SC02-M819F08Y
with thermal paste 12 mm housing with Press-fit pins	10-PZ122PB100SC02-M819F08Y-/3/
without thermal paste 17 mm housing with solder pins	10-F0122PB100SC02-M819F09
with thermal paste 17 mm housing with solder pins	10-F0122PB100SC02-M819F09-/3/
without thermal paste 17 mm housing with Press-fit pins	10-P0122PB100SC02-M819F09Y
with thermal paste 17 mm housing with Press-fit pins	10-P0122PB100SC02-M819F09Y-/3/

		Name	Date code	UL & VIN	Lot	Serial
Text		NN-NNNNNNNNNNNNN-TTTTTTVV	WWYY	UL VIN	LLLLL	SSSS
	Type&Ver	**Lot number**	**Serial**	**Date code**		
Datamatrix	TTTTTTVV	LLLLL	SSSS	WWYY		

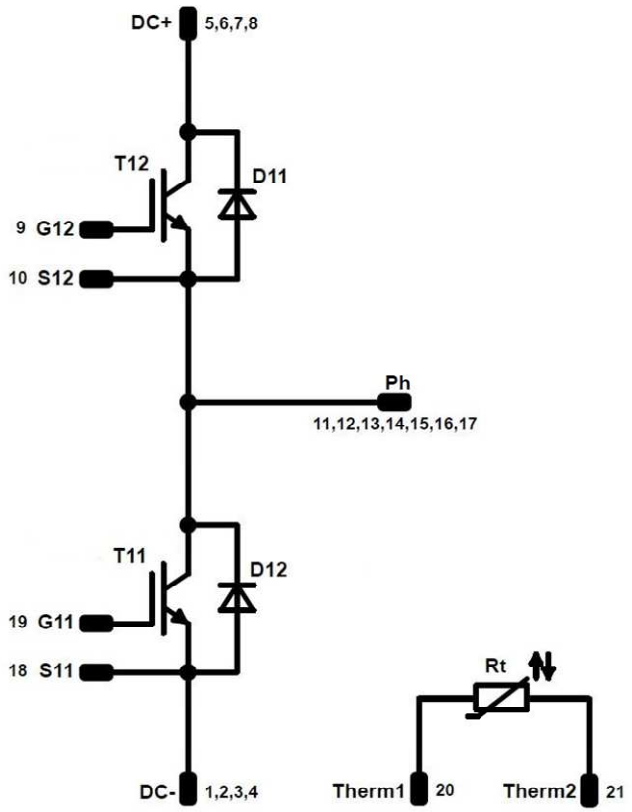
Outline

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



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	

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10-FZ122PB100SC02-M819F08
10-PZ122PB100SC02-M819F08Y
10-F0122PB100SC02-M819F09
10-P0122PB100SC02-M819F09Y
datasheet

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

Handling instruction
Handling instructions for *flow* 0 packages see vincotech.com website.

Package data
Package data for *flow* 0 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-FZ122PB100SC02-M819F0xx-D1-14	17 Aug. 2018	Initial release	