

## High voltage fast-switching NPN power transistor

### Features

- High voltage capability
- Low spread of dynamic parameters
- Very high switching speed

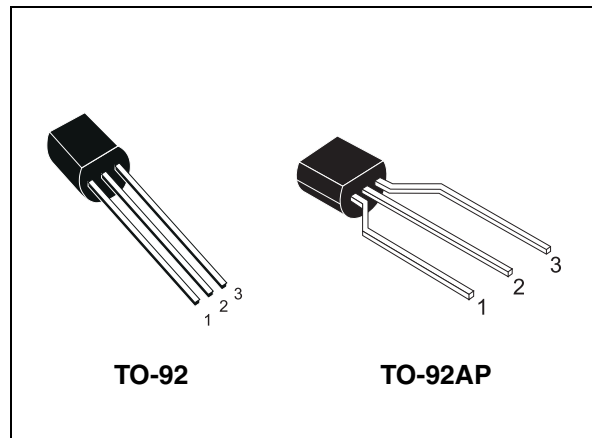
### Applications

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

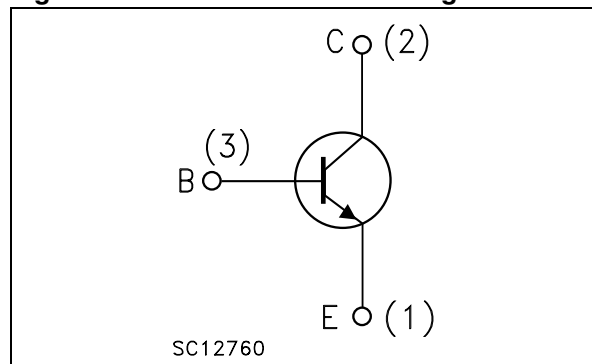
### Description

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 STBV42G and STBV42G-AP are supplied using halogen-free molding compound.



**Figure 1. Internal schematic diagram**



**Table 1. Device summary**

Order codes	Marking	Package	Packaging
STBV42	BV42	TO-92	Bulk
STBV42-AP	BV42	TO-92AP	Ammopack
STBV42G	BV42G	TO-92	Bulk
STBV42G-AP	BV42G	TO-92AP	Ammopack

# 1 Electrical ratings

**Table 2. 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 ( $I_C = 0$ )	9	V
$I_C$	Collector current	1	A
$I_{CM}$	Collector peak current ( $t_P < 5$ ms)	2	A
$I_B$	Base current	0.5	A
$I_{BM}$	Base peak current ( $t_P < 5$ ms)	1	A
$P_{TOT}$	Total dissipation at $T_C = 25$ °C	1	W
$T_{stg}$	Storage temperature	-65 to 150	°C
$T_J$	Max. operating junction temperature	150	

**Table 3. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thJC}$	Thermal resistance junction-case max	125	°C/W

## 2 Electrical characteristics

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

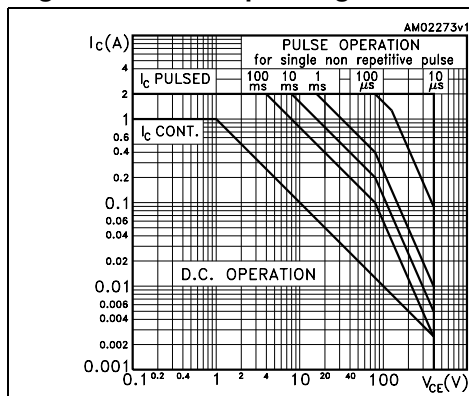
**Table 4. Electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{CES}$	Collector cut-off current ( $V_{BE} = 0$ )	$V_{CE} = 700\text{ V}$			1	mA
		$V_{CE} = 700\text{ V}$ $T_C = 125\text{ °C}$			5	mA
$I_{EBO}$	Emitter cut-off current ( $I_C = 0$ )	$V_{EB} = 9\text{ V}$			1	mA
$V_{CEO(sus)}^{(1)}$	Collector-emitter sustaining voltage ( $I_B = 0$ )	$I_C = 1\text{ mA}$	400			V
$V_{CE(sat)}^{(1)}$	Collector-emitter saturation voltage	$I_C = 0.25\text{ A}$ $I_B = 50\text{ mA}$		0.2	0.5	V
		$I_C = 0.5\text{ A}$ $I_B = 125\text{ mA}$		0.3	1	V
		$I_C = 0.75\text{ A}$ $I_B = 250\text{ mA}$		0.4	1.5	V
$V_{BE(sat)}^{(1)}$	Base-emitter saturation voltage	$I_C = 0.25\text{ A}$ $I_B = 50\text{ mA}$			1	V
		$I_C = 0.5\text{ A}$ $I_B = 125\text{ mA}$			1.2	V
$h_{FE}^{(1)}$	DC current gain	$I_C = 0.5\text{ mA}$ $V_{CE} = 2\text{ V}$	12			
		$I_C = 0.4\text{ A}$ $V_{CE} = 5\text{ V}$	10		30	
		$I_C = 0.8\text{ A}$ $V_{CE} = 5\text{ V}$	5		20	
$t_f$	Inductive Load Fall time	$I_C = 0.25\text{ A}$ $V_{clamp} = 300\text{ V}$ $I_{B1} = -I_{B2} = 50\text{ mA}$ $L = 3\text{ mH}$ <i>Figure 9</i>		0.3		$\mu\text{s}$

