



## STX83003

# HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

- ST83003 SILICON IN TO-92 PACKAGE
- MEDIUM VOLTAGE CAPABILITY
- LOW SPREAD OF DYNAMIC PARAMETERS
- MINIMUM LOT-TO-LOT SPREAD FOR RELIABLE OPERATION
- VERY HIGH SWITCHING SPEED

### APPLICATIONS:

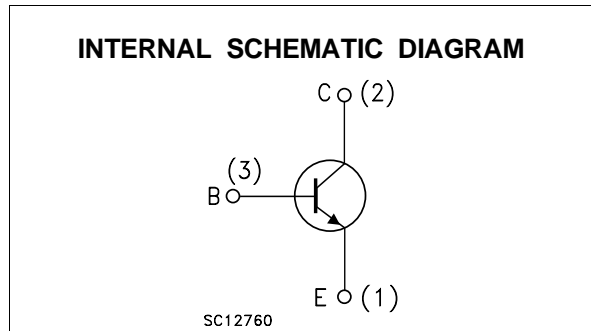
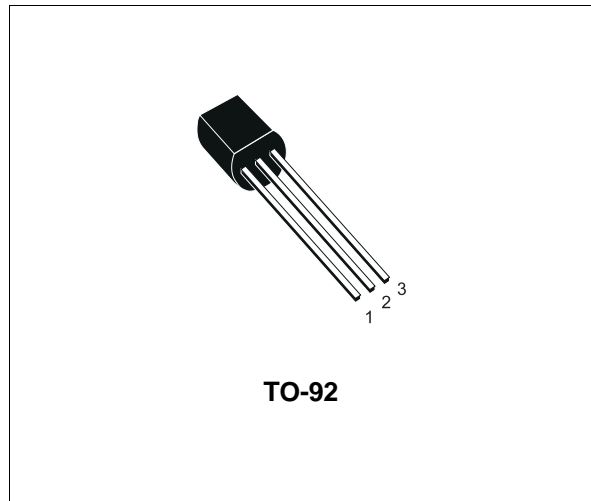
- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING

### 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 STX83003 is expressly designed for a new solution to be used in compact fluorescent lamps, where it is coupled with the STX93003, its complementary PNP transistor.



### 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 ( $I_C = 0, I_B = 0.5 \text{ A}, t_p < 10 \mu\text{s}, T_j < 150^\circ\text{C}$ )	$V_{(BR)EBO}$	V
$I_C$	Collector Current	1	A
$I_{CM}$	Collector Peak Current ( $t_p < 5 \text{ ms}$ )	3	A
$I_B$	Base Current	0.5	A
$I_{BM}$	Base Peak Current ( $t_p < 5 \text{ ms}$ )	1.5	A
$P_{tot}$	Total Dissipation at $T_C = 25^\circ\text{C}$	1.5	W
$T_{stg}$	Storage Temperature	-65 to 150	$^\circ\text{C}$
$T_j$	Max. Operating Junction Temperature	150	$^\circ\text{C}$

**THERMAL DATA**

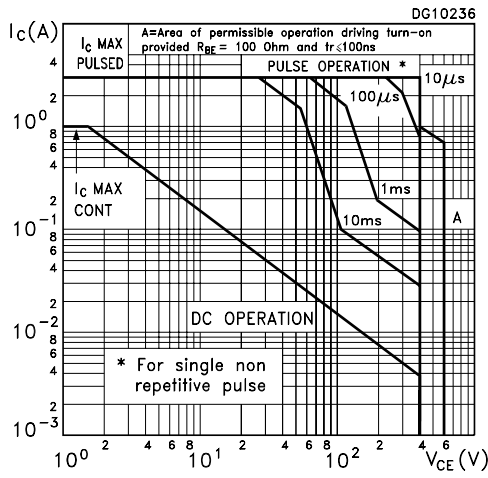
R <sub>thj-case</sub>	Thermal Resistance Junction-Case	Max	83.3	°C/W
R <sub>thj-amb</sub>	Thermal Resistance Junction-Ambient	Max	200	°C/W

