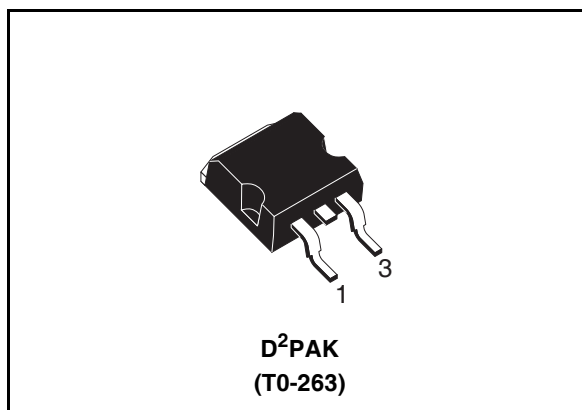


High voltage fast-switching NPN power transistor

General features

- Improved specification: Lower leakage current, Tighter gain range, DC current gain preselection, Tighter storage time range
- High voltage capability
- Integrated free-wheeling diode
- Low spread of dynamic parameters
- Minimum lot-to-lot spread for reliable operation
- Very high switching speed
- Fully characterized at 125 °C
- Large RBSOA
- In compliance with the 2002/93/EC European Directive



Description

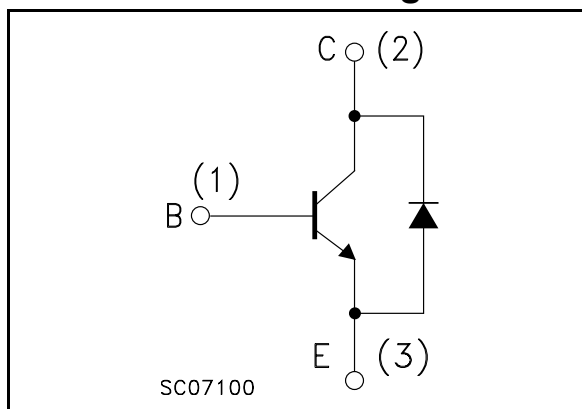
The device is manufactured using high voltage Multi-Epitaxial Planar technology for high switching speeds and medium voltage capability.

It uses a Cellular Emitter structure to enhance switching speeds.

Applications

- Electronic transformers for halogen lamps
- Switch mode power supplies

Internal schematic diagram



Order codes

Part Number	Marking	Package	Packing
STB13007DT4	B13007D	D ² PAK	Tape & Reel

Contents

1	Electrical ratings	3
2	Electrical characteristics	4
2.1	Electrical characteristics (curves)	5
2.2	Test circuits	6
3	Package mechanical data	7
4	Revision history	9

1 Electrical ratings

Table 1. Absolute maximum rating

Symbol	Parameter	Value	Unit
V_{CEV}	Collector-emitter voltage ($V_{BE} = -1.5V$)	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	8	A
I_{CM}	Collector peak current ($t_P < 5ms$)	16	A
I_B	Base current	4	A
I_{BM}	Base peak current ($t_P < 5ms$)	8	A
P_{tot}	Total dissipation at $T_C = 25^\circ C$	80	W
T_{stg}	Storage temperature	-65 to 150	$^\circ C$
T_J	Max. operating junction temperature	150	$^\circ C$

Table 2. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	1.56	$^\circ C/W$
$R_{thj-amb}$	Thermal resistance junction-amb max	62.5	$^\circ C/W$

