

Low voltage fast-switching NPN power transistor

Features

- AEC Q101 compliant
- Very low collector to emitter saturation voltage
- High current gain characteristic
- Fast-switching speed
- Surface-mounting SOT-223 power package in tape and reel

Applications

High efficiency low voltage switching applications

Description

The device is manufactured in planar technology with "Base Island" layout.

The resulting transistor shows exceptional high gain performance coupled with very low saturation voltage.

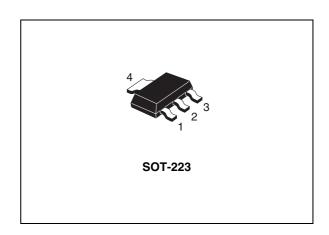


Figure 1. Internal schematic diagram

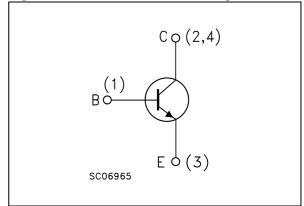


Table 1. Device summary

Order code	Marking	Package	Packaging
STN851-A	N851	SOT-223	Tape and reel

Electrical ratings STN851-A

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V _{CBO}	Collector-base voltage (I _E = 0)	150	V
V _{CEO}	Collector-emitter voltage (I _B = 0)	60	V
V _{EBO}	Emitter-base voltage (I _C = 0)	7	V
I _C	Collector current	5	Α
I _{CM}	Collector peak current (t _P < 5 ms)	10	Α
I _B	Base current	1	Α
I _{BM}	Base peak current (t _P < 5 ms)	2	Α
P _{tot}	Total dissipation at T _{amb} = 25 °C	1.6	W
T _{stg}	Storage temperature	-65 to 150	°C
TJ	Max. operating junction temperature	150	°C

Table 3. Thermal data

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

^{1.} Device mounted on a p.c.b. area of 1 \mbox{cm}^2

2 Electrical characteristics

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

Table 4. Electrical characteristics

Symbol	Parameter	Test co	nditions	Min.	Тур.	Max.	Unit
I _{CBO}	Collector cut-off current (I _E = 0)	V _{CB} = 120 V V _{CB} = 120 V	T _c = 100 °C			50 1	nΑ μΑ
I _{EBO}	Emitter cut-off current (I _C = 0)	V _{EB} = 7 V				10	nA
V _{(BR)CBO}	Collector-base breakdown voltage (I _E = 0)	I _C = 100 μA		150			٧
V _{(BR)CEO} ⁽¹⁾	Collector-emitter breakdown voltage (I _B = 0)	I _C = 10 mA		60			V
V _{(BR)EBO}	Emitter-base breakdown voltage (I _C = 0)	Ι _Ε = 100 μΑ		7			V
V _{CE(sat)} (1)	Collector-emitter saturation voltage	$I_{C} = 100 \text{ mA}$ $I_{C} = 1 \text{ A}$ $I_{C} = 2 \text{ A}$ $I_{C} = 5 \text{ A}$	$I_B = 50 \text{ mA}$		10 70 140 320	50 120 250 500	mV mV mV
V _{BE(sat)} (1)	Base-emitter saturation voltage	I _C = 4 A	I _B = 200 mA		1	1.15	V
V _{BE(on)} (1)	Base-emitter on voltage	I _C = 4 A	V _{CE} = 1 V		0.89	1	V
h _{FE} ⁽¹⁾	DC current gain	$I_{C} = 10 \text{ mA}$ $I_{C} = 2 \text{ A}$ $I_{C} = 5 \text{ A}$ $I_{C} = 10 \text{ A}$	$V_{CE} = 1 V$ $V_{CE} = 1 V$	150 150 90 30	300 270 140 50	350	
f _T	Transition frequency	V _{CE} = 10 V	I _C = 100 mA		130		MHz
C _{CBO}	Collector-base capacitance (I _E = 0)	V _{CB} = 10 V	f = 1 MHz		50		pF
t _{on} t _s	Resistive load Turn-on time Storage time Fall time	$I_C = 1 A$ $I_{B1} = -I_{B2} = 0.$			50 1.35 120		ns µs ns

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

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Electrical characteristics STN851-A

