

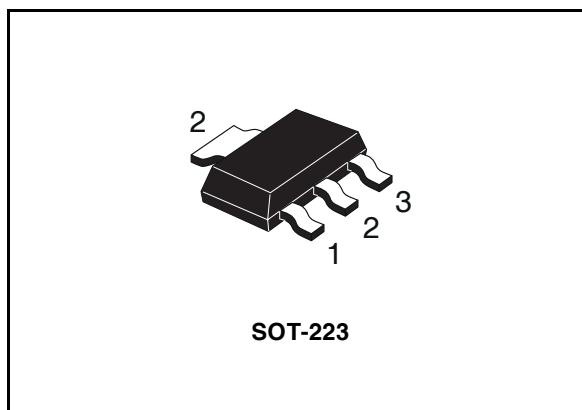


STN790A

Medium Current, High Performance, Low Voltage PNP Transistor

General features

- Very low Collector to Emitter saturation voltage
- D.C. Current gain, $h_{FE} > 100$
- 3A continuous collector current
- 40V breakdown voltage ($V_{(BR)CER}$)
- SOT-223 plastic package for surface mounting circuits
- Available in tape & reel packing
- In compliance with the 2002/93/EC European Directive



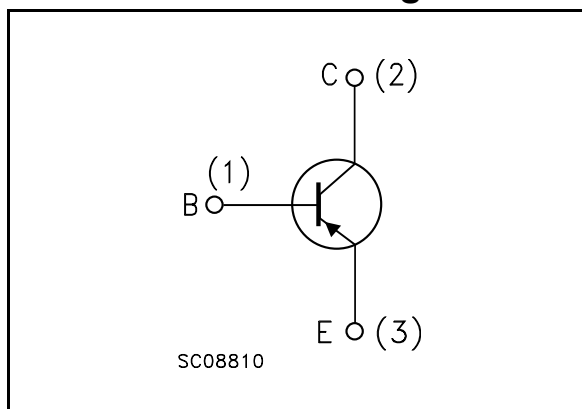
Description

The device is manufactured in low voltage PNP Planar Technology by using a "Base Island" layout. The resulting transistor shows exceptional high gain performance coupled with very low saturation voltage.

Applications

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

Internal schematic diagram



Order codes

Part Number	Marking	Package	Packing
STN790A	N790A	SOT-223	Tape & reel

Contents

1	Electrical ratings	3
2	Electrical characteristics	4
2.1	Electrical characteristics (curves)	5
2.2	Test circuits	6
3	Package mechanical data	7
4	Revision history	9

1 Electrical ratings

Table 1. Absolute maximum rating

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base voltage ($I_E = 0$)	-40	V
V_{CER}	Collector-emitter voltage ($R_{BE} = 47\Omega$)	-40	V
V_{CEO}	Collector-emitter voltage ($I_B = 0$)	-30	V
V_{EBO}	Emitter-base voltage ($I_C = 0$)	-5	V
I_C	Collector current	-3	A
I_{CM}	Collector peak current ($t_p < 5ms$)	-6	A
P_{tot}	Total dissipation at $T_C = 25^\circ C$	1.6	W
T_{stg}	Storage temperature	-65 to 150	$^\circ C$
T_J	Max. operating junction temperature	150	$^\circ C$

Table 2. Thermal data

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

1. Device mounted on PCB area of 1 cm².

2 Electrical characteristics

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

Table 3. Electrical characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{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	μA μA
I_{EBO}	Emitter cut-off current ($I_{\text{C}} = 0$)	$V_{\text{EB}} = -4\text{V}$			-10	μA
$V_{(\text{BR})\text{CEO}}^{(2)}$	Collector-emitter breakdown voltage ($I_{\text{B}} = 0$)	$I_{\text{C}} = -10\text{mA}$	-30			V
$V_{(\text{BR})\text{CER}}^{(2)}$	Collector-emitter breakdown voltage ($R_{\text{BE}} = 47\Omega$)	$I_{\text{C}} = -10\text{mA}$	-40			V
$V_{(\text{BR})\text{CBO}}$	Collector-base breakdown voltage ($I_{\text{E}} = 0$)	$I_{\text{C}} = -100\mu\text{A}$	-40			V
$V_{(\text{BR})\text{EBO}}$	Emitter-base breakdown voltage ($I_{\text{C}} = 0$)	$I_{\text{E}} = -100\mu\text{A}$	-5			V
$V_{\text{CE}(\text{sat})}^{(2)}$	Collector-emitter saturation voltage	$I_{\text{C}} = -0.5\text{A}$ $I_{\text{B}} = -5\text{mA}$ $I_{\text{C}} = -1.2\text{A}$ $I_{\text{B}} = -20\text{mA}$ $I_{\text{C}} = -2\text{A}$ $I_{\text{B}} = -20\text{mA}$ $I_{\text{C}} = -3\text{A}$ $I_{\text{B}} = -100\text{mA}$ $I_{\text{C}} = -3\text{A}$ $I_{\text{B}} = -100\text{mA}$ $T_{\text{J}} = 100^{\circ}\text{C}$			-0.15 -0.25 -0.5 -0.7 -0.9	V V V V V
$V_{\text{BE}(\text{sat})}^{(2)}$	Base-emitter saturation voltage	$I_{\text{C}} = -1\text{A}$ $I_{\text{B}} = -10\text{mA}$		-0.8	-1	V
$V_{\text{BE}(\text{on})}^{(2)}$	Base-emitter on voltage	$I_{\text{C}} = -1\text{A}$ $V_{\text{CE}} = -2\text{V}$		-0.8	-1	V
$h_{\text{FE}}^{(2)}$	DC current gain	$I_{\text{C}} = -10\text{mA}$ $V_{\text{CE}} = -2\text{V}$ $I_{\text{C}} = -500\text{mA}$ $V_{\text{CE}} = -2\text{V}$ $I_{\text{C}} = -1\text{A}$ $V_{\text{CE}} = -2\text{V}$ $I_{\text{C}} = -2\text{A}$ $V_{\text{CE}} = -1\text{V}$ $I_{\text{C}} = -3\text{A}$ $V_{\text{CE}} = -1\text{V}$	100 100 100 100 90	200 200 160 130	400 400	

