

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.

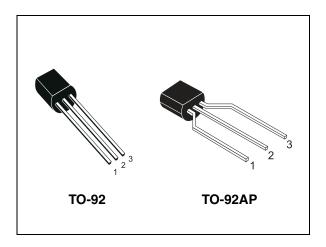


Figure 1. Internal schematic diagram

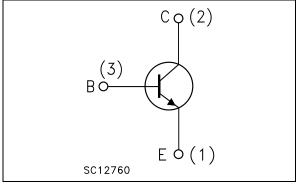


Table 1. Device summary

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	
۱ _C	Collector current	1	А	
I _{CM}	Collector peak current (t _P < 5 ms)	2	А	
Ι _Β	Base current	0.5	А	
I _{BM}	Base peak current (t _P < 5 ms)	1	А	
P _{TOT}	Total dissipation at $T_c = 25 \text{ °C}$	1	W	
T _{stg}	Storage temperature	-65 to 150	.⊃°	
TJ	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

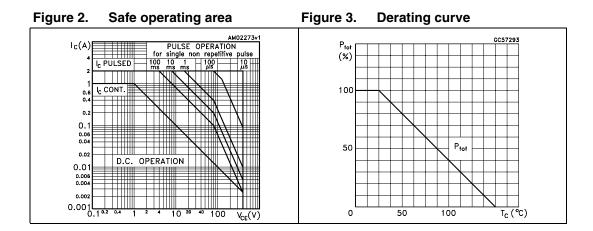
(T_C = 25 °C; unless otherwise specified)

