



**ST13003**

## 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:

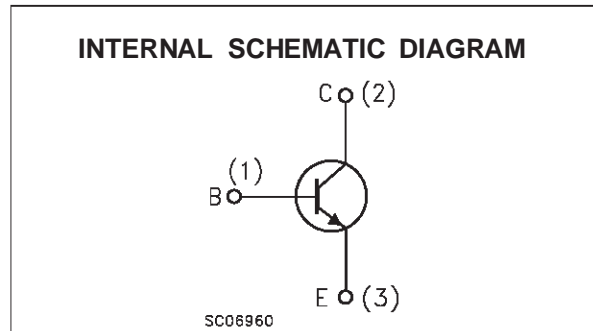
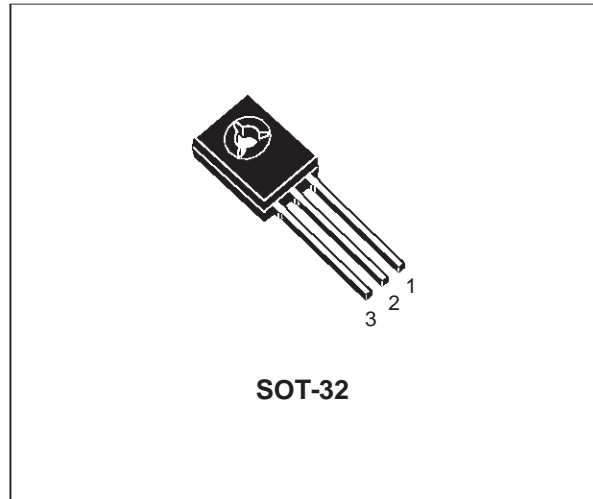
- ELECTRONIC BALLASTS FOR FLUORESCENT LIGHTING
- SWITCH MODE POWER SUPPLIES

### 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 device is designed for use in lighting applications and low cost switch-mode power supplies.



### 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, $t_p < 10\mu s$ , $T_j < 150^\circ C$ )	$BV_{EBO}$	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	$^\circ C$

**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

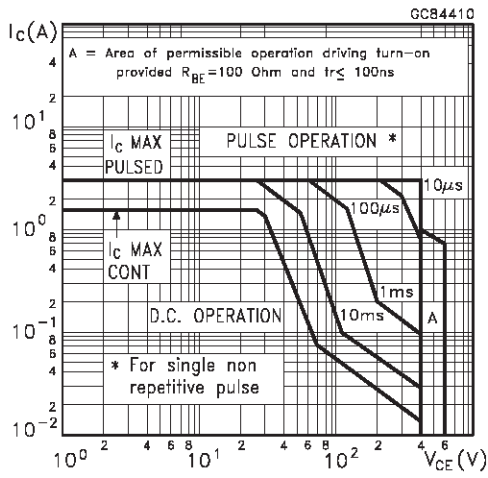
**ELECTRICAL CHARACTERISTICS** (T<sub>case</sub> = 25 °C unless otherwise specified)