2 Electrical characteristics

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

Table 3. Electrical characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector cut-off current ($V_{BE} = 0V$)	$V_{CE} = 700V$ $V_{CE} = 700V \quad T_C = 100^{\circ}C$			10 0.5	μA mA
I_{CEO}	Collector cut-off current ($I_B = 0$)	$V_{CE} = 400V$			100	μA
I_{EBO}	Emitter cut-off current ($I_C = 0$)	$V_{EB} = 9V$			100	μA
$V_{CEO(sus)}^{(1)}$	Collector-emitter sustaining voltage ($I_B = 0$)	$I_C = 10mA$	400			V
$V_{CE(sat)}^{(1)}$	Collector-emitter saturation voltage	$I_C = 2A \quad I_B = 0.4A$ $I_C = 5A \quad I_B = 1A$ $I_C = 8A \quad I_B = 2A$ $I_C = 5A \quad I_B = 1A$ $T_C = 100^{\circ}C$			0.8 1.5 2 3	V V V V
$V_{BE(sat)}^{(1)}$	Base-emitter saturation voltage	$I_C = 2A \quad I_B = 0.4A$ $I_C = 5A \quad I_B = 1A$ $I_C = 5A \quad I_B = 1A$ $T_C = 100^{\circ}C$			1.2 1.6 1.5	V V V
h_{FE}	DC current gain	$I_C = 2A \quad V_{CE} = 5V$ $I_C = 5A \quad V_{CE} = 5V$	18 8		40 25	
V_f	Diode forward voltage	$I_C = 3A$			2.5	V
t_s t_f	Inductive load Storage time Fall time	$I_C = 5A \quad V_{Clamp} = 250V$ $I_{B1} = 1A \quad V_{BE(off)} = -5V$ $R_{BB} = 0\Omega \quad L = 200\mu H$ (see fig. 11)		1.7 90	2.3 150	μs ns
t_s t_f	Inductive load Storage time Fall time	$I_C = 5A \quad V_{Clamp} = 250V$ $I_{B1} = 1A \quad V_{BE(off)} = -5V$ $R_{BB} = 0\Omega \quad L = 200\mu H$ $T_C = 125^{\circ}C$ (see fig. 11)		2.2 150		μs ns