Table 3. Electrical characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
f_t	Transition frequency	$I_C = -50\text{mA}$ $V_{CE} = -5\text{V}$ $f = 50\text{MHz}$		100		MHz
t_d	Resistive load Delay time	$I_C = -3\text{A}$ $V_{CC} = -20\text{V}$ $I_{B1} = -I_{B2} = -60\text{mA}$ (see figure 7)		180	220	ns
t_r	Rise time			160	210	ns
t_s	Storage time			250	300	ns
t_f	Fall time			80	100	ns

Note (2) Pulsed duration = 300 μs , duty cycle $\leq 1.5\%$

2.1 Electrical characteristics (curves)

Figure 1. DC current gain

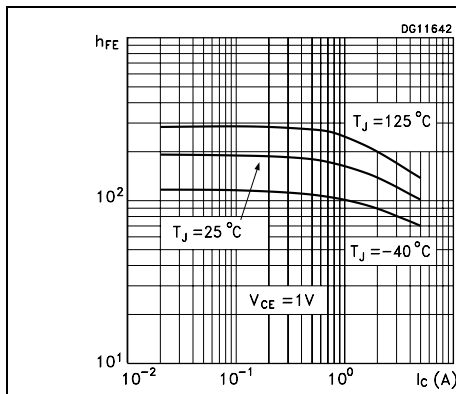


Figure 2. DC current gain

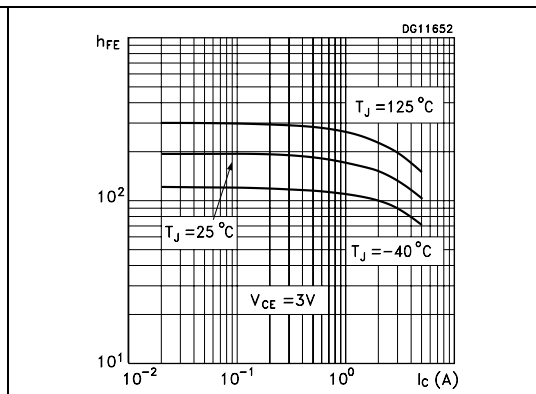


Figure 3. Collector-emitter saturation voltage

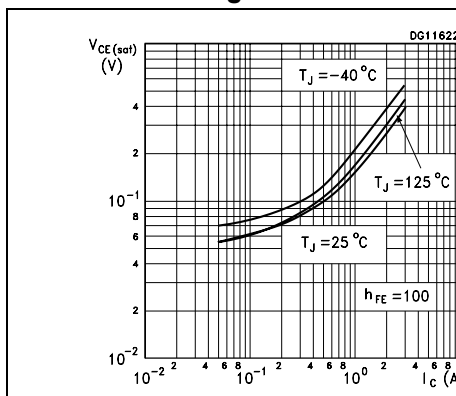


