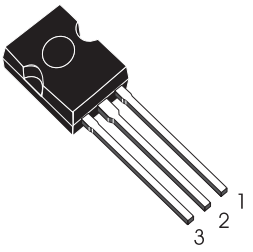
STK13003

High voltage fast-switching NPN power transistor

Features

- STK13003 is reverse pin out versus standard SOT-82 package
- High voltage capability
- Low spread of dynamic parameters
- Minimum lot-to-lot spread for reliable operation
- Very high switching speed



SOT-82

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.

Figure 1. Internal schematic diagram

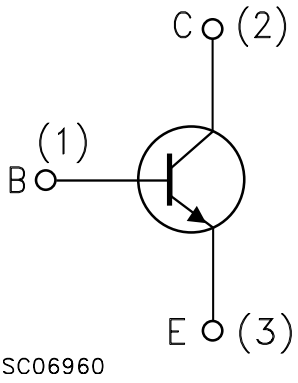


Table 1. Device summary

Order code	Marking	Package	Packaging
STK13003	K13003	SOT-82	Tube

1 Electrical ratings

Table 2. Absolute maximum rating

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 = 0.75A, tp < 10µs)	$V_{(BR)EBO}$	V
I_C	Collector current	1.5	A
I_{CM}	Collector peak current (t_P < 5ms)	3	A
I_B	Base current	0.75	A
I_{BM}	Base peak current (t_P < 5ms)	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_{case} = 25 °C unless otherwise specified)

Table 3. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector cut-off current (V_{BE} = 0)	V_{CE} =700V V_{CE} =700V T_c = 125°C			1 5	mA mA
$V_{(BR)EBO}$	Emitter-Base breakdown voltage (I_C = 0)	I_E =10mA	9		18	V
$V_{CEO(sus)}$ (1)	Collector-emitter sustaining voltage (I_B = 0)	I_C =10mA	400			V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 0.5A I_B = 0.1A I_C = 1A I_B = 0.25A I_C = 1.5A I_B = 0.5A			0.5 1 1.5	V V V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = 0.5A I_B = 0.1A I_C = 1A I_B = 0.25A			1 1.2	V V
h_{FE}	DC current gain	I_C =0.5A V_{CE} =2V I_C =1A V_{CE} =2V	8 5		20 25	
t_r t_s t_f	Resistive load Rise time Storage time Fall time	V_{CC} = 125V I_C = 1A I_{B1} = 0.2A I_{B2} = -0.2A T_p = 25µs			 1 4 0.7	 µs µs µs
t_s	Inductive load Storage time	I_C = 1A I_{B1} = 0.2A V_{BE} =-5V L =50mH V_{Clamp} =300V		0.8		µs

