



Vincotech

# 10-R0126PA008SC-M627F40

datasheet

flow90PACK 0

1200 V / 8 A

## Topology features

- Inverter
- Open Emitter configuration
- Temperature sensor

## Component features

- Easy paralleling
- Low turn-off losses
- Low collector emitter saturation voltage
- Positive temperature coefficient
- Short tail current

## Housing features

- Base isolation:  $\text{Al}_2\text{O}_3$
- 90° mounting angle between heatsink and PCB
- Screw-on heatsink mounting
- Clip-in PCB mounting
- Thermo-mechanical push-and-pull force relief
- Solder pin

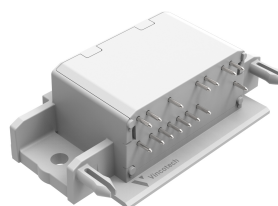
## Target applications

- Standard Drive
- Servo Drive
- Bookshelf Inverter

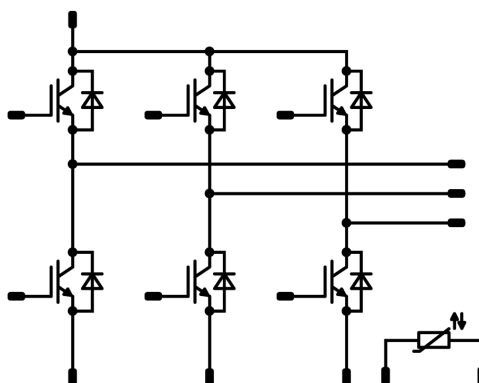
## Types

- 10-R0126PA008SC-M627F40

## flow90 0 housing



## Schematic





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## Maximum Ratings

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

Parameter	Symbol	Conditions	Value	Unit
<b>Inverter Switch</b>				
Collector-emitter voltage	$V_{CES}$		1200	V
Collector current (DC current)	$I_C$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	14	A
Repetitive peak collector current	$I_{CRM}$	$t_p$ limited by $T_{jmax}$	24	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	51	W
Gate-emitter voltage	$V_{GES}$		$\pm 20$	V
Short circuit ratings	$t_{SC}$	$V_{GE} = 15\text{ V}$ , $V_{CC} = 800\text{ V}$ $T_j = 150\text{ °C}$	10	$\mu s$
Maximum junction temperature	$T_{jmax}$		175	$^{\circ}\text{C}$

## Inverter Diode

Peak repetitive reverse voltage	$V_{RRM}$		1200	V
Forward current (DC current)	$I_F$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	20	A
Repetitive peak forward current	$I_{FRM}$	$t_p$ limited by $T_{jmax}$	20	A
Total power dissipation	$P_{tot}$	$T_j = T_{jmax}$ $T_s = 80\text{ °C}$	49	W
Maximum junction temperature	$T_{jmax}$		175	$^{\circ}\text{C}$

## Module Properties

### Thermal Properties

Storage temperature	$T_{stg}$		-40...+125	$^{\circ}\text{C}$
Operation temperature under switching condition	$T_{jop}$		-40...+( $T_{jmax} - 25$ )	$^{\circ}\text{C}$

### Isolation Properties

Isolation voltage	$V_{isol}$	DC Test Voltage* $t_p = 2\text{ s}$	6000	V
Isolation voltage	$V_{isol}$	AC Voltage $t_p = 1\text{ min}$	2500	V
Creepage distance			> 12,7	mm
Clearance			10,93	mm
Comparative Tracking Index	CTI		$\geq 200$	

\*100 % tested in production



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## Characteristic Values

Parameter	Symbol	Conditions					Values			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	

### Inverter Switch

#### Static

Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,00015	25	5,3	5,8	6,3	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		8	25 125 150	1,58	1,91 2,14 2,22	2,07 <sup>(1)</sup>	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		490		pF
Reverse transfer capacitance	$C_{res}$							30		pF

#### Thermal

Thermal resistance junction to sink <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4 \text{ W/mK}$ (PSX)						1,85		K/W
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#### Dynamic

Turn-on delay time	$t_{d(on)}$	$R_{gon} = 32 \Omega$ $R_{goff} = 32 \Omega$	$\pm 15$	600	8	25 150		55 54		ns
Rise time	$t_r$					25 150		22,6 24,4		ns
Turn-off delay time	$t_{d(off)}$					25 150		176,8 240,4		ns
Fall time	$t_f$					25 150		66,98 120,68		ns
Turn-on energy (per pulse)	$E_{on}$					25 150		0,555 0,87		mWs
Turn-off energy (per pulse)	$E_{off}$					25 150		0,434 0,733		mWs



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## Characteristic Values

Parameter	Symbol	Conditions					Values			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	

### Inverter Diode

#### Static

Forward voltage	$V_F$				10	25 150	1,35	1,83 1,75	2,05 <sup>(1)</sup>	V
Reverse leakage current	$I_R$	$V_r = 1200$ V				25			2,7	μA

#### Thermal

Thermal resistance junction to sink <sup>(2)</sup>	$R_{th(j-s)}$	$\lambda_{paste} = 3,4$ W/mK (PSX)						1,95		K/W
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#### Dynamic

