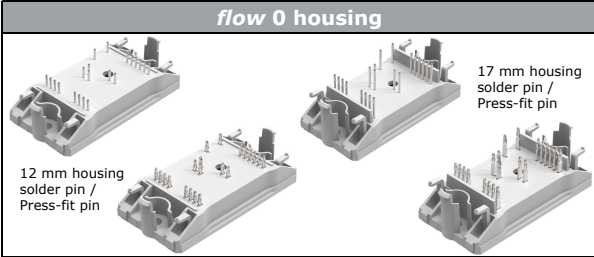
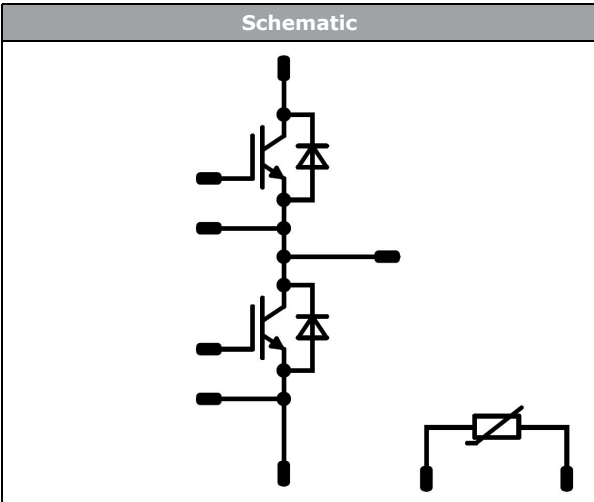




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<i>flow</i> PHASE 0 + NTC	1200 V / 100 A
<div style="background-color: #f0f0f0; padding: 2px; text-align: center; font-weight: bold; margin-bottom: 5px;">Features</div> <ul style="list-style-type: none"> <li>High efficiency IGBT4 half-bridge</li> <li>Full current FWD</li> <li>Thermistor</li> </ul>	<div style="background-color: #f0f0f0; padding: 2px; text-align: center; font-weight: bold; margin-bottom: 5px;"><i>flow</i> 0 housing</div> 
<div style="background-color: #f0f0f0; padding: 2px; text-align: center; font-weight: bold; margin-bottom: 5px;">Target applications</div> <ul style="list-style-type: none"> <li>Industrial Drives</li> <li>Power Supply</li> <li>Solar Inverters</li> <li>UPS</li> <li>Welding &amp; Cutting</li> </ul>	<div style="background-color: #f0f0f0; padding: 2px; text-align: center; font-weight: bold; margin-bottom: 5px;">Schematic</div> 
<div style="background-color: #f0f0f0; padding: 2px; text-align: center; font-weight: bold; margin-bottom: 5px;">Types</div> <ul style="list-style-type: none"> <li>10-FZ122PB100SC02-M819F08</li> <li>10-PZ122PB100SC02-M819F08Y</li> <li>10-F0122PB100SC02-M819F09</li> <li>10-P0122PB100SC02-M819F09Y</li> </ul>	

## Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
<b>Half-Bridge Switch</b>				
Collector-emitter voltage	$V_{CES}$		1200	V
Collector current	$I_C$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	98	A
Repetitive peak collector current	$I_{CRM}$	$t_p$ limited by $T_{jmax}$	300	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	199	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



## Maximum Ratings

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

Parameter	Symbol	Condition	Value	Unit
<b>Half-Bridge Diode</b>				
Peak repetitive reverse voltage	$V_{RRM}$		1200	V
Continuous (direct) forward current	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	79	A
Repetitive peak forward current	$I_{FRM}$		200	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	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* $t_p = 2\text{ s}$	6000	V
		AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			min. 12,7	mm
Clearance		12 mm housing solder pin / 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	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ 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		171		ns
Rise time	$t_r$					125		184		
Turn-off delay time	$t_{d(off)}$					25		33		
Fall time	$t_f$					125		37		
Turn-on energy (per pulse)	$E_{on}$					25		293		
Turn-off energy (per pulse)	$E_{off}$	125		365						
		25		60						
		125		121						
		25		6,905						
		125		10,138						
		25		6,265						
		125		9,373						



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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	

### 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	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						0,78		K/W
-------------------------------------	---------------	---------------------------------------	--	--	--	--	--	------	--	-----