1. Pulsed duration = 300 µs, duty cycle ≤ 1.5%.

2.1 Electrical characteristics (curves)

2.2

Figure 2. Safe operating areas

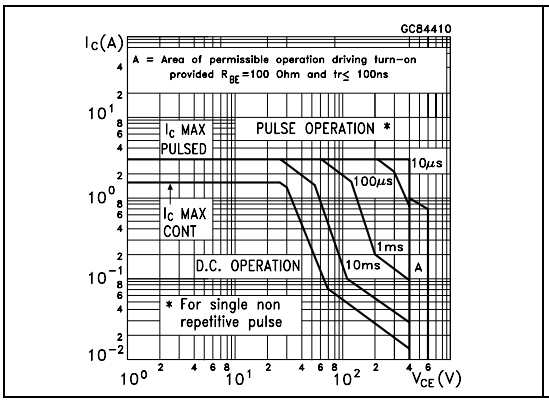


Figure 3. Derating curves

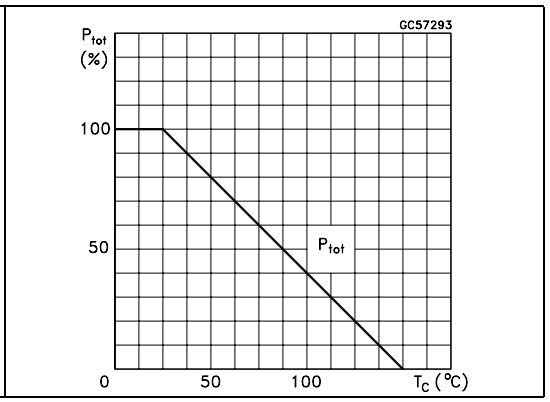


Figure 4. Output characteristics

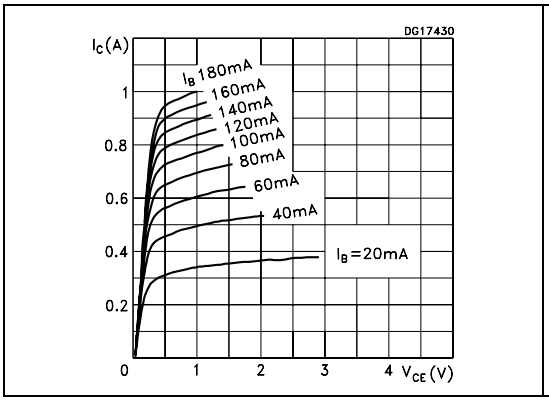


Figure 5. Reverse biased safe operating areas

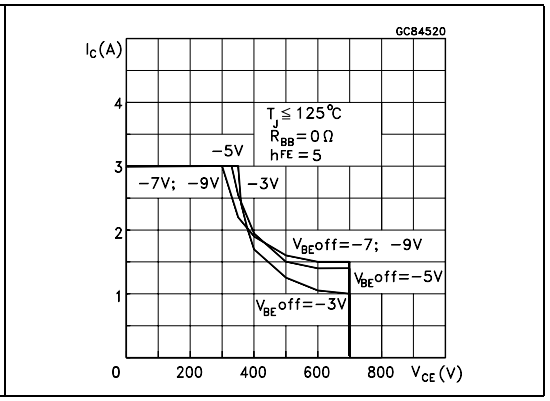


Figure 6. DC current gain

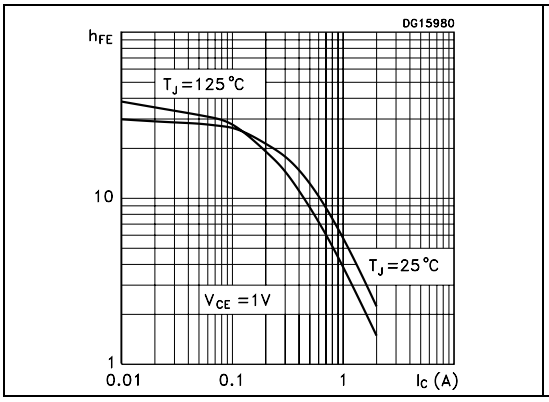


Figure 7. DC current gain