Peak recovery current	$I_{RRM}$	$di/dt=362$ A/μs $di/dt=293$ A/μs	$\pm 15$	600	8	25 150		7,09 9,08		A
Reverse recovery time	$t_{rr}$					25 150		246,73 428,03		ns
Recovered charge	$Q_r$					25 150		0,852 1,77		μC
Reverse recovered energy	$E_{rec}$					25 150		0,327 0,714		mWs
Peak rate of fall of recovery current	$(di_{rr}/dt)_{max}$					25 150		79,73 44,4		A/μs



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## Characteristic Values

Parameter	Symbol	Conditions					Values			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	

## Thermistor

### Static

Rated resistance	$R$					25		4,7		kΩ
Deviation of $R_{100}$	$\Delta_{R/R}$	$R_{100} = 426 \Omega$				100	-12		11	%
Power dissipation	$P$							200		mW
Power dissipation constant	$d$					25		2		mW/K
B-value	$B_{(25/50)}$	Tol. $\pm 3 \%$						3500		K
B-value	$B_{(25/100)}$	Tol. $\pm 3 \%$						3560		K
Vincotech Thermistor Reference									G	

<sup>(1)</sup> Value at chip level

<sup>(2)</sup> Only valid with pre-applied Vincotech thermal interface material.



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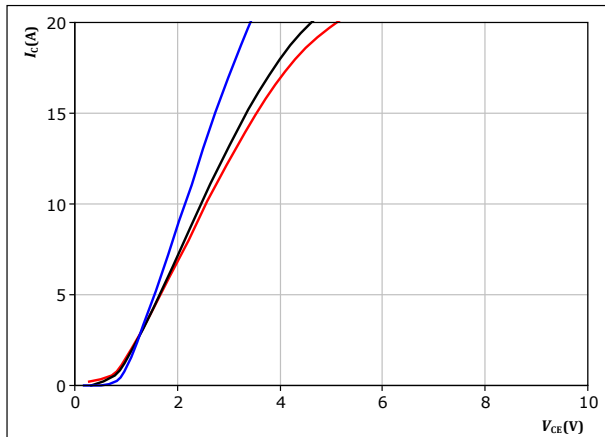
# 10-R0126PA008SC-M627F40 datasheet

## Inverter Switch Characteristics

figure 1. IGBT

Typical output characteristics

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

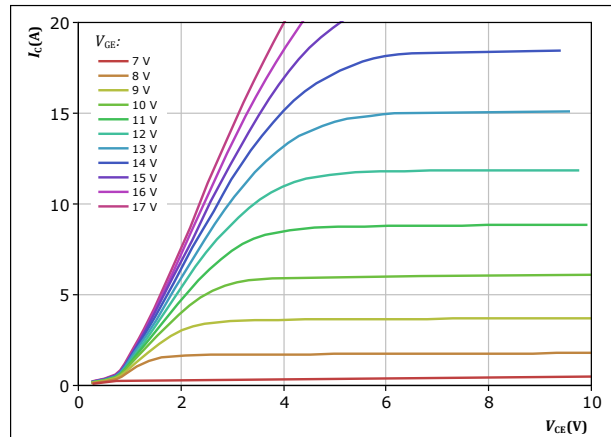


$t_p = 250 \mu s$   
 $V_{GE} = 15 V$   
 $T_j: 25 ^\circ C$   
 $125 ^\circ C$   
 $150 ^\circ C$

figure 2. IGBT

Typical output characteristics

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

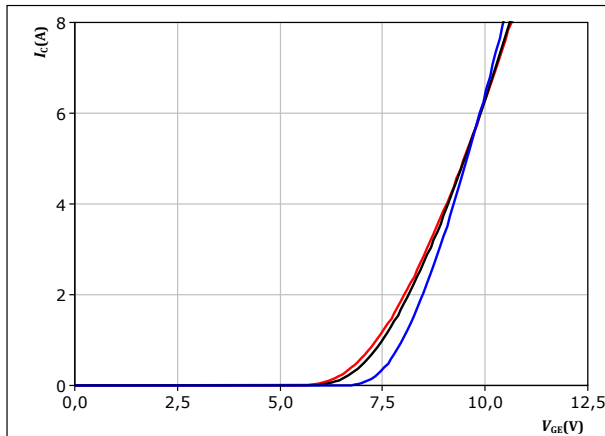


$t_p = 250 \mu s$   
 $T_j = 150 ^\circ C$   
 $V_{GE}$  from 7 V to 17 V in steps of 1 V

figure 3. IGBT

Typical transfer characteristics

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

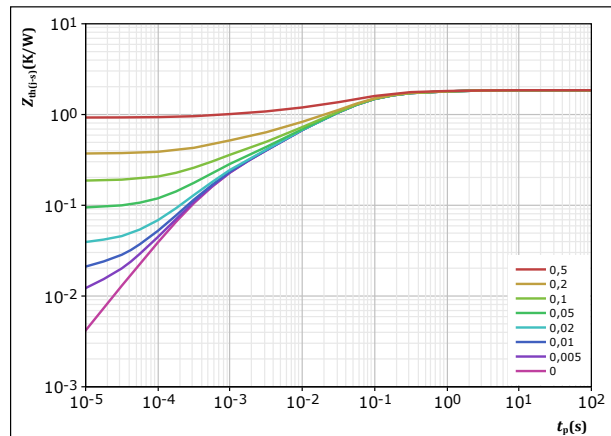


$t_p = 250 \mu s$   
 $V_{CE} = 10 V$   
 $T_j: 25 ^\circ C$   
 $125 ^\circ C$   
 $150 ^\circ C$

figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$   
 $R_{th(j-s)} = 1,853 K/W$   
IGBT thermal model values  