#### Dynamic

Peak recovery current	$I_{RRM}$					25 125		104 119		A
Reverse recovery time	$t_{rr}$					25 125		247 392		ns
Recovered charge	$Q_r$	$di/dt = 3987$ A/μs $di/dt = 3060$ A/μs	±15	600	100	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	$(di_{rr}/dt)_{max}$					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
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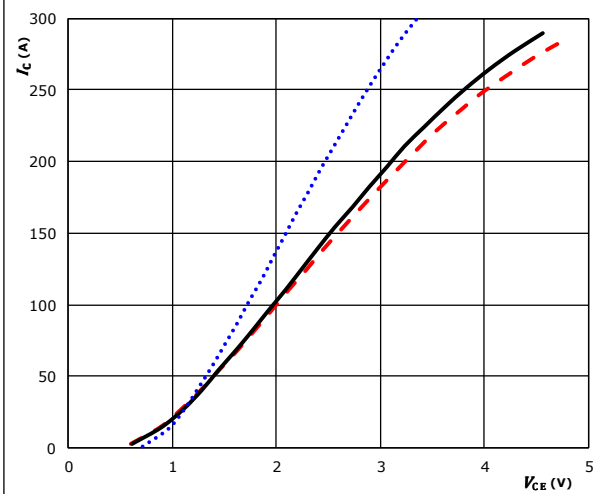
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## Half-Bridge Switch Characteristics

**figure 1. IGBT**

Typical output characteristics

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

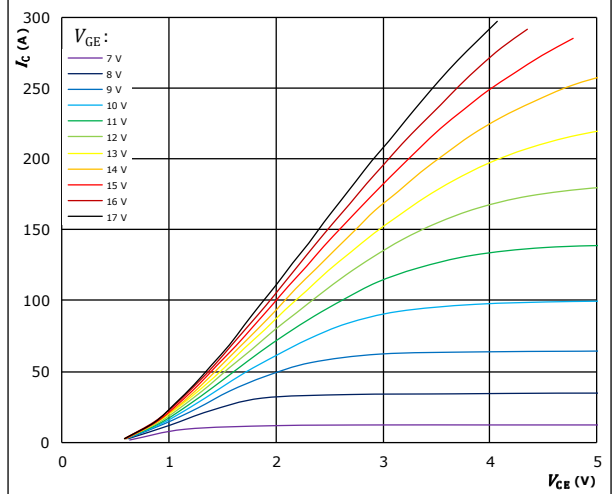


$t_p = 250 \mu s$   $T_j: 25 \text{ }^\circ C$  .....  
 $V_{GE} = 15 \text{ V}$   $T_j: 125 \text{ }^\circ C$  ———  
 $T_j: 150 \text{ }^\circ C$  - - - - -

**figure 2. IGBT**

Typical output characteristics

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

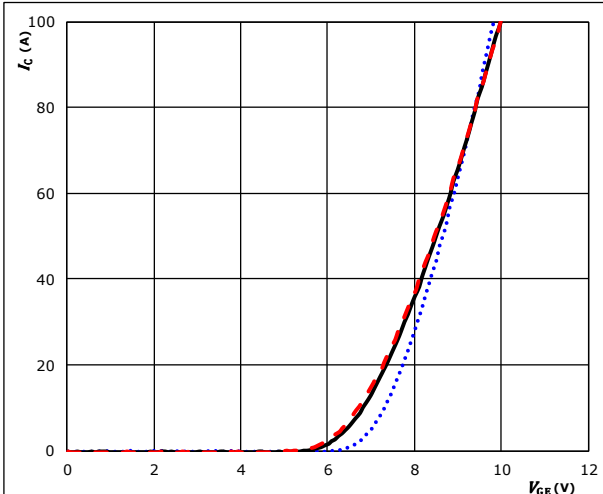


$t_p = 250 \mu s$   
 $T_j = 150 \text{ }^\circ C$   
 $V_{GE}$  from 7 V to 17 V in steps of 1 V

**figure 3. IGBT**

Typical transfer characteristics

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

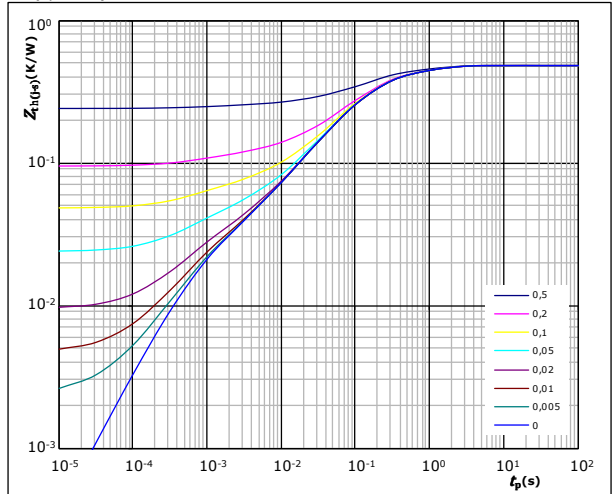


$t_p = 100 \mu s$   $T_j: 25 \text{ }^\circ C$  .....  
 $V_{CE} = 10 \text{ V}$   $T_j: 125 \text{ }^\circ C$  ———  
 $T_j: 150 \text{ }^\circ C$  - - - - -

