



BULT3N4

Medium voltage fast-switching NPN power transistor

Features

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

Application

- Electronic ballast 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 device is expressly designed for a new solution to be used in compact fluorescent lamps, where it is coupled with the BULT3P3, its complementary PNP transistor.

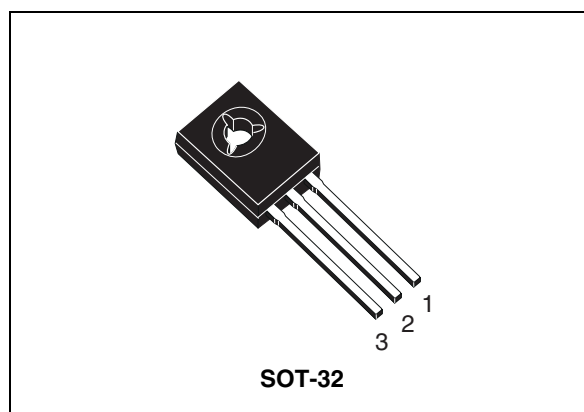


Figure 1. Internal schematic diagram

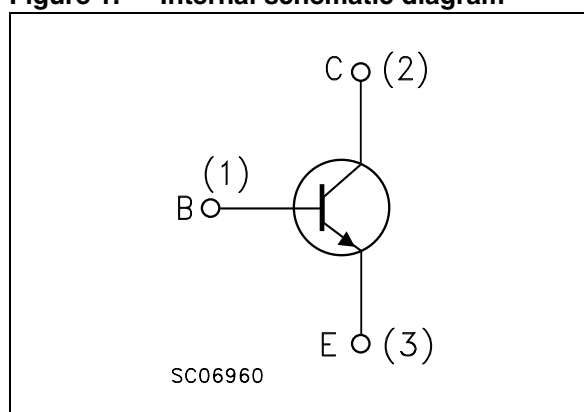


Table 1. Device summary

Order code	Marking	Package	Packing
BULT3N4	BULT3N4	SOT-32	Tube

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CES}	Collector-emitter voltage ($V_{BE} = 0$)	400	V
V_{CEO}	Collector-emitter voltage ($I_B = 0$)	200	V
V_{EBO}	Emitter-base voltage ($I_C = 0$, $I_B = 1.5$ A, $t_P < 100$ μ s, $T_j < 150^\circ\text{C}$)	$V_{(BR)EBO}$	V
I_C	Collector current	3	A
I_{CM}	Collector peak current ($t_P < 5$ ms)	6	A
I_B	Base current	1.5	A
I_{BM}	Base peak current ($t_P < 5$ ms)	3	A
P_{tot}	Total dissipation at $T_c = 25^\circ\text{C}$	32	W
T_{stg}	Storage temperature	-65 to 150	$^\circ\text{C}$
T_J	Max. operating junction temperature	150	$^\circ\text{C}$

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance junction-case max	3.9	$^\circ\text{C/W}$

