

**ST83003**

## HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

- MEDIUM VOLTAGE CAPABILITY
- LOW SPREAD OF DYNAMIC PARAMETERS
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- VERY HIGH SWITCHING SPEED

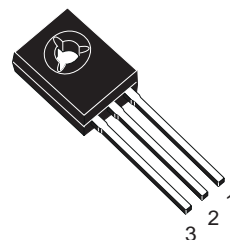
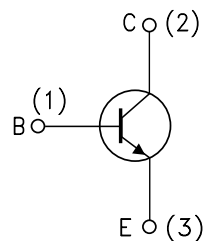
**APPLICATIONS:**

- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING
- SWITCH MODE POWER SUPPLIES

**DESCRIPTION**

The device is manufactured using high voltage Multi Epitaxial Planar technology for high switching speeds and medium voltage capability. It uses a Cellular Emitter structure with planar edge termination to enhance switching speeds while maintaining the wide RBSOA.

The ST83003 is expressly designed for a new solution to be used in compact fluorescent lamps, where it is coupled with the ST93003, its complementary PNP transistor.

**SOT-32****INTERNAL SCHEMATIC DIAGRAM**

SC06960

**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-Emitter Voltage ( $V_{BE} = 0$ )	700	V
$V_{CEO}$	Collector-Emitter Voltage ( $I_B = 0$ )	400	V
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0$ , $I_B = 0.75$ A, $t_p < 10\mu s$ , $T_j < 150^\circ C$ )	$V_{(BR)EBO}$	V
$I_C$	Collector Current	1.5	A
$I_{CM}$	Collector Peak Current ( $t_p < 5$ ms)	3	A
$I_B$	Base Current	0.75	A
$I_{BM}$	Base Peak Current ( $t_p < 5$ ms)	1.5	A
$P_{tot}$	Total Dissipation at $T_c = 25^\circ C$	40	W
$T_{stg}$	Storage Temperature	-65 to 150	$^\circ C$
$T_j$	Max. Operating Junction Temperature	150	$^\circ C$

## THERMAL DATA

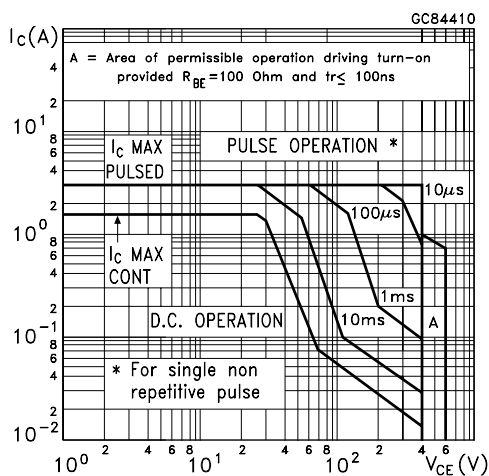
R <sub>thj-case</sub>	Thermal Resistance Junction-case	Max	3.12	°C/W
R <sub>thj-amb</sub>	Thermal Resistance Junction-ambient	Max	89	°C/W

ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

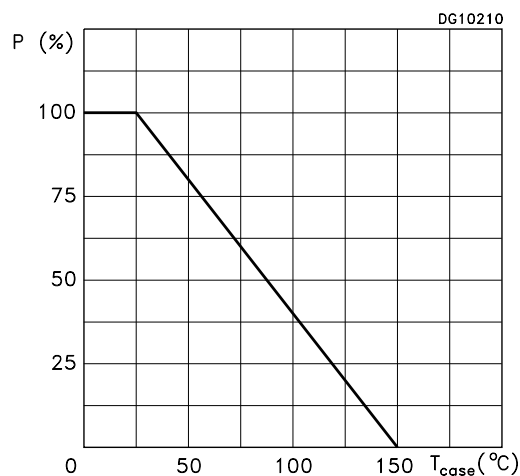
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>CEV</sub>	Collector Cut-off Current (V <sub>BE</sub> = -1.5V)	V <sub>CE</sub> = 700V V <sub>CE</sub> = 700V T <sub>j</sub> = 125°C			1 5	mA mA
V <sub>(BR)EBO</sub>	Emitter-Base Breakdown Voltage (I <sub>C</sub> = 0)	I <sub>E</sub> = 10 mA	12		18	V
V <sub>CEO(sus)*</sub>	Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0)	I <sub>C</sub> = 10 mA L = 25 mH	400			V
V <sub>CE(sat)*</sub>	Collector-Emitter Saturation Voltage	I <sub>C</sub> = 0.5 A I <sub>C</sub> = 0.35 A I <sub>B</sub> = 0.1 A I <sub>B</sub> = 50 mA			0.5 1	V V
V <sub>BE(sat)*</sub>	Base-Emitter Saturation Voltage	I <sub>C</sub> = 0.5 A I <sub>B</sub> = 0.1 A			1	V
h <sub>FE*</sub>	DC Current Gain	I <sub>C</sub> = 10 mA I <sub>C</sub> = 0.35 A I <sub>C</sub> = 1 A V <sub>CE</sub> = 5 V V <sub>CE</sub> = 5 V V <sub>CE</sub> = 5 V	10 16 4	25	32	
t <sub>r</sub> t <sub>s</sub> t <sub>f</sub>	RESISTIVE LOAD Rise Time Storage Time Fall Time	I <sub>C</sub> = 0.35 A I <sub>B1</sub> = 70 mA T <sub>p</sub> ≥ 25 μs V <sub>CC</sub> = 125 V I <sub>B2</sub> = -70 mA (see figure 2)	1.5	100 2.2 0.2	2.9	ns μs μs
t <sub>s</sub> t <sub>f</sub>	INDUCTIVE LOAD Storage Time Fall Time	I <sub>C</sub> = 0.5 A V <sub>BE(off)</sub> = -5 V V <sub>clamp</sub> = 300 V I <sub>B1</sub> = 0.1 A L = 10 mH (see figure 1)		450 90		ns ns