**figure 4. IGBT**

Transient thermal impedance as function of pulse duration

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



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

IGBT thermal model values

$R$ (K/W)	$\tau$ (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



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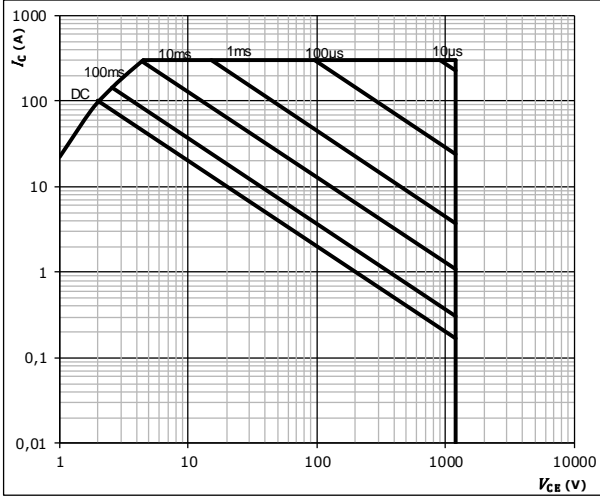
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## Half-Bridge Switch Characteristics

**figure 6. IGBT**

Safe operating area

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



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

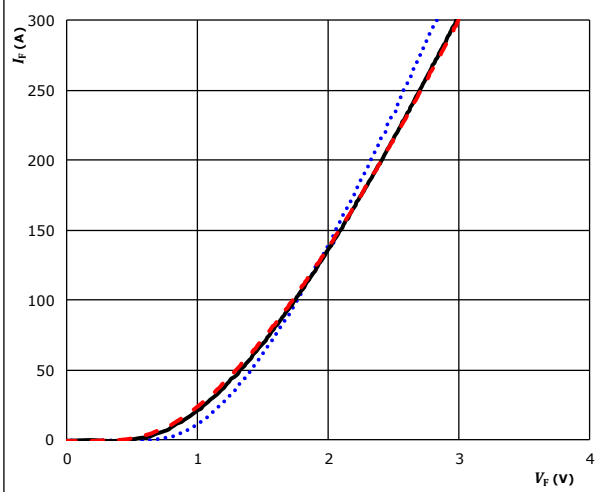


## Half-Bridge Diode Characteristics

**figure 1.** FWD

Typical forward characteristics

$$I_F = f(V_F)$$

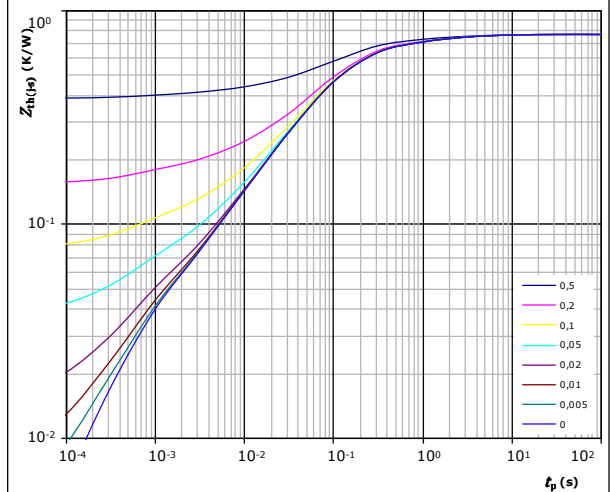


$t_p = 250 \mu s$   
 $T_j$ : 25 °C .....  
 125 °C ———  
 150 °C - - -

**figure 2.** FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$   
 $R_{th(j-s)} = 0,78 \text{ K/W}$   
 FWD thermal model values

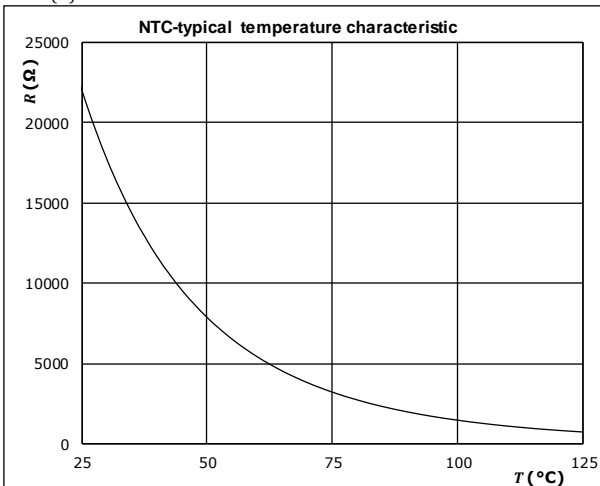
$R$ (K/W)	$\tau$ (s)
3,30E-02	5,07E+00
9,76E-02	9,33E-01
3,59E-01	1,37E-01
2,01E-01	4,10E-02
5,37E-02	6,38E-03
3,09E-02	6,30E-04

