

## High voltage fast-switching NPN power transistor

### Features

- High voltage capability
- Low spread of dynamic parameters
- Minimum lot-to-lot spread for reliable operation
- Very high switching speed

### Applications

- Compact fluorescent lamps (CFLS)
- SMPS for battery charger

### Description

The device is manufactured using high voltage multi epitaxial planar technology for high switching speeds and high voltage capability. It uses a cellular emitter structure with planar edge termination to enhance switching speeds while maintaining the wide RBSOA.

The STBV32G and STBV32G-AP are supplied using halogen-free molding compound.

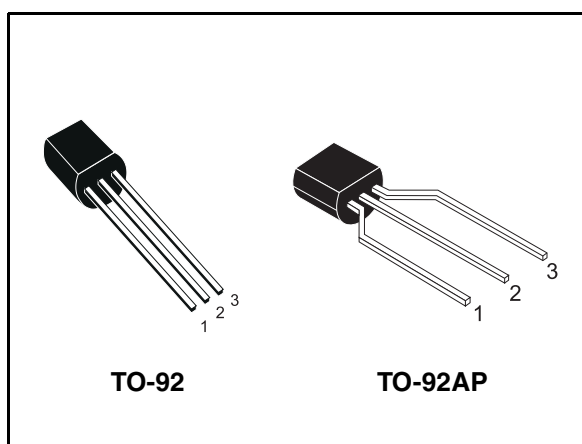


Figure 1. Internal schematic diagram

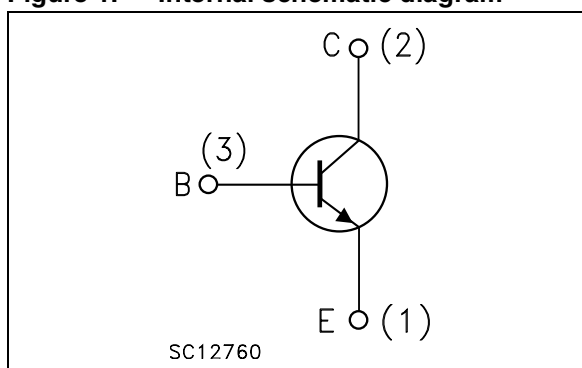


Table 1. Device summary

Order codes	Marking	Package	Packaging
STBV32	BV32	TO-92	Bulk
STBV32G	BV32G	TO-92	Bulk
STBV32-AP	BV32	TO-92AP	Ammopack
STBV32G-AP	BV32G	TO-92AP	Ammopack

# 1 Electrical ratings

**Table 2. Absolute maximum rating**

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-emitter voltage ( $V_{BE} = 0$ )	700	V
$V_{CEO}$	Collector-emitter voltage ( $I_B = 0$ )	400	V
$V_{EBO}$	Collector-base voltage ( $I_C = 0$ , $I_B = 0.5A$ , $t_P < 10$ ms)	$V_{(BR)EBO}$	V
$I_C$	Collector current ( $f \geq 100$ Hz, duty-cycle $\leq 50\%$ , $T_C = 25$ °C)	1.5	A
$I_{CM}$	Collector peak current ( $t_P < 5$ ms)	3	A
$I_B$	Base current	0.5	A
$I_{BM}$	Base peak current ( $t_P < 5$ ms)	1.5	A
$P_{TOT}$	Total dissipation at $T_C = 25$ °C	1.5	W
$T_{stg}$	Storage temperature	-65 to 150	°C
$T_J$	Max. operating junction temperature	150	

**Table 3. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	83.3	°C/W

## 2 Electrical characteristics

( $T_{\text{case}} = 25\text{ °C}$ ; unless otherwise specified)

