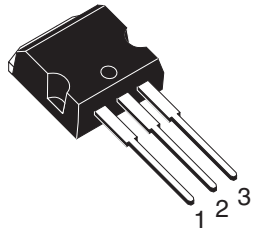
STB13005

High voltage fast-switching NPN power transistor

Features

- Low spread of dynamic parameters
- Minimum lot-to-lot spread for reliable operation
- Very high switching speed
- Through hole TO-262 (I^2PAK) power package in tube (suffix “-1”)



I^2PAK

Applications

- Electronic ballast for fluorescent lighting
- Switch mode power supplies

Description

The device is manufactured using high voltage multi-epitaxial planar technology for high switching speeds and medium 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

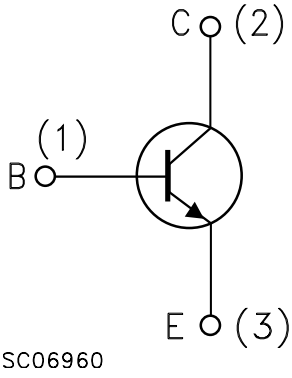


Table 1. Device summary

Order code	Marking [1]	Package	Packaging
STB13005-1	B13005A	I^2PAK	Tube
	B13005B		

1. Product is pre-selected in DC current gain (group A and group B). STMicroelectronics reserves the right to ship either groups according to production availability. Please contact your nearest STMicroelectronics sales office for delivery details.

Contents

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)	9	V
I_C	Collector current	4	A
I_{CM}	Collector peak current (t_P < 5ms)	8	A
I_B	Base current	2	A
I_{BM}	Base peak current (t_P < 5ms)	4	A
P_{tot}	Total dissipation at T_c = 25°C	75	W
T_{stg}	Storage temperature	-65 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} =700 V V_{CE} =700 V T_C = 125°C			1 5	mA mA
I_{EBO}	Emitter cut-off current (I_C = 0)	V_{EB} = 9 V			1	mA
$V_{CEO(sus)}$ (1)	Collector-emitter sustaining voltage (I_B = 0)	I_C =10 mA	400			V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 1 A I_B = 0.2 A I_C = 2 A I_B = 0.5 A I_C = 4 A I_B = 1 A			0.5 0.6 1	V V V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = 1 A I_B = 0.2 A I_C = 2 A I_B = 0.5 A			1.2 1.6	V V
h_{FE} (1)(2)	DC current gain	I_C = 1 A V_{CE} = 5 V Group A Group B I_C = 2 A V_{CE} = 5 V	 15 27 8		 32 45 40	
t_s t_f	Resistive load Storage time Fall time	I_C = 2 A V_{CC} = 125 V I_{B1} = - I_{B2} = 0.4 A t_p = 30 µs	 1.5	 0.2	 3	 µs µs

1. Pulsed duration = 300 ms, duty cycle £1.5%
2. Product is pre-selected in DC current gain (group A and group B). STMicroelectronics reserves the right to ship either groups according to production availability. Please contact your nearest STMicroelectronics sales office for delivery details.