$R (K/W)$	$\tau (s)$
1,07E-01	1,43E+00
3,06E-01	1,62E-01
8,20E-01	4,85E-02
2,99E-01	1,03E-02
1,69E-01	2,84E-03
1,52E-01	4,86E-04



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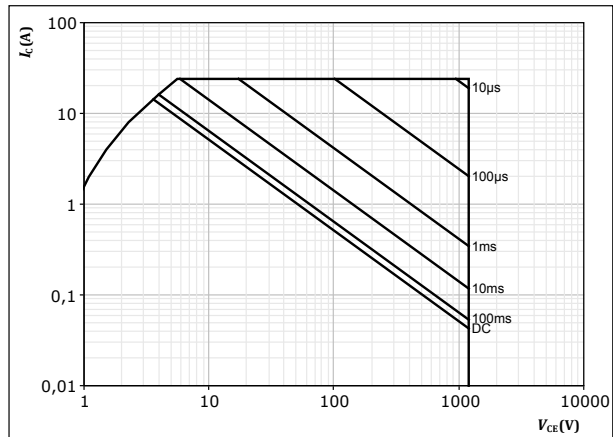
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datasheet

## Inverter Switch Characteristics

**figure 5.** IGBT

Safe operating area

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



$D$  = single pulse

$T_s = 80$  °C

$V_{GE} = 15$  V

$T_j = T_{jmax}$



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## Inverter Diode Characteristics

figure 6. FWD

Typical forward characteristics

$$I_F = f(V_F)$$

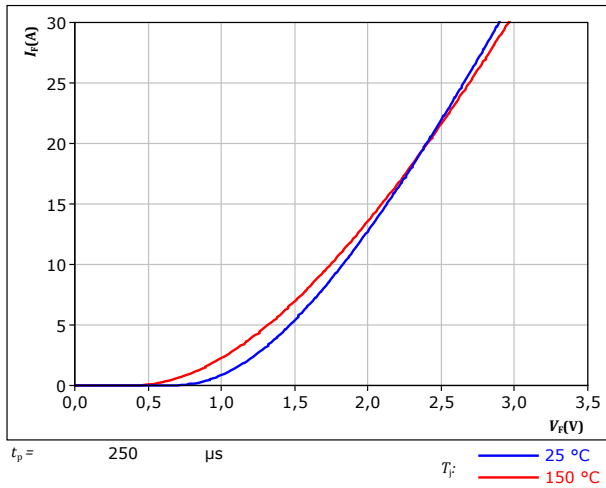
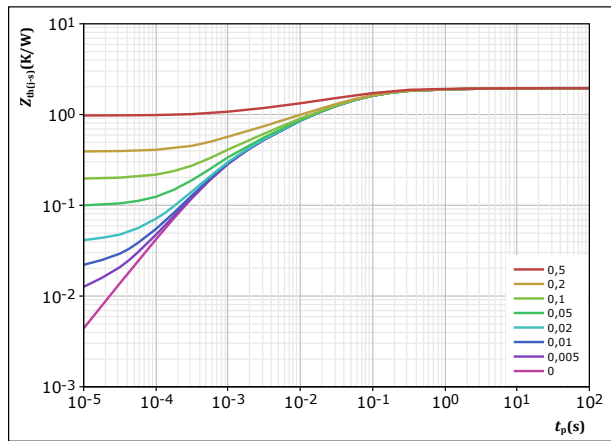


figure 7. FWD

Transient thermal impedance as a function of pulse width

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



$D =$	$t_p / T$	
$R_{th(j-s)} =$	1,952	K/W
FWD thermal model values		
$R$ (K/W)	$\tau$ (s)	
5,14E-02	4,05E+00	
1,26E-01	5,34E-01	
6,86E-01	7,62E-02	
5,26E-01	1,70E-02	
3,32E-01	3,96E-03	
2,31E-01	7,27E-04	





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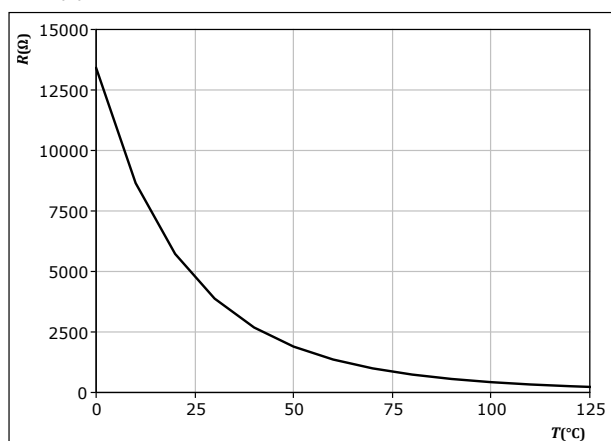
## Thermistor Characteristics

figure 8.

