



# ST13003DN

## High voltage fast-switching NPN power transistor

Preliminary data

### Features

- High voltage capability
- Low spread of dynamic parameters
- Very high switching speed
- Integrated free-wheeling diode

### Application

- Compact fluorescent lamps (CFLs)

### 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.

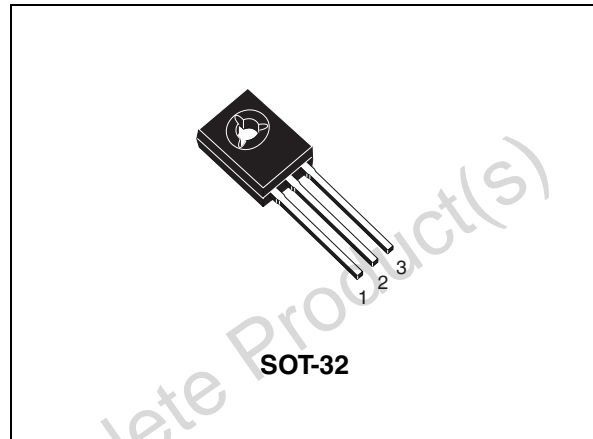


Figure 1. Internal schematic diagram

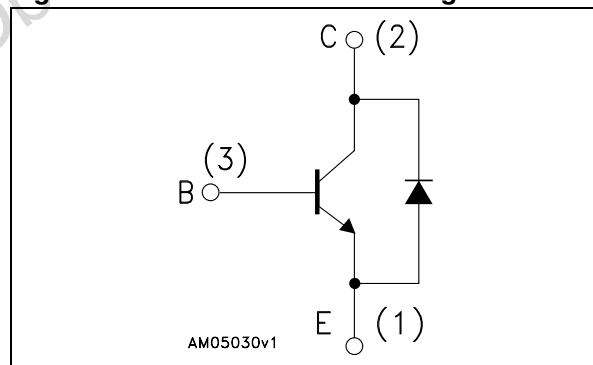


Table 1. Device summary

Order code	Marking	Package	Packaging
ST13003DN	13003DN	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
$V_{EBO}$	Collector-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	20	W
$T_{STG}$	Storage temperature	-55 to 150	°C
$T_J$	Max. operating junction temperature	150	

**Table 3. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thJC}$	Thermal resistance junction-case	6.25	°C/W

## 2 Electrical characteristics

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

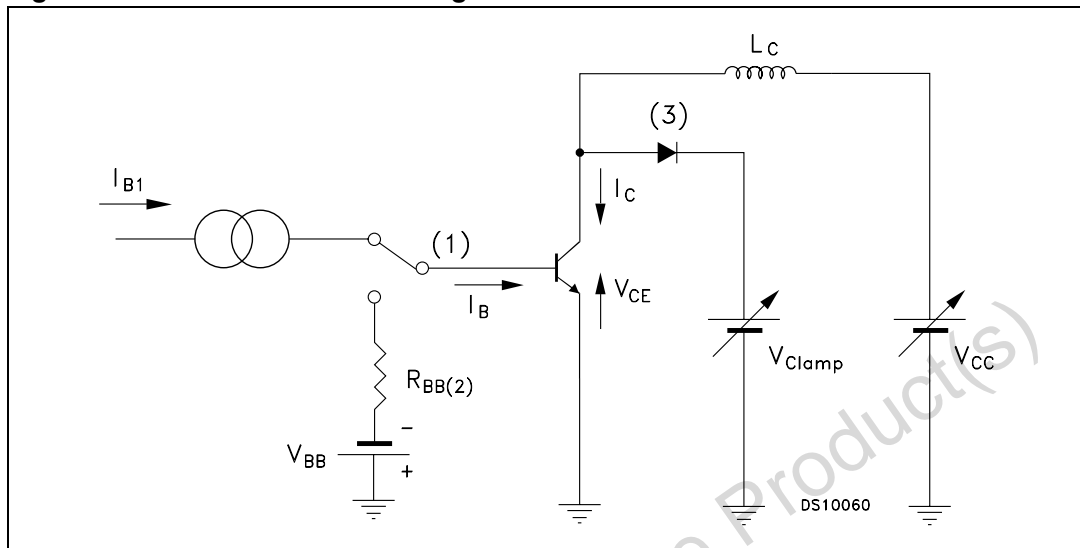
**Table 4. Electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{\text{CES}}$	Collector cut-off current ( $V_{\text{BE}} = 0$ )	$V_{\text{CE}} = 700\text{ V}$ $V_{\text{CE}} = 700\text{ V}$ $T_{\text{C}} = 125\text{ °C}$			1 5	mA mA
$I_{\text{EBO}}$	Emitter cut-off current ( $I_{\text{C}} = 0$ )	$V_{\text{EB}} = 9\text{ V}$			1	mA
$V_{\text{CEO(sus)}}^{(1)}$	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	$I_{\text{C}} = 0.5\text{ A}$ $I_{\text{B}} = 125\text{ mA}$ $I_{\text{C}} = 1\text{ A}$ $I_{\text{B}} = 330\text{ mA}$			0.7 1.2	V V
$V_{\text{BE(sat)}}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 0.5\text{ A}$ $I_{\text{B}} = 125\text{ mA}$ $I_{\text{C}} = 1\text{ A}$ $I_{\text{B}} = 330\text{ mA}$			1.2 1.3	V V
$h_{\text{FE}}$	DC current gain	$I_{\text{C}} = 0.5\text{ A}$ , $V_{\text{CE}} = 2\text{ V}$ $I_{\text{C}} = 1\text{ A}$ $V_{\text{CE}} = 10\text{ V}$	6 5		18 15	
$t_{\text{s}}$ $t_{\text{f}}$	Inductive Load Storage time Fall time	$I_{\text{C}} = 0.4\text{ A}$ $V_{\text{clamp}} = 300\text{ V}$ $I_{\text{B(on)}} = -I_{\text{B(off)}} = 80\text{ mA}$ $V_{\text{BB(off)}} = -5\text{ V}$ <i>Figure 2</i>		2.5 180		$\mu\text{s}$ ns
$V_{\text{F}}$	Diode forward voltage	$I_{\text{F}} = 350\text{ mA}$		1.5		V