\* Pulsed: Pulse duration = 300μs, duty cycle = 1.5 %

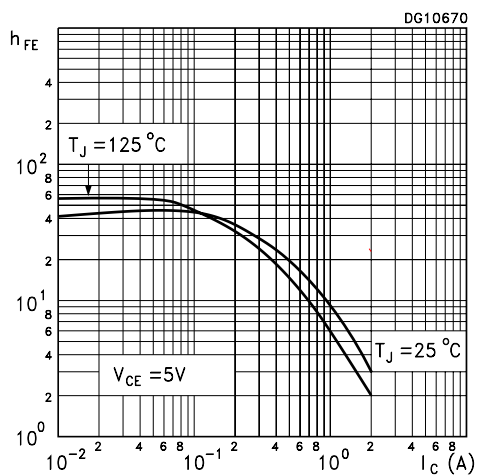
## Safe Operating Areas



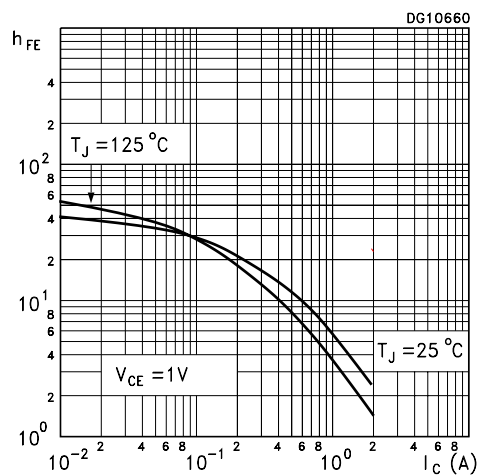
## Derating Curve



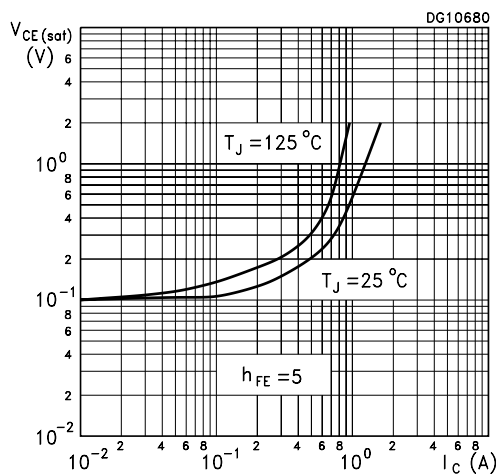
## DC Current Gain



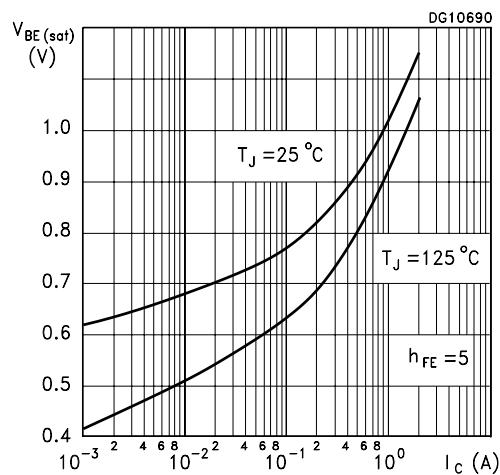
## DC Current Gain



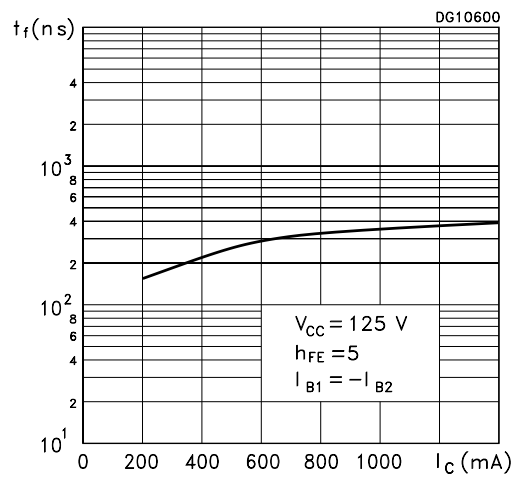
