High voltage fast-switching NPN power transistor

Datasheet - production data

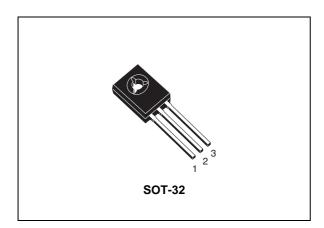
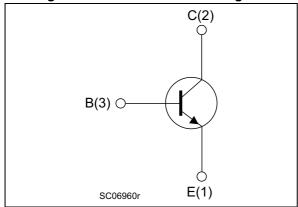


Figure 1. Internal schematic diagram



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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Electrical ratings ST13003, ST13003-K

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	٧
V _{EBO}	Emitter-base voltage ($I_C = 0$, $I_B = 0.75$ A, $t_P < 10 \mu$ s)	V _{(BR)EBO}	٧
I _C	Collector current	1.5	Α
I _{CM}	Collector peak current (t _P < 5 ms)	3	Α
I _B	Base current	0.75	Α
I _{BM}	Base peak current (t _P < 5 ms)	1.5	Α
P _{TOT}	Total dissipation at T _C = 25 °C	40	W
T _{STG}	Storage temperature	-55 to 150	°C
T _J	Operating junction temperature	-40 to 150	°C

Table 3. Thermal data

Symbo	l Parameter	Value	Unit
R _{thJC}	Thermal resistance junction-case max.	3.1	°C/W



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2 Electrical characteristics

 T_{case} = 25 °C unless otherwise specified.

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions		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 $(I_C = 0)$	I _E = 10 mA		9		18	V
V _{CEO(sus)} (1)	Collector-emitter sustaining voltage (I _B = 0)	I _C = 10 mA		400			V
V _{CE(sat)} (1)	Collector-emitter saturation voltage	$I_C = 0.5 A$ $I_C = 1 A$ $I_C = 1.5 A$	$I_B = 0.25 \text{ A}$			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	Resistive load Rise time Storage time Fall time	$V_{CC} = 125 \text{ V}$ $I_{B1} = 0.2 \text{ A}$ $t_p = 25 \mu \text{s}$	-			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

^{1.} Pulsed duration = 300 μ s, duty cycle \leq 1.5%



Electrical characteristics (curves) 2.1

Figure 2. Safe operating areas

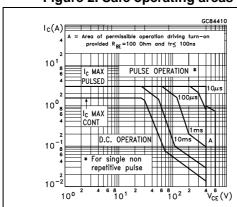


Figure 3. Derating curve

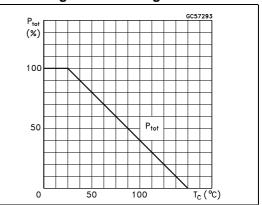
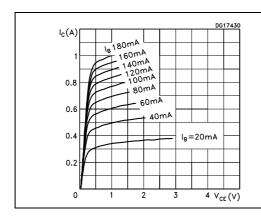


Figure 4. Output characteristics

Figure 5. Reverse biased safe operating areas



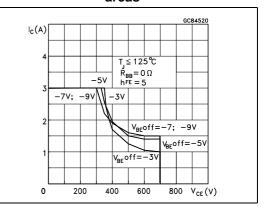
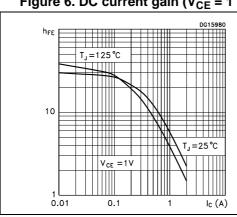
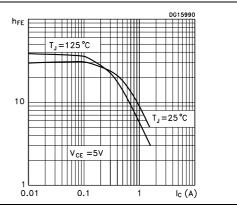


Figure 6. DC current gain $(V_{CE} = 1 V)$



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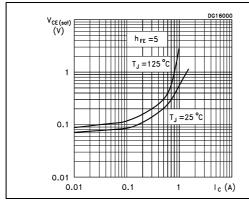
Figure 7. DC current gain $(V_{CE} = 5 V)$



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Figure 8. Collector-emitter saturation voltage

Figure 9. Base-emitter saturation voltage



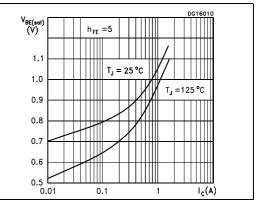
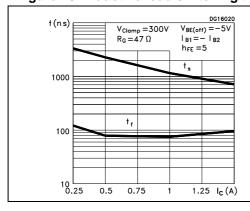
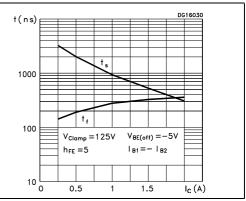


Figure 10. Inductive load switching time Figure 10.

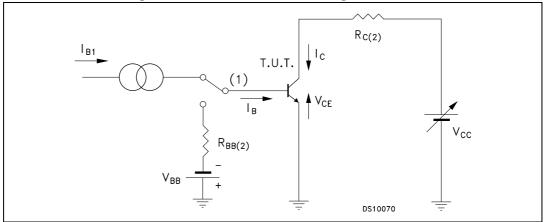
Figure 11. Resistive load switching time





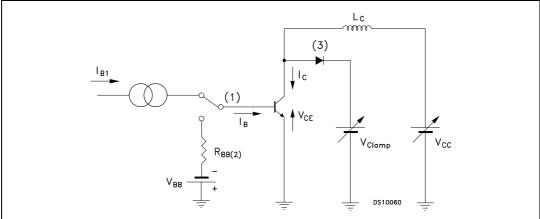
2.2 Test circuits

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

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3 Package mechanical data

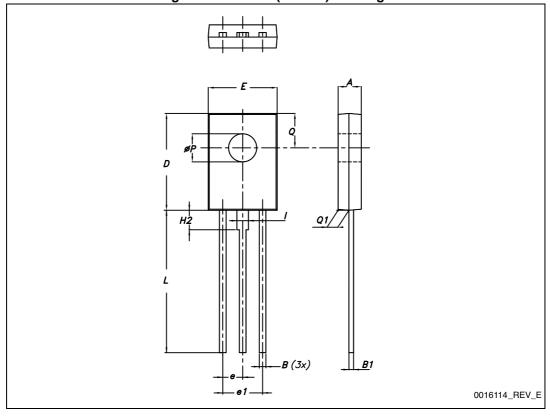
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Table 5. SOT-32 (TO-126) mechanical data

Dim.	mm.				
	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			
I		1.27			

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



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ST13003, ST13003-K Revision history

4 Revision history

Table 6. Document 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.



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