1. Pulse test: pulse duration  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$

### 2.1 Electrical characteristics (curves)

**Figure 2. Safe operating area**



**Figure 3. Derating curve**

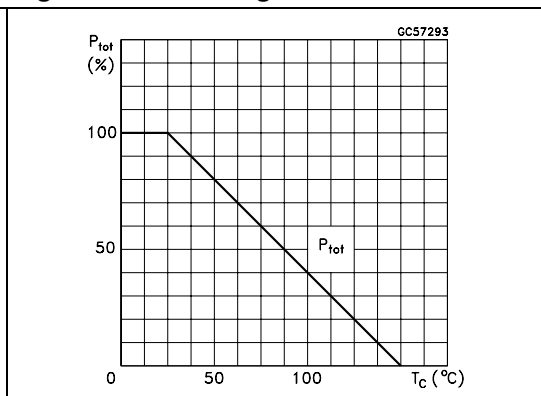


Figure 4. DC current gain ( $V_{CE} = 3\text{ V}$ )

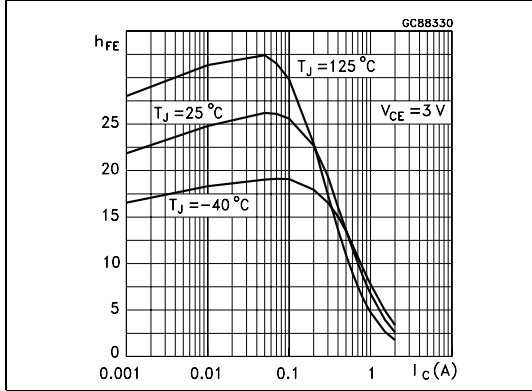


Figure 5. DC current gain ( $V_{CE} = 5\text{ V}$ )

