



# STN851

## LOW VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

PRELIMINARY DATA

Ordering Code	Marking	Shipment
STN851	N851	Tape & Reel

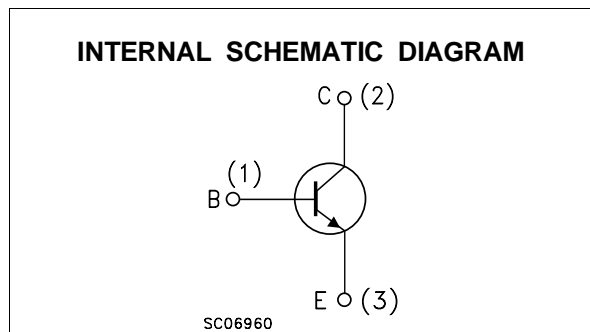
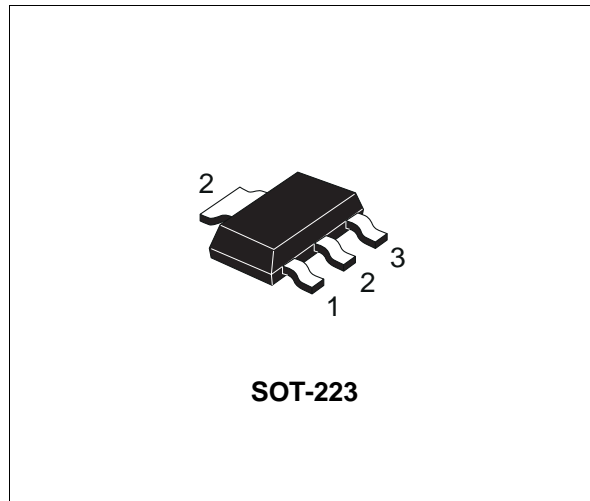
- VERY LOW COLLECTOR TO EMITTER SATURATION VOLTAGE
- HIGH CURRENT GAIN CHARACTERISTIC
- FAST-SWITCHING SPEED
- SURFACE-MOUNTING SOT-223 MEDIUM POWER PACKAGE IN TAPE & REEL

### APPLICATIONS:

- EMERGENCY LIGHTING
- VOLTAGE REGULATORS
- RELAY DRIVERS
- HIGH EFFICIENCY LOW VOLTAGE SWITCHING APPLICATIONS

### DESCRIPTION

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



### 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

**THERMAL DATA**

$R_{thj-amb}$	Thermal Resistance Junction-ambient	Max	78	$^{\circ}\text{C}/\text{W}$
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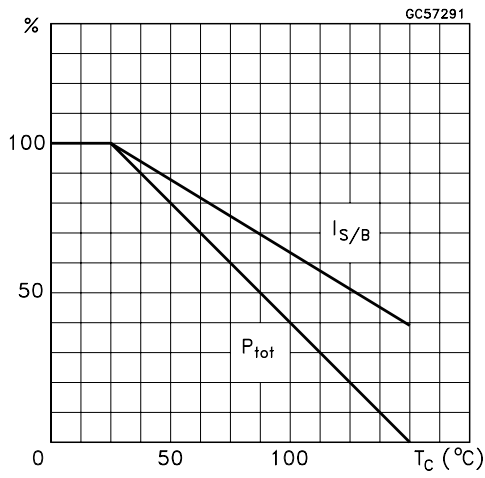
• Device mounted on a P.C.B. area of  $1\text{ cm}^2$