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

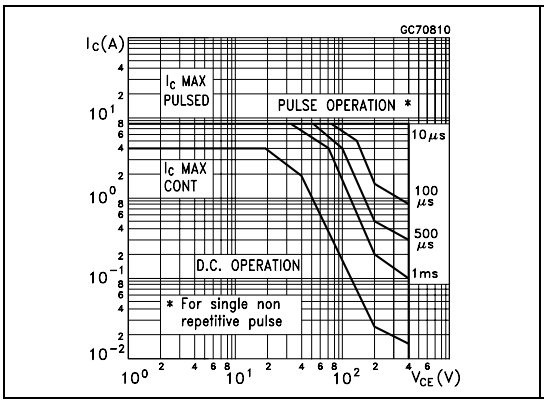


Figure 3. Derating curve

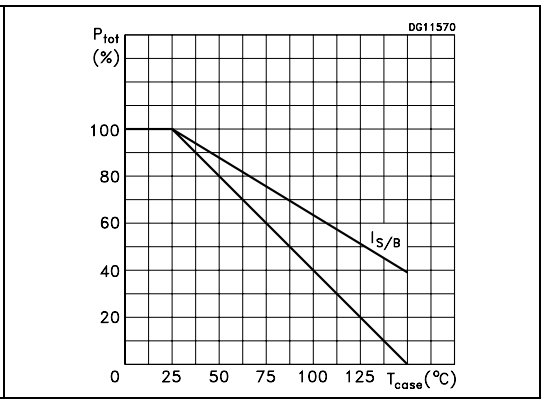


Figure 4. DC current gain

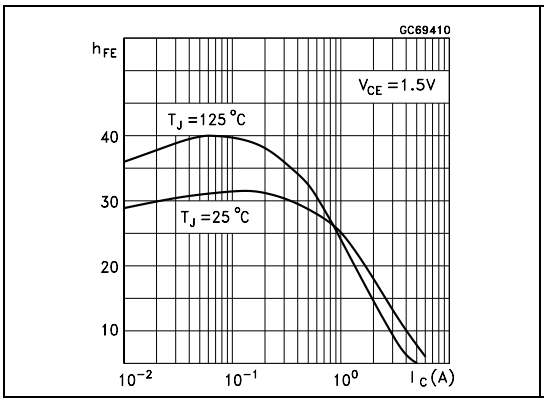


Figure 5. DC current gain

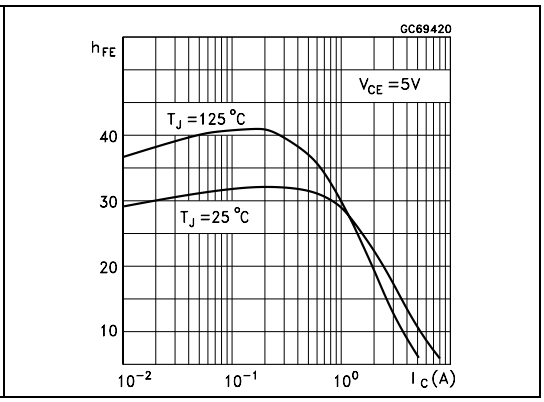