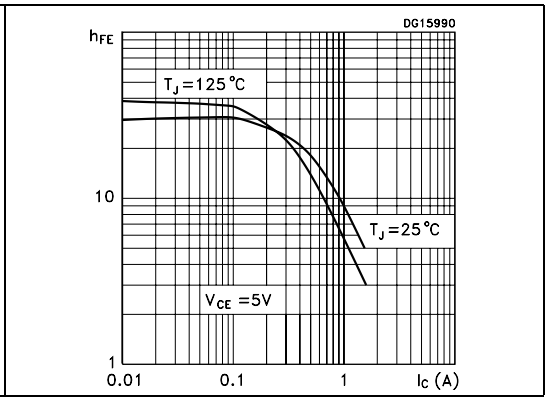


Figure 8. Collector-emitter saturation voltage

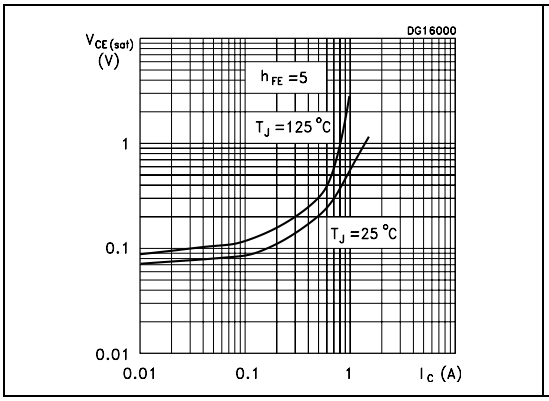


Figure 9. Base-emitter saturation voltage

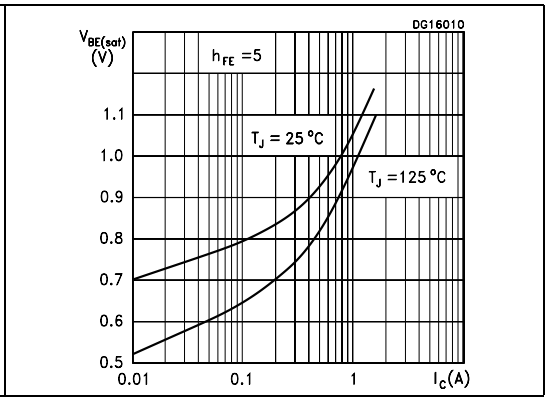


Figure 10. Inductive load switching time

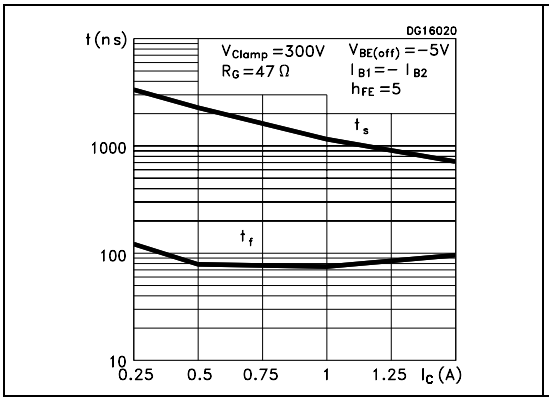
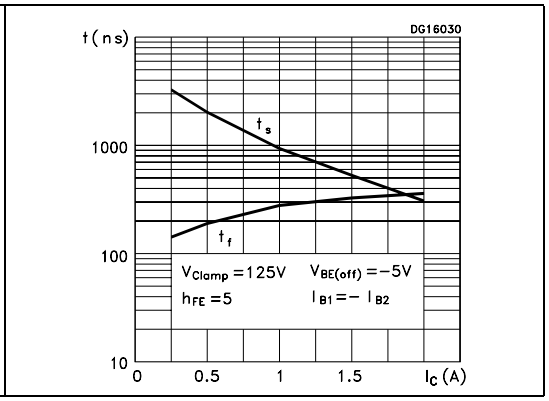


Figure 11. Resistive load switching time



2.3 Test circuits

Resistive load switching test circuit

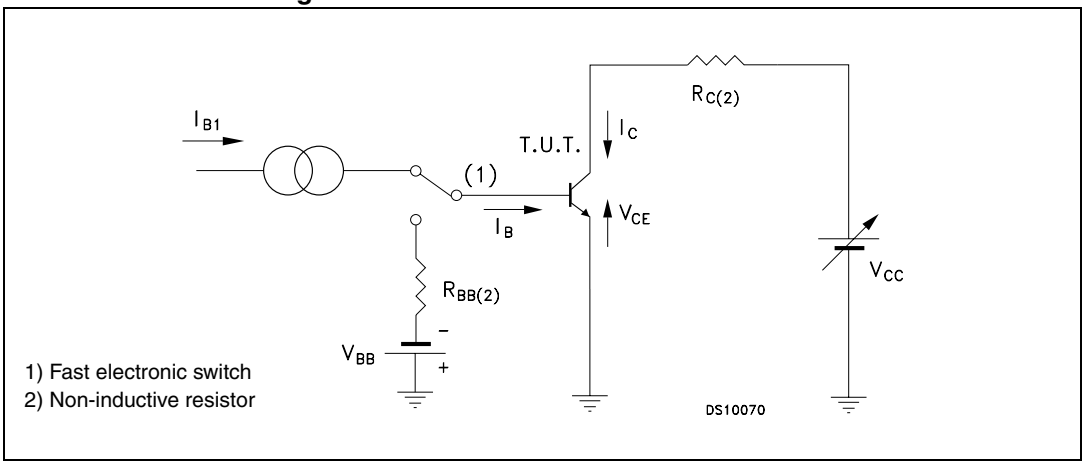
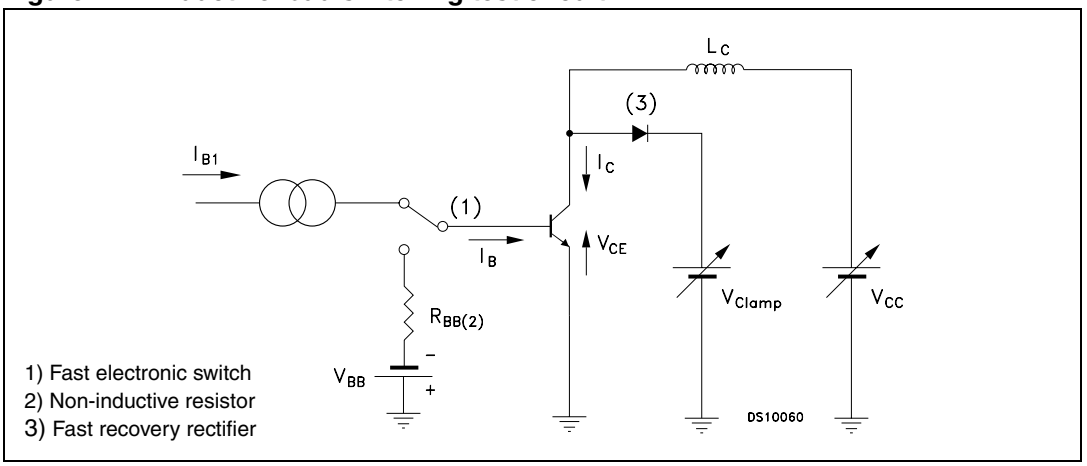


