



# STN878

Medium current, high performance, low voltage  
NPN transistor

## Features

- Very low Collector to Emitter saturation voltage
- D.C. Current gain,  $h_{FE} > 100$
- 5A continuous collector current
- SOT-223 plastic package for surface mounting circuits
- Available in tape & reel packing

## Applications

- Power management in portable equipment
- Voltage regulation in bias supply circuits
- Switching regulator in battery charger applications
- Heavy load driver

## Description

The device is manufactured in low voltage PNP planar technology with “base island” layout. the resulting transistor shows exceptional high gain performance coupled with very low saturation voltage.

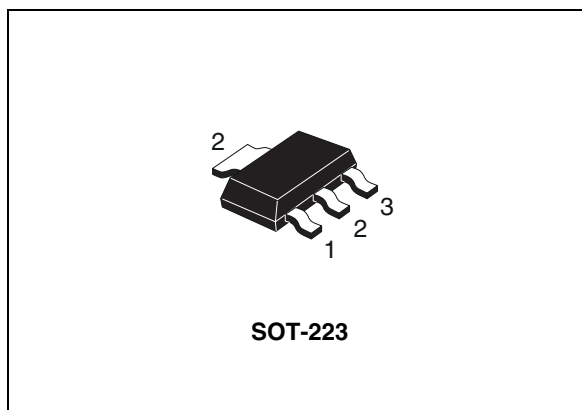


Figure 1. Internal schematic diagram

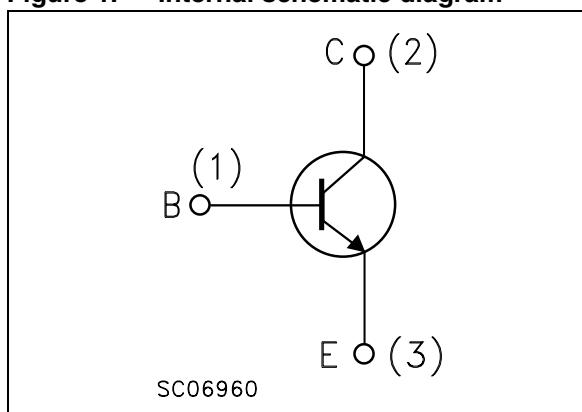


Table 1. Device summary

Order code	Marking	Package	Packaging
STN878	N878	SOT-223	Tape & reel

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# 1 Electrical ratings

**Table 2. Absolute maximum rating**

Symbol	Parameter	Value	Unit
$V_{CBO}$	Collector-base voltage ( $I_E = 0$ )	45	V
$V_{CEO}$	Collector-emitter voltage ( $I_B = 0$ )	30	V
$V_{EBO}$	Emitter-base voltage ( $I_C = 0$ )	6	V
$I_C$	Collector current	5	A
$I_{CM}$	Collector peak current ( $t_P < 5\text{ms}$ )	10	A
$P_{tot}$	Total dissipation at $T_{amb} = 25^\circ\text{C}$	1.6	W
$T_{stg}$	Storage temperature	-65 to 150	$^\circ\text{C}$
$T_J$	Max. operating junction temperature	150	$^\circ\text{C}$

**Table 3. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-amb}$	Thermal resistance junction-amb <sup>(1)</sup> max	78	$^\circ\text{C/W}$

1. Device mounted on PCB area of  $1\text{ cm}^2$ .

## 2 Electrical characteristics

( $T_{\text{case}} = 25^{\circ}\text{C}$  unless otherwise specified)

