

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
- Integrated antiparallel collector-emitter diode

Applications

- 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.

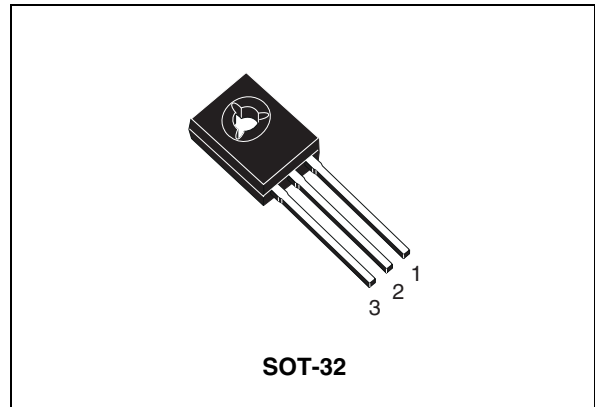


Figure 1. Internal schematic diagram

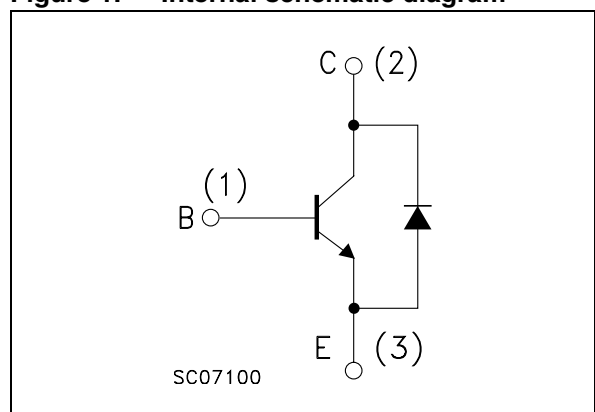


Table 1. Device summary

Order code	Marking	Package	Packaging
ST13003D-K	13003D	SOT-32	Bag

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 ($I_C = 0$, $I_B = 0.75$ A, $t_P < 10$ μ s)	$V_{(BR)EBO}$	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 $T_C = 25$ °C	40	W
T_{STG}	Storage temperature	-55 to 150	°C
T_J	Max. operating junction temperature	150	°C

2 Electrical characteristics

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

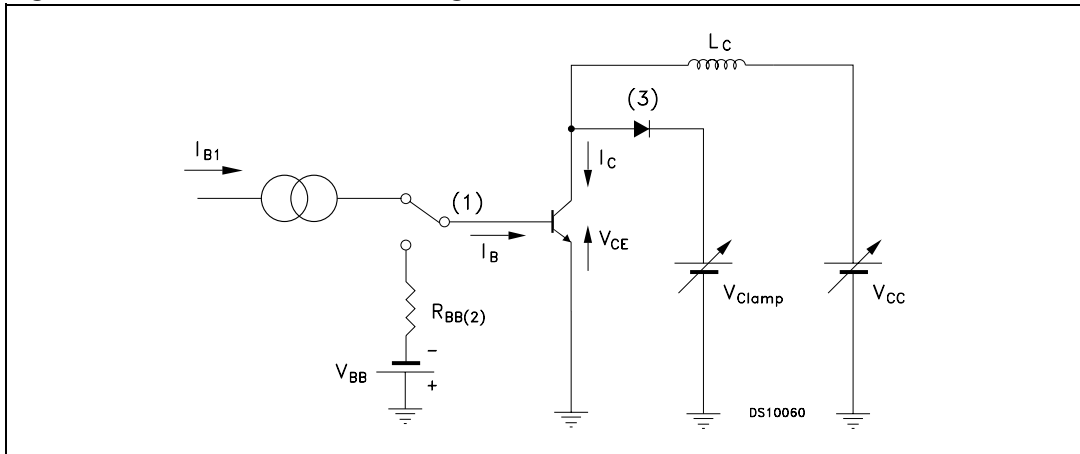
Table 3. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector cut-off current ($V_{\text{BE}} = 0$)	$V_{\text{CE}} = 700\text{ V}$ $V_{\text{CE}} = 700\text{ V}$ $T_{\text{c}} = 125\text{ °C}$			1 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 ($I_{\text{B}} = 0$)	$I_{\text{C}} = 10\text{ mA}$	400			V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 0.5\text{ A}$ $I_{\text{B}} = 0.1\text{ A}$ $I_{\text{C}} = 1\text{ A}$ $I_{\text{B}} = 0.25\text{ A}$ $I_{\text{C}} = 1.5\text{ A}$ $I_{\text{B}} = 0.5\text{ A}$			0.5 1 3	V V V
$V_{\text{BE(sat)}}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 0.5\text{ A}$ $I_{\text{B}} = 0.1\text{ A}$ $I_{\text{C}} = 1\text{ A}$ $I_{\text{B}} = 0.25\text{ A}$			1 1.2	V V
h_{FE}	DC current gain	$I_{\text{C}} = 0.5\text{ A}$ $V_{\text{CE}} = 2\text{ V}$ $I_{\text{C}} = 1\text{ A}$ $V_{\text{CE}} = 2\text{ V}$	8 5		20 25	
t_{r} t_{s} t_{f}	Resistive load Rise time Storage time Fall time	$V_{\text{CC}} = 125\text{ V}$ $I_{\text{C}} = 1\text{ A}$ $I_{\text{B1}} = 0.2\text{ A}$ $I_{\text{B2}} = -0.2\text{ A}$ $T_{\text{p}} = 25\text{ }\mu\text{s}$			1 4 0.7	μs μs μs
t_{s}	Inductive load Storage time	$I_{\text{C}} = 1\text{ A}$ $I_{\text{B1}} = 0.2\text{ A}$ $V_{\text{BE}} = -5\text{ V}$ $L = 50\text{ mH}$ $V_{\text{Clamp}} = 300\text{ V}$		0.8		μs
V_{F}	Diode forward voltage	$I_{\text{F}} = 0.5\text{ A}$			1.5	V