**Table 4. Electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{\text{CES}}$	Collector cut-off current ( $V_{\text{BE}} = 0$ )	$V_{\text{CE}} = 700\text{ V}$			1	mA
		$V_{\text{CE}} = 700\text{ V}$ $T_{\text{C}} = 125\text{ °C}$			5	mA
$V_{(\text{BR})\text{EBO}}$	Emitter-base breakdown voltage ( $I_{\text{C}} = 0$ )	$I_{\text{E}} = 10\text{ mA}$	9		18	V
$V_{\text{CEO(sus)}}^{(1)}$	Collector-emitter sustaining voltage ( $I_{\text{B}} = 0$ )	$I_{\text{C}} = 10\text{ mA}$	400			V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 0.5\text{ A}$ $I_{\text{B}} = 100\text{ mA}$			0.5	V
		$I_{\text{C}} = 1\text{ A}$ $I_{\text{B}} = 250\text{ mA}$			1	V
		$I_{\text{C}} = 1.5\text{ A}$ $I_{\text{B}} = 500\text{ mA}$			1.5	V
$V_{\text{BE(sat)}}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 0.5\text{ A}$ $I_{\text{B}} = 100\text{ mA}$			1	V
		$I_{\text{C}} = 1\text{ A}$ $I_{\text{B}} = 250\text{ mA}$			1.2	V
$h_{\text{FE}}$	DC current gain	$I_{\text{C}} = 0.5\text{ mA}$ $V_{\text{CE}} = 2\text{ V}$	20			
		$I_{\text{C}} = 0.5\text{ A}$ $V_{\text{CE}} = 2\text{ V}$	8		25	
		$I_{\text{C}} = 1\text{ A}$ $V_{\text{CE}} = 2\text{ V}$	5		25	
$t_{\text{r}}$ $t_{\text{s}}$ $t_{\text{f}}$	Resistive load Rise time Storage time Fall time	$I_{\text{C}} = 1\text{ A}$ $t_{\text{p}} = 25\text{ }\mu\text{s}$			1	$\mu\text{s}$
		$I_{\text{B1}} = -I_{\text{B2}} = 200\text{ mA}$			4	$\mu\text{s}$
		$V_{\text{CC}} = 125\text{ V}$ <i>Figure 12.</i>			0.7	$\mu\text{s}$
$t_{\text{s}}$	Inductive Load Storage time	$I_{\text{C}} = 1\text{ A}$ $V_{\text{clamp}} = 300\text{ V}$ $I_{\text{B1}} = 200\text{ mA}$ $V_{\text{BE(off)}} = -5\text{ V}$ $L = 50\text{ mH}$ $R_{\text{BB}} = 0$ <i>Figure 13.</i>		0.8		$\mu\text{s}$