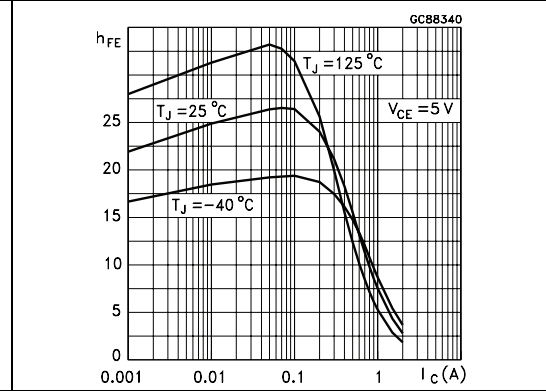


Figure 6. Collector-emitter saturation voltage

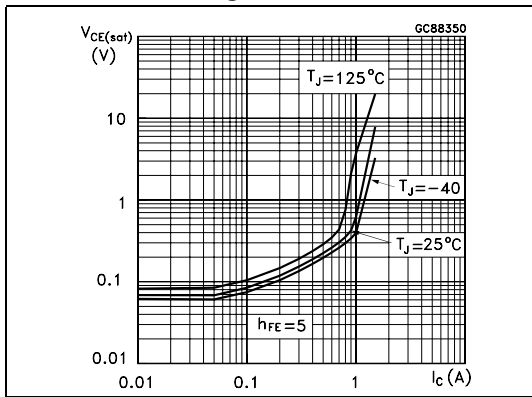


Figure 7. Base-emitter saturation voltage

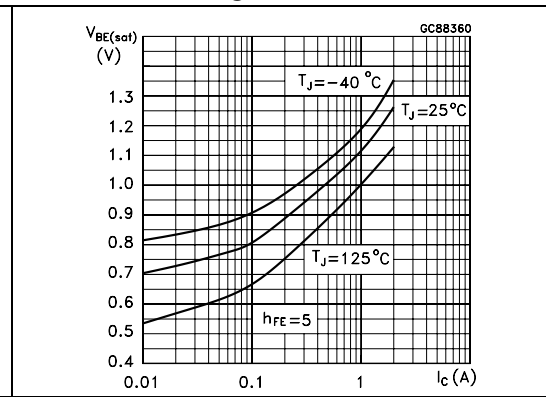
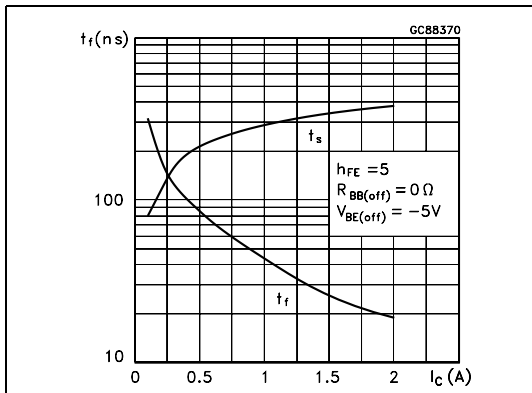
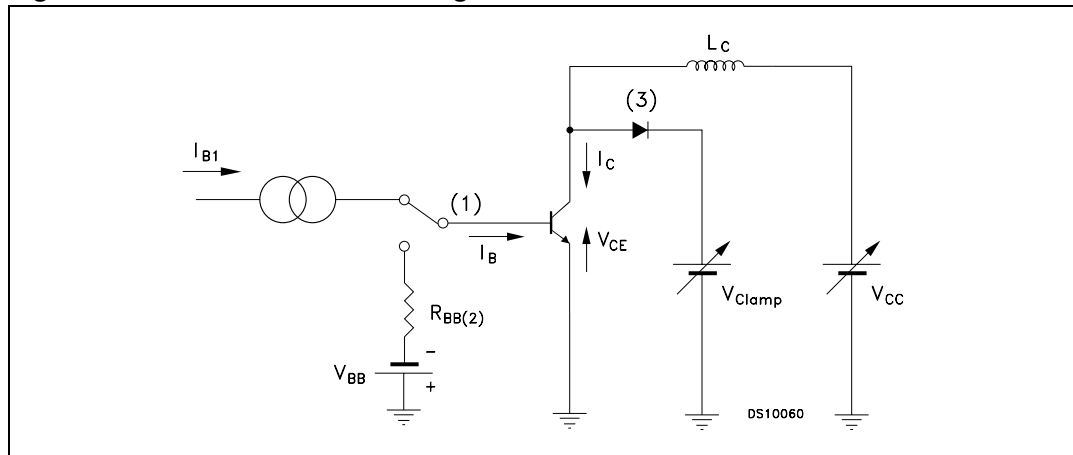


Figure 8. Switching time inductive load



## 2.2 Test circuit

Figure 9. Inductive load switching test circuit



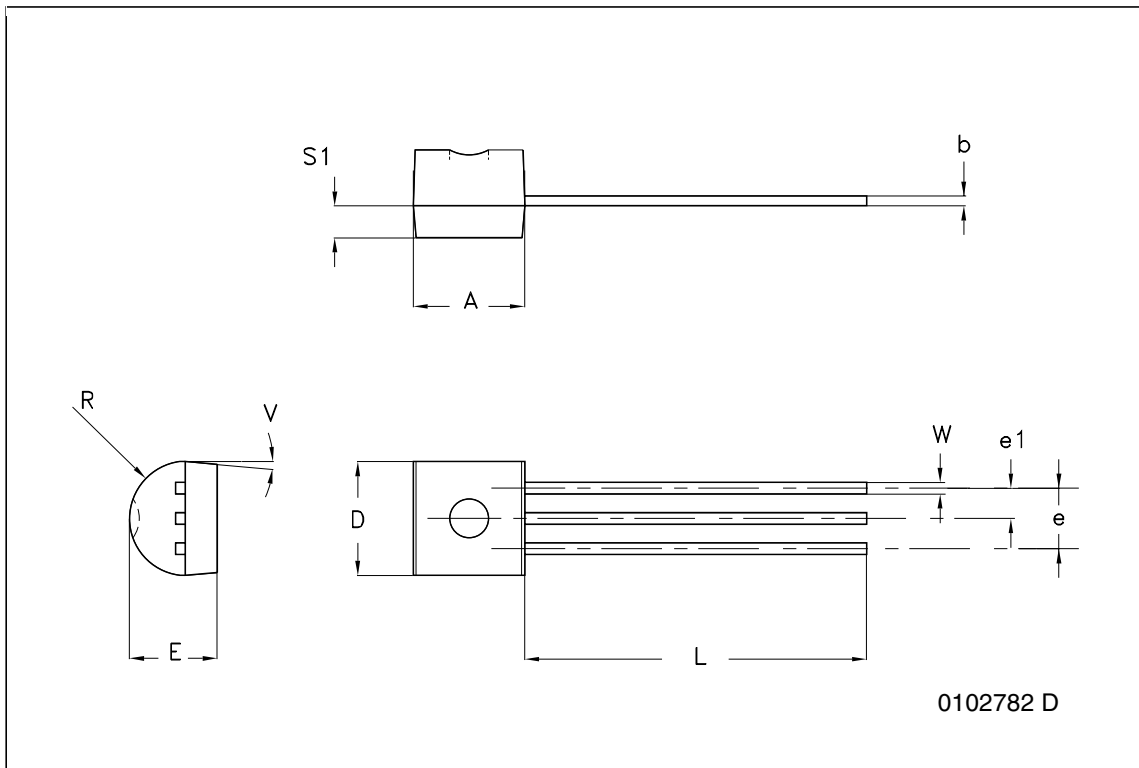
1. Fast electronic switch
2. Non-inductive resistor
3. Fast recovery rectifier