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
BV <sub>EBO</sub>	Emitter-Base Breakdown Voltage (I <sub>C</sub> = 0)	I <sub>E</sub> = 10 mA	9		18	V
V <sub>CEO(sus)*</sub>	Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0)	I <sub>C</sub> = 10 mA L = 25mH	400			V
V <sub>CE(sat)*</sub>	Collector-Emitter Saturation Voltage	I <sub>C</sub> = 0.5 A I <sub>C</sub> = 1 A I <sub>C</sub> = 1.5 A I <sub>B</sub> = 0.1 A I <sub>B</sub> = 0.25 A I <sub>B</sub> = 0.5 A			0.5 1 3	V V V
V <sub>BE(sat)*</sub>	Base-Emitter Saturation Voltage	I <sub>C</sub> = 0.5 A I <sub>C</sub> = 1 A I <sub>B</sub> = 0.1 A I <sub>B</sub> = 0.25 A			1.0 1.2	V V
h <sub>FE</sub>	DC Current Gain	I <sub>C</sub> = 0.5 A Group A Group B I <sub>C</sub> = 1 A V <sub>CE</sub> = 2 V V <sub>CE</sub> = 2 V	8 15 5		20 35 25	
t <sub>r</sub> t <sub>s</sub> t <sub>f</sub>	RESISTIVE LOAD Rise Time Storage Time Fall Time	I <sub>C</sub> = 1 A I <sub>B1</sub> = 0.2 A T <sub>p</sub> = 25 μs V <sub>CC</sub> = 125 V I <sub>B2</sub> = -0.2 A			1.0 4.0 0.7	μs μs μs
t <sub>s</sub>	INDUCTIVE LOAD Storage Time	I <sub>C</sub> = 1 A V <sub>BE</sub> = -5 V V <sub>clamp</sub> = 300 V I <sub>B1</sub> = 0.2 A L = 50 mH		0.8		μs

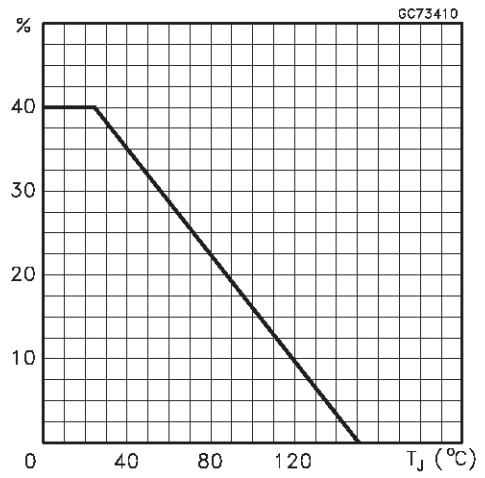
\* Pulsed: Pulse duration = 300μs, duty cycle = 1.5 %

Note : Product is pre-selected in DC current gain (GROUP A and GROUP B). STMicroelectronics reserves the right to ship either groups according to production availability. Please contact your nearest STMicroelectronics sales office for delivery details.