Figure 12. Inductive load switching test circuit

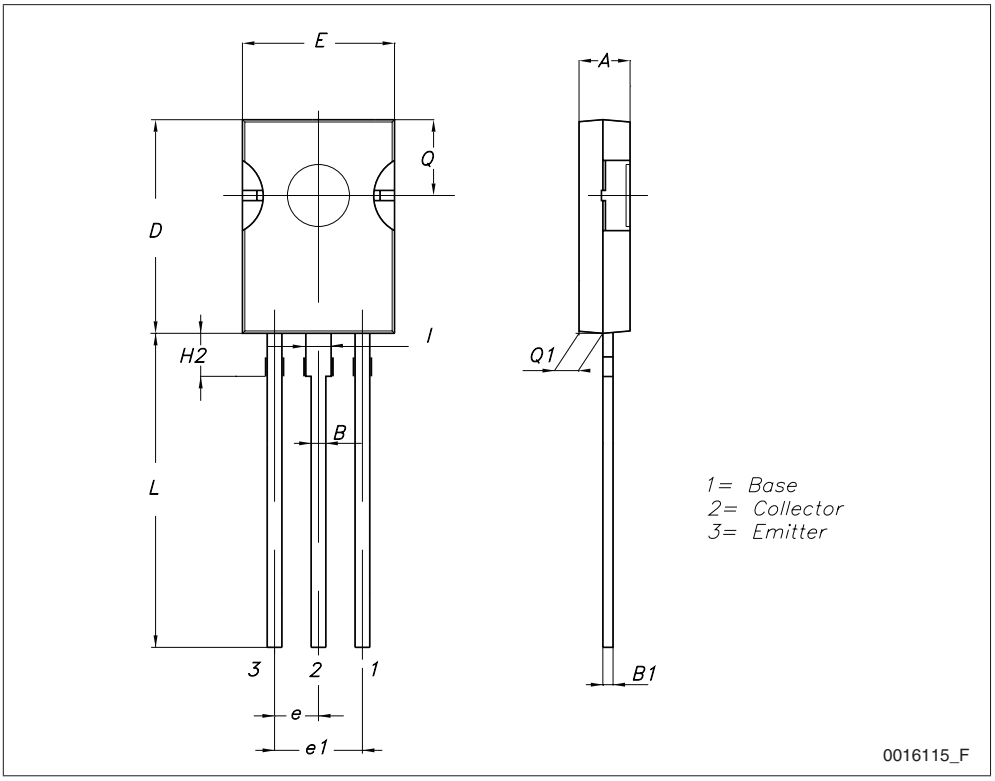


3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com

SOT-82 mechanical data

Dim.	mm.		
	Min.	Typ.	Max.
A	2.40		2.70
B	0.70		0.90
B1	0.49		0.75
D	10.50		10.80
E	7.40		7.80
e	2.04		2.54
e1	4.07		5.08
L	15.40		16
Q		3.80	
Q1	1		1.30
H2		2.07	
I		1.27	



4 Revision history

Table 4. Document revision history

Date	Revision	Changes
21-Jun-2004	3	
14-Jul-2008	4	Modified mechanical data *Figure on page 8*.

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