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

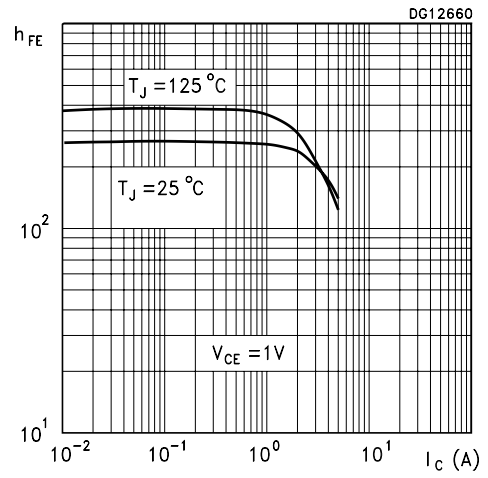
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CBO}$	Collector Cut-off Current ( $I_E = 0$ )	$V_{CB} = 120\text{ V}$ $V_{CB} = 120\text{ V}$ $T_j = 100\text{ }^{\circ}\text{C}$			50 1	nA $\mu\text{A}$
$I_{EBO}$	Emitter Cut-off Current ( $I_C = 0$ )	$V_{EB} = 7\text{ V}$			10	nA
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage ( $I_E = 0$ )	$I_C = 100\text{ }\mu\text{A}$	150			V
$V_{(BR)CEO}^*$	Collector-Emitter Breakdown Voltage ( $I_B = 0$ )	$I_C = 10\text{ mA}$	60			V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage ( $I_C = 0$ )	$I_E = 100\text{ }\mu\text{A}$	7			V
$V_{CE(sat)}^*$	Collector-Emitter Saturation Voltage	$I_C = 100\text{ mA}$ $I_B = 5\text{ mA}$ $I_C = 1\text{ A}$ $I_B = 50\text{ mA}$ $I_C = 2\text{ A}$ $I_B = 50\text{ mA}$ $I_C = 5\text{ A}$ $I_B = 200\text{ mA}$		10 70 140 320	50 120 250 500	mV mV mV mV
$V_{BE(sat)}^*$	Base-Emitter Saturation Voltage	$I_C = 4\text{ A}$ $I_B = 200\text{ mA}$		1	1.15	V
$V_{BE(on)}^*$	Base-Emitter On Voltage	$I_C = 4\text{ A}$ $V_{CE} = 1\text{ V}$		0.89	1	V
$h_{FE}^*$	DC Current Gain	$I_C = 10\text{ mA}$ $V_{CE} = 1\text{ V}$ $I_C = 2\text{ A}$ $V_{CE} = 1\text{ V}$ $I_C = 5\text{ A}$ $V_{CE} = 1\text{ V}$ $I_C = 10\text{ A}$ $V_{CE} = 1\text{ V}$	150 150 90 30	300 270 140 50	350	
$f_T$	Transition frequency	$V_{CE} = 10\text{ V}$ $I_C = 100\text{ mA}$		130		MHz
$C_{CBO}$	Collector-Base Capacitance	$V_{CB} = 10\text{ V}$ $f = 1\text{ MHz}$		50		pF
$t_{on}$ $t_s$ $t_f$	RESISTIVE LOAD Turn- on Time Storage Time Fall Time	$I_C = 1\text{ A}$ $V_{CC} = 10\text{ V}$ $I_{B1} = - I_{B2} = 0.1\text{ A}$		50 1.35 120		ns $\mu\text{s}$ ns