Figure 4. Base-emitter saturation voltage

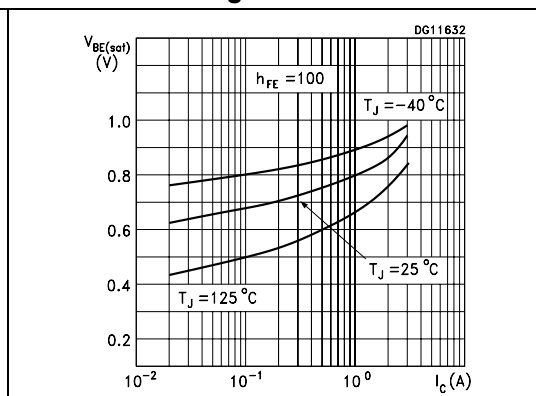
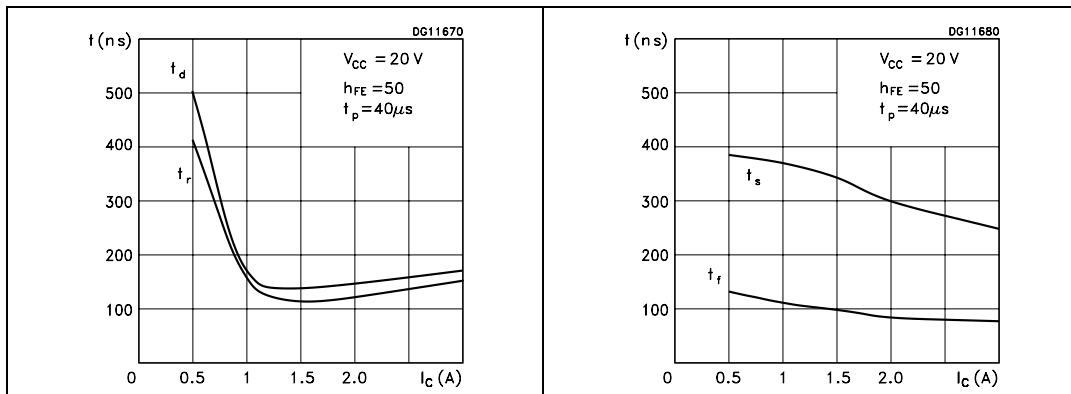
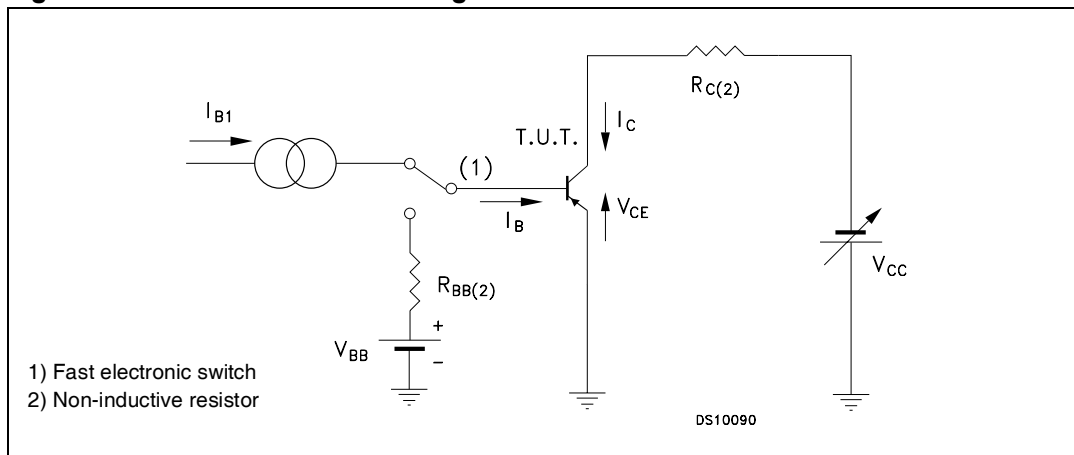


Figure 5. Switching time resistive load Figure 6. Switching time resistive load



2.2 Test circuits

Figure 7. Resistive load switching test circuit

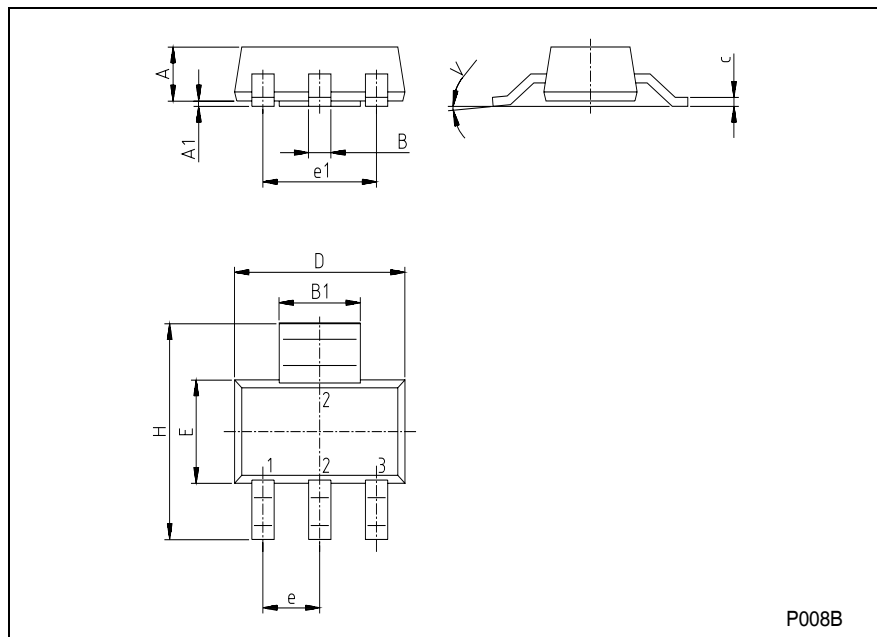


3 Package mechanical data

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

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				



4 Revision history

Table 4. Revision history

Date	Revision	Changes
24-Mar-2004	1	Initial release.
05-Sep-2005	2	New template
24-Mar-2006	3	Updated to new template.

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