2 Electrical characteristics

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

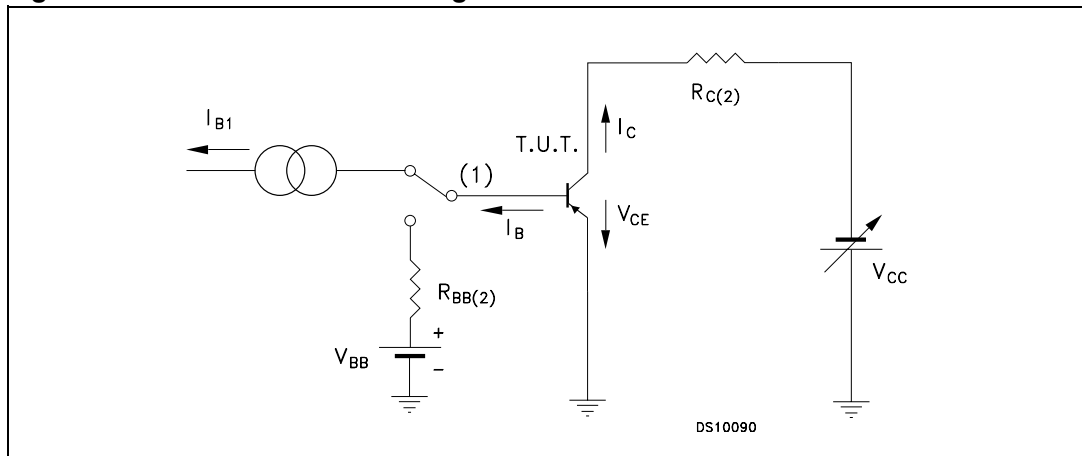
Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector cut-off current ($V_{\text{BE}} = 0$)	$V_{\text{CE}} = 400\text{ V}$ $V_{\text{CE}} = 400\text{ V}$ $T_{\text{C}} = 125\text{ °C}$			0.1 0.5	mA 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 ($I_{\text{B}} = 0$)	$I_{\text{C}} = 10\text{ mA}$	200			V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 0.7\text{ A}$ $I_{\text{B}} = 0.1\text{ A}$ $I_{\text{C}} = 1\text{ A}$ $I_{\text{B}} = 0.2\text{ A}$			0.4 0.5	V V
$V_{\text{BE(sat)}}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 0.5\text{ A}$ $I_{\text{B}} = 0.1\text{ A}$ $I_{\text{C}} = 1\text{ A}$ $I_{\text{B}} = 0.2\text{ A}$ $I_{\text{C}} = 2\text{ A}$ $I_{\text{B}} = 0.4\text{ A}$			1 1.1 1.3	V V V
h_{FE}	DC current gain	$I_{\text{C}} = 10\text{ mA}$ $V_{\text{CE}} = 5\text{ V}$ $I_{\text{C}} = 0.75\text{ A}$ $V_{\text{CE}} = 5\text{ V}$ $I_{\text{C}} = 2\text{ A}$ $V_{\text{CE}} = 5\text{ V}$	10 22 4	28	36	
t_{r} t_{s} t_{f}	Resistive load Rise time Storage time Fall time	$I_{\text{C}} = 0.7\text{ A}$ $V_{\text{CC}} = 150\text{ V}$ $I_{\text{B(on)}} = -I_{\text{B(off)}} = 140\text{ mA}$ $T_{\text{p}} = 30\text{ }\mu\text{s}$		80 1.2 100		ns μs ns
t_{s} t_{f}	Inductive load Storage time Fall time	$I_{\text{C}} = 1\text{ A}$ $I_{\text{B(on)}} = 100\text{ mA}$ $V_{\text{BE(off)}} = -5\text{ V}$ $R_{\text{BB}} = 0$ $V_{\text{clamp}} = 150\text{ V}$ $L = 1\text{ mH}$		120 50	200 90	ns ns

