STN851

Low voltage fast-switching NPN power transistor

Features

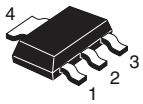
- Very low collector to emitter saturation voltage
- High current gain characteristic
- Fast-switching speed

Applications

- Emergency lighting
- Voltage regulators
- Relay drivers
- 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.



SOT-223

Figure 1. Internal schematic diagram

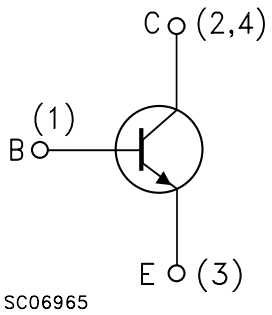


Table 1. Device summary

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

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	A
I_{CM}	Collector peak current (t_P < 5 ms)	10	A
I_B	Base current	1	A
I_{BM}	Base peak current (t_P < 5 ms)	2	A
P_{tot}	Total dissipation at T_{amb} = 25 °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
$R_{thj\text{-}amb}$	Thermal resistance junction-ambient (1)	78	°C/W

1. Device mounted on a p.c.b. area of 1 cm^2

2 Electrical characteristics

(T_{case} = 25 °C unless otherwise specified)

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	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	nA µA
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			V
$V_{(BR)CEO}$ (1)	Collector-emitter breakdown voltage (I_B = 0)	I_C = 10 mA	60			V
$V_{(BR)EBO}$	Emitter-base breakdown voltage (I_C = 0)	I_E = 100 µA	7			V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 100 mA I_B = 5 mA I_C = 1 A I_B = 50 mA I_C = 2 A I_B = 50 mA I_C = 5 A I_B = 200 mA		10 70 140 320	50 120 250 500	mV 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 mA V_{CE} = 1 V I_C = 2 A V_{CE} = 1 V I_C = 5 A V_{CE} = 1 V I_C = 10 A 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
	Resistive load					
t_{on}	Turn-on time	I_C = 1 A V_{CC} = 10 V		50		ns
t_s	Storage time	I_{B1} = -I_{B2} = 0.1 A		1.35		µs
t_f	Fall time			120		ns