## Thermistor Characteristics

**figure 1.** Thermistor

Typical NTC characteristic as a function of temperature

$$R = f(T)$$

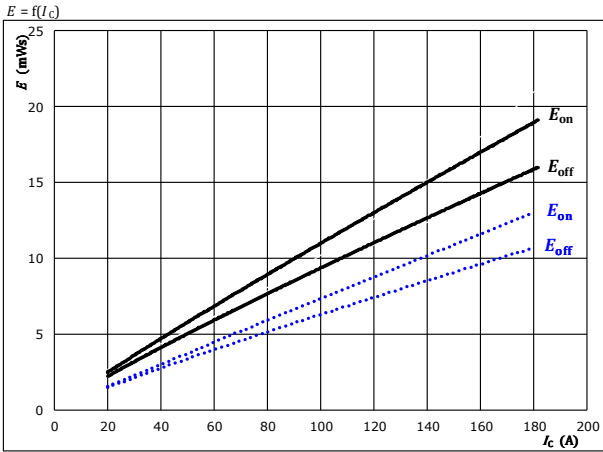




## Inverter Switching Characteristics

**figure 1.** IGBT

Typical switching energy losses as a function of collector current

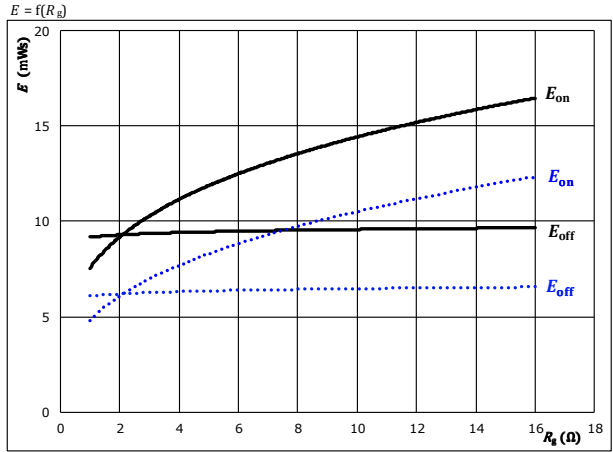


With an inductive load at  $T_j$ : 25 °C (dotted blue line), 125 °C (solid black line)

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

**figure 2.** IGBT

Typical switching energy losses as a function of gate resistor

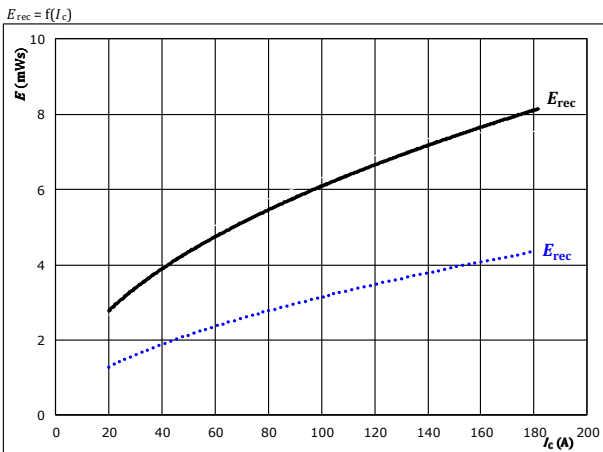


With an inductive load at  $T_j$ : 25 °C (dotted blue line), 125 °C (solid black line)

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

**figure 3.** FWD

Typical reverse recovered energy loss as a function of collector current

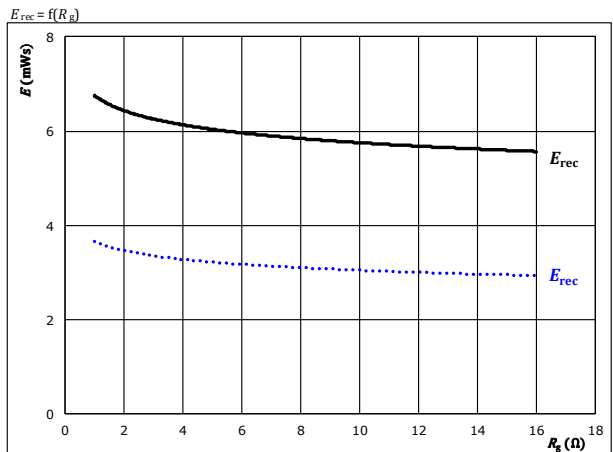


With an inductive load at  $T_j$ : 25 °C (dotted blue line), 125 °C (solid black line)

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

**figure 4.** FWD

Typical reverse recovered energy loss as a function of gate resistor



With an inductive load at  $T_j$ : 25 °C (dotted blue line), 125 °C (solid black line)

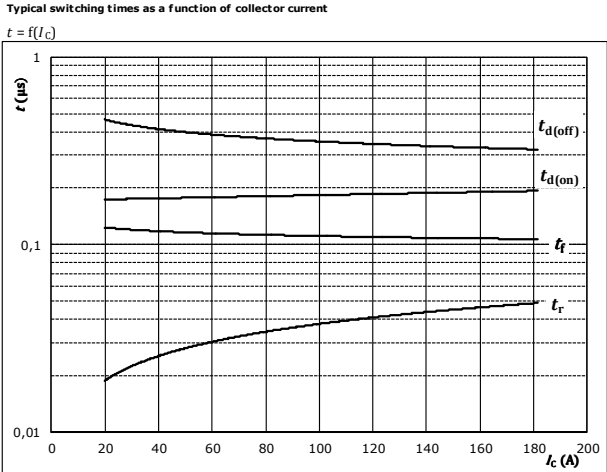
$V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $I_c = 100$  A



