



## STX13003

# HIGH VOLTAGE FAST-SWITCHING NPN POWER TRANSISTOR

- ST13003 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:

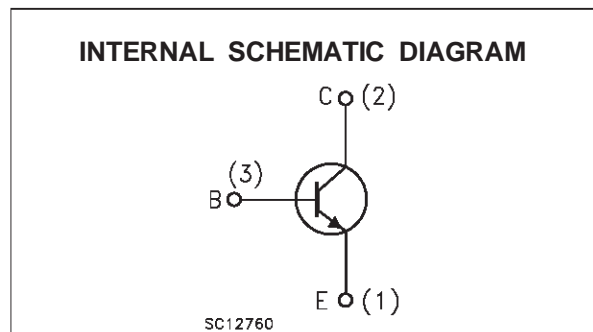
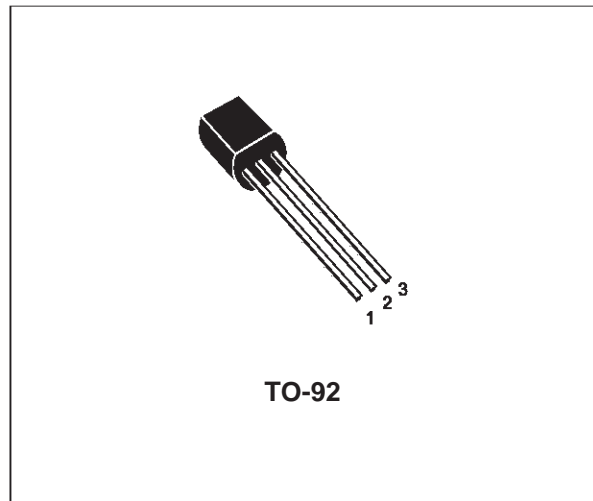
- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING

### 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 STX13003 is designed for use in compact fluorescent lamp application.



### 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 ( $I_C = 0, I_B = 0.5 \text{ A}, t_p < 10 \mu\text{s}, T_j < 150^\circ\text{C}$ )	$BV_{EBO}$	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	$^\circ\text{C}$

## STX13003

### THERMAL DATA

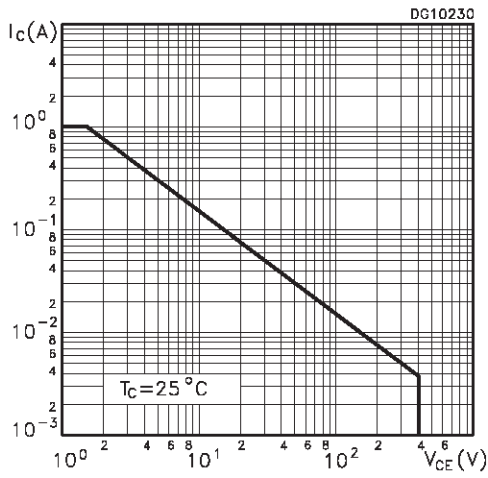
$R_{thj-case}$	Thermal Resistance Junction-case	Max	83.3	$^{\circ}\text{C}/\text{W}$
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### ELECTRICAL CHARACTERISTICS ( $T_{case} = 25^{\circ}\text{C}$ unless otherwise specified)