Thermistor

Typical NTC characteristic as function of temperature

$$R_T = f(T)$$





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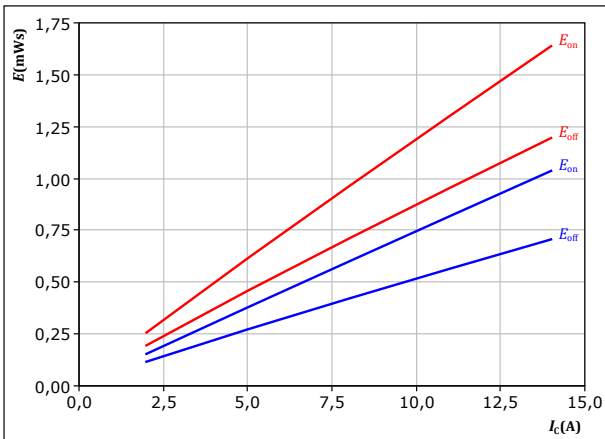
## Inverter Switching Characteristics

figure 9.

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  
 $R_{gon} = 32$   $\Omega$   
 $R_{goff} = 32$   $\Omega$

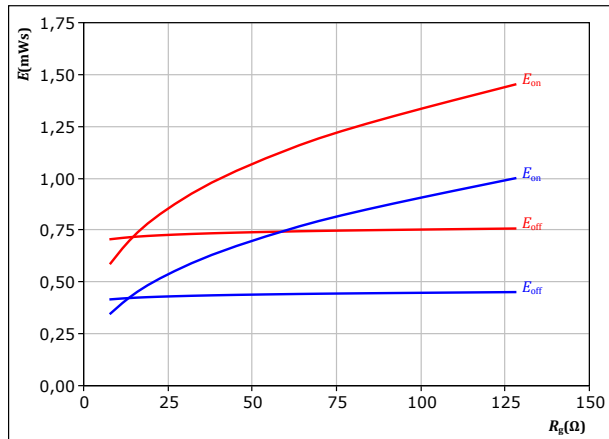
$T_j$ : — 25 °C  
— 150 °C

figure 10.

IGBT

Typical switching energy losses as a function of IGBT turn on gate resistor

$$E = f(R_g)$$



With an inductive load at

$V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $I_C = 8$  A

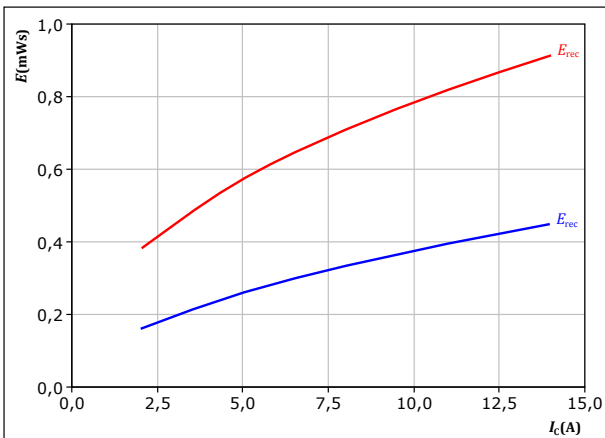
$T_j$ : — 25 °C  
— 150 °C

figure 11.

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  
 $R_{gon} = 32$   $\Omega$

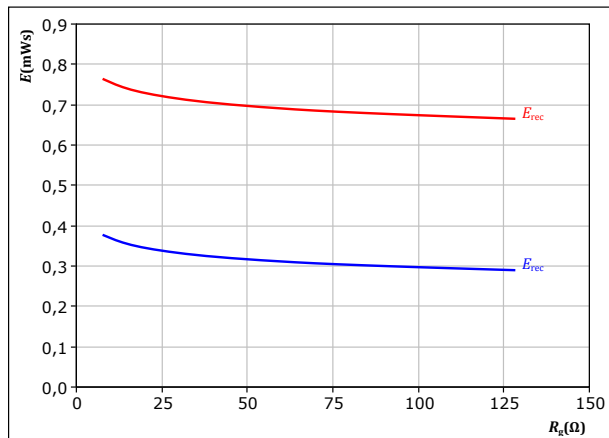
$T_j$ : — 25 °C  
— 150 °C

figure 12.

FWD

Typical reverse recovered energy loss as a function of IGBT turn on gate resistor

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



With an inductive load at

$V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $I_C = 8$  A

$T_j$ : — 25 °C  
— 150 °C



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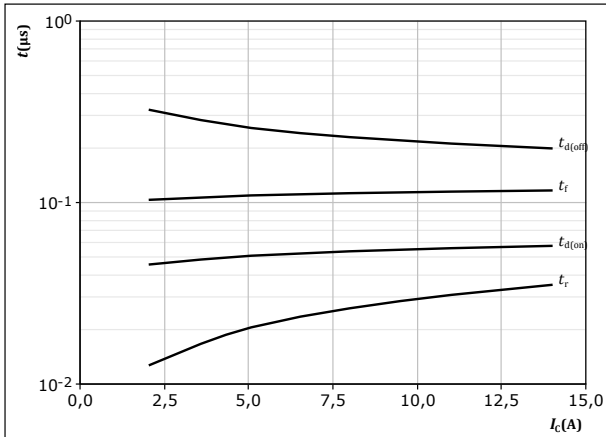
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datasheet

## Inverter Switching Characteristics

figure 13.