\* Pulsed: Pulse duration =  $300\mu\text{s}$ , duty cycle = 1.5 %

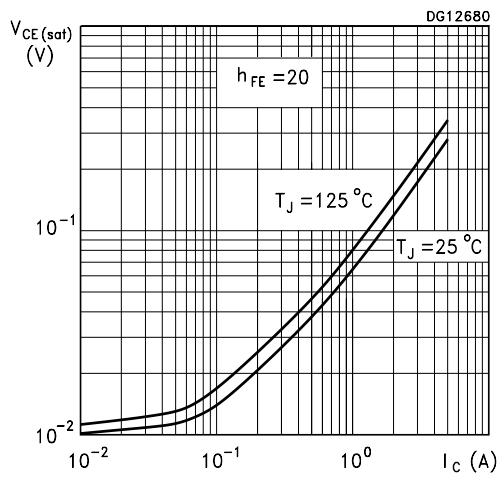
Derating Curve



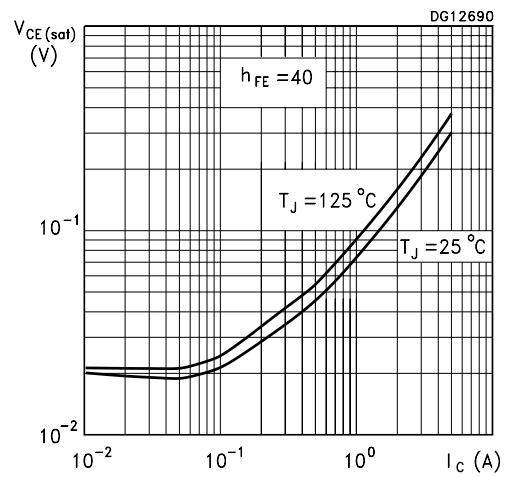
DC Current Gain



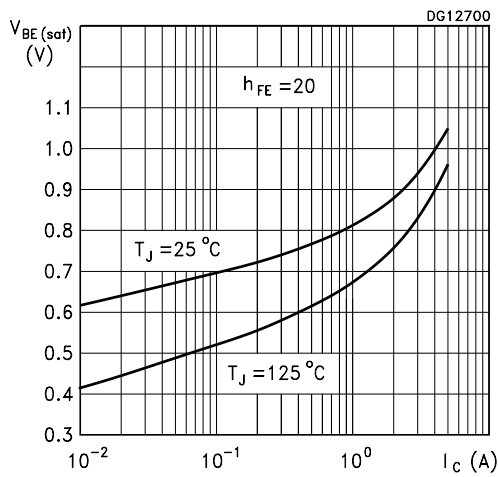
Collector-Emitter Saturation Voltage



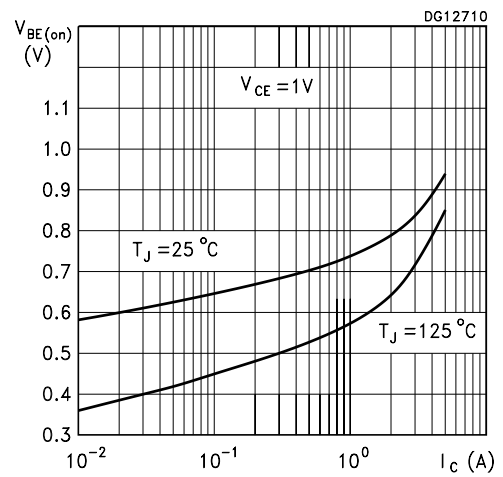
Collector-Emitter Saturation Voltage