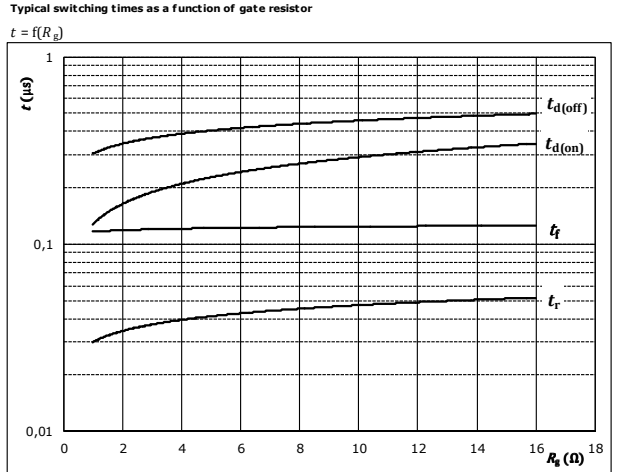


## Inverter Switching Characteristics

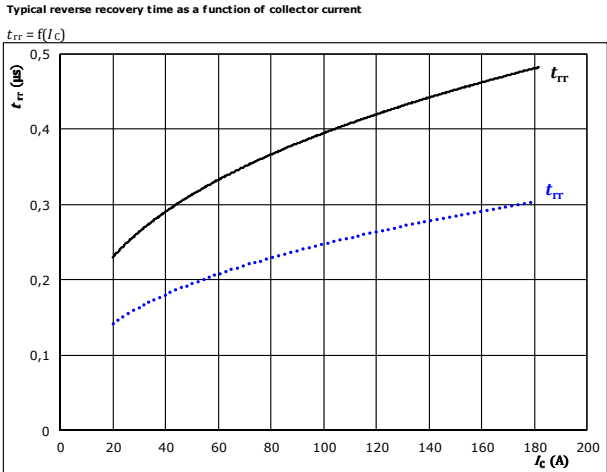
**figure 5. IGBT**  
 Typical switching times as a function of collector current



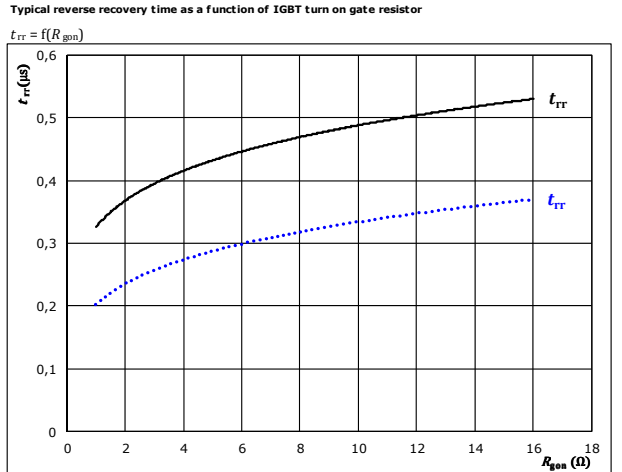
**figure 6. IGBT**  
 Typical switching times as a function of gate resistor



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



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



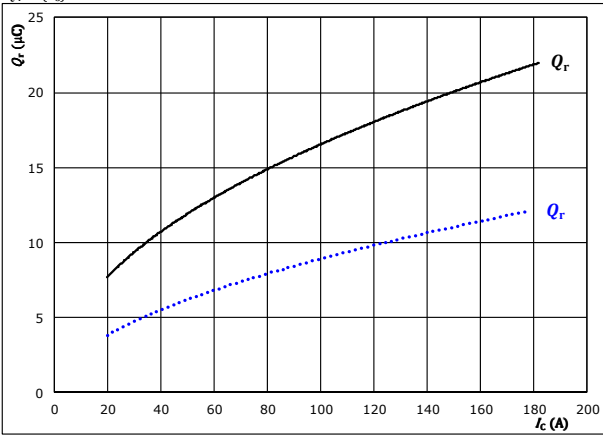


## Inverter Switching Characteristics

**figure 9.** FWD

Typical recovered charge as a function of collector current

$$Q_r = f(I_c)$$

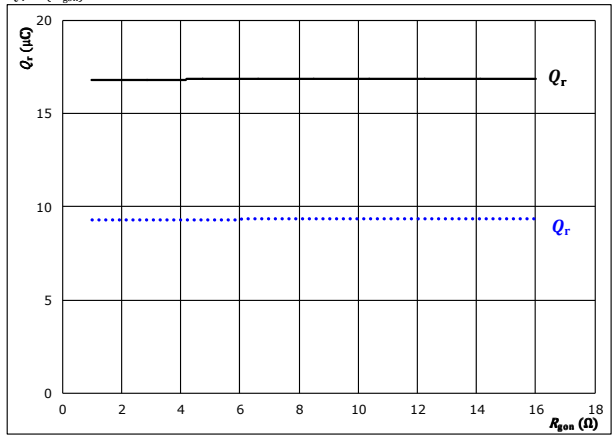


At  $V_{CE} = 600$  V  $T_j = 25$  °C (dotted blue line)  
 $V_{GE} = \pm 15$  V  $T_j = 125$  °C (solid black line)  
 $R_{gdn} = 4$  Ω