## Collector Emitter Saturation Voltage



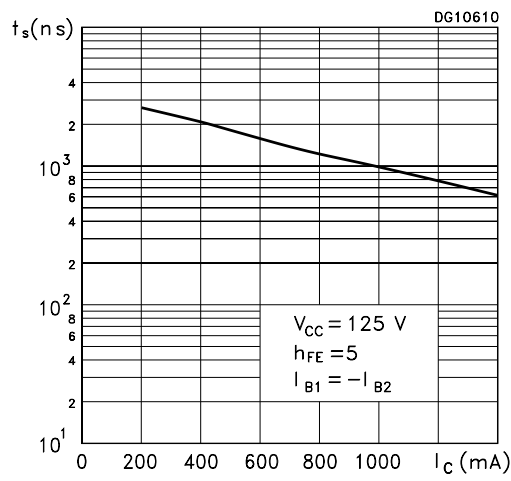
## Base Emitter Saturation Voltage



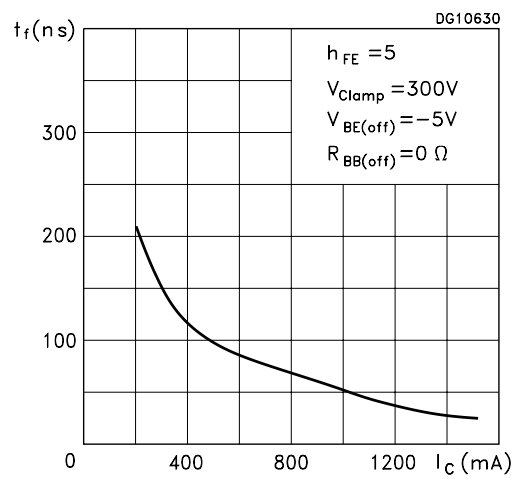
Resistive Load Fall Time



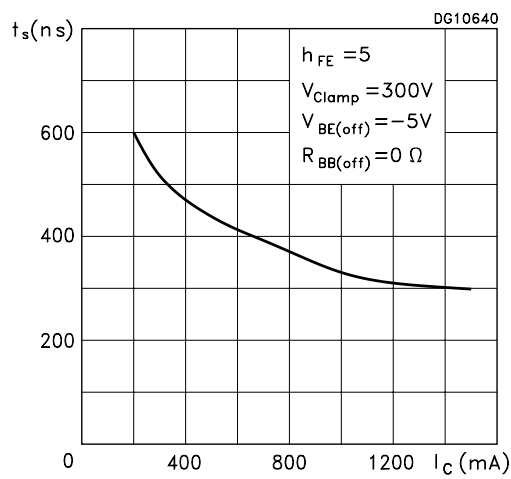
Resistive Load Storage Time



Inductive Load Fall Time



Inductive Load Storage Time



Reverse Biased SOA

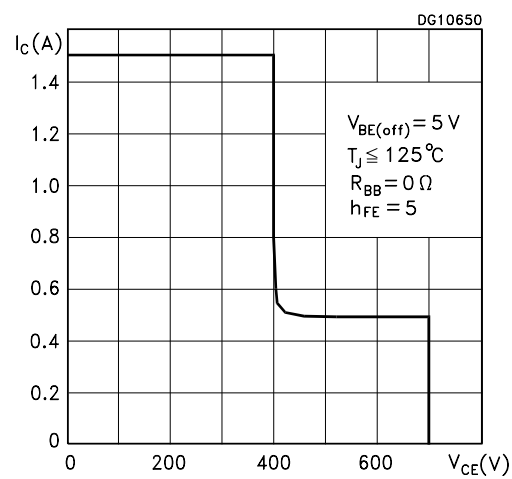


Figure 1: Inductive Load Switching Test Circuit.