IGBT

Typical switching times as a function of collector current  
 $t = f(I_C)$



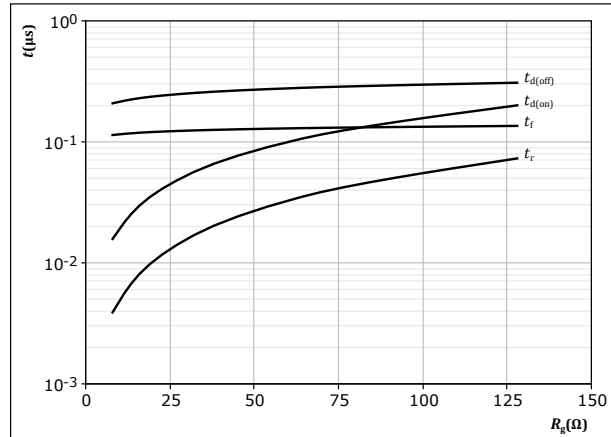
With an inductive load at

$T_j = 150$  °C  
 $V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 32$  Ω  
 $R_{goff} = 32$  Ω

figure 14.

IGBT

Typical switching times as a function of IGBT turn on gate resistor  
 $t = f(R_g)$



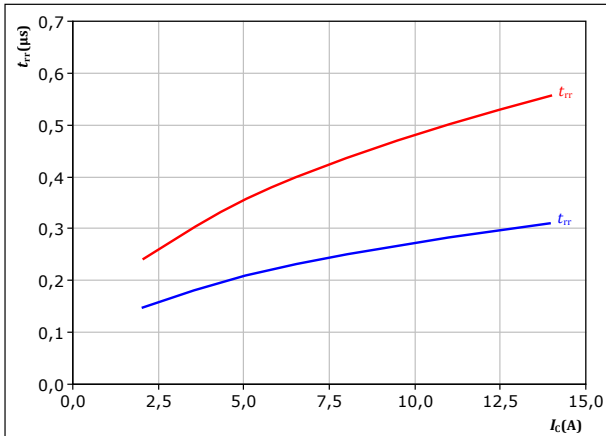
With an inductive load at

$T_j = 150$  °C  
 $V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $I_C = 8$  A

figure 15.

FWD

Typical reverse recovery time as a function of collector current  
 $t_{rr} = f(I_C)$



With an inductive load at

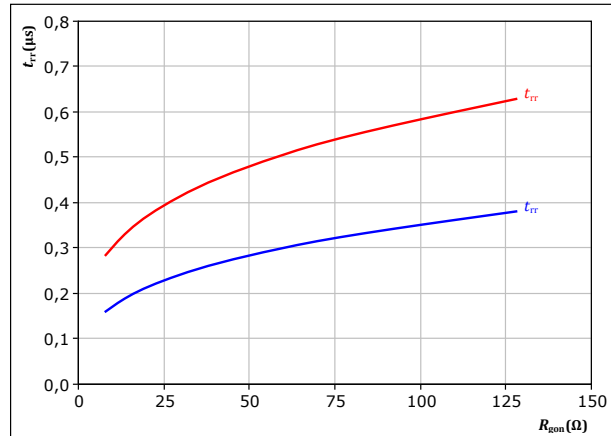
$V_{CE} = 600$  V  
 $V_{GE} = \pm 15$  V  
 $R_{gon} = 32$  Ω

$T_j$ : — 25 °C  
— 150 °C

figure 16.

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  
 $V_{GE} = \pm 15$  V  
 $I_C = 8$  A

$T_j$ : — 25 °C  
— 150 °C



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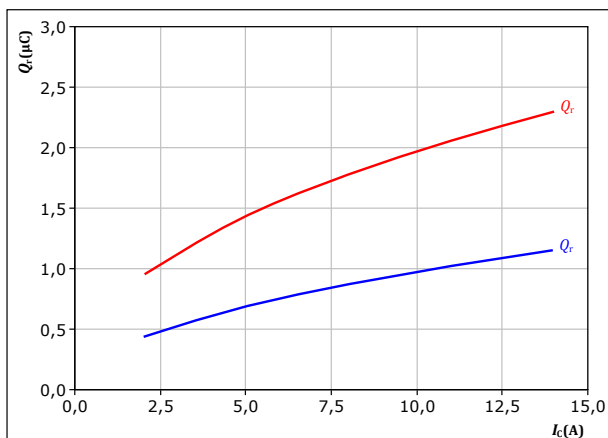
## Inverter Switching Characteristics

figure 17.

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  
 $R_{gon} = 32$  Ω

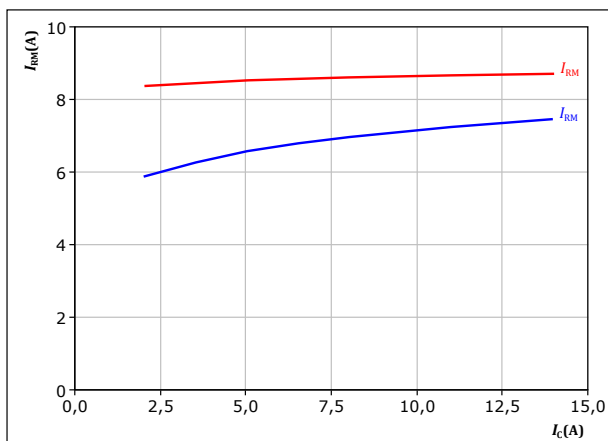
$T_j$ : — 25 °C  
— 150 °C

figure 19.