1. Pulse duration = 300 µs, duty cycle ≤ 1.5%

2.1 Electrical characteristics (curves)

Figure 2. Derating curve

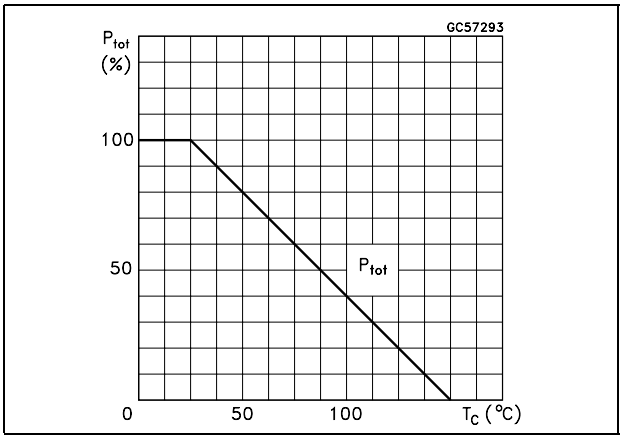


Figure 3. DC current gain

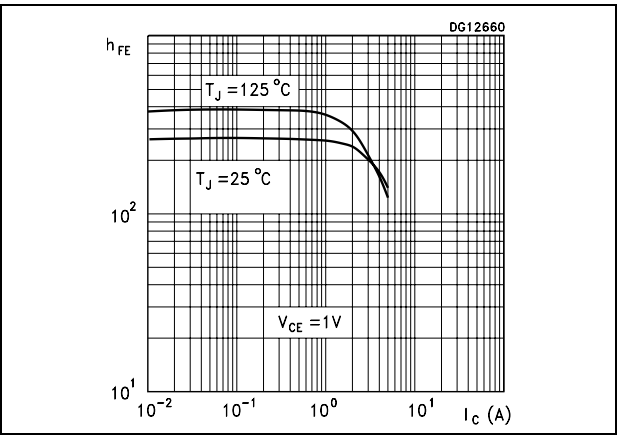


Figure 4. Collector-emitter saturation voltage

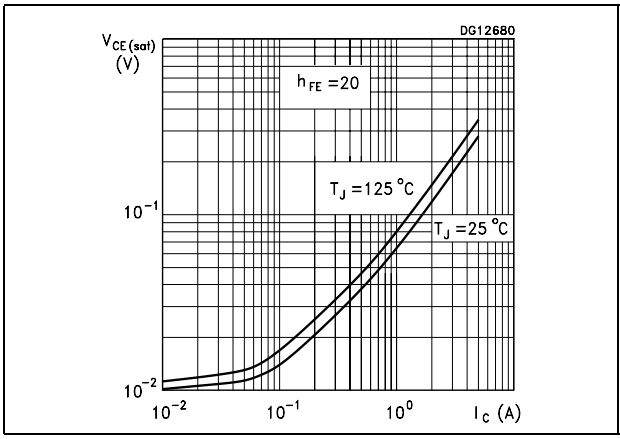


Figure 5. Collector-emitter saturation voltage

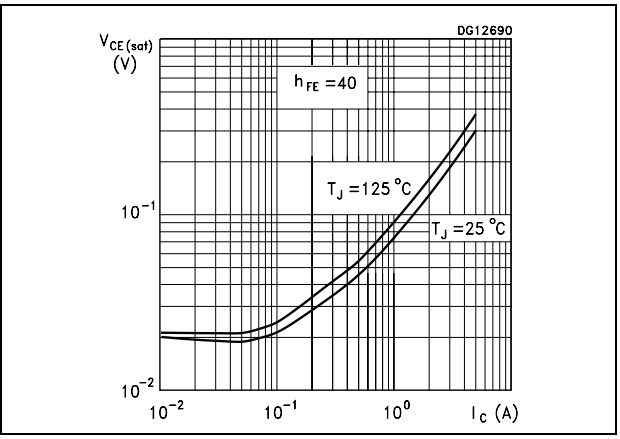


Figure 6. Base-emitter saturation voltage

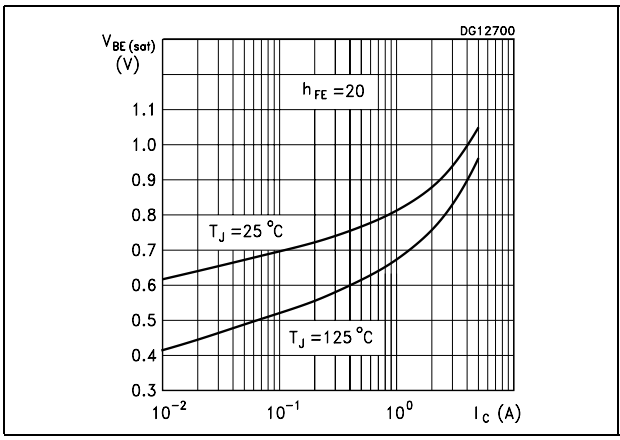