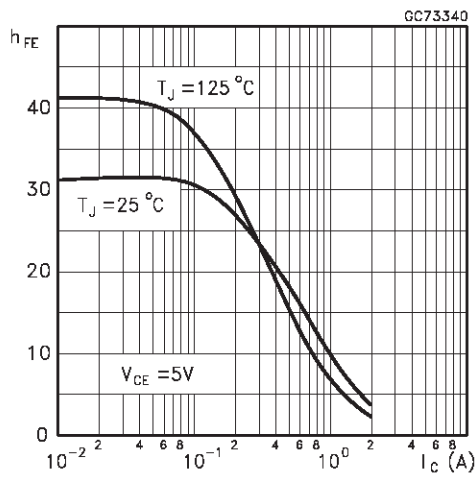
Safe Operating Areas



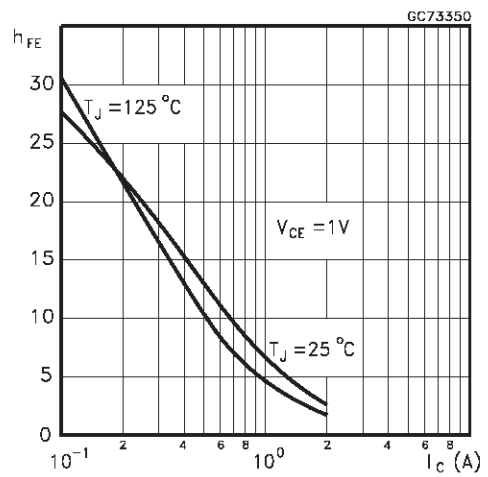
Derating Curve



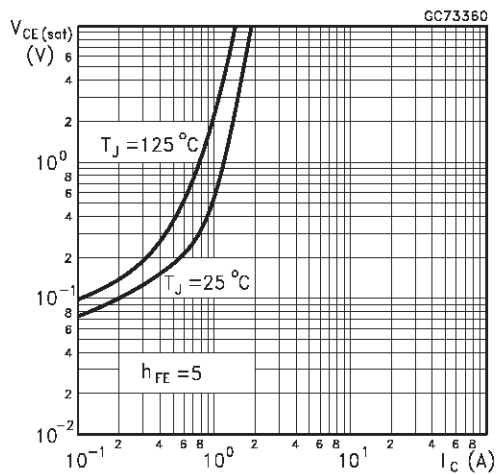
DC Current Gain



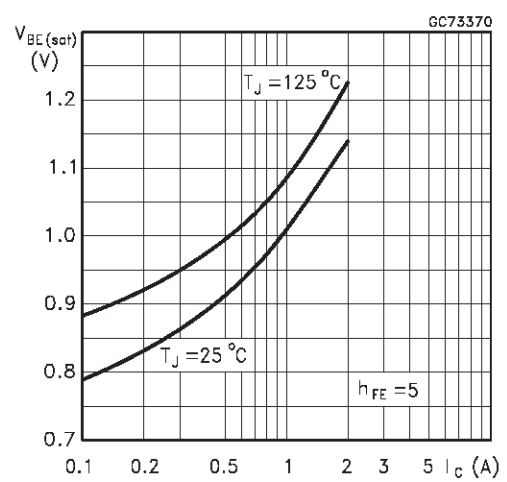
DC Current Gain



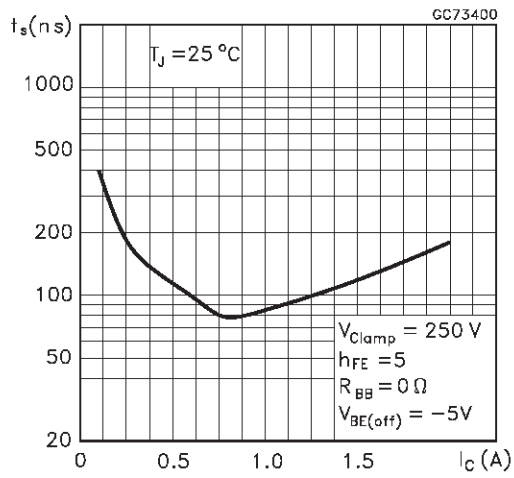