FWD

Typical peak reverse recovery 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  
 $R_{gon} = 32$  Ω

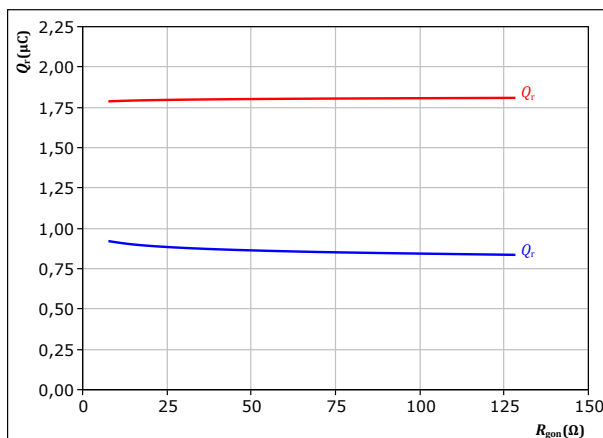
$T_j$ : — 25 °C  
— 150 °C

figure 18.

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  
 $I_c = 8$  A

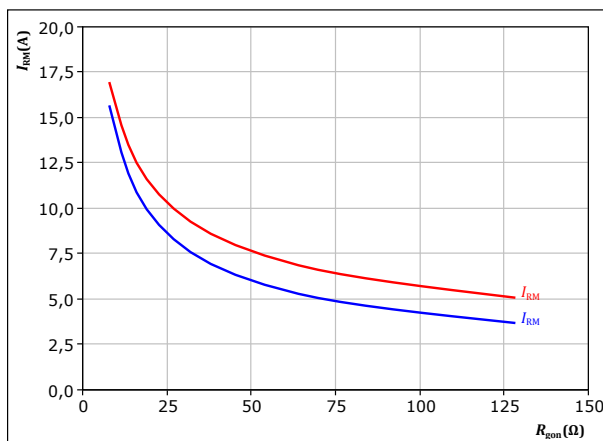
$T_j$ : — 25 °C  
— 150 °C

figure 20.

FWD

Typical peak reverse recovery 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  
 $I_c = 8$  A

$T_j$ : — 25 °C  
— 150 °C



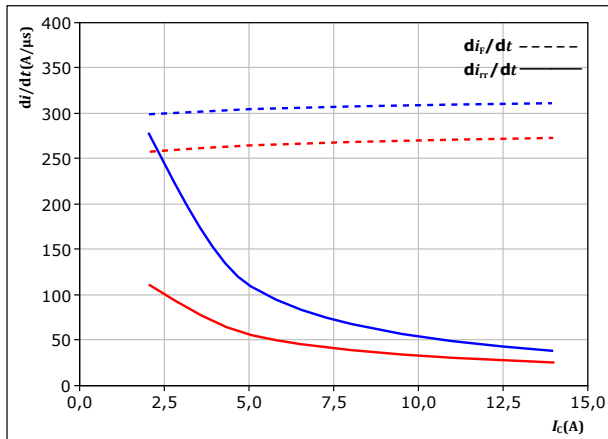
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## Inverter Switching Characteristics

figure 21. FWD

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



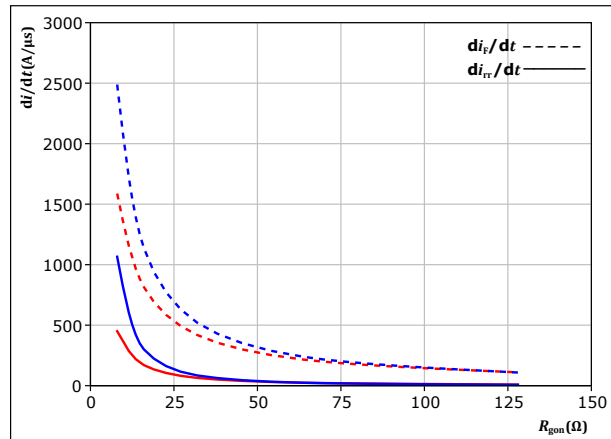
With an inductive load at

$V_{CE} = 600 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $R_{gon} = 32 \text{ } \Omega$

$T_j$ : — 25 °C  
— 150 °C

figure 22. FWD

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



With an inductive load at

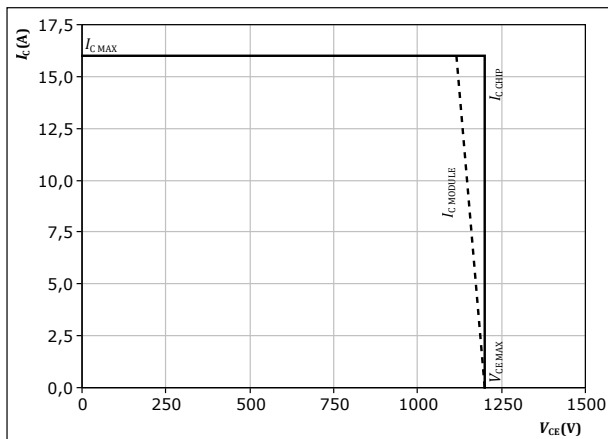
$V_{CE} = 600 \text{ V}$   
 $V_{GE} = \pm 15 \text{ V}$   
 $I_C = 8 \text{ A}$

$T_j$ : — 25 °C  
— 150 °C

figure 23. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



At  $T_j = 150 \text{ } ^\circ\text{C}$   
 $R_{gon} = 32 \text{ } \Omega$   
 $R_{goff} = 32 \text{ } \Omega$



