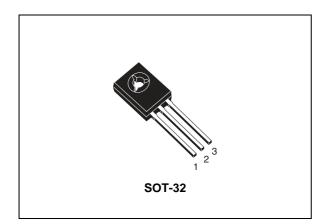
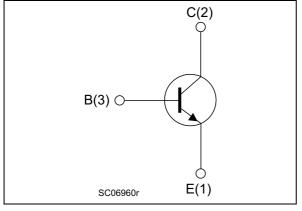


# ST13003, ST13003-K

# High voltage fast-switching NPN power transistor



## Figure 1. Internal schematic diagram



### **Datasheet - production data**

## **Features**

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

## **Applications**

- Electronic ballast for fluorescent lighting (CFL)
- 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.

### Table 1. Device summary

Part number	Marking	Package	Packaging
ST13003	13003	SOT-32	Tube
ST13003-K	13003	SOT-32	Bag

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This is information on a product in full production.

# 1 Electrical ratings

Symbol	Parameter	Value	Unit
V <sub>CES</sub>	Collector-emitter voltage ( $V_{BE} = 0$ )	700	V
V <sub>CEO</sub>	Collector-emitter voltage (I <sub>B</sub> = 0)	400	V
V <sub>EBO</sub>	Emitter-base voltage (I <sub>C</sub> = 0, I <sub>B</sub> = 0.75 A, t <sub>P</sub> < 10 $\mu$ s)	V <sub>(BR)EBO</sub>	V
۱ <sub>C</sub>	Collector current	1.5	А
I <sub>CM</sub>	Collector peak current (t <sub>P</sub> < 5 ms)	3	Α
Ι <sub>Β</sub>	Base current	0.75	Α
I <sub>BM</sub>	Base peak current (t <sub>P</sub> < 5 ms)	1.5	А
P <sub>TOT</sub>	Total dissipation at $T_C = 25 \ ^{\circ}C$	40	W
T <sub>STG</sub>	Storage temperature	-55 to 150	°C
TJ	Operating junction temperature	-40 to 150	°C

Table 2. Absolute maximum ratings	Table 2.	Absolute	maximum	ratings
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### Table 3. Thermal data

Symbol	Parameter	Value	Unit
R <sub>thJC</sub>	Thermal resistance junction-case max.	3.1	°C/W



# 2 Electrical characteristics

 $T_{case} = 25 \ ^{\circ}C$  unless otherwise specified.

Symbol	Parameter	Test cor	nditions	Min.	Тур.	Max.	Unit
I <sub>CES</sub>	Collector cut-off current $(V_{BE} = 0)$	V <sub>CE</sub> = 700 V V <sub>CE</sub> = 700 V	T <sub>C</sub> = 125 °C			1 5	mA mA
V <sub>(BR)EBO</sub>	Emitter-Base breakdown voltage (I <sub>C</sub> = 0)	l <sub>E</sub> = 10 mA		9		18	V
V <sub>CEO(sus)</sub> <sup>(1)</sup>	Collector-emitter sustaining voltage (I <sub>B</sub> = 0)	l <sub>C</sub> = 10 mA		400			V
V <sub>CE(sat)</sub> <sup>(1)</sup>	Collector-emitter saturation voltage	$I_{C} = 0.5 \text{ A}$ $I_{C} = 1 \text{ A}$ $I_{C} = 1.5 \text{ A}$	I <sub>B</sub> = 0.25 A			0.5 1 1.5	V V V
V <sub>BE(sat)</sub> <sup>(1)</sup>	Base-emitter saturation voltage	I <sub>C</sub> = 0.5 A I <sub>C</sub> = 1 A	-			1 1.2	V V
h <sub>FE</sub>	DC current gain	I <sub>C</sub> = 0.5 A I <sub>C</sub> = 1 A		8 5		20 25	
t <sub>r</sub> t <sub>s</sub> t <sub>f</sub>	Resistive load Rise time Storage time Fall time	$V_{CC} = 125 V$ $I_{B1} = 0.2 A$ $t_p = 25 \mu s$	-			1 4 0.7	μs μs μs
t <sub>s</sub>	Inductive load Storage time	$I_{C} = 1 A$ $V_{BE} = -5 V$ $V_{Clamp} = 300 V$	L = 50  mH		0.8		μs

Table 4	Electrical	characteristics
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1. Pulsed duration = 300  $\mu$ s, duty cycle  $\leq$  1.5%



GC57293

T<sub>C</sub> (℃)