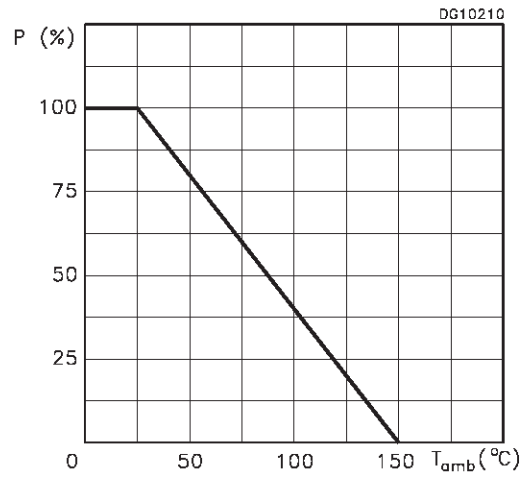
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CEV}$	Collector Cut-off Current ( $V_{BE} = -1.5\text{V}$ )	$V_{CE} = 700\text{V}$ $V_{CE} = 700\text{V}$ $T_j = 125^{\circ}\text{C}$			1 5	$\text{mA}$ $\text{mA}$
$BV_{EBO}$	Emitter-Base Breakdown Voltage ( $I_C = 0$ )	$I_E = 10\text{ mA}$	9		18	V
$V_{CEO(sus)*}$	Collector-Emitter Sustaining Voltage ( $I_B = 0$ )	$I_C = 10\text{ mA}$ $L = 25\text{ mH}$	400			V
$V_{CE(sat)*}$	Collector-Emitter Saturation Voltage	$I_C = 0.5\text{ A}$ $I_B = 0.1\text{ A}$ $I_C = 1\text{ A}$ $I_B = 0.25\text{ A}$ $I_C = 1.5\text{ A}$ $I_B = 0.5\text{ A}$			0.5 1 3	V V V
$V_{BE(sat)*}$	Base-Emitter Saturation Voltage	$I_C = 0.5\text{ A}$ $I_B = 0.1\text{ A}$ $I_C = 1\text{ A}$ $I_B = 0.25\text{ A}$			1 1.2	V V
$h_{FE*}$	DC Current Gain	$I_C = 0.5\text{ A}$ $V_{CE} = 2\text{ V}$ $I_C = 1\text{ A}$ $V_{CE} = 2\text{ V}$	8 5		35 25	
$t_r$ $t_s$ $t_f$	RESISTIVE LOAD Rise Time Storage Time Fall Time	$I_C = 1\text{ A}$ $V_{CC} = 125\text{ V}$ $I_{B1} = 0.2\text{ A}$ $I_{B2} = -0.2\text{ A}$ $T_p = 25\text{ }\mu\text{s}$			1 4 0.7	$\mu\text{s}$ $\mu\text{s}$ $\mu\text{s}$
$t_s$	INDUCTIVE LOAD Storage Time	$I_C = 1\text{ A}$ $I_{B1} = 0.2\text{ A}$ $V_{BE} = -5\text{ V}$ $L = 50\text{ mH}$ $V_{clamp} = 300\text{ V}$		0.8		$\mu\text{s}$