1. Pulsed duration = 300  $\mu\text{s}$ , duty cycle  $\leq 1.5\%$

## 2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

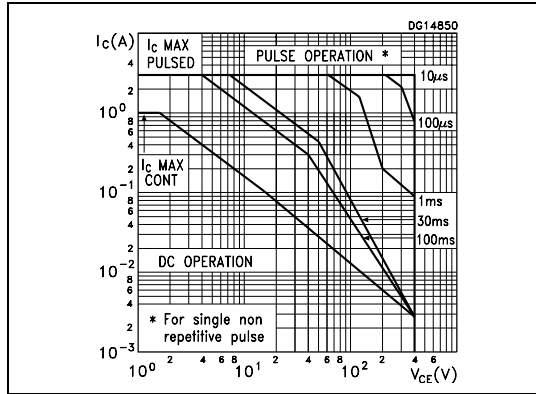


Figure 3. Derating curve

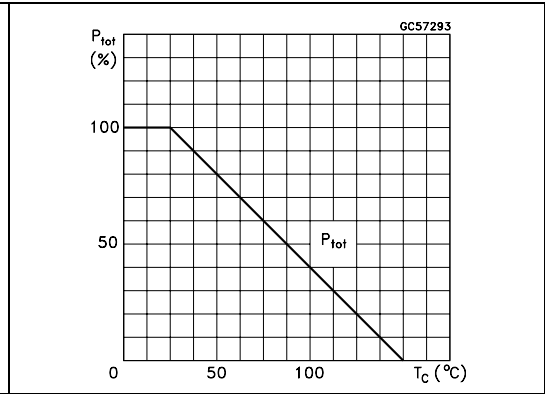


Figure 4. Output characteristics

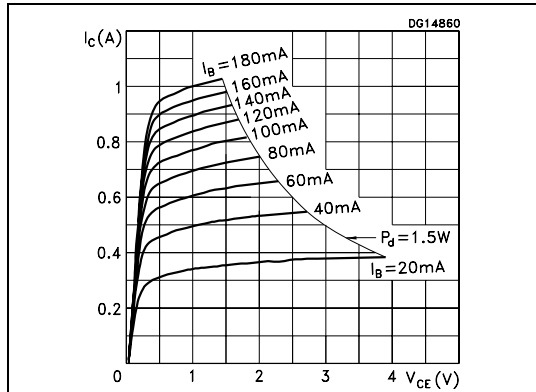


Figure 5. Reverse biased safe operating area

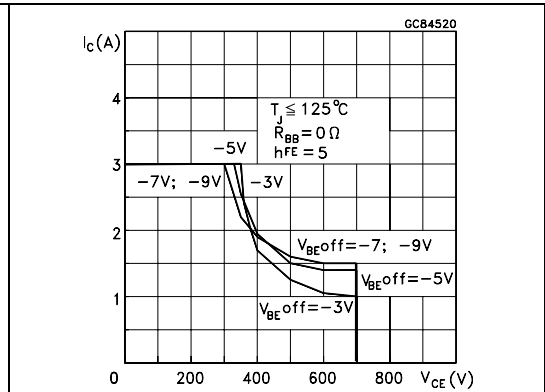


Figure 6. DC current gain

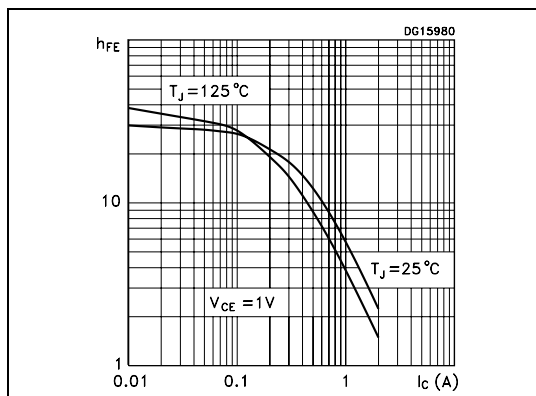
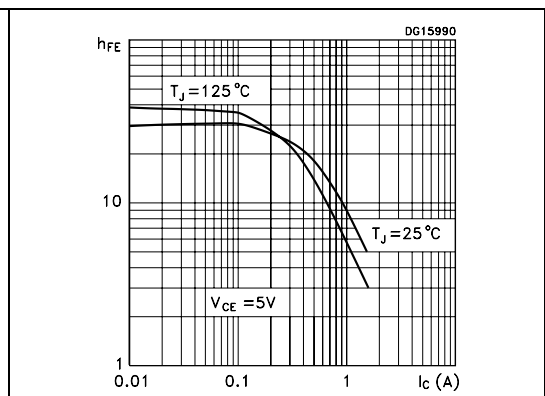
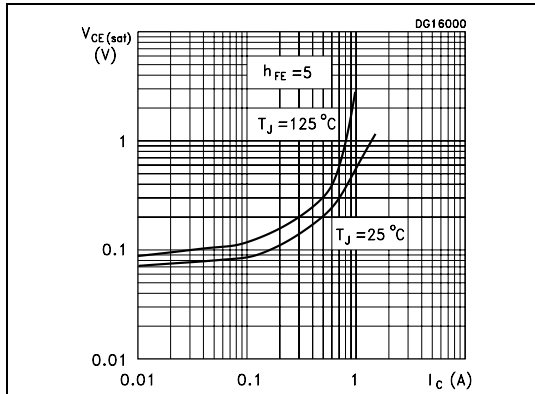