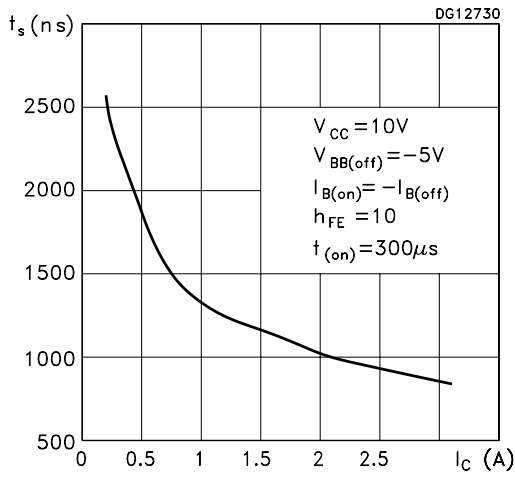
Base-Emitter Saturation Voltage



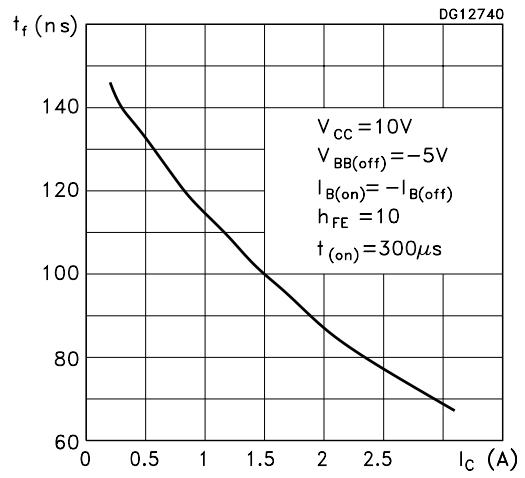
Base-Emitter On Voltage



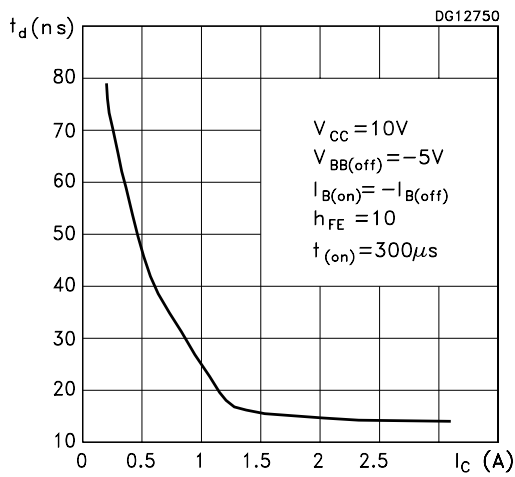
Switching Times Resistive Load



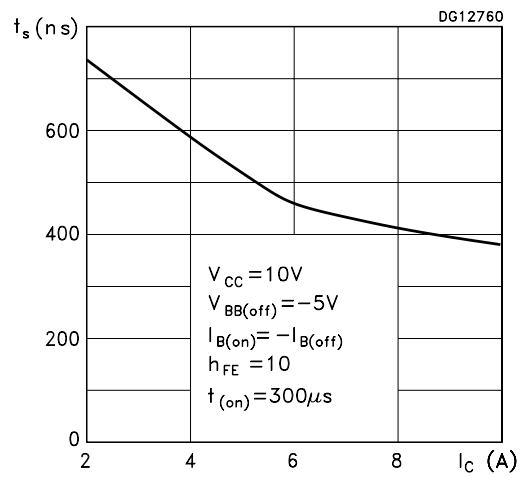
Switching Times Resistive Load



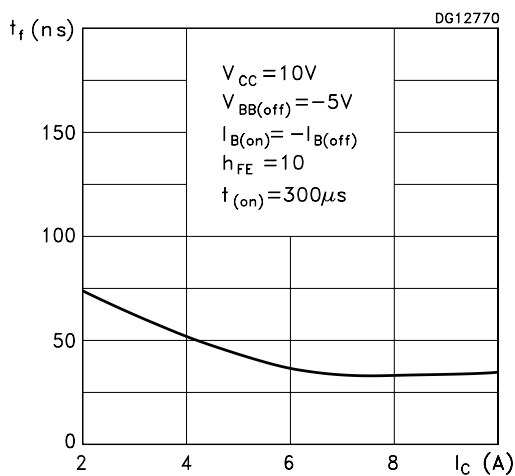