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

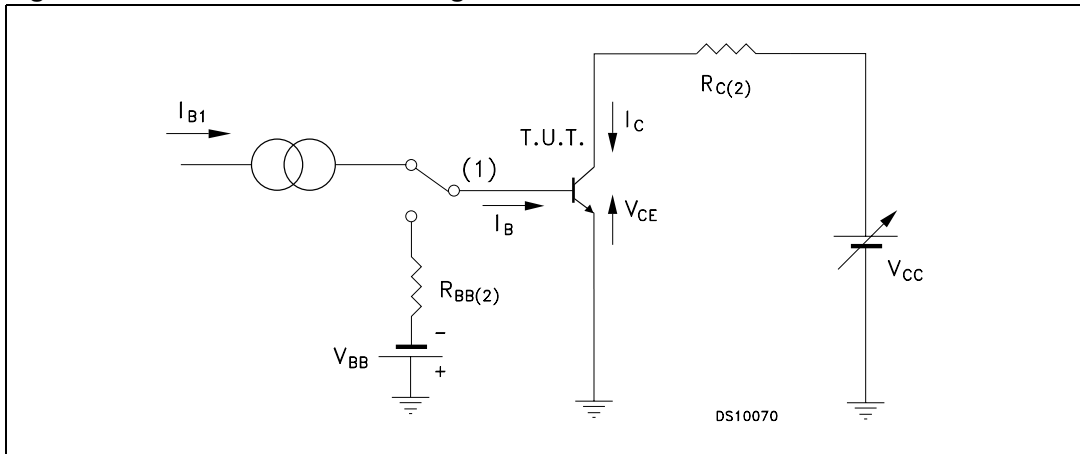
2.1 Test circuits

Figure 2. Inductive load switching test circuit



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

Figure 3. Resistive load switching test circuit



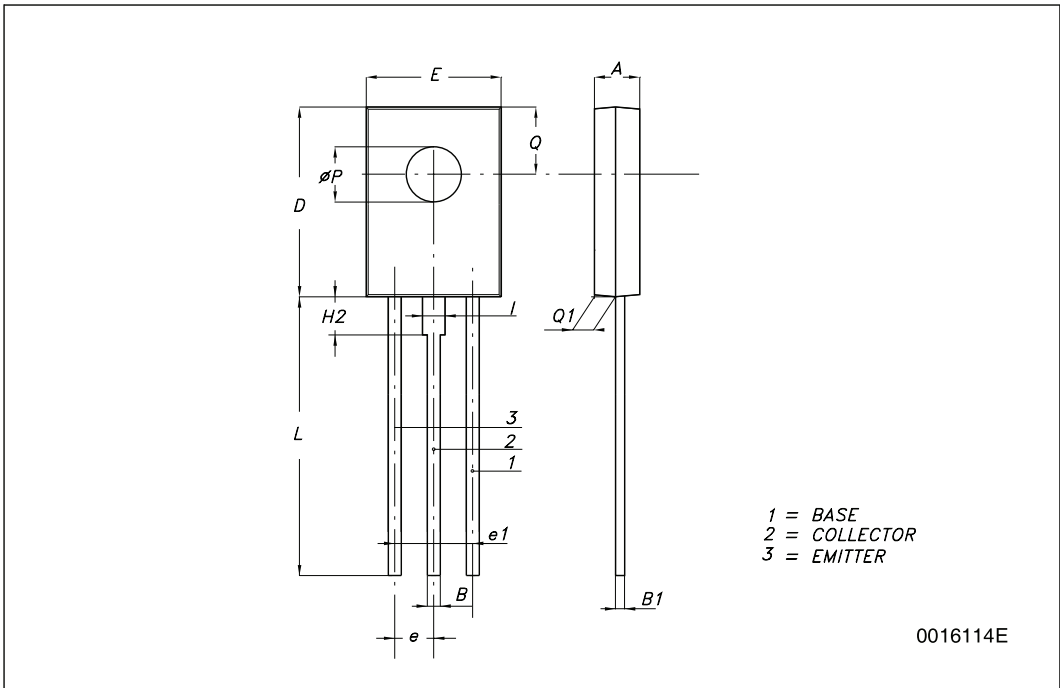
- 1. Fast electronic switch
- 2. Non-inductive resistor

3 Package mechanical data

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

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 4. Document revision history

Date	Revision	Changes
15-Nov-2007	1	Initial release.
08-Sep-2009	2	Updated packaging information Table 1 on page 1 .

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