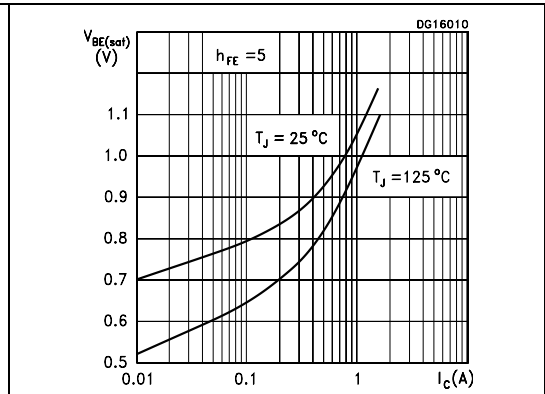
Figure 7. DC current gain



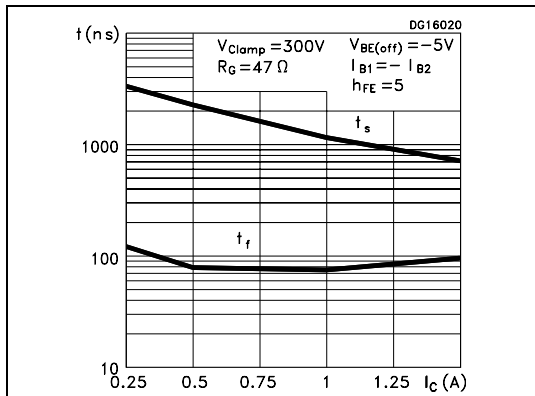
**Figure 8. Collector-emitter saturation voltage**



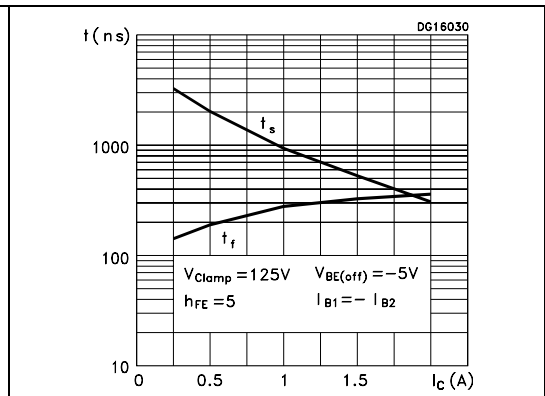
**Figure 9. Base-emitter saturation voltage**