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

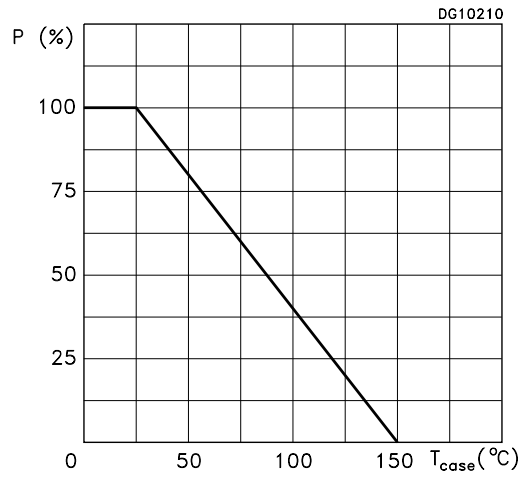
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>CES</sub>	Collector Cut-off Current (V <sub>BE</sub> = 0)	V <sub>CE</sub> = 700V V <sub>CE</sub> = 700V      T <sub>j</sub> = 125°C			1 5	mA mA
V <sub>(BR)EBO</sub>	Emitter-Base Breakdown Voltage (I <sub>C</sub> = 0)	I <sub>E</sub> = 10 mA	12		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>B</sub> = 0.1 A I <sub>C</sub> = 0.35 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      V <sub>CE</sub> = 5 V I <sub>C</sub> = 0.35 A      V <sub>CE</sub> = 5 V I <sub>C</sub> = 1 A          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      V <sub>CC</sub> = 125 V I <sub>B1</sub> = 70 mA      I <sub>B2</sub> = -70 mA T <sub>p</sub> ≥ 25 μs      (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      I <sub>B1</sub> = 0.1 A V <sub>BE(off)</sub> = -5 V      L = 10 mH V <sub>clamp</sub> = 300 V      (see figure 1)		450 90		ns ns