Figure 6. Collector-emitter saturation voltage

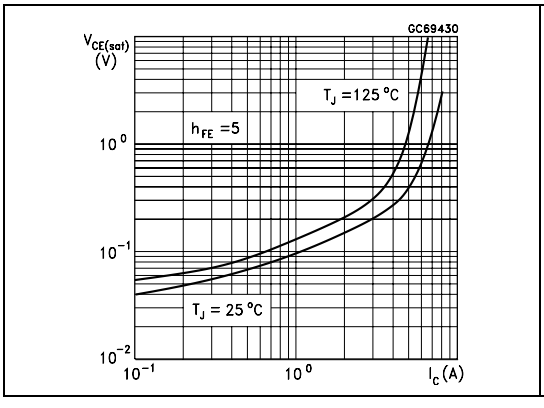


Figure 7. Base-emitter saturation voltage

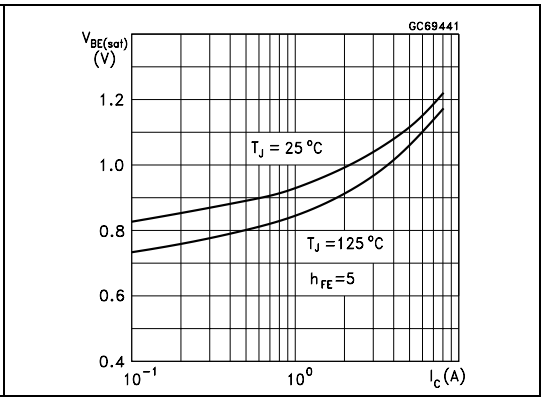


Figure 8. Inductive load fall time

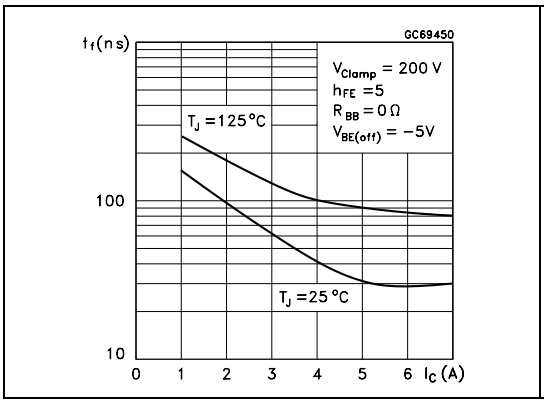


Figure 9. Inductive load storage time