Parameter	Test c	onditions	Min.	Тур.	Max.	Unit
Collector cut-off current	V _{CE} = 700 V				1	mA
(V _{BE} = 0)	V _{CE} = 700 V	T _C = 125 °C			5	mA
Emitter cut-off current $(I_{C} = 0)$	V _{EB} = 9 V				1	mA
Collector-emitter sustaining voltage (I _B = 0)	I _C = 1 mA		400			۷
Collector-emitter saturation	I _C = 0.25 A	l _B = 50 mA		0.2	0.5	V
	I _C = 0.5 A	I _B = 125 mA		0.3	1	V
Voltago	I _C = 0.75 A	I _B = 250 mA		0.4	1.5	V
Base-emitter saturation	I _C = 0.25 A	l _B = 50 mA			1	V
voltage	I _C = 0.5 A	I _B = 125 mA			1.2	V
	l _C = 0.5 mA	V _{CE} = 2 V	12			
DC current gain	I _C = 0.4 A	$V_{CE} = 5 V$	10		30	
	I _C = 0.8 A	$V_{CE} = 5 V$	5		20	
Inductive Load	I _C = 0.25 A	$V_{clamp} = 300 V$				
Fall time	$I_{B1} = -I_{B2} = 50$	mA	1	0.3		μs
	L = 3 mH	Figure 9	1			
	ParameterCollector cut-off current $(V_{BE} = 0)$ Emitter cut-off current $(I_C = 0)$ Collector-emitter sustaining voltage (I_B = 0)Collector-emitter saturation voltageBase-emitter saturation voltageDC current gainInductive Load	ParameterTest ofCollector cut-off current $V_{CE} = 700 \text{ V}$ $(V_{BE} = 0)$ $V_{CE} = 700 \text{ V}$ Emitter cut-off current $V_{EB} = 9 \text{ V}$ $(I_C = 0)$ $V_{EB} = 9 \text{ V}$ Collector-emitter sustaining voltage (I_B = 0) $I_C = 1 \text{ mA}$ Collector-emitter saturation voltage $I_C = 0.25 \text{ A}$ $I_C = 0.75 \text{ A}$ $I_C = 0.75 \text{ A}$ Base-emitter saturation voltage $I_C = 0.25 \text{ A}$ $I_C = 0.5 \text{ A}$ $I_C = 0.5 \text{ A}$ DC current gain $I_C = 0.5 \text{ mA}$ $I_C = 0.4 \text{ A}$ $I_C = 0.4 \text{ A}$ $I_C = 0.25 \text{ A}$ $I_C = 0.25 \text{ A}$ Inductive Load $I_C = 0.25 \text{ A}$ Fall time $I_{B1} = -I_{B2} = 50 \text{ P}$	ParameterTest conditionsCollector cut-off current $V_{CE} = 700 \text{ V}$ $(V_{BE} = 0)$ $V_{CE} = 700 \text{ V}$ Emitter cut-off current $V_{CE} = 700 \text{ V}$ $(I_C = 0)$ $V_{EB} = 9 \text{ V}$ Collector-emitter sustaining voltage (I_B = 0) $I_C = 1 \text{ mA}$ Collector-emitter saturation voltage $I_C = 0.25 \text{ A}$ $I_B = 50 \text{ mA}$ $I_C = 0.75 \text{ A}$ $I_B = 125 \text{ mA}$ $I_C = 0.75 \text{ A}$ $I_B = 250 \text{ mA}$ $I_C = 0.5 \text{ A}$ $I_B = 125 \text{ mA}$ $I_C = 0.5 \text{ A}$ $I_B = 125 \text{ mA}$ $I_C = 0.5 \text{ A}$ $I_B = 125 \text{ mA}$ $I_C = 0.5 \text{ A}$ $I_B = 50 \text{ mA}$ $I_C = 0.5 \text{ A}$ $I_B = 50 \text{ mA}$ $I_C = 0.5 \text{ A}$ $I_B = 50 \text{ mA}$ $I_C = 0.5 \text{ A}$ $I_B = 50 \text{ mA}$ $I_C = 0.5 \text{ A}$ $I_B = 50 \text{ mA}$ $I_C = 0.5 \text{ A}$ $I_B = 50 \text{ mA}$ $I_C = 0.5 \text{ A}$ $I_B = 50 \text{ mA}$ $I_C = 0.5 \text{ A}$ $I_B = 50 \text{ mA}$ $I_C = 0.5 \text{ A}$ $I_B = 50 \text{ mA}$ $I_C = 0.5 \text{ A}$ $I_B = 50 \text{ mA}$ $I_C = 0.5 \text{ A}$ $I_B = 50 \text{ mA}$ $I_C = 0.5 \text{ A}$ $V_{CE} = 5 \text{ V}$ $I_C = 0.8 \text{ A}$ $V_{CE} = 5 \text{ V}$ $I_{B1} = -I_{B2} = 50 \text{ mA}$	ParameterTest conditionsMin.Collector cut-off current $V_{CE} = 700 \text{ V}$ $V_{CE} = 125 \text{ °C}$ Emitter cut-off current $V_{CE} = 700 \text{ V}$ $T_C = 125 \text{ °C}$ Emitter cut-off current $V_{EB} = 9 \text{ V}$ $V_{EB} = 9 \text{ V}$ Collector-emitter sustaining voltage (I_B = 0) $I_C = 1 \text{ mA}$ 400Collector-emitter saturation voltage $I_C = 0.25 \text{ A}$ $I_B = 50 \text{ mA}$ $I_C = 0.5 \text{ A}$ $I_B = 125 \text{ mA}$ $I_C = 0.75 \text{ A}$ $I_B = 250 \text{ mA}$ Base-emitter saturation voltage $I_C = 0.25 \text{ A}$ $I_B = 50 \text{ mA}$ $I_C = 0.5 \text{ A}$ DC current gain $I_C = 0.5 \text{ mA}$ $V_{CE} = 2 \text{ V}$ 12DC current gain $I_C = 0.25 \text{ A}$ $V_{CE} = 5 \text{ V}$ 5Inductive Load $I_C = 0.25 \text{ A}$ $V_{clamp} = 300 \text{ V}$ $I_B = -1_{B2} = 50 \text{ mA}$	ParameterTest conditionsMin.Typ.Collector cut-off current $V_{CE} = 700 \text{ V}$ $V_{CE} = 700 \text{ V}$ $T_{C} = 125 \text{ °C}$ $V_{CE} = 700 \text{ V}$ Emitter cut-off current $V_{CE} = 700 \text{ V}$ $T_{C} = 125 \text{ °C}$ $V_{CE} = 700 \text{ V}$ $T_{C} = 125 \text{ °C}$ Emitter cut-off current $V_{EB} = 9 \text{ V}$ $V_{CE} = 700 \text{ V}$ $V_{CE} = 700 \text{ V}$ $V_{CE} = 100 \text{ V}$ Collector-emitter sustaining voltage (I_B = 0) $I_C = 1 \text{ mA}$ 400 0.2 Collector-emitter saturation voltage $I_C = 0.25 \text{ A}$ $I_B = 50 \text{ mA}$ 0.2 Base-emitter saturation voltage $I_C = 0.25 \text{ A}$ $I_B = 250 \text{ mA}$ 0.4 Base-emitter saturation voltage $I_C = 0.25 \text{ A}$ $I_B = 50 \text{ mA}$ 0.4 DC current gain $I_C = 0.5 \text{ mA}$ $V_{CE} = 2 \text{ V}$ 12 $I_C = 0.5 \text{ mA}$ $V_{CE} = 5 \text{ V}$ 10 0.3 Inductive Load $I_C = 0.25 \text{ A}$ $V_{clamp} = 300 \text{ V}$ 0.3	$\begin{array}{c c c c c c c c c c c c c c c c c c c $