Figure 7. Base-emitter on voltage

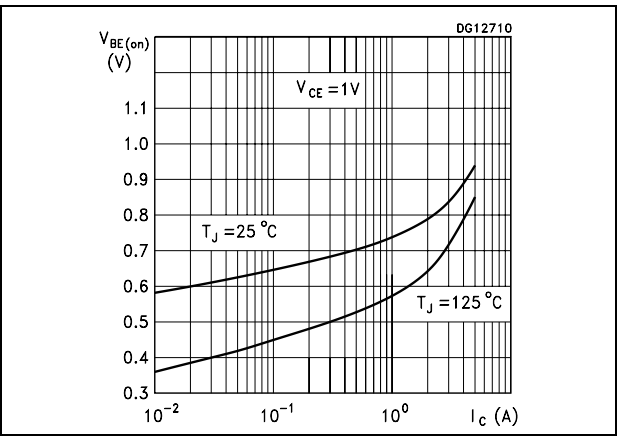


Figure 8. Resistive load switching time

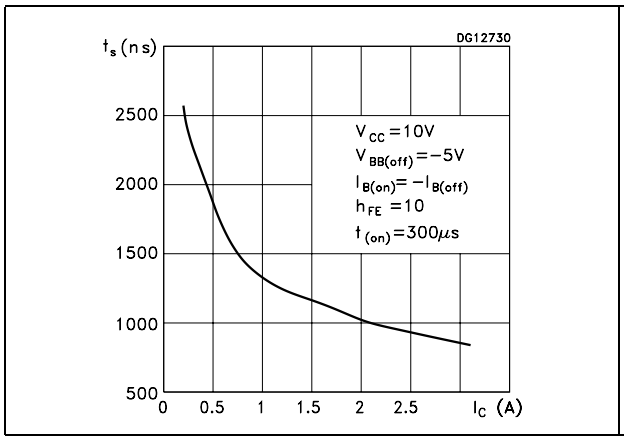


Figure 9. Resistive load switching time

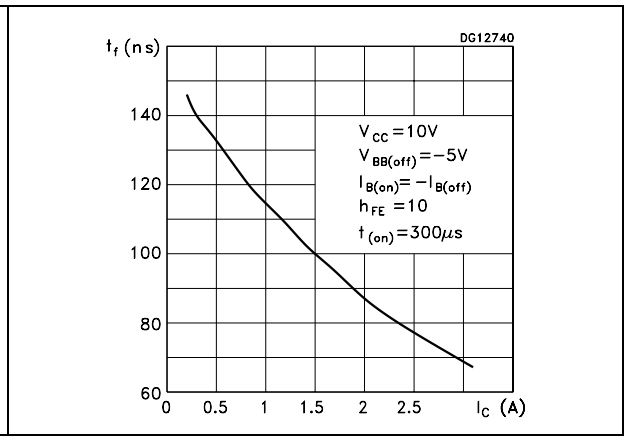


Figure 10. Resistive load switching time

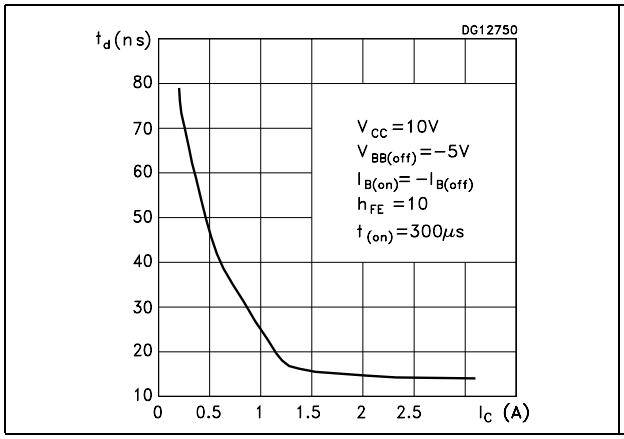


Figure 11. Inductive load switching time

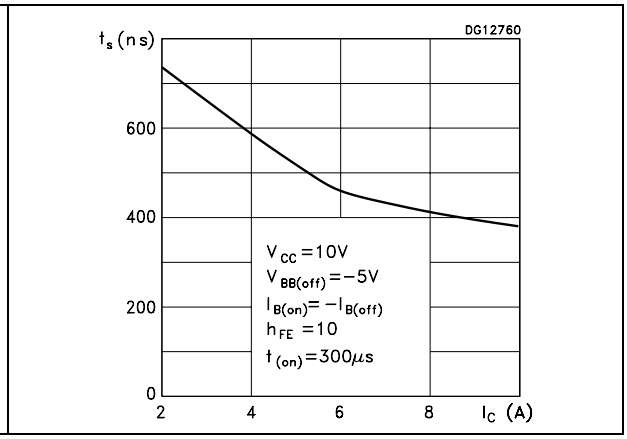
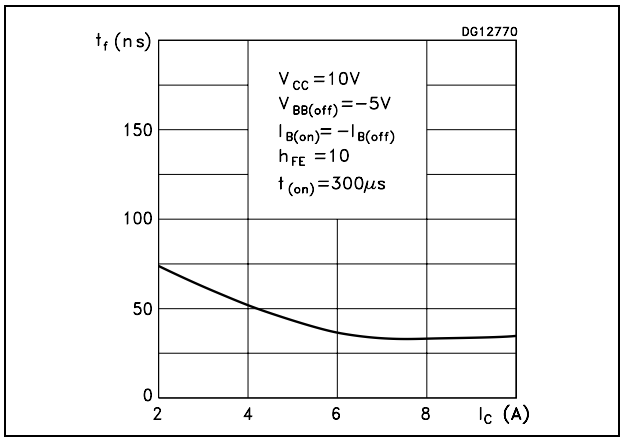
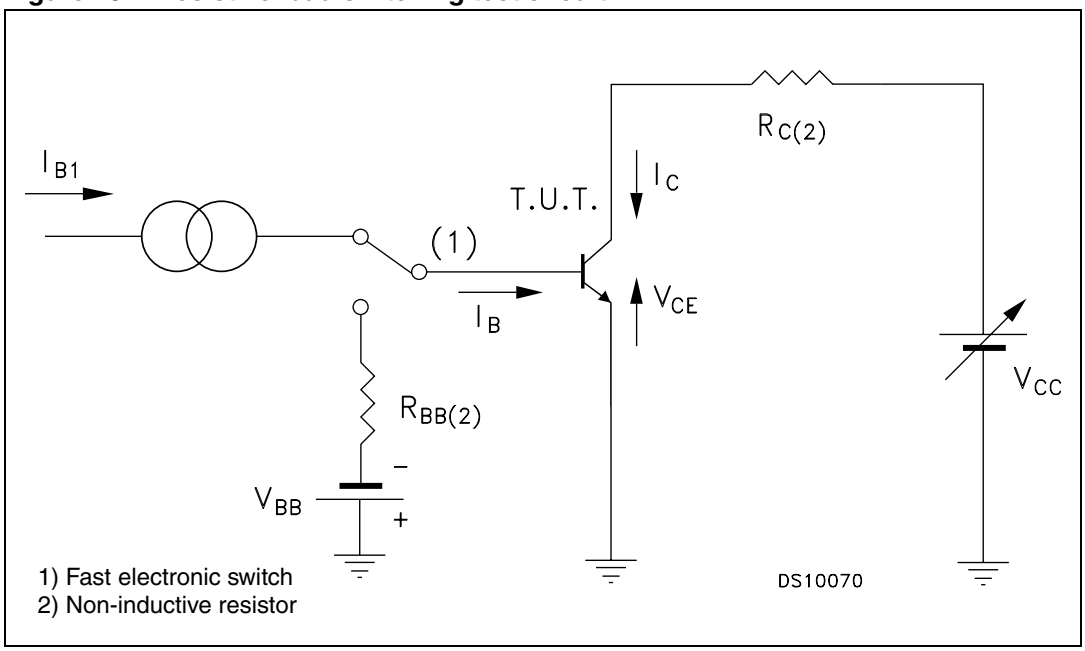