Switching Times Resistive Load

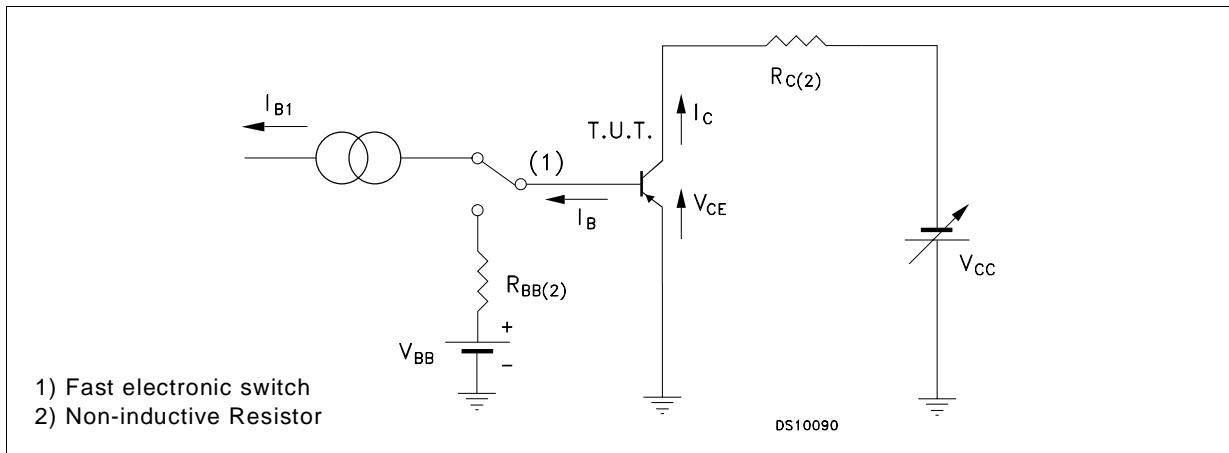


Switching Times Inductive Load



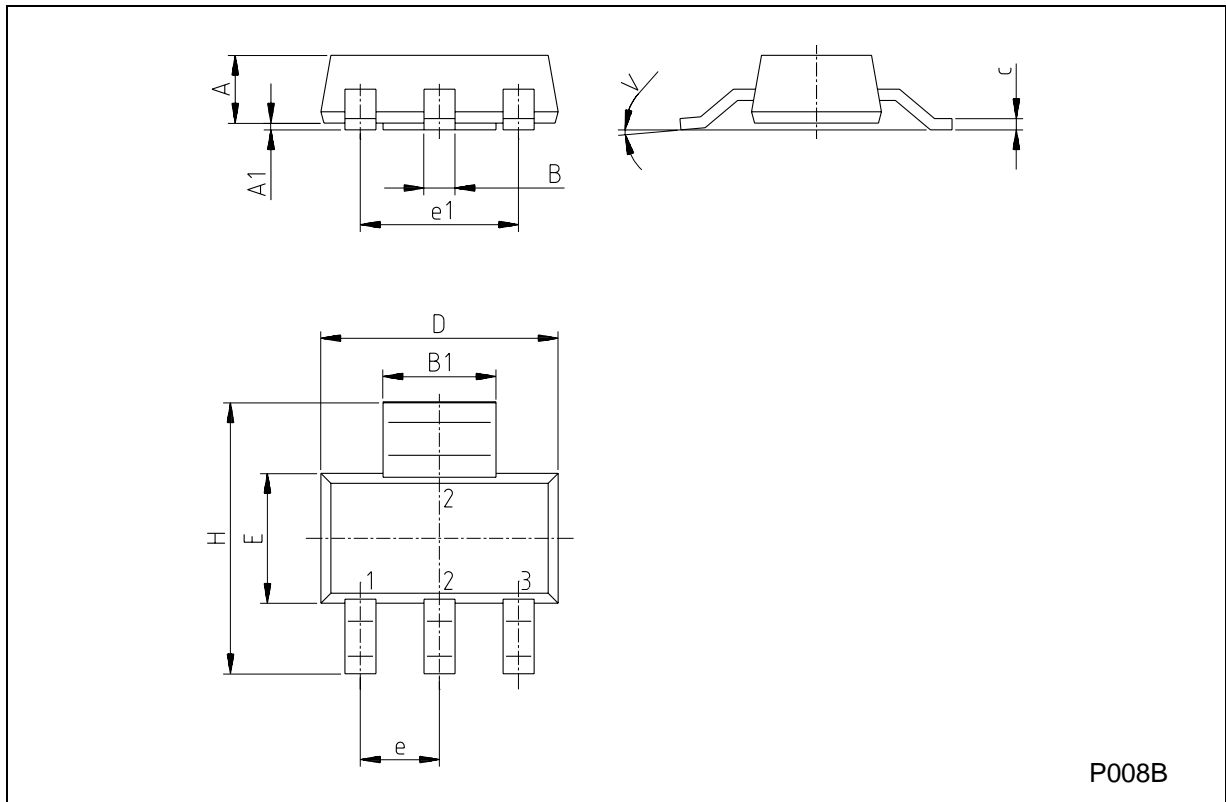
Switching Times Inductive Load



**Figure 1:** Resistive Load Switching Test Circuit.

**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				



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