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

## 2.1 Test circuit

Figure 2. Inductive load switching test circuit



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

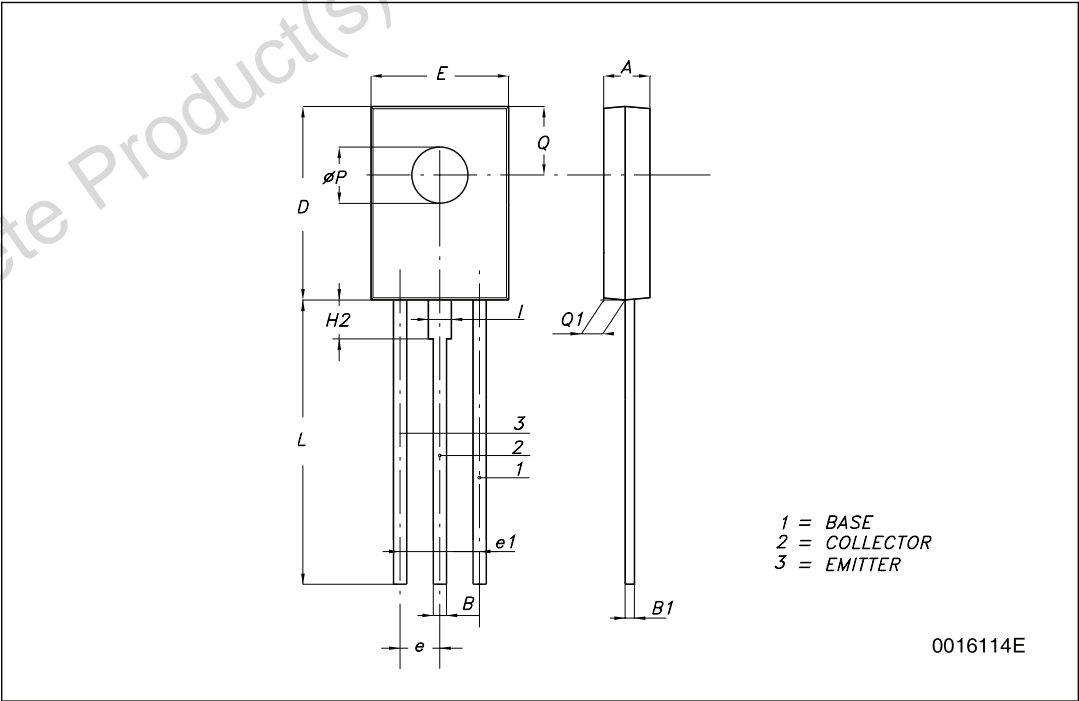
### 3 Package mechanical data

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Obsolete Product(s) - Obsolete Product(s)

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-Feb-2010	1	First release.

Obsolete Product(s) - Obsolete Product(s)

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