### 3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

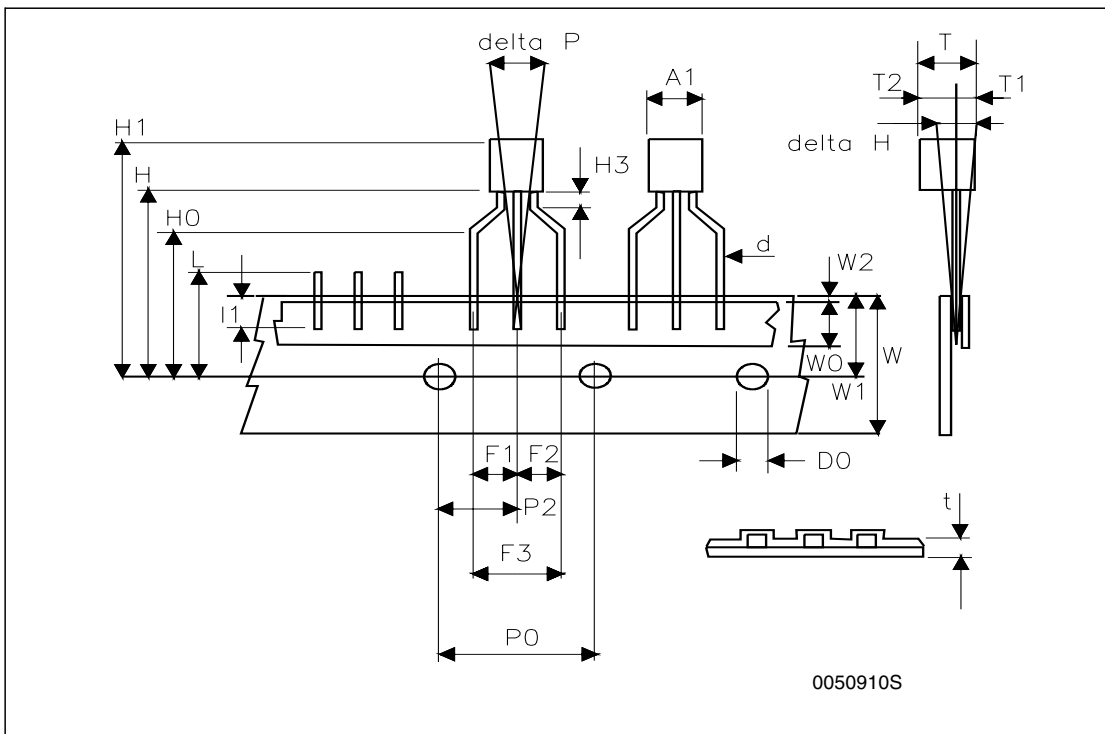
**TO-92 bulk shipment mechanical data**

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 ammpack 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
06-Sep-2001	3	Document migration, no content change.
03-Jul-2008	4	Added halogen-free molding compound package.
21-Oct-2008	5	Updated <a href="#">Table 2 on page 2</a> and <a href="#">Table 4 on page 3</a> .
29-Jul-2009	6	Updated safe operating area <a href="#">Figure 2 on page 3</a> .

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