

Medium current, high performance, low voltage PNP transistor

Features

- Very low collector to emitter saturation voltage
- DC current gain, $h_{FE} > 100$
- 3 A continuous collector current
- 40 V breakdown voltage $V_{(BR)CER}$
- SOT-223 plastic package for surface mounting circuits in tape and 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 by using a "Base Island" layout. The resulting transistor shows exceptional high gain performance coupled with very low saturation voltage.

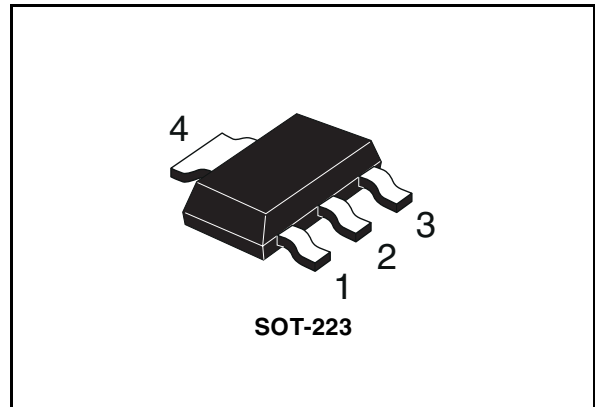


Figure 1. Internal schematic diagram

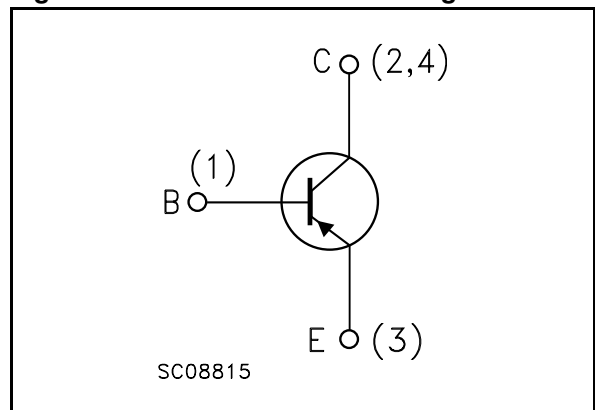


Table 1. Device summary

Order code	Marking	Package	Packaging
STN790A	N790A	SOT-223	Tape and reel

1 Electrical ratings

Table 2. 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 ($t_P < 5\text{ ms}$)	-6	A
P_{tot}	Total dissipation at $T_{amb} = 25\text{ °C}$	1.6	W
T_{stg}	Storage temperature	-65 to 150	°C
T_J	Max. operating junction temperature	150	°C

Table 3. Thermal data

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

1. Device mounted on PCB area of 1 cm².

2 Electrical characteristics

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

Table 4. Electrical characteristics

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

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	$I_C = -3 \text{ A}$ $V_{CC} = -20 \text{ V}$		180	220	ns
t_r	Rise time	$I_{B1} = -I_{B2} = -60 \text{ mA}$		160	210	ns
t_s	Storage time	see Figure 8		250	300	ns
t_f	Fall time			80	100	ns