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

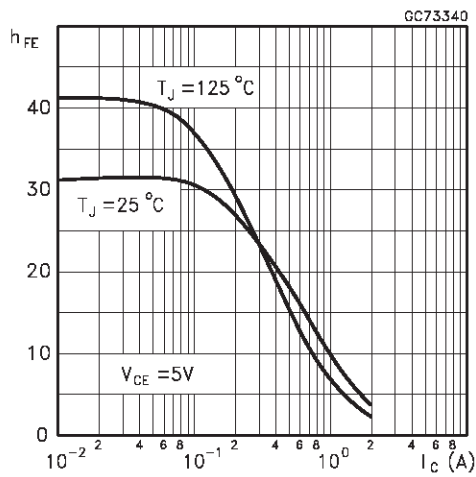
Safe Operating Area



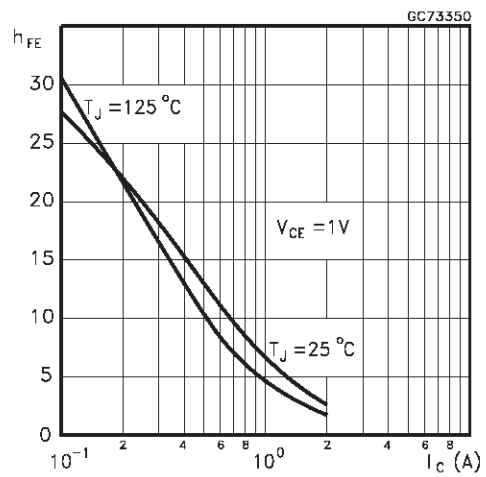
Derating Curve



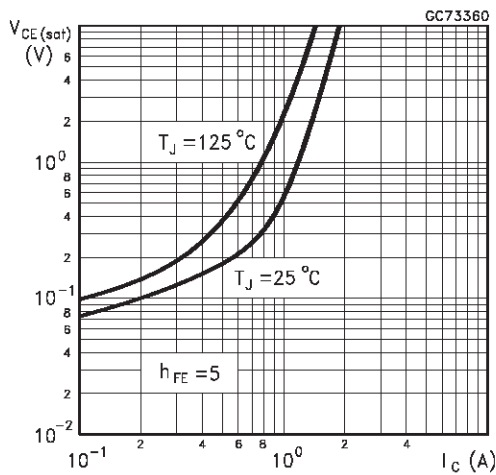
DC Current Gain



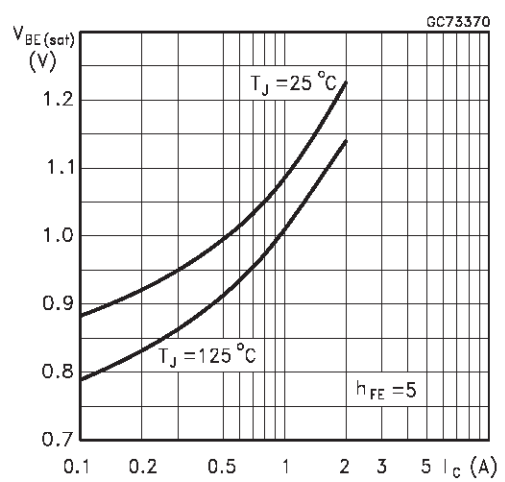
DC Current Gain



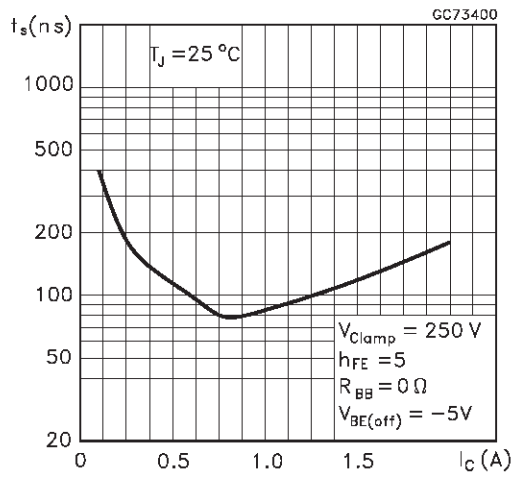