Collector Emitter Saturation Voltage



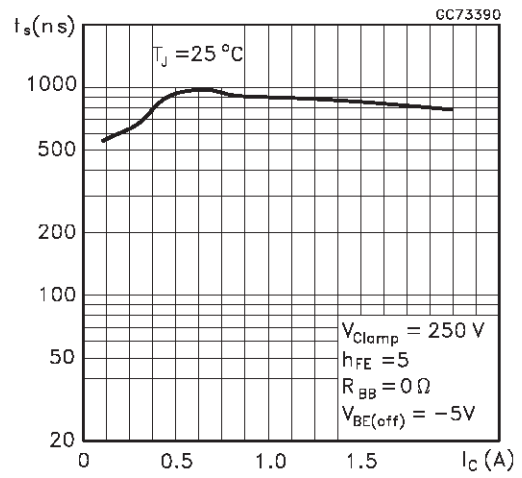
Base Emitter Saturation Voltage



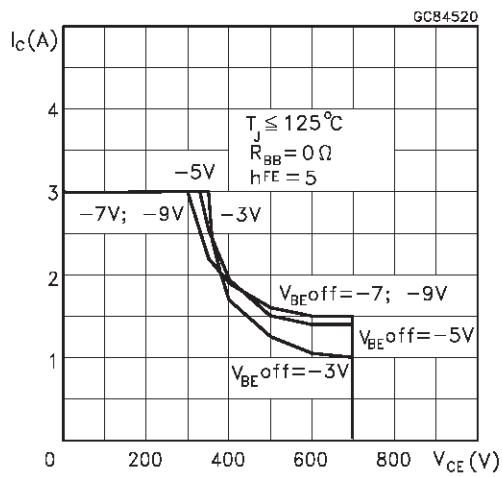
Inductive Fall Time

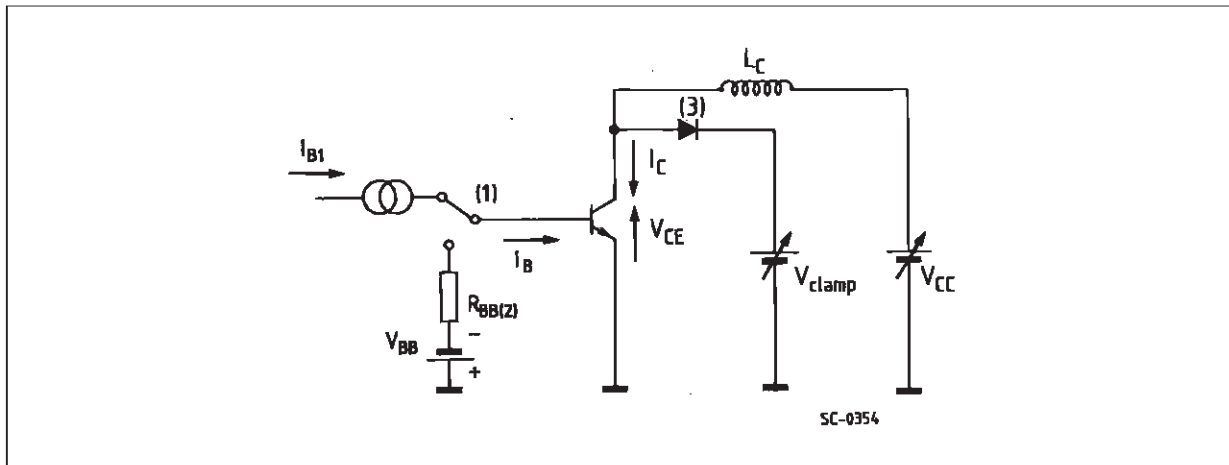
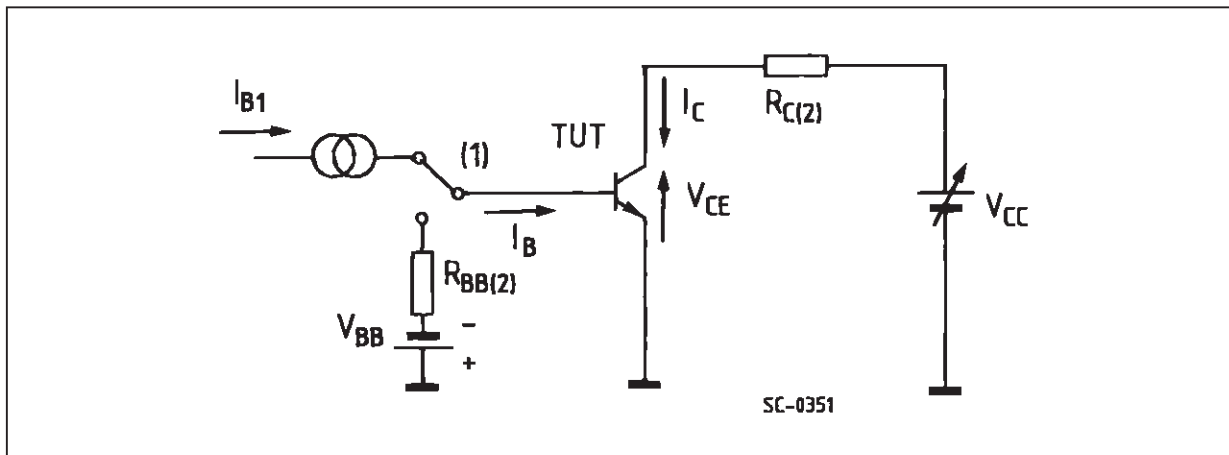