Note (1) Pulsed duration = 300 μs , duty cycle $\leq 1.5\%$

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

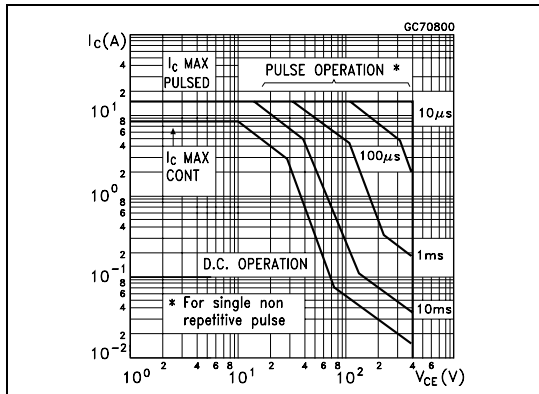


Figure 2. Derating curve

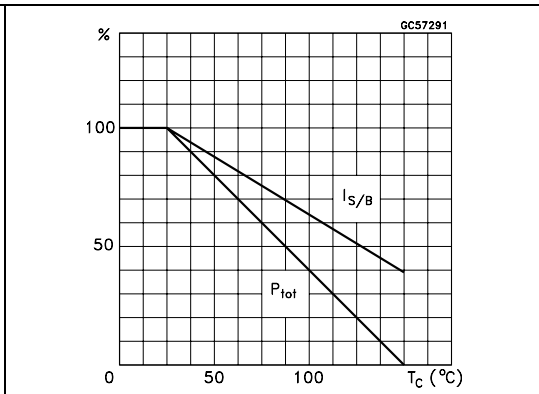


Figure 3. DC current gain

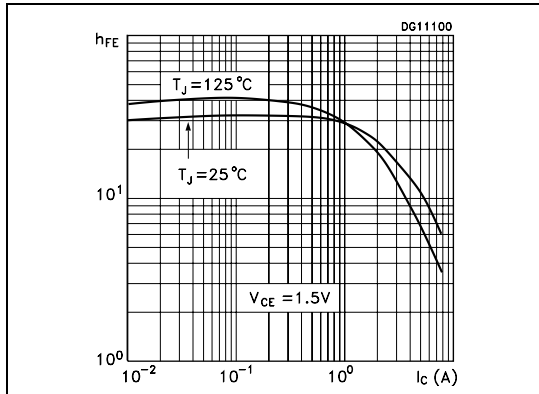


Figure 4. DC current gain

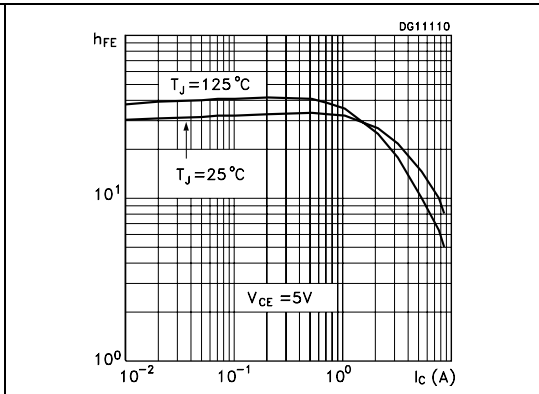


Figure 5. Collector-emitter saturation voltage

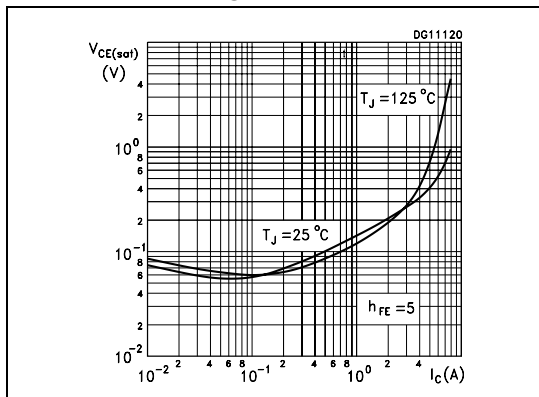


Figure 6. Base-emitter saturation voltage

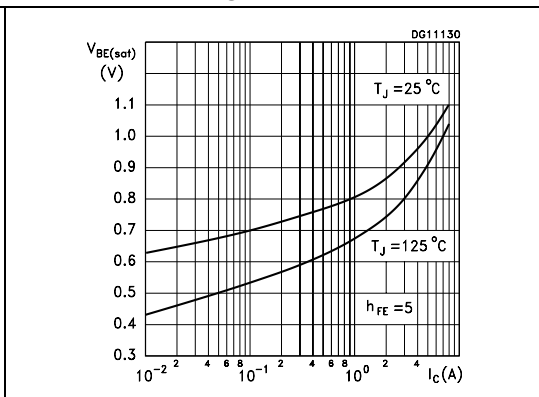


Figure 7. Diode forward voltage

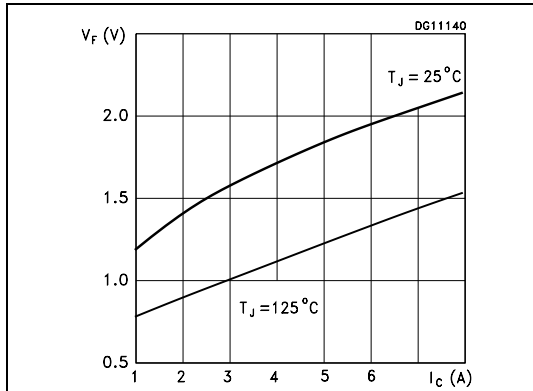