Figure 12. Inductive load switching time



2.2 Test circuit

Figure 13. Resistive load switching test circuit

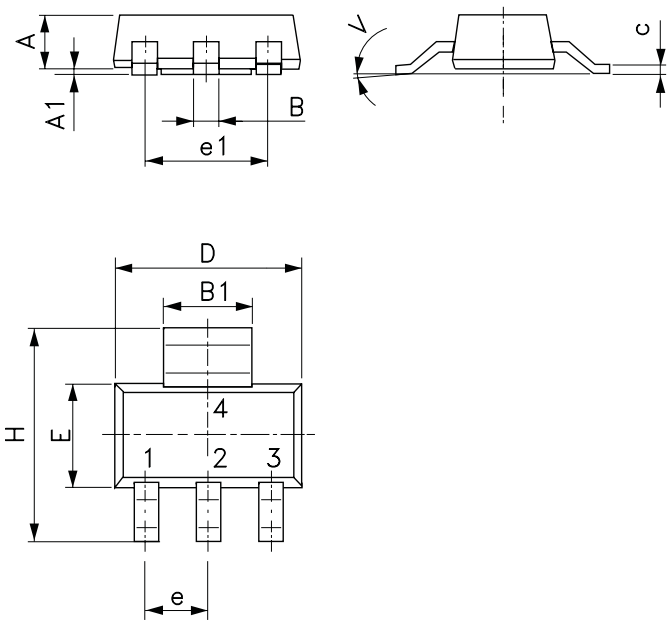


3 Package mechanical data

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.

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 ^{o}



4 Revision history

Table 5. Document revision history

Date	Revision	Changes
09-Sep-2003	6	
16-Mar-2009	7	Updated SOT-223 mechanical data

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