Inductive Storage Time



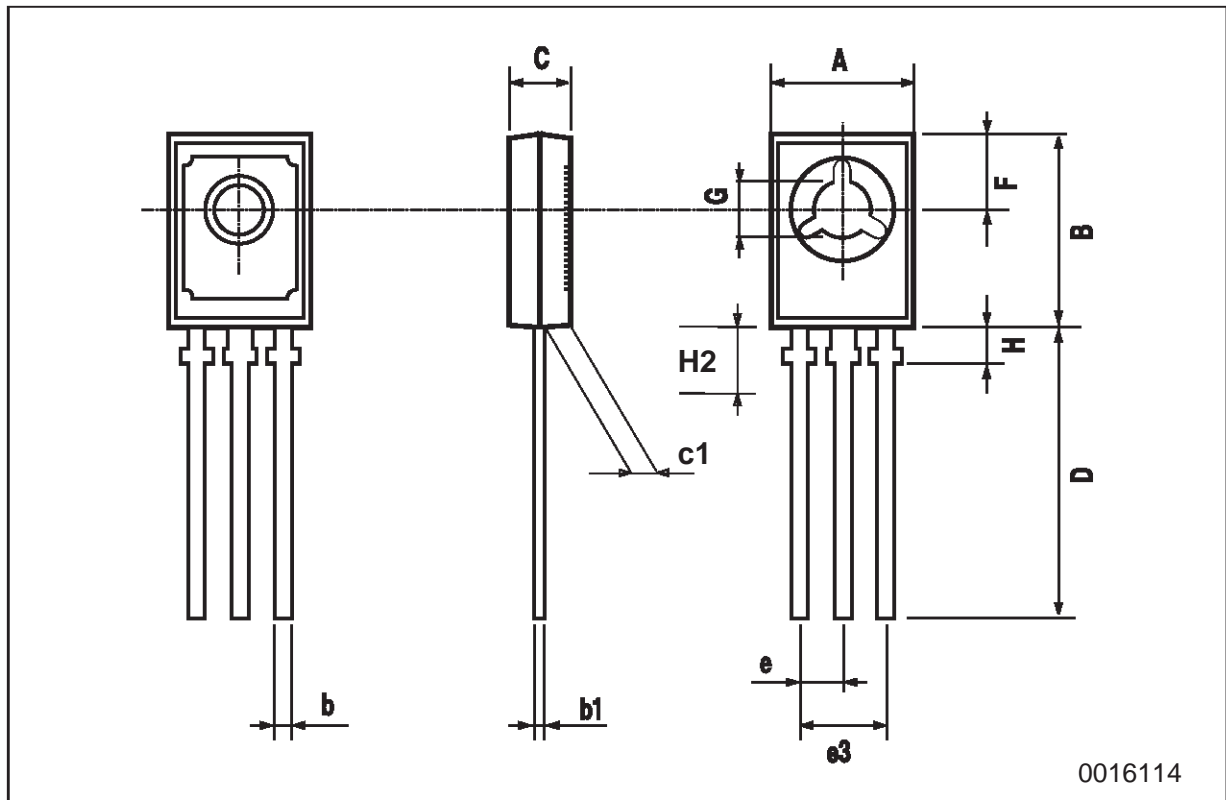
Reverse Biased SOA



**Figure 1:** Inductive Load Switching Test Circuits.**Figure 2:** Resistive Load Switching Test Circuits.

**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		0.445
b	0.7		0.9	0.028		0.035
b1	0.49		0.75	0.019		0.030
C	2.4		2.7	0.040		0.106
c1	1.0		1.3	0.039		0.050
D	15.4		16.0	0.606		0.629
e		2.2			0.087	
e3	4.15		4.65	0.163		0.183
F		3.8			0.150	
G	3		3.2	0.118		0.126
H			2.54			0.100



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