 $I_{C}(A)$ 

 $T_J = 25 °C$ 

1

#### 2.1 **Electrical characteristics (curves)**

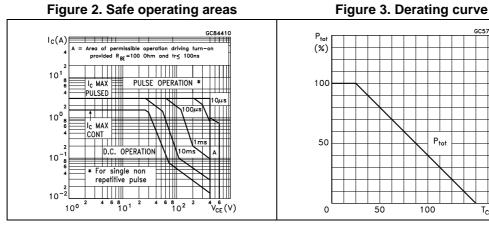


Figure 4. Output characteristics

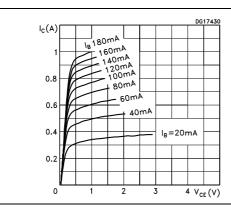


Figure 5. Reverse biased safe operating areas

100

 $\mathsf{P}_{\mathsf{tot}}$ 

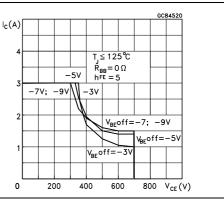


Figure 7. DC current gain (V<sub>CE</sub> = 5 V)

Figure 6. DC current gain ( $V_{CE} = 1 V$ )

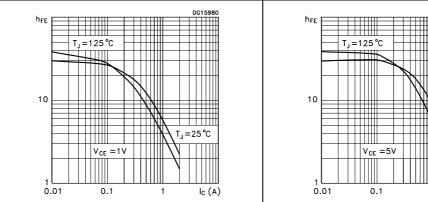
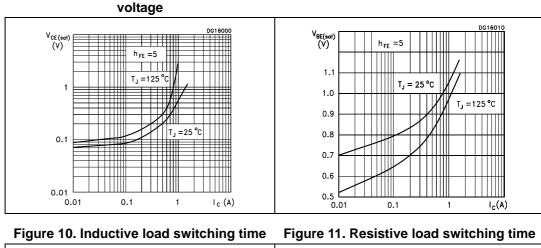
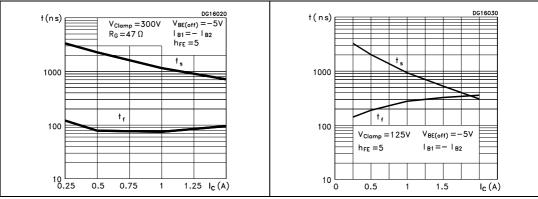




Figure 9. Base-emitter saturation voltage

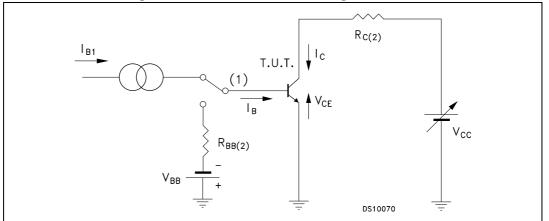
Figure 8. Collector-emitter saturation





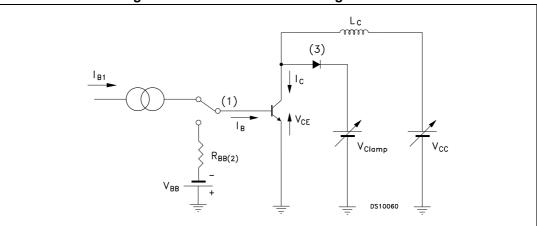


# 2.2 Test circuits



### Figure 12. Resistive load switching test circuit

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



## Figure 13. Inductive load switching test circuit

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



# 3 Package mechanical data

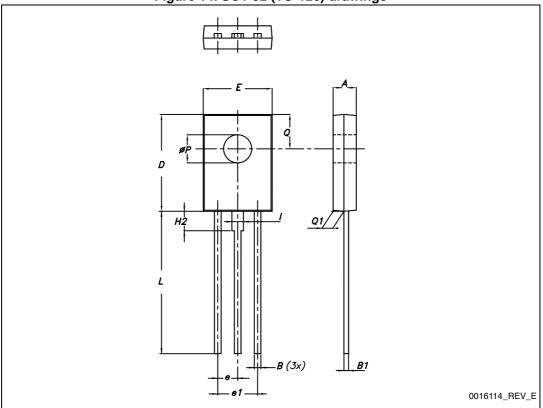
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK<sup>®</sup>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

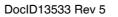


Dim.	mm.			
Dini.	Min.	Тур.	Max.	
А	2.4		2.9	
В	0.64		0.88	
B1	0.39		0.63	
D	10.5		11.05	
E	7.4		7.8	
е	2.04	2.29	2.54	
e1	4.07	4.58	5.08	
L	15.3		16	
Р	2.9		3.2	
Q		3.8		
Q1	1		1.52	
H2		2.15		
		1.27		

Table 5. SOT-32 (TO-126) mechanical data

## Figure 14. SOT-32 (TO-126) drawings







# 4 Revision history

Date	Revision	Changes
23-May-2007	1	Initial release.
09-Jul-2008	2	Added Table 1 on page 1.
15-Dec-2009	3	Added Table 3: Thermal data on page 2.
15-Jun-2011	4	Modified: Table 2
18-Jun-2013	5	Added device ST13003.

## Table 6. Document revision history



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