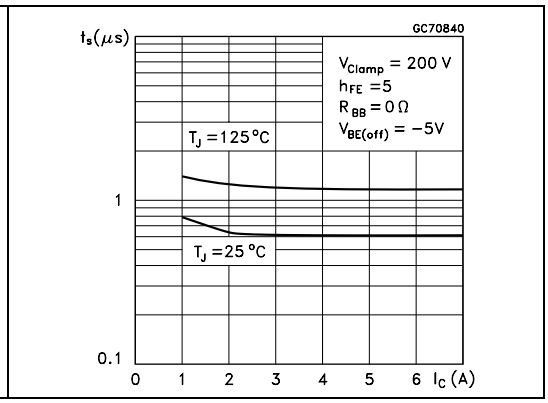


Figure 10. Resistive load fall time

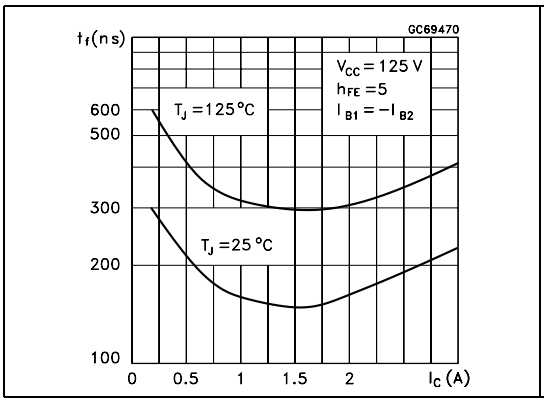


Figure 11. Resistive load storage time

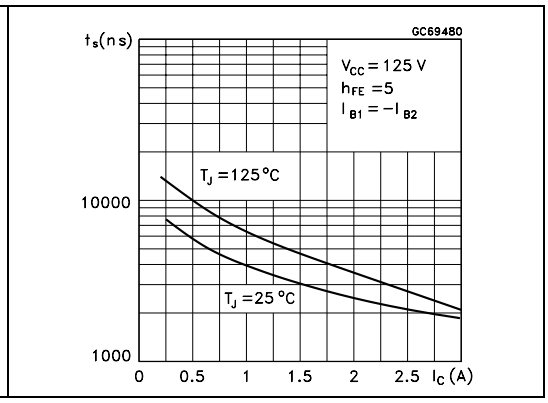
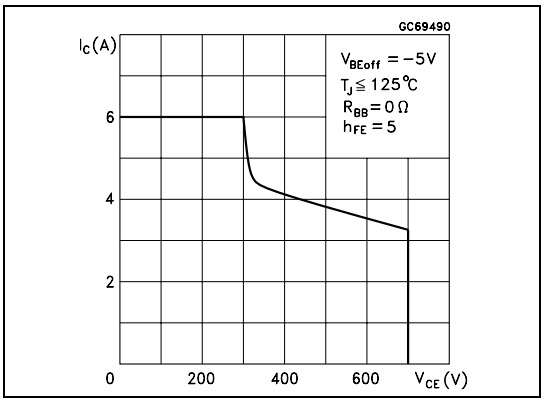
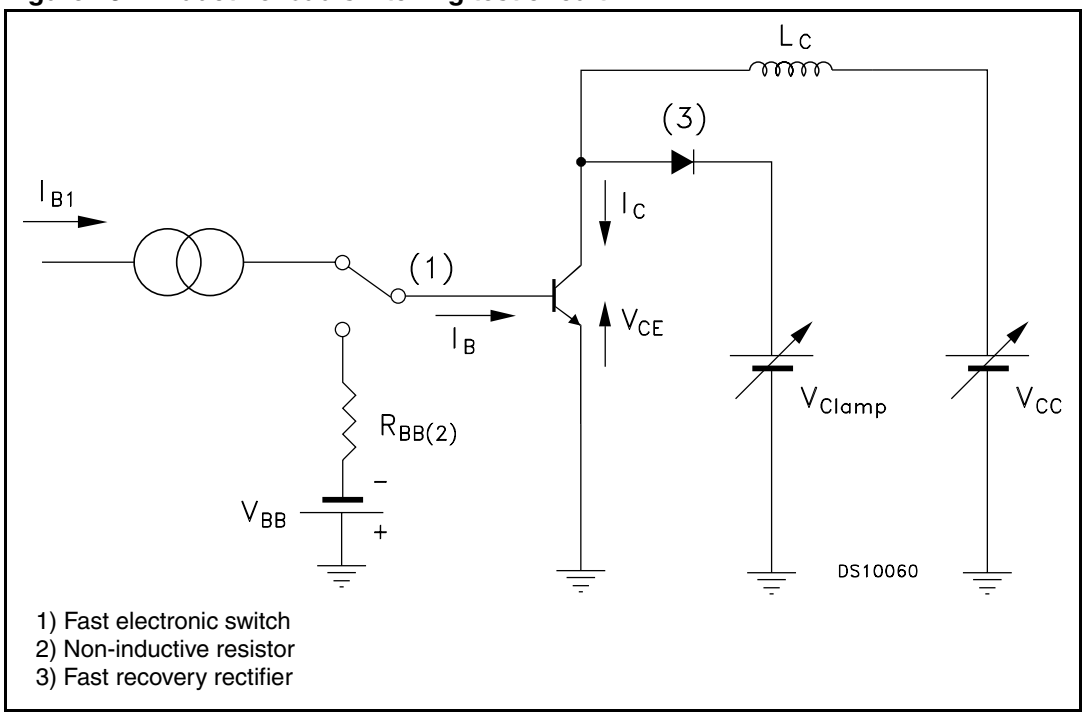