**Table 4. Electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{\text{CBO}}$	Collector cut-off current ( $I_{\text{E}} = 0$ )	$V_{\text{CB}} = 30 \text{ V}$ $V_{\text{CB}} = 30 \text{ V}; T_{\text{C}} = 100^{\circ}\text{C}$			10 100	$\mu\text{A}$ $\mu\text{A}$
$I_{\text{EBO}}$	Emitter cut-off current ( $I_{\text{C}} = 0$ )	$V_{\text{EB}} = 6 \text{ V}$			10	$\mu\text{A}$
$V_{(\text{BR})\text{CEO}}^{(1)}$	Collector-emitter breakdown voltage ( $I_{\text{B}} = 0$ )	$I_{\text{C}} = 10 \text{ mA}$	30			V
$V_{(\text{BR})\text{CBO}}$	Collector-base breakdown voltage ( $I_{\text{E}} = 0$ )	$I_{\text{C}} = 100 \mu\text{A}$	45			V
$V_{(\text{BR})\text{EBO}}$	Emitter-base breakdown voltage ( $I_{\text{C}} = 0$ )	$I_{\text{E}} = 100 \mu\text{A}$	6			V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 0.5 \text{ A}$ $I_{\text{B}} = 5 \text{ mA}$			0.15	V
		$I_{\text{C}} = 2 \text{ A}$ $I_{\text{B}} = 50 \text{ mA}$			0.35	V
		$I_{\text{C}} = 5 \text{ A}$ $I_{\text{B}} = 0.25 \text{ A}$			0.7	V
		$I_{\text{C}} = 6 \text{ A}$ $I_{\text{B}} = 0.25 \text{ A}$		0.7		V
		$I_{\text{C}} = 8 \text{ A}$ $I_{\text{B}} = 0.4 \text{ A}$		1		V
		$I_{\text{C}} = 10 \text{ A}$ $I_{\text{B}} = 0.5 \text{ A}$		1.2		V
$V_{\text{BE(sat)}}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 2 \text{ A}$ $I_{\text{B}} = 50 \text{ mA}$			1.1	V
		$I_{\text{C}} = 6 \text{ A}$ $I_{\text{B}} = 0.25 \text{ A}$		1.2		V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 10 \text{ mA}$ $V_{\text{CE}} = 1 \text{ V}$	120	200	300	
		$I_{\text{C}} = 500 \text{ mA}$ $V_{\text{CE}} = 1 \text{ V}$	100	200		
		$I_{\text{C}} = 5 \text{ A}$ $V_{\text{CE}} = 1 \text{ V}$	70	100		
		$I_{\text{C}} = 5 \text{ A}$ $V_{\text{CE}} = 1 \text{ V}$		100		
		$T_{\text{C}} = 100^{\circ}\text{C}$				
		$I_{\text{C}} = 8 \text{ A}$ $V_{\text{CE}} = 1 \text{ V}$		55		
$t_{\text{d}}$ $t_{\text{r}}$ $t_{\text{s}}$ $t_{\text{f}}$	Resistive load Delay time Rise time Storage time Fall time	$I_{\text{C}} = 3 \text{ A}$ $V_{\text{CC}} = 20 \text{ V}$		180	220	ns
		$I_{\text{B1}} = -I_{\text{B2}} = 60 \text{ mA}$		160	210	ns
		see <a href="#">Figure 8</a>		250	300	ns
				80	100	ns