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## Inverter Switching Definitions

figure 24. IGBT

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

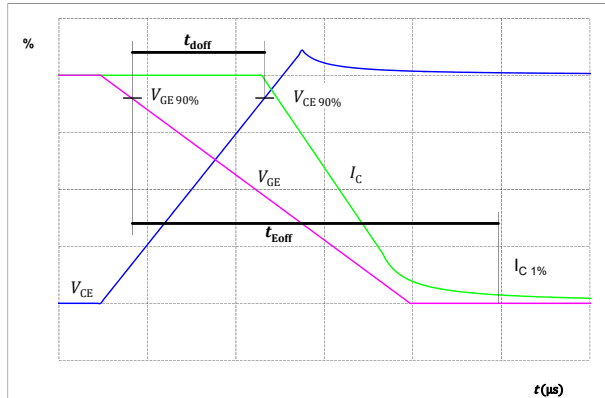


figure 25. IGBT

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

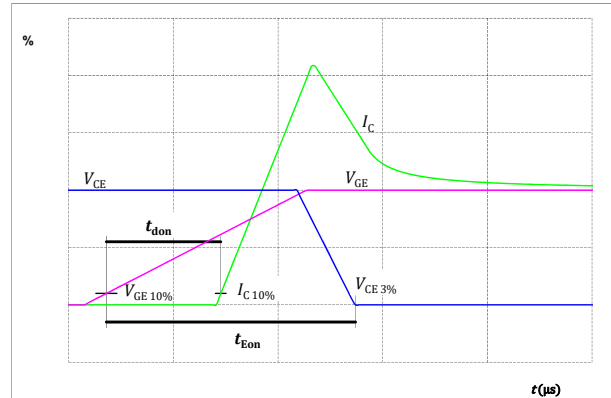


figure 26. IGBT

Turn-off Switching Waveforms & definition of  $t_f$

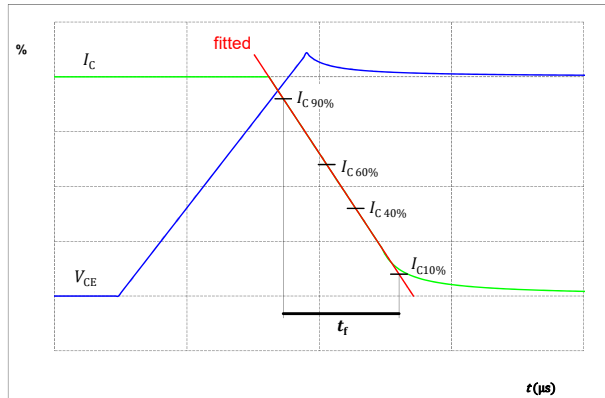
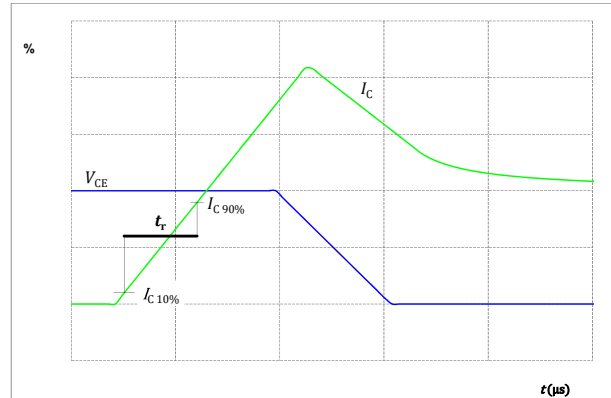


figure 27. IGBT

Turn-on Switching Waveforms & definition of  $t_r$





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## Inverter Switching Definitions

figure 28.

FWD

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

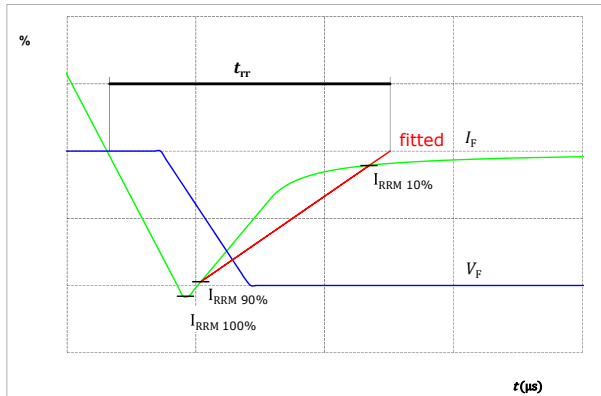
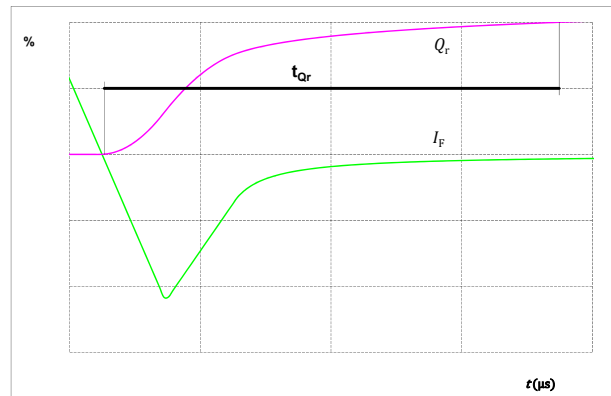


figure 29.