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

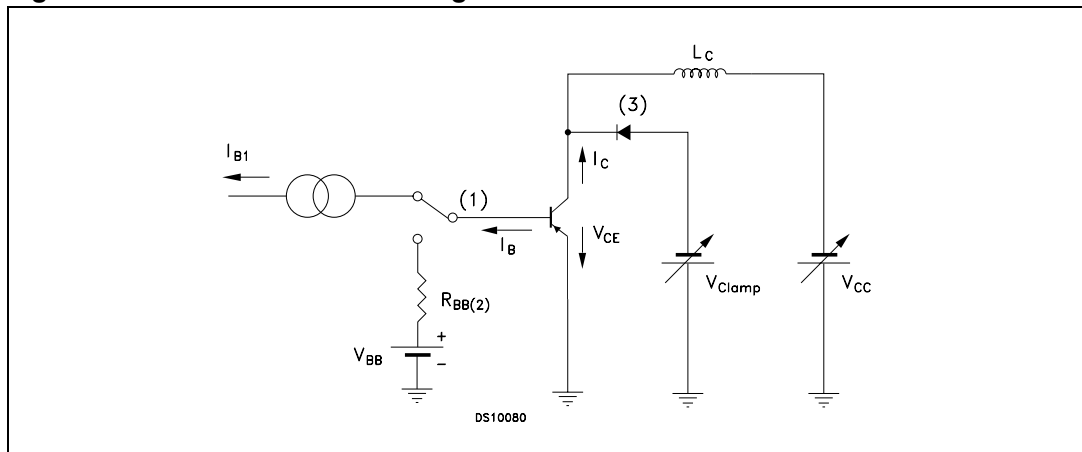
2.1 Test circuits

Figure 2. Resistive load switching test circuit



1. Fast electronic switch
2. Non-inductive resistor

Figure 3. Inductive load switching test circuit

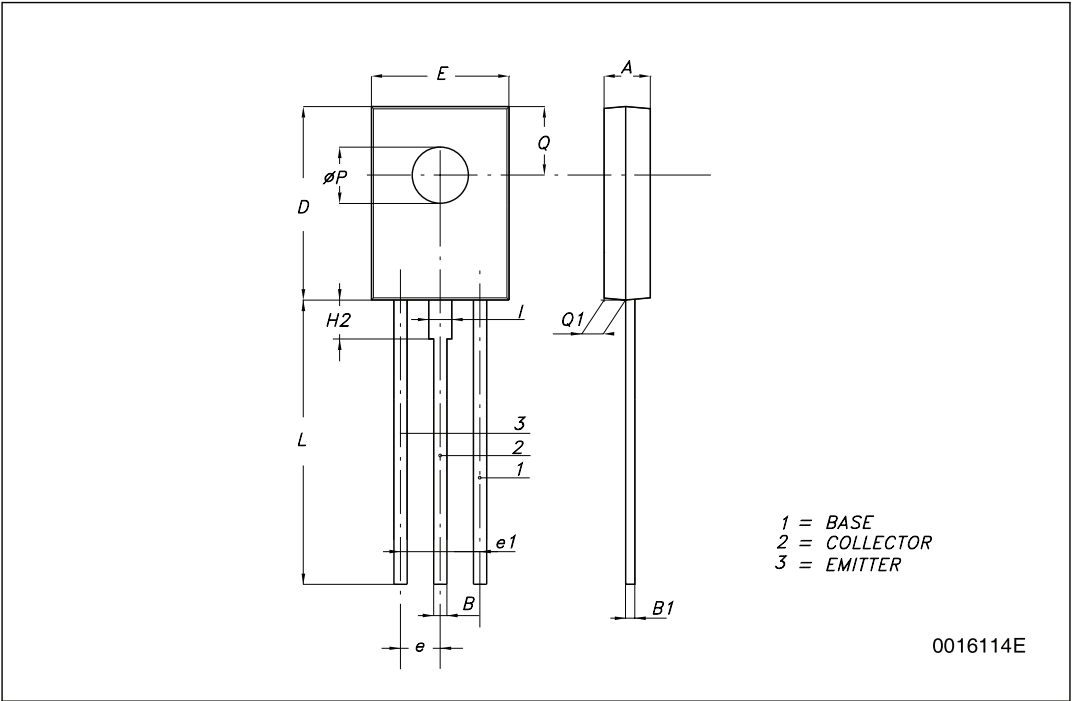


1. Fast electronic switch
2. Non-inductive resistor
3. Fast recovery rectifier

3 Package mechanical data

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SOT-32 (TO-126) MECHANICAL DATA			
DIM.	mm.		
	MIN.	TYP	MAX.
A	2.4		2.9
B	0.64		0.88
B1	0.39		0.63
D	10.5		11.05
E	7.4		7.8
e	2.04	2.29	2.54
e1	4.07	4.58	5.08
L	15.3		16
P	2.9		3.2
Q		3.8	
Q1	1		1.52
H2		2.15	
I		1.27	



4 Revision history

Table 5. Document revision history

Date	Revision	Changes
25-Sep-2009	1	Initial release.

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