1. Pulsed duration = 300 ms, duty cycle  $\leq 1.5\%$

2.1 Electrical characteristics (curves)

Figure 2. DC current gain

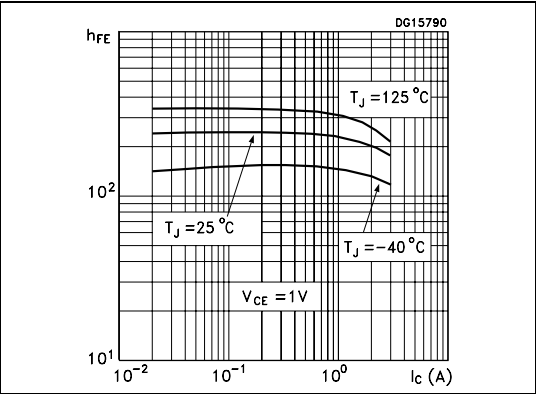


Figure 3. DC current gain

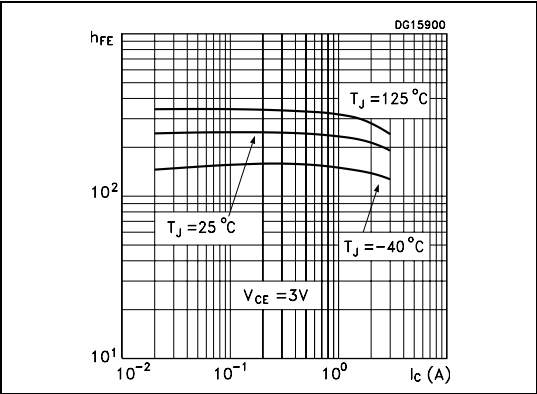


Figure 4. Collector-emitter saturation voltage

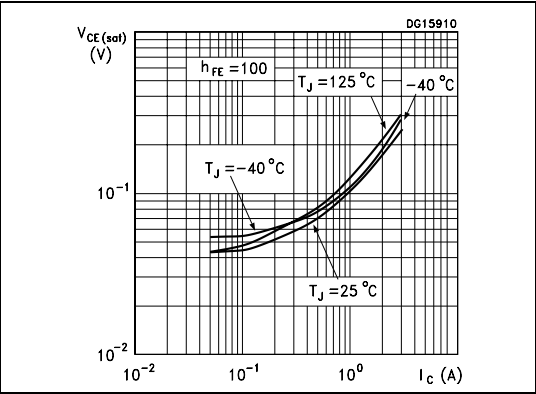


Figure 5. Base-emitter saturation voltage

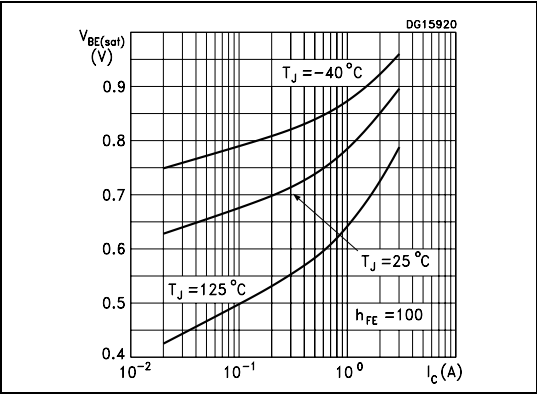


Figure 6. Switching time resistive load

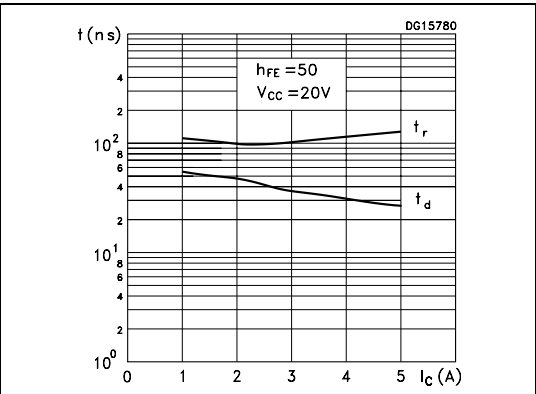
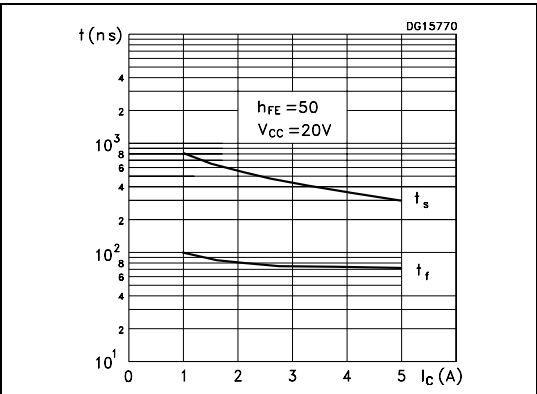
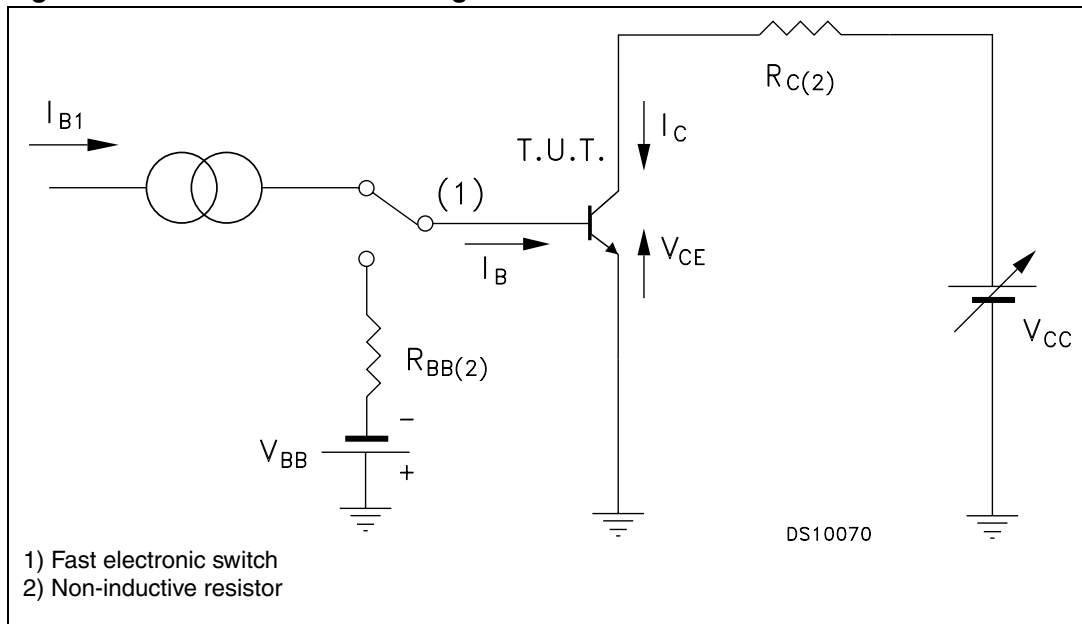