**figure 10.** FWD

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

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

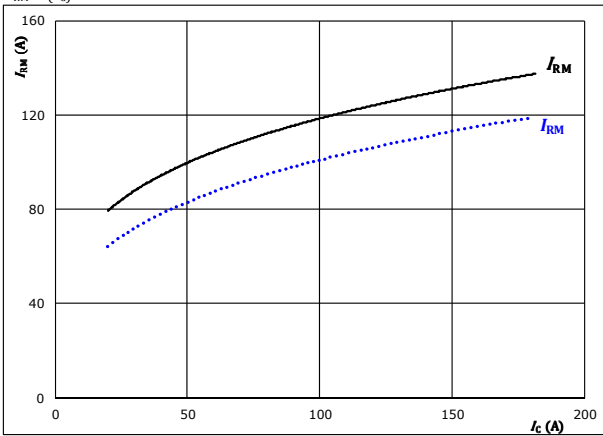


At  $V_{CE} = 600$  V  $T_j = 25$  °C (dotted blue line)  
 $V_{GE} = \pm 15$  V  $T_j = 125$  °C (solid black line)  
 $I_c = 100$  A

**figure 11.** FWD

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

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

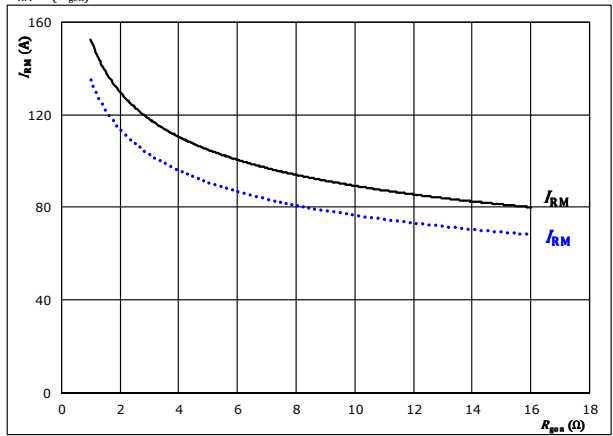


At  $V_{CE} = 600$  V  $T_j = 25$  °C (dotted blue line)  
 $V_{GE} = \pm 15$  V  $T_j = 125$  °C (solid black line)  
 $R_{gdn} = 4$  Ω

**figure 12.** FWD

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

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



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



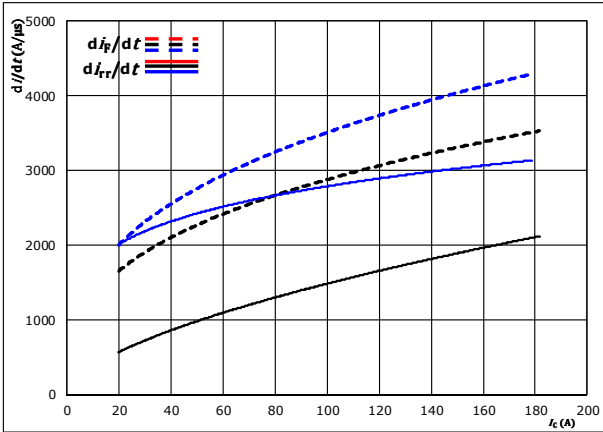
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## Inverter Switching Characteristics

**figure 13.** FWD

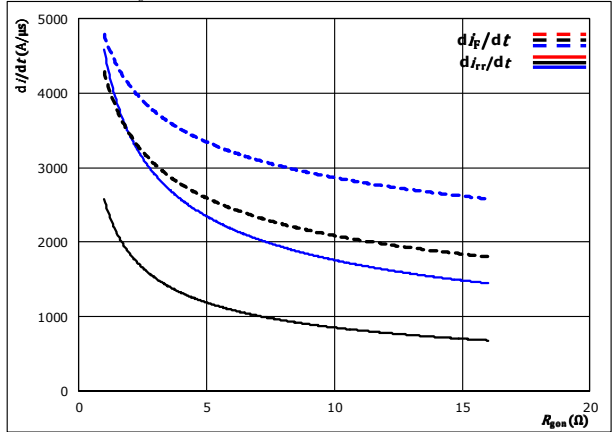
Typical rate of fall of forward and reverse recovery current as a function of collector current  
 $di_f/dt, di_{rr}/dt = f(I_C)$