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

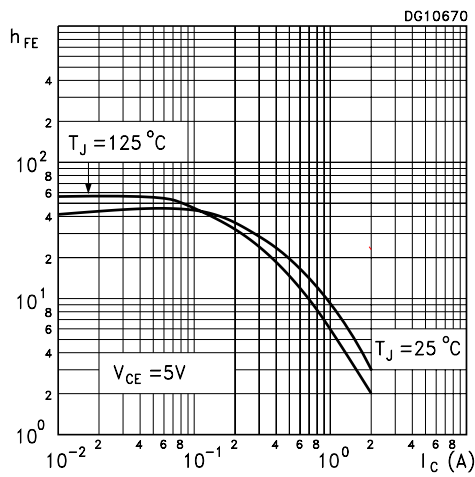
Safe Operating Area



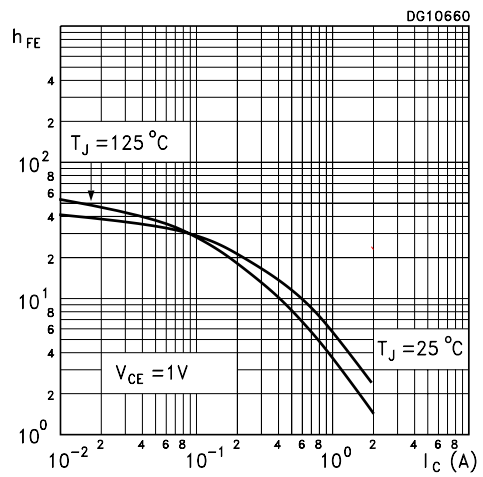
Derating Curve



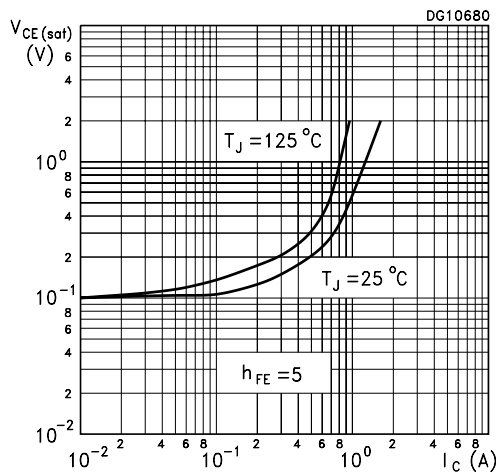
DC Current Gain



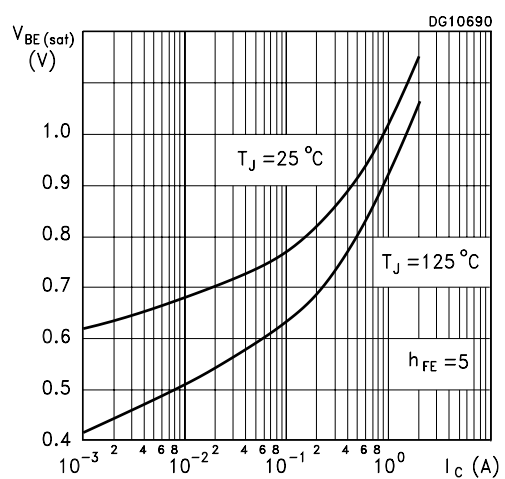
DC Current Gain



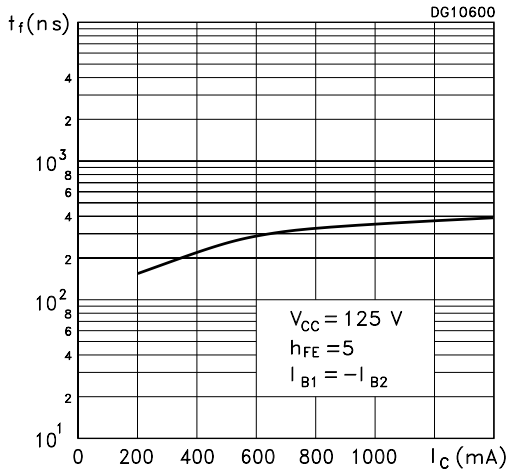
Collector Emitter Saturation Voltage



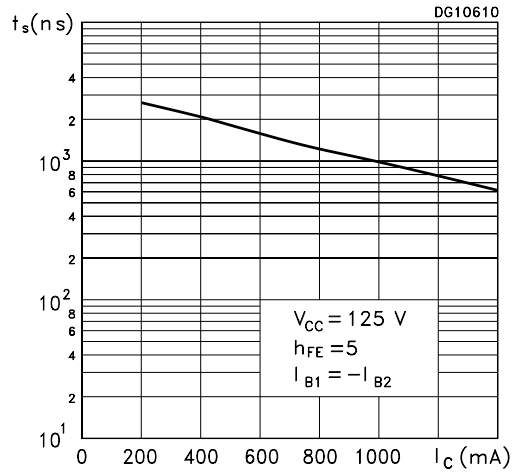
Base Emitter Saturation Voltage