1. Pulse duration = 300 μs , duty cycle $\leq 1.5\%$

2.1 Electrical characteristics (curves)

Figure 2. DC current gain

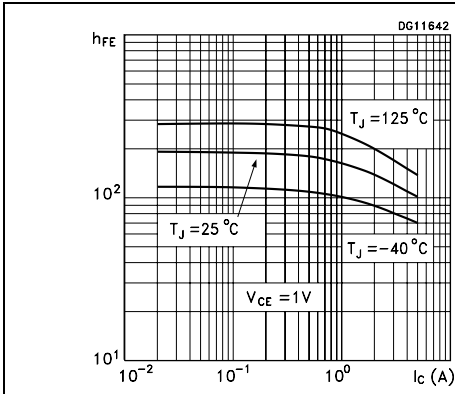


Figure 3. DC current gain

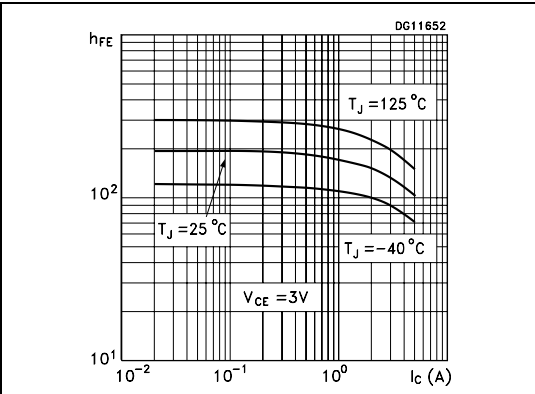


Figure 4. Collector-emitter saturation voltage

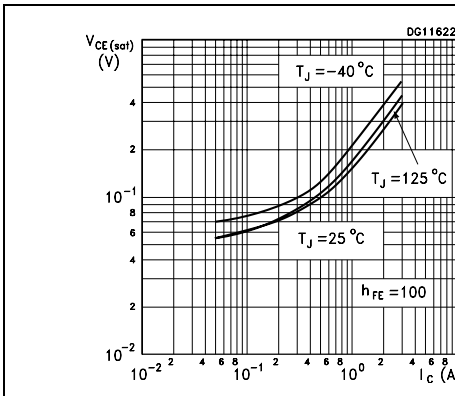


Figure 5. Base-emitter saturation voltage

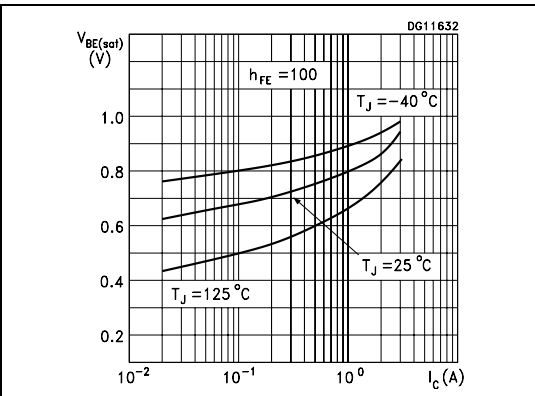
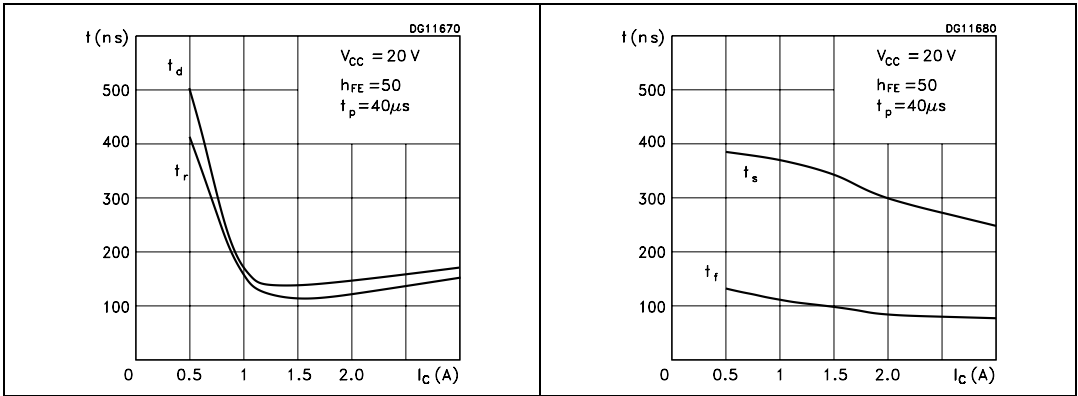
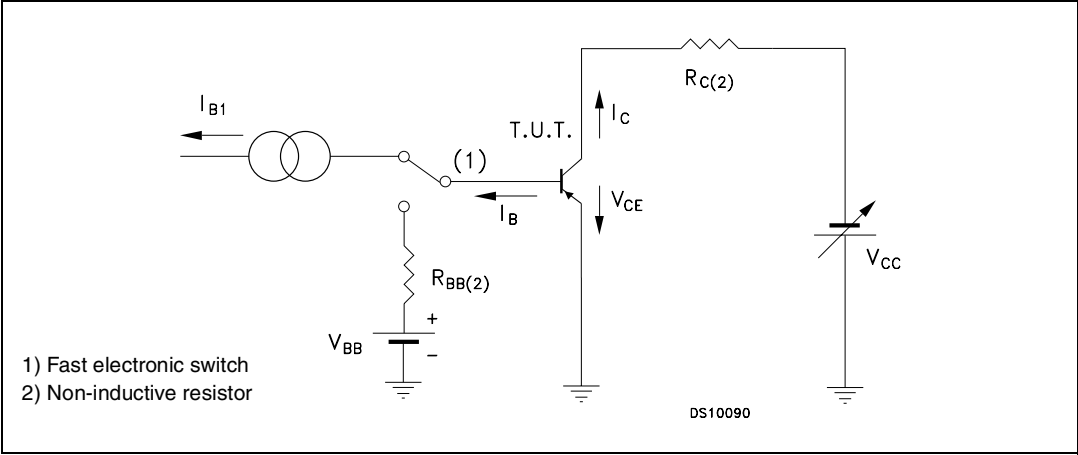


Figure 6. Switching time resistive load Figure 7. Switching time resistive load



2.2 Test circuit

Figure 8. Resistive load switching test circuit



SOT-223 mechanical data

DIM.	mm.		
	min.	typ	max.
A			1.80
A1	0.02		0.1
B	0.60	0.70	0.85
B1	2.90	3.00	3.15
c	0.24	0.26	0.35
D	6.30	6.50	6.70
e		2.30	
e1		4.60	
E	3.30	3.50	3.70
H	6.70	7.00	7.30
V			10 °