At  $V_{CE} = 600$  V  $T_j = 25$  °C  
 $V_{GE} = \pm 15$  V  $T_j = 125$  °C  
 $R_{g0n} = 4$  Ω

**figure 14.** FWD

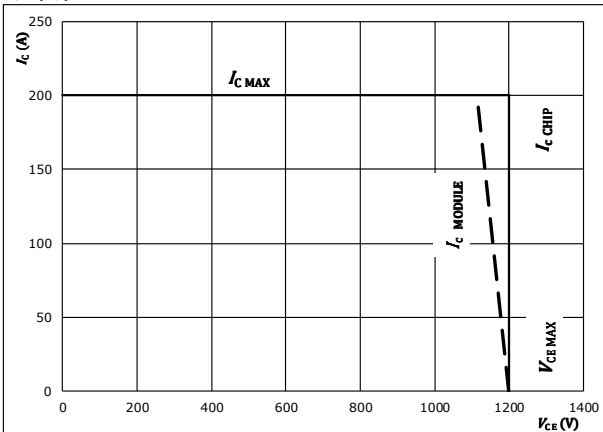
Typical rate of fall of forward and reverse recovery current as a function of IGBT turn on gate resistor  
 $di_f/dt, di_{rr}/dt = f(R_{g0n})$



At  $V_{CE} = 600$  V  $T_j = 25$  °C  
 $V_{GE} = \pm 15$  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  
 $R_{g0n} = 4$  Ω  
 $R_{g0ff} = 4$  Ω



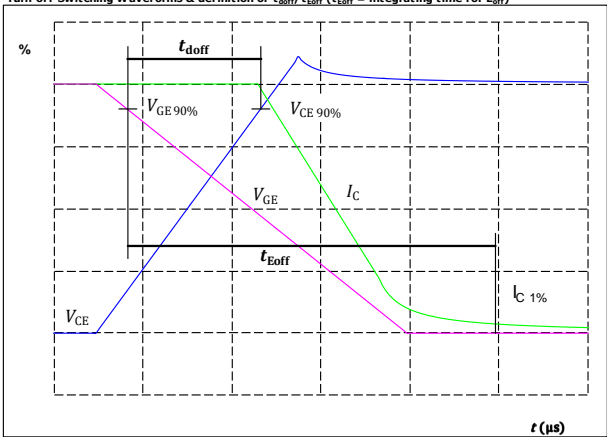
## Inverter Switching Definitions

**General conditions**

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

**figure 1.** IGBT

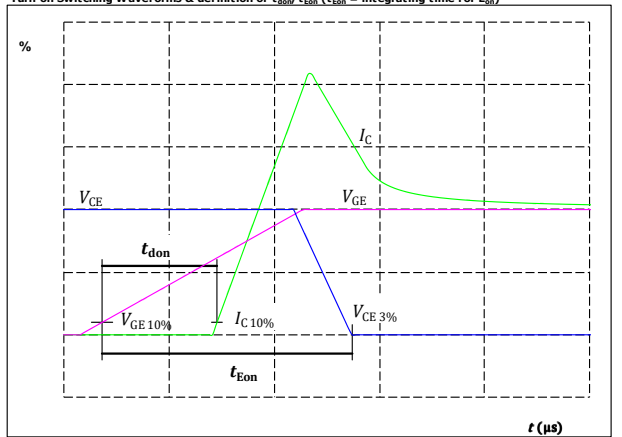
Turn-off Switching Waveforms & definition of  $t_{doff}$ ,  $t_{Eoff}$  ( $t_{Eoff}$  = integrating time for  $E_{off}$ )



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

**figure 2.** IGBT

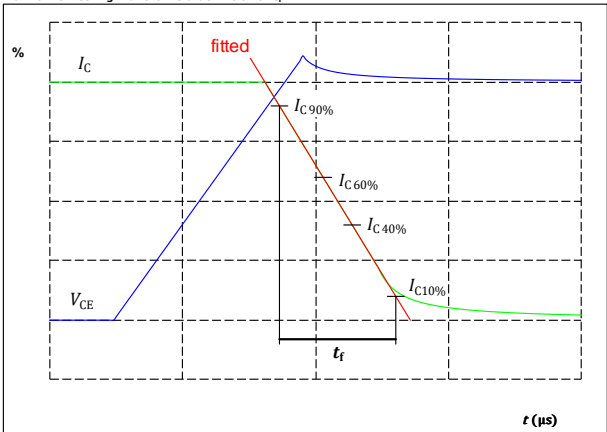
Turn-on Switching Waveforms & definition of  $t_{don}$ ,  $t_{Eon}$  ( $t_{Eon}$  = integrating time for  $E_{on}$ )