Collector Emitter Saturation Voltage



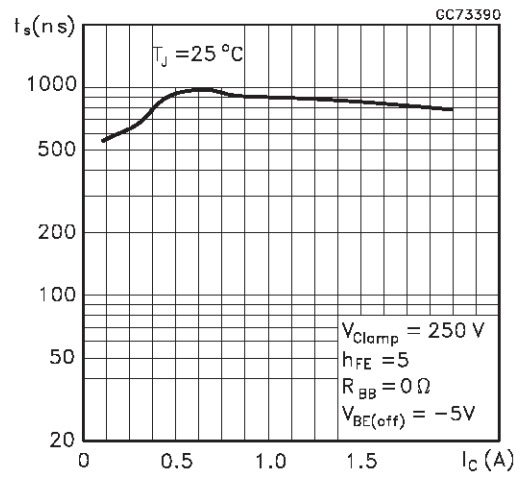
Base Emitter Saturation Voltage



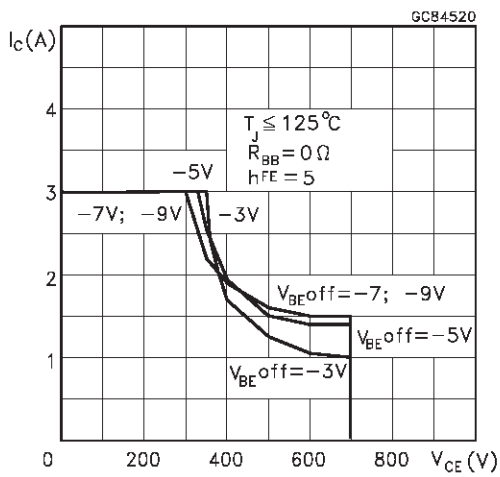
Inductive Fall Time



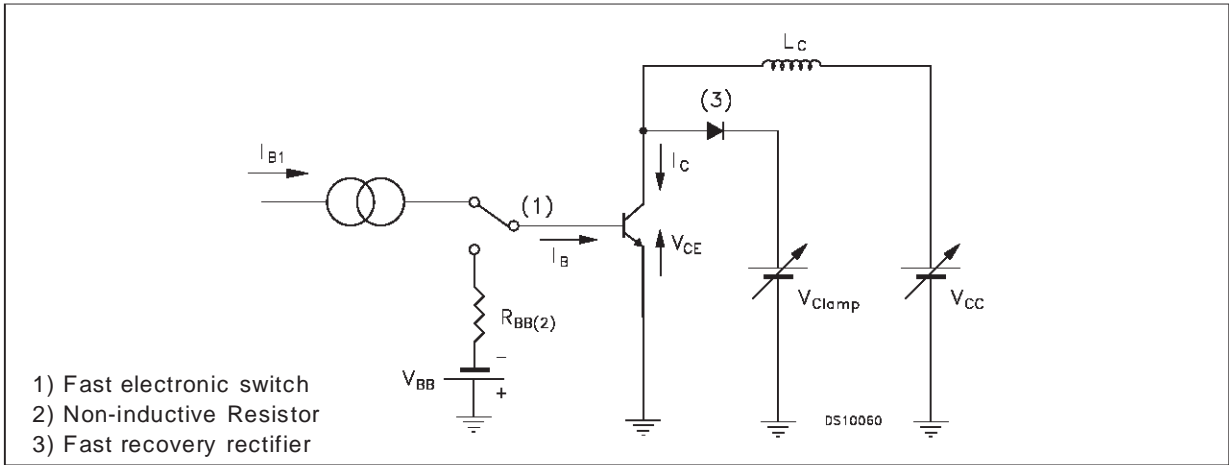
Inductive Storage Time



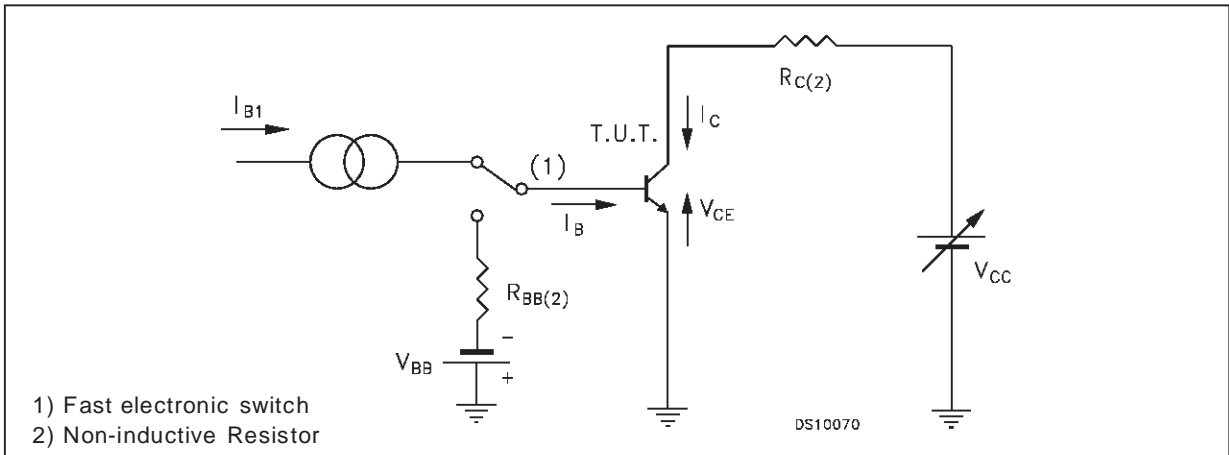
Reverse Biased SOA



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