**Figure 10. Inductive load switching time**



**Figure 11. Resistive load switching time**



## 2.2 Test circuits

Figure 12. Resistive load switching test circuit

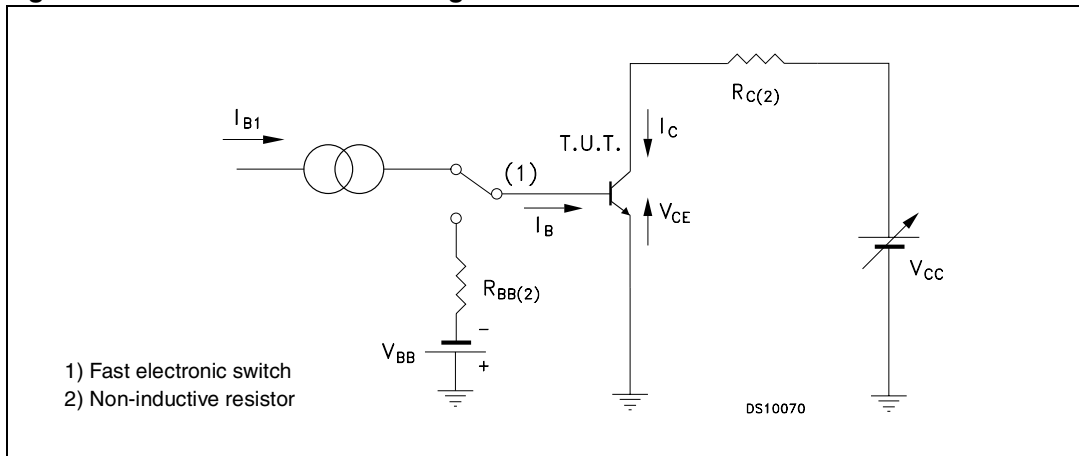
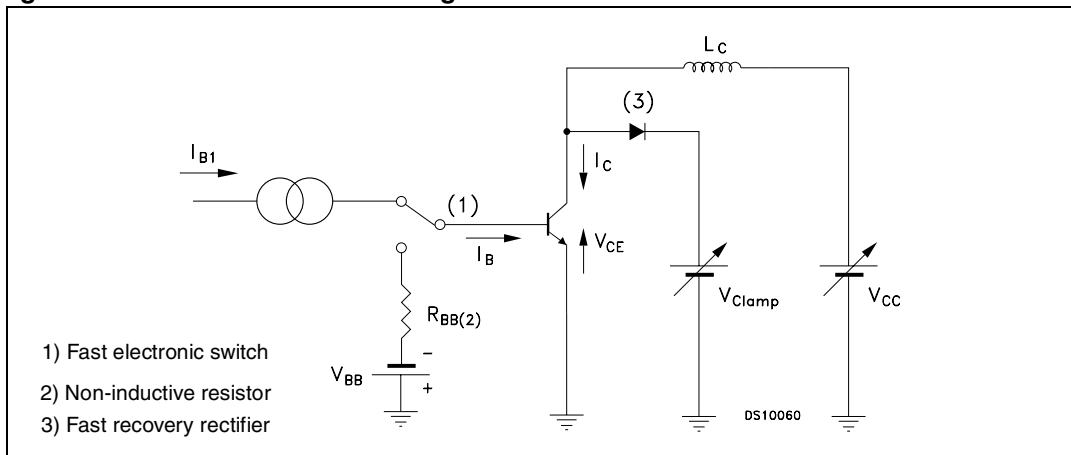