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

**figure 3.** IGBT

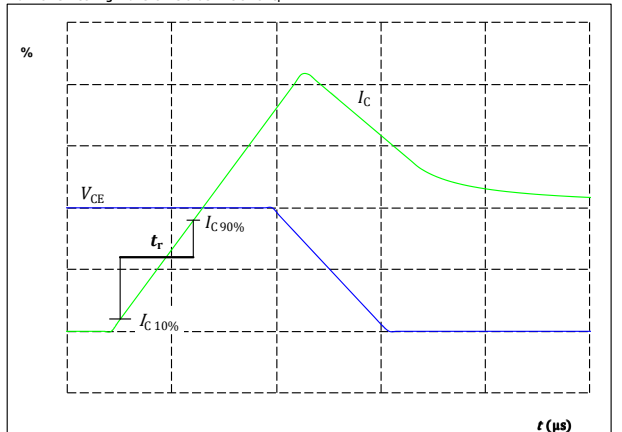
Turn-off Switching Waveforms & definition of  $t_r$



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

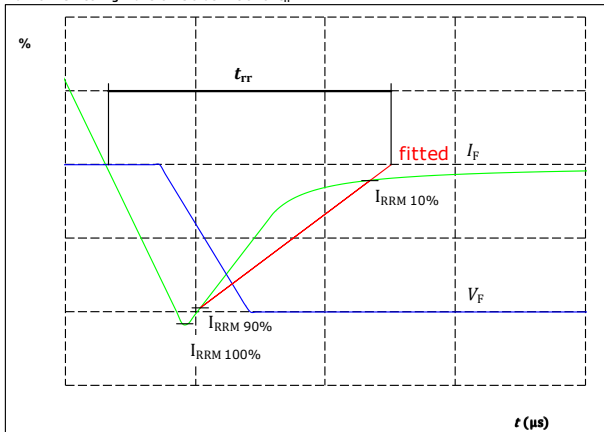


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 datasheet

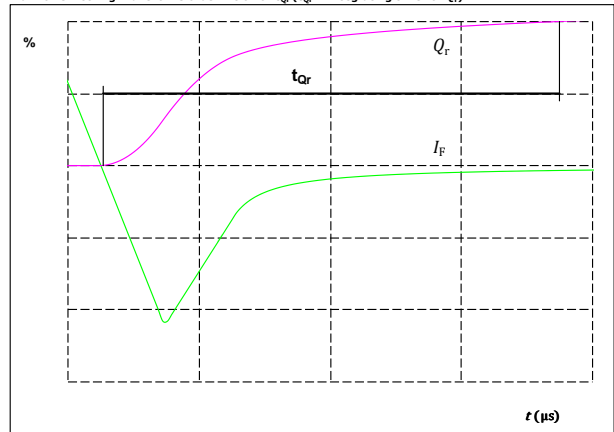
## Inverter Switching Characteristics

**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	$\mu\text{C}$



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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/			

Text	Name		Date code	UL & VIN	Lot	Serial
	Type&Ver	Lot number	Serial	Date code		
NN-NNNNNNNNNNNN TTTTWW WWYY UL VIN LLLLL SSSS	NN-NNNNNNNNNNNN-TTTTWW		WWYY	UL VIN	LLLLL	SSSS
	TTTTTWW	LLLLL	SSSS	WWYY		

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

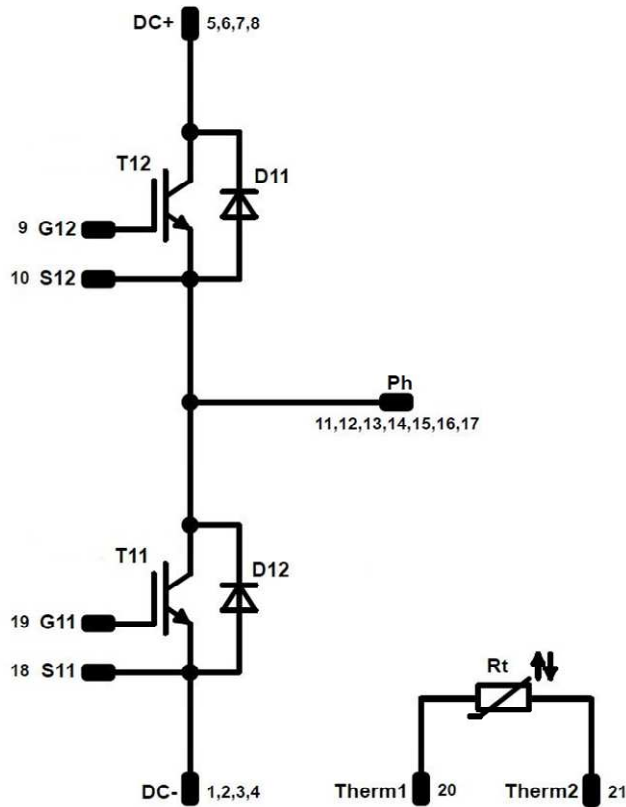
Tolerance of pinpositions: ±0,5mm at the end of pins  
 Dimension of coordinate axis is only offset without tolerance



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**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-P0122PB100SC02-M819F09Y**  
datasheet

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-FZ122PB100SC02-M819F0xx-D1-14	17 Aug. 2018	Initial release	

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