2.1 Electrical characteristics (curves)

Figure 2. Derating curve

Figure 3. DC current gain

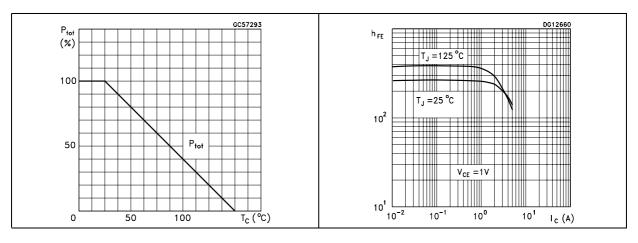


Figure 4. Collector-emitter saturation voltage

Figure 5. Collector-emitter saturation voltage

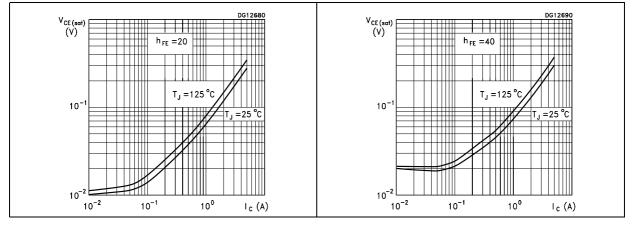
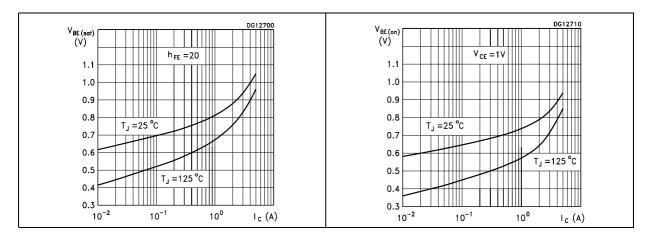


Figure 6. Base-emitter saturation voltage

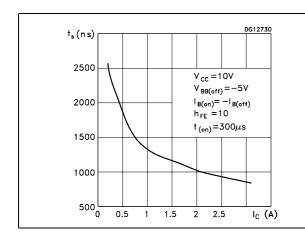
Figure 7. Base-emitter on voltage



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Figure 8. Resistive load switching time

Figure 9. Resistive load switching time



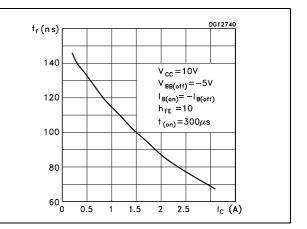
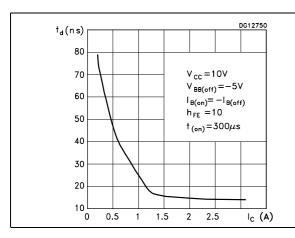


Figure 10. Resistive load switching time

Figure 11. Inductive load switching time



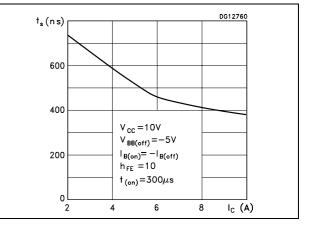
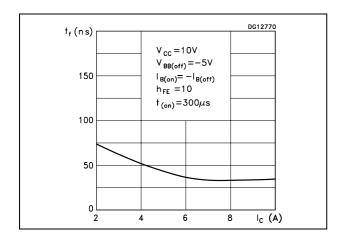


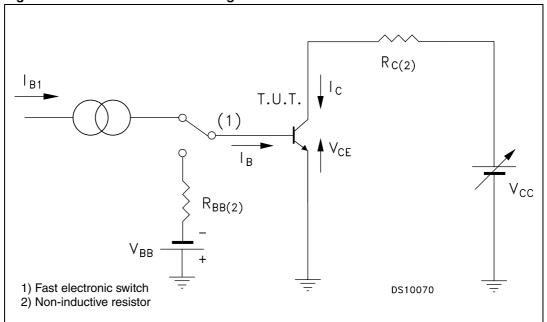
Figure 12. Inductive load switching time



Electrical characteristics STN851-A

2.2 Test circuit

Figure 13. Resistive load switching test circuit



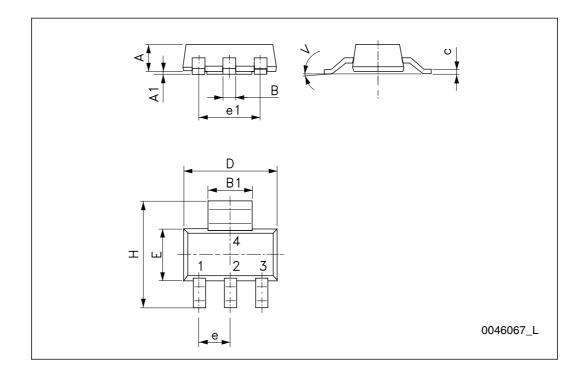
3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and products status are available at: www.st.com. ECOPACK is an ST trademark.

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DIM.	mm.					
	min.	typ	max.			
Α			1.80			
A1	0.02		0.1			
В	0.60	0.70	0.85			
B1	2.90	3.00	3.15			
С	0.24	0.26	0.35			
D	6.30	6.50	6.70			
е		2.30				
e1		4.60				
E	3.30	3.50	3.70			
Н	6.70	7.00	7.30			
V			10 °			



STN851-A Revision history

4 Revision history

Table 5. Document revision history

Date	Revision	Changes
16-Mar-2009	1	First issue

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