Figure 13. Inductive load switching test circuit

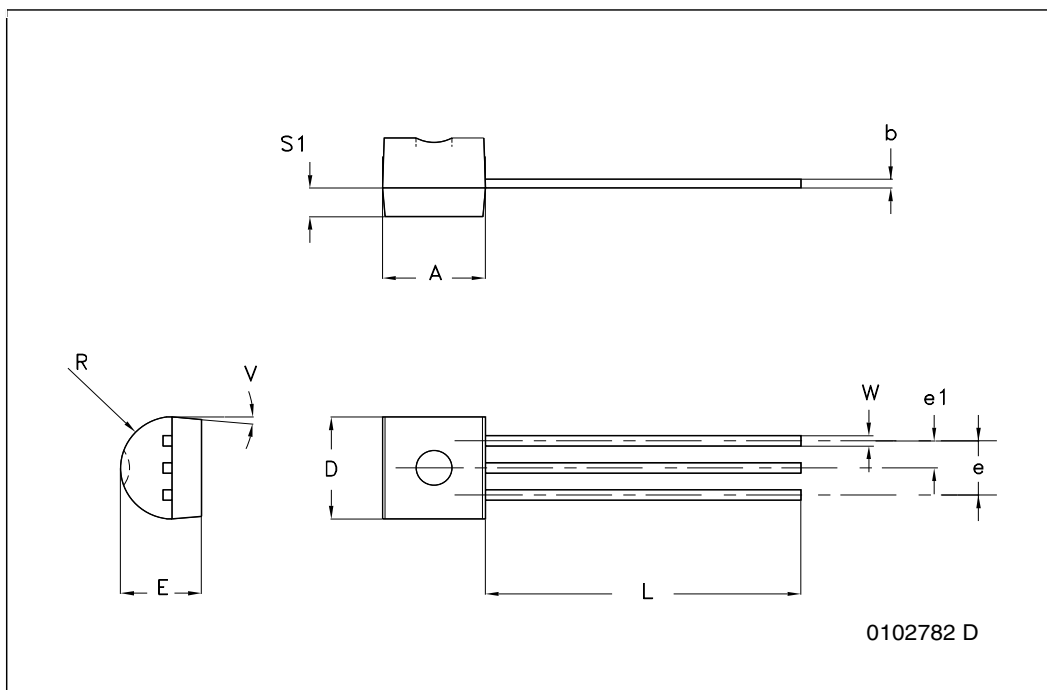


### 3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: [www.st.com](http://www.st.com)

**TO-92 bulk shipment mechanical data**

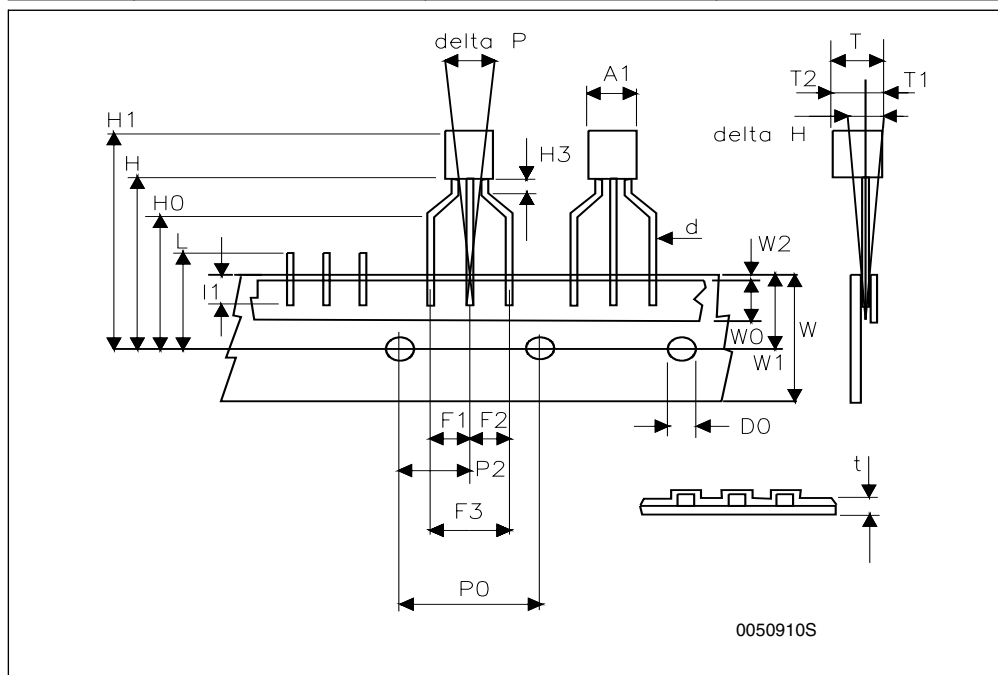
DIM.	mm.		
	MIN.	TYP	MAX.
A	4.32		4.95
b	0.36		0.51
D	4.45		4.95
E	3.30		3.94
e	2.41		2.67
e1	1.14		1.40
L	12.70		15.49
R	2.16		2.41
S1	0.92		1.52
W	0.41		0.56
V		5°	





## TO-92 ammopack shipment (suffix"-AP") mechanical data

Dim.	mm		
	Min	Typ	Max
A1			4.80
T			3.80
T1			1.60
T2			2.30
d			0.48
P0	12.50	12.70	12.90
P2	5.65	6.35	7.05
F1,F2	2.44	2.54	2.94
F3	4.98	5.08	5.48
delta H	-2.00		2.00
W	17.50	18.00	19.00
W0	5.70	6.00	6.30
W1	8.50	9.00	9.25
W2			0.50
H	18.50		20.50
H3	0.5	1	1.5
H0	15.50	16.00	16.50
H1			25.00
D0	3.80	4.00	4.20
t			0.90
L			11.00
I1	3.00		
delta P	-1.00		1.00



## 4 Revision history

**Table 5. Document revision history**

Date	Revision	Changes
02-Jul-2008	8	Added halogen-free molding compound package.

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