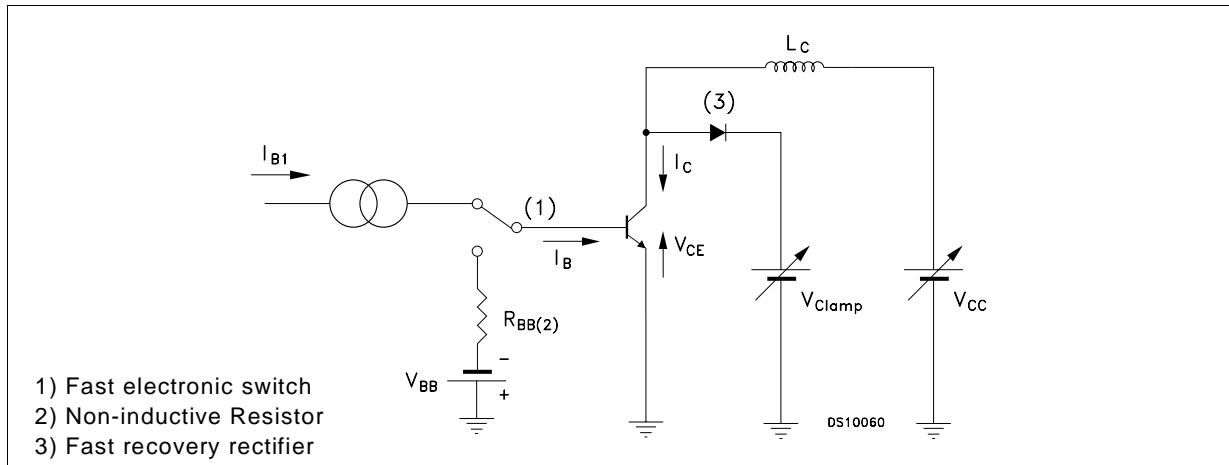
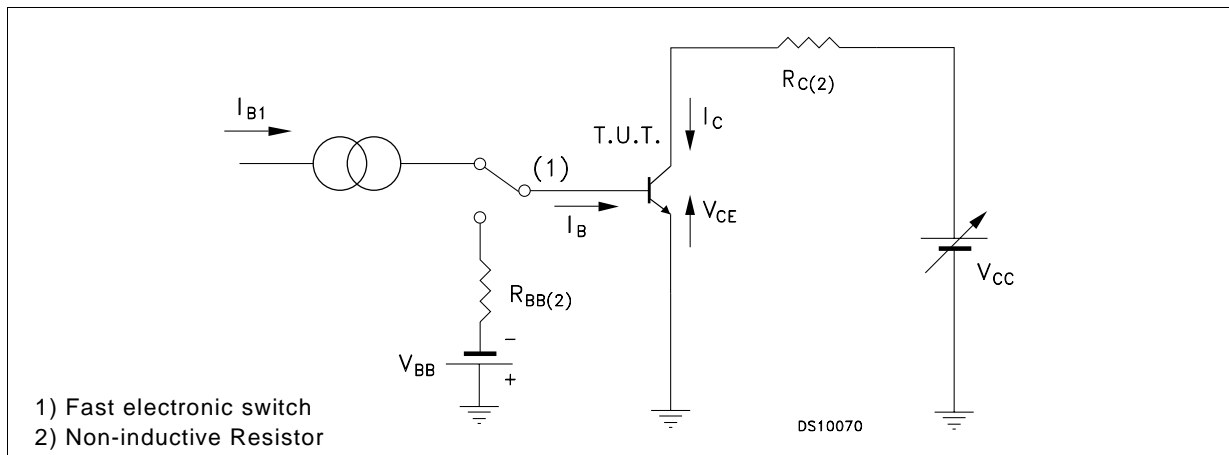
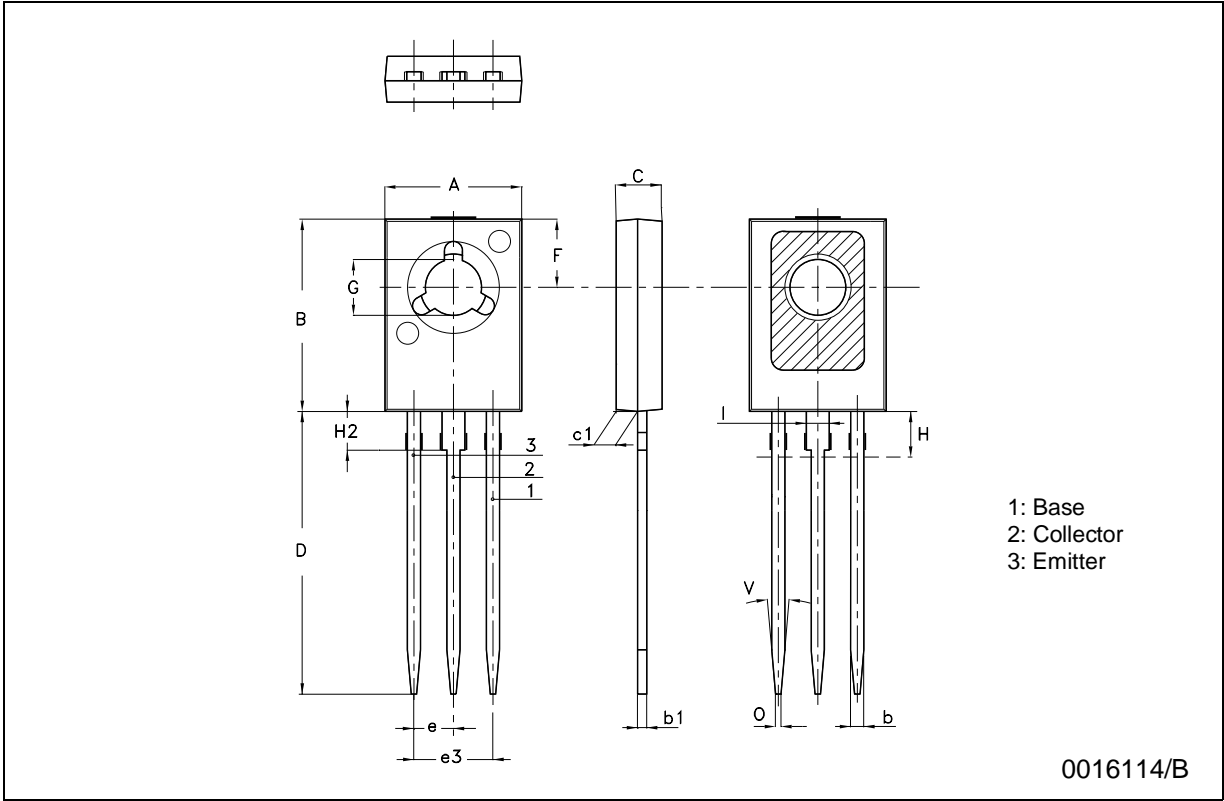


Figure 2: Resistive Load Switching Test Circuit.



SOT-32 (TO-126) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	7.4		7.8	0.291		0.307
B	10.5		10.8	0.413		0.425
b	0.7		0.9	0.028		0.035
b1	0.40		0.65	0.015		0.025
C	2.4		2.7	0.094		0.106
c1	1.0		1.3	0.039		0.051
D	15.4		16.0	0.606		0.630
e		2.2			0.087	
e3		4.4			0.173	
F		3.8			0.150	
G	3		3.2	0.118		0.126
H			2.54			0.100
H2		2.15			0.084	
I		1.27			0.05	
O		0.3			0.011	
V		10°			10°	



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