FWD

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





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# 10-R0126PA008SC-M627F40

datasheet

Ordering Code	
Version	Ordering Code
Without thermal paste	10-R0126PA008SC-M627F40
With thermal paste (3,4 W/mK, PSX-P7)	10-R0126PA008SC-M627F40-/3/

Marking						
	Text	Name	Date code	UL & VIN	Lot	Serial
		NN-NNNNNNNNNNNNNNNN- TTTTIV	WWYY	UL VIN	LLLLL	SSSS
	Datamatrix	Type&Ver TTTTTIV	Lot number LLLLL	Serial SSSS	Date code WWYY	

## Outline

Pin table [mm]

Pin	X	Y	Function
1	33,6	0	+UB
2	19,85	0	GWL
3	15,95	0	E6
4	12,95	0	E5
5	9,95	0	GVL
6	6,95	0	NTC1
7	3,95	0	GUL
8	0	0	E4
9	0	7	U
10	3	7	GUH
11	10	7	NTC2
12	19,3	7	V
13	22,3	7	GVH
14	28,5	7	W
15	31,5	7	GWH

The image shows two views of a component: a top view and a bottom view.

**Top View:** Shows 15 pins numbered 1 to 15. The pins are arranged in two rows. The top row contains pins 1 through 15. The bottom row contains pins 8 through 11. The distance between the centerlines of the two rows is 16.8 mm. The total width of the component is 11.23 mm. The coordinate system (X, Y) is shown with the origin at the bottom-left corner of the pin array.

**Bottom View:** Shows the underside of the component. It features a central rectangular area with a dashed line indicating the center. There are two circular mounting holes on the left and right sides. The distance between the centerlines of these holes is 19.32 ± 0.5 mm. The diameter of the mounting holes is  $\phi 1 \pm 0.05$  mm.

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

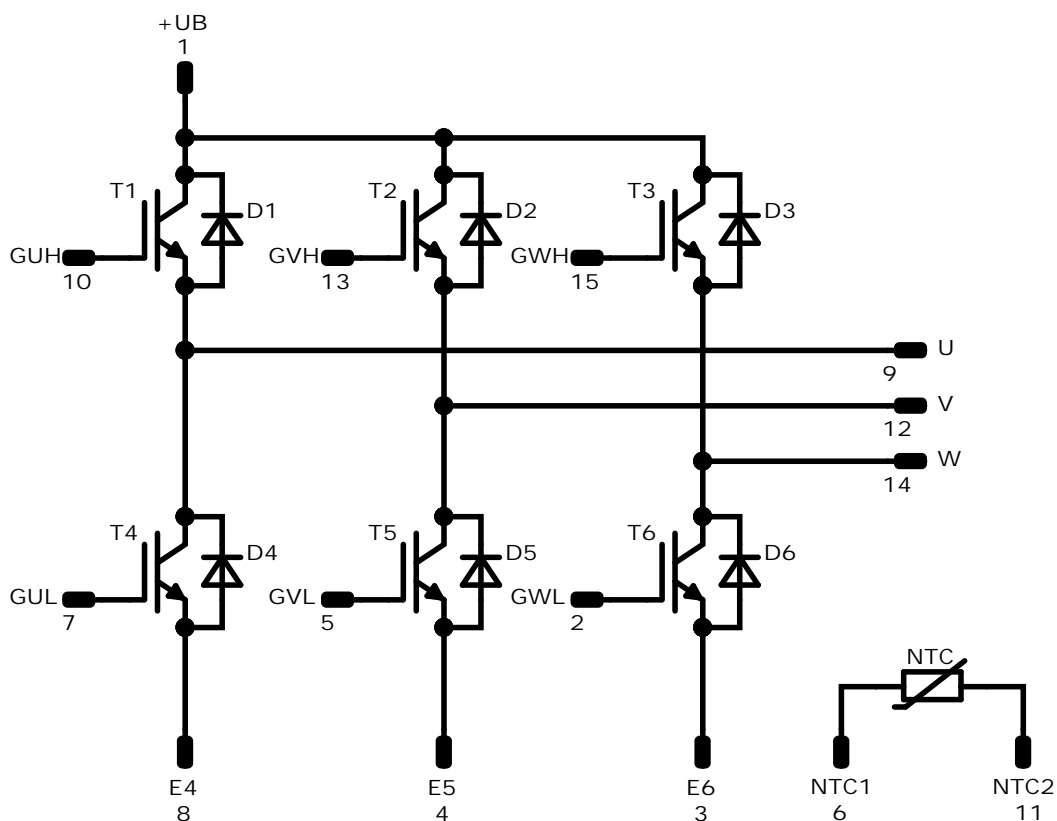




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datasheet

Pinout




Identification

ID	Component	Voltage	Current	Function	Comment
T4, T1, T5, T2, T6, T3	IGBT	1200 V	8 A	Inverter Switch	
D1, D4, D2, D5, D3, D6	FWD	1200 V	10 A	Inverter Diode	
NTC	Thermistor			Thermistor	



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Packaging instruction				
Standard packaging quantity (SPQ) 135	>SPQ	Standard	<SPQ	Sample
Handling instruction				
Handling instructions for <i>flow90 0</i> packages see vincotech.com website.				
Package data				
Package data for <i>flow90 0</i> packages see vincotech.com website.				
Vincotech thermistor reference				
See Vincotech thermistor reference table at 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-R0126PA008SC-M627F40-D3-14	4 May. 2022	New Datasheet format, module is unchanged	

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