Figure 7. Switching time resistive load



## 2.2 Test circuits

Figure 8. Resistive load switching test circuit

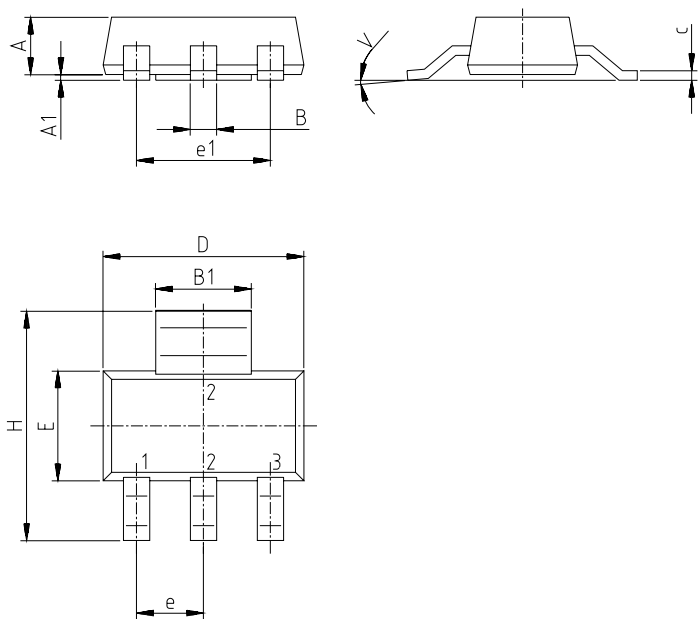


### 3      **Package mechanical data**

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: [www.st.com](http://www.st.com)

SOT-223 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.80			0.071
B	0.60	0.70	0.80	0.024	0.027	0.031
B1	2.90	3.00	3.10	0.114	0.118	0.122
c	0.24	0.26	0.32	0.009	0.010	0.013
D	6.30	6.50	6.70	0.248	0.256	0.264
e		2.30			0.090	
e1		4.60			0.181	
E	3.30	3.50	3.70	0.130	0.138	0.146
H	6.70	7.00	7.30	0.264	0.276	0.287
V			10°			10°
A1		0.02				



P008B



## 4 Revision history

**Table 5. Document revision history**

Date	Revision	Changes
21-Aug-2007	1	Initial release.

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