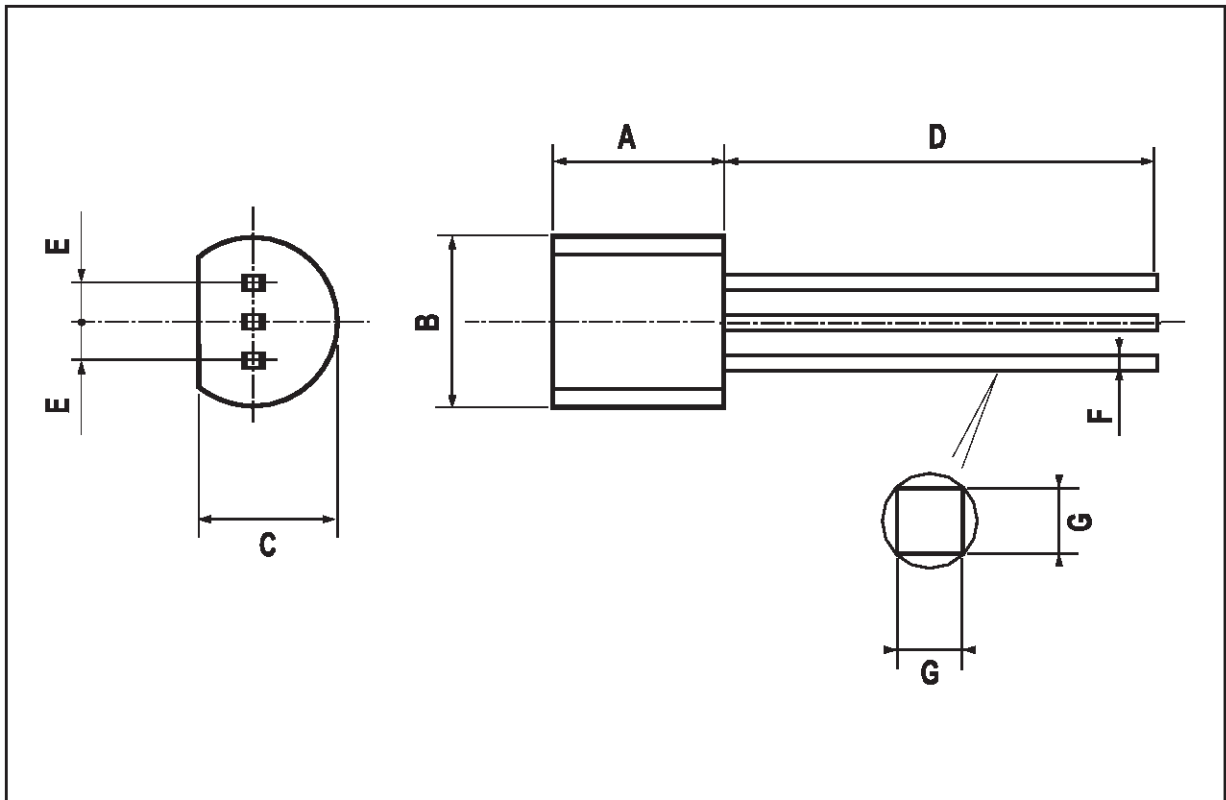


**Figure 2: Resistive Load Switching Test Circuits.**



**TO-92 MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.58		5.33	0.180		0.210
B	4.45		5.2	0.175		0.204
C	3.2		4.2	0.126		0.165
D	12.7			0.500		
E		1.27			0.050	
F	0.4		0.51	0.016		0.020
G	0.35			0.14		



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