

ST13003, ST13003-K

High voltage fast-switching NPN power transistor

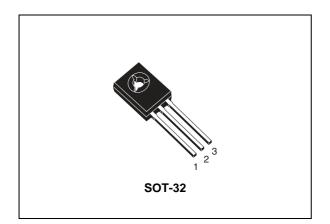
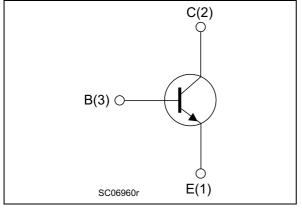


Figure 1. Internal schematic diagram



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 _{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
۱ _C	Collector current	1.5	А
I _{CM}	Collector peak current (t _P < 5 ms)	3	Α
Ι _Β	Base current	0.75	Α
I _{BM}	Base peak current (t _P < 5 ms)	1.5	А
P _{TOT}	Total dissipation at $T_C = 25 \ ^{\circ}C$	40	W
T _{STG}	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 _{thJC}	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 _{CES}	Collector cut-off current $(V_{BE} = 0)$	V _{CE} = 700 V V _{CE} = 700 V	T _C = 125 °C			1 5	mA mA
V _{(BR)EBO}	Emitter-Base breakdown voltage (I _C = 0)	l _E = 10 mA		9		18	V
V _{CEO(sus)} ⁽¹⁾	Collector-emitter sustaining voltage (I _B = 0)	l _C = 10 mA		400			V
V _{CE(sat)} ⁽¹⁾	Collector-emitter saturation voltage	$I_{C} = 0.5 \text{ A}$ $I_{C} = 1 \text{ A}$ $I_{C} = 1.5 \text{ A}$	I _B = 0.25 A			0.5 1 1.5	V V V
V _{BE(sat)} ⁽¹⁾	Base-emitter saturation voltage	I _C = 0.5 A I _C = 1 A	-			1 1.2	V V
h _{FE}	DC current gain	I _C = 0.5 A I _C = 1 A		8 5		20 25	
t _r t _s t _f	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 _s	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 μ s, duty cycle \leq 1.5%



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T_C (℃)

 $I_{C}(A)$

 $T_J = 25 °C$

1

2.1 **Electrical characteristics (curves)**

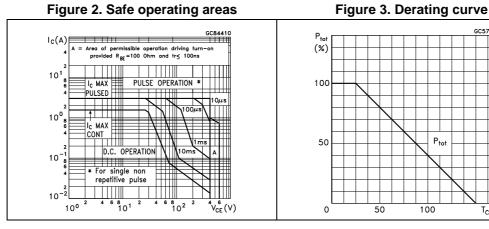


Figure 4. Output characteristics

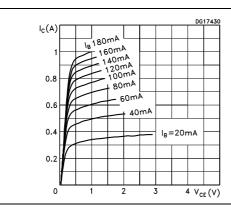


Figure 5. Reverse biased safe operating areas

100

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

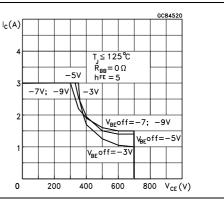


Figure 7. DC current gain (V_{CE} = 5 V)

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

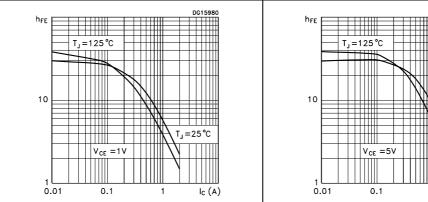
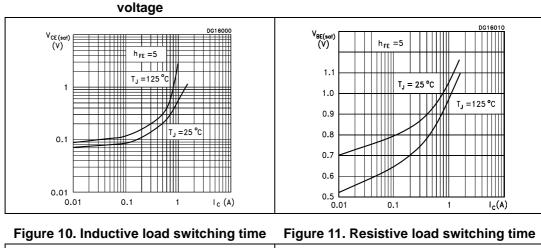
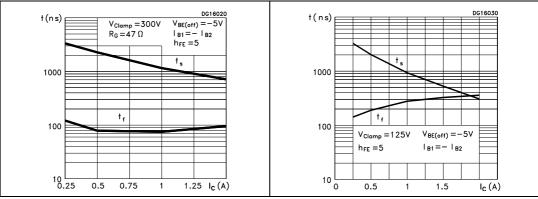




Figure 9. Base-emitter saturation voltage

Figure 8. Collector-emitter saturation







2.2 Test circuits

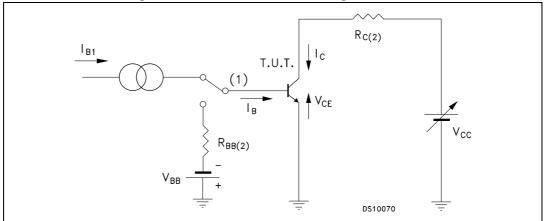


Figure 12. Resistive load switching test circuit

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

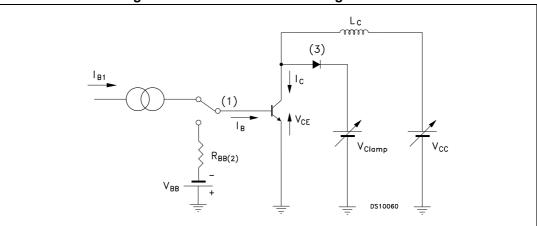


Figure 13. Inductive load switching test circuit

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



3 Package mechanical data

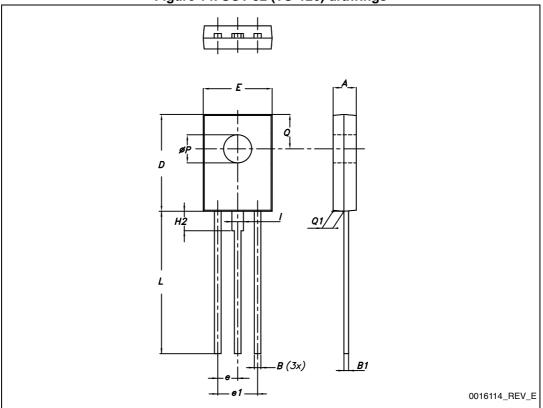
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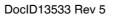


Dim.	mm.			
Dini.	Min.	Тур.	Max.	
А	2.4		2.9	
В	0.64		0.88	
B1	0.39		0.63	
D	10.5		11.05	
E	7.4		7.8	
е	2.04	2.29	2.54	
e1	4.07	4.58	5.08	
L	15.3		16	
Р	2.9		3.2	
Q		3.8		
Q1	1		1.52	
H2		2.15		
		1.27		

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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