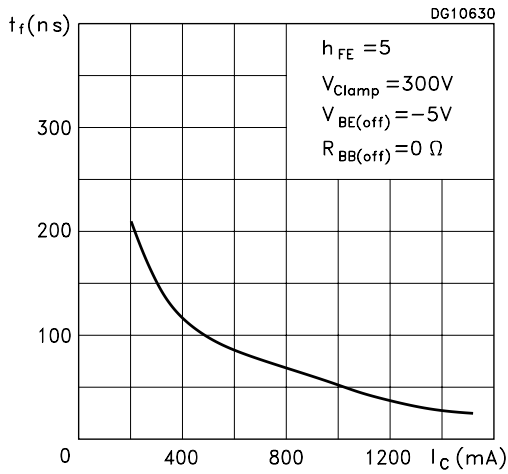
Resistive Load Fall Time



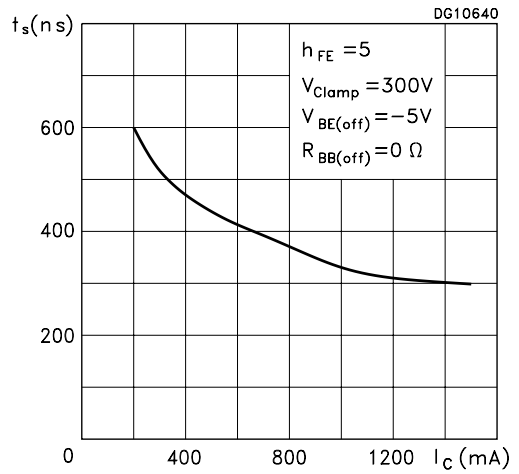
Resistive Load Storage Time



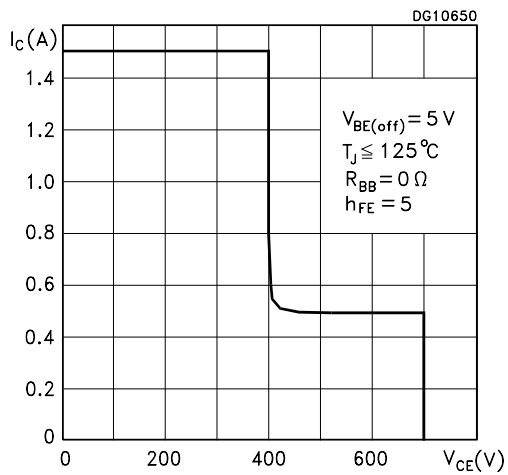
Inductive Load Fall Time



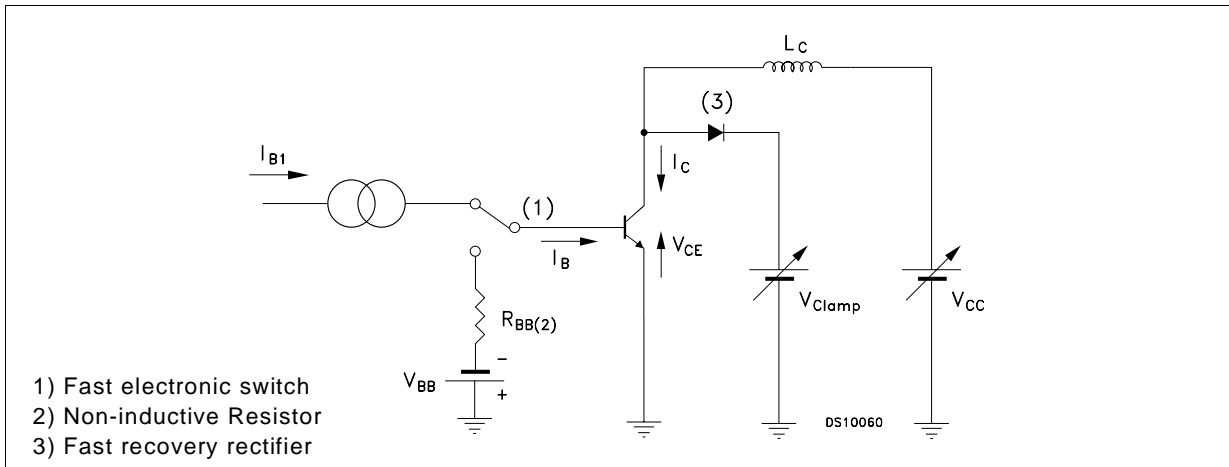
Inductive Load Storage Time



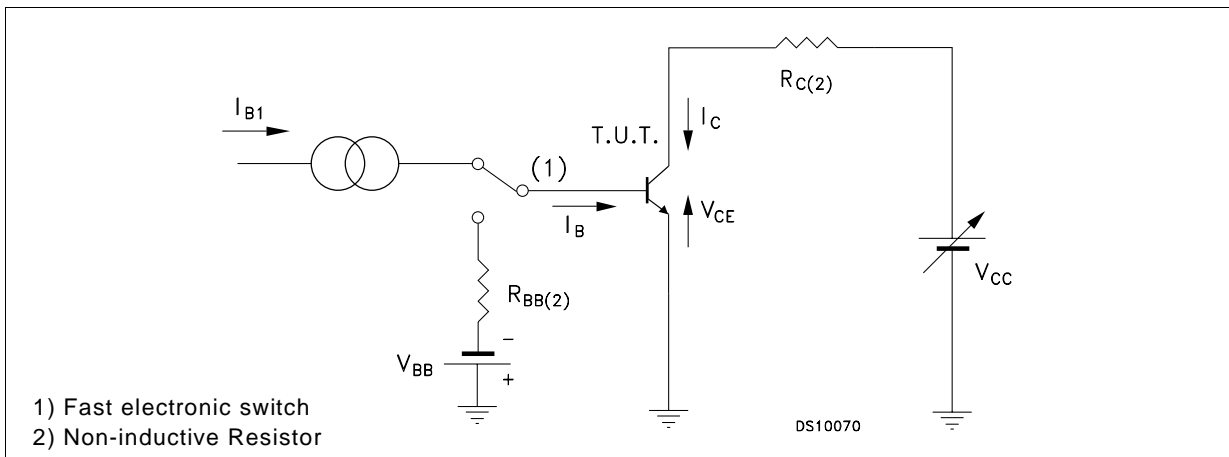
Reverse Biased SOA



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

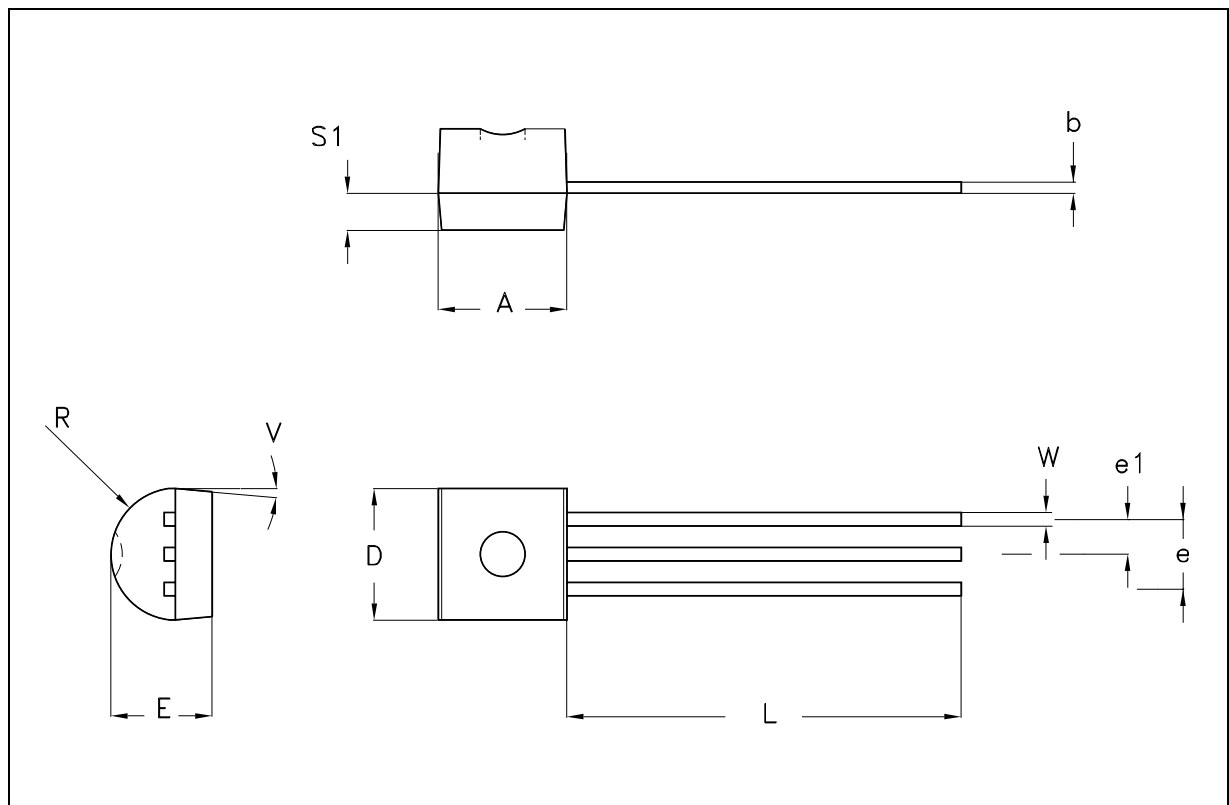


**Figure 2: Resistive Load Switching Test Circuit.**



**TO-92 MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.32		4.95	0.170		0.195
b	0.36		0.51	0.014		0.020
D	4.45		4.95	0.175		0.194
E	3.30		3.94	0.130		0.155
e	2.41		2.67	0.095		0.105
e1	1.14		1.40	0.045		0.055
L	12.70		15.49	0.500		0.609
R	2.16		2.41	0.085		0.094
S1	1.14		1.52	0.045		0.059
W	0.41		0.56	0.016		0.022
V	4 degree		6 degree	4 degree		6 degree



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