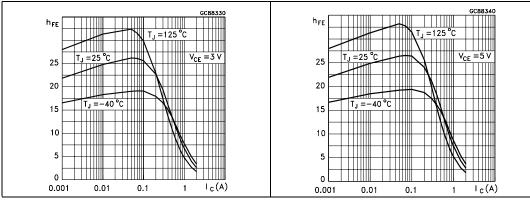
 Table 4.
 Electrical characteristics

1. Pulse test: pulse duration \leq 300 µs, duty cycle \leq 2 %

2.1 Electrical characteristics (curves)











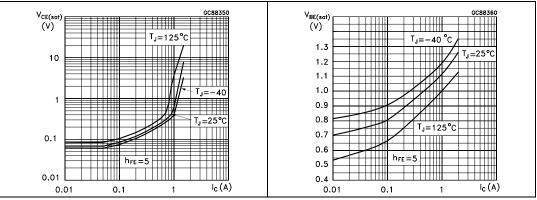
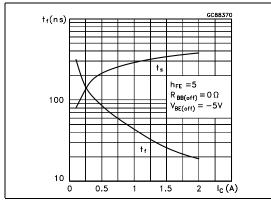


Figure 8. Switching time inductive load





2.2 Test circuit

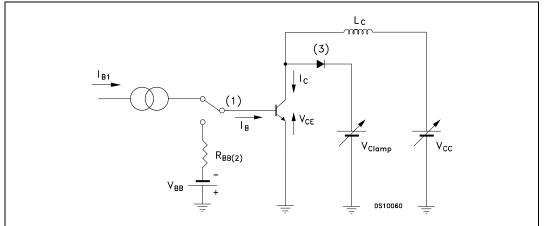


Figure 9. Inductive load switching test circuit

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



3 Package mechanical data

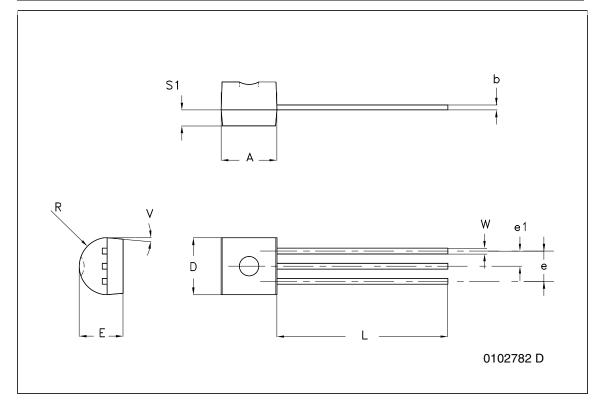
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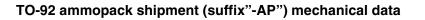
	TO-92 bulk shipment mechanical data			
DIM.		mm.		
DIM.	MIN.	ТҮР	MAX.	
А	4.32		4.95	
b	0.36		0.51	
D	4.45		4.95	
E	3.30		3.94	
е	2.41		2.67	
e1	1.14		1.40	
L	12.70		15.49	
R	2.16		2.41	
S1	0.92		1.52	
W	0.41		0.56	
V		5 ⁰		

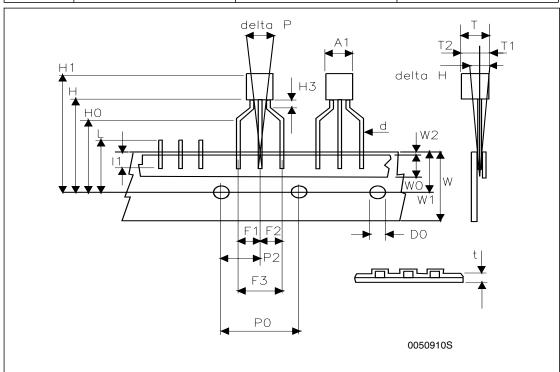




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Dim.	mm			
	Min	Тур	Мах	
A1			4.80	
Т			3.80	
T1			1.60	
T2			2.30	
d			0.48	
P0	12.50	12.70	12.90	
P2	5.65	6.35	7.05	
F1,F2	2.44	2.54	2.94	
F3	4.98	5.08	5.48	
delta H	-2.00		2.00	
W	17.50	18.00	19.00	
W0	5.70	6.00	6.30	
W1	8.50	9.00	9.25	
W2			0.50	
н	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	
11	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 Table 2 on page 2 and Table 4 on page 3.
29-Jul-2009	6	Updated safe operating area Figure 2 on page 3.



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