Figure 12. Reverse biased operating area



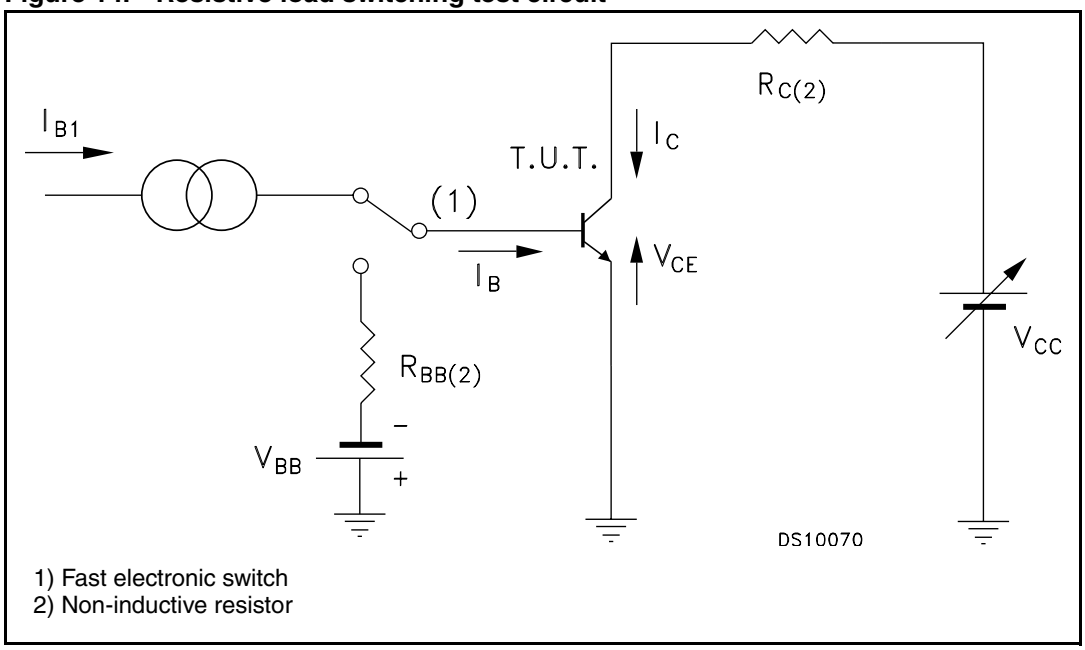
3 Test circuit

Figure 13. Inductive load switching test circuit



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

Figure 14. Resistive load switching test circuit



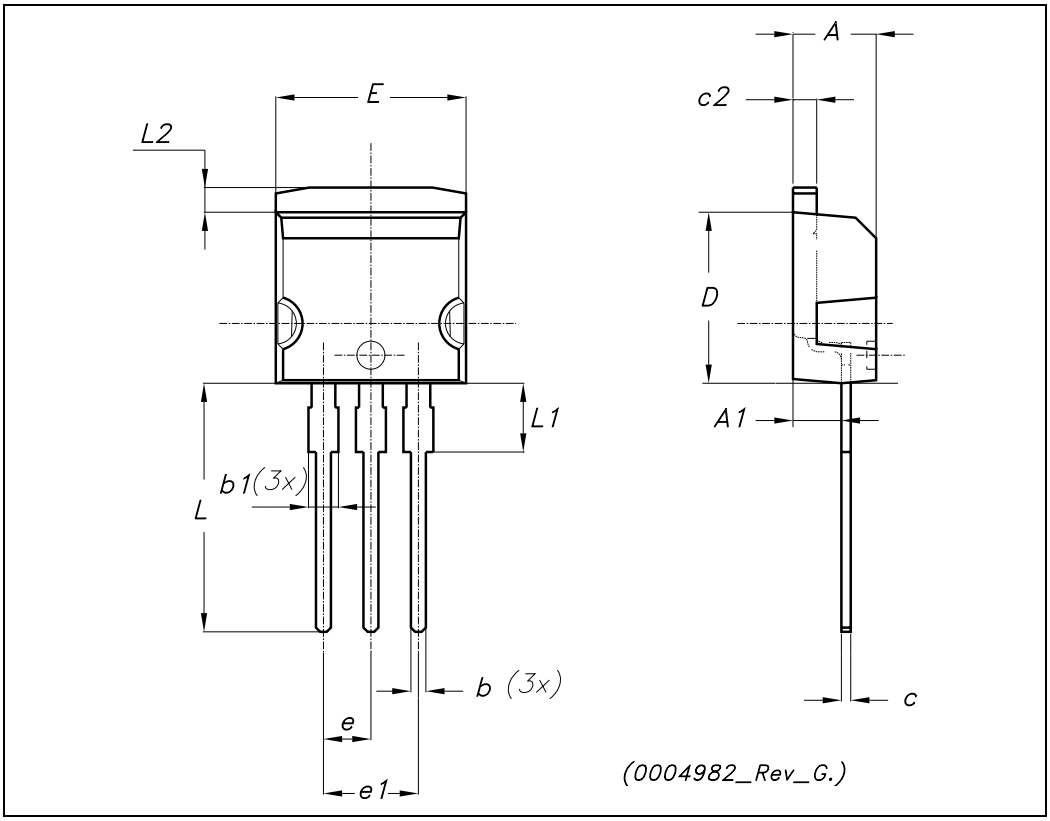
1) Fast electronic switch
2) Non-inductive resistor

4 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

TO-262 (I^2PAK) MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
A1	2.40		2.72	0.094		0.107
b	0.61		0.88	0.024		0.034
b1	1.14		1.70	0.044		0.066
c	0.49		0.70	0.019		0.027
c2	1.23		1.32	0.048		0.052
D	8.95		9.35	0.352		0.368
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.194		0.202
E	10		10.40	0.393		0.410
L	13		14	0.511		0.551
L1	3.50		3.93	0.137		0.154
L2	1.27		1.40	0.050		0.055



5 Revision history

Table 4. Document revision history

Date	Revision	Changes
11-Oct-2007	6	Initial release

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