Figure 8. Switching times inductive load

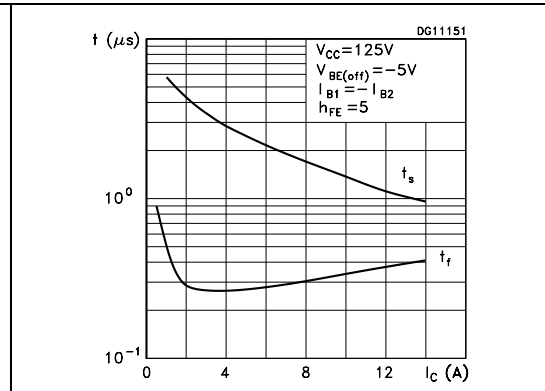


Figure 9. Switching times inductive load

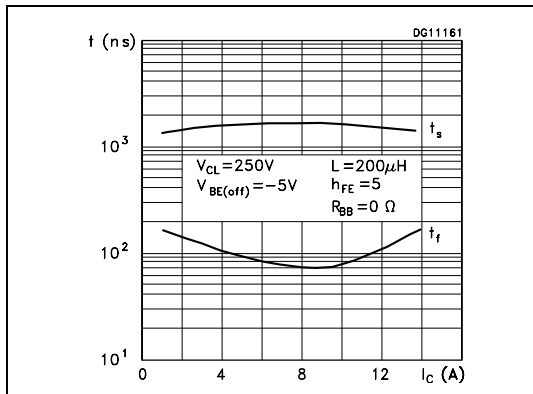
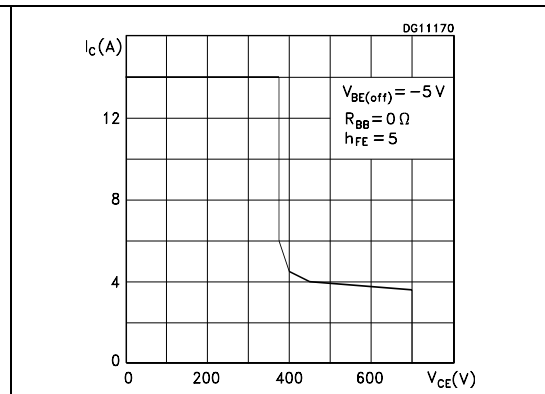
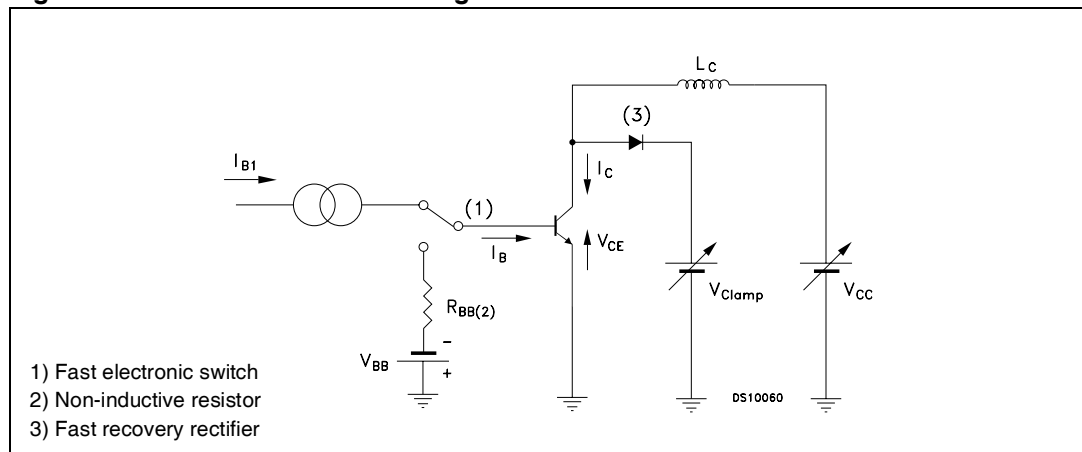


Figure 10. Reverse biased safe operating area



2.2 Test circuits

Figure 11. Inductive load switching test circuit

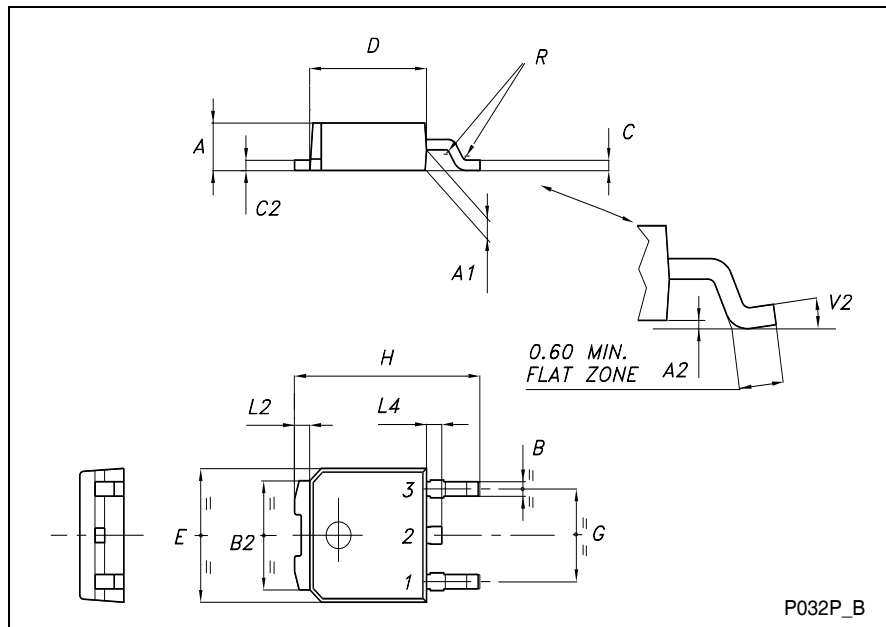


3 Package mechanical data

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

TO-252 (DPAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.20		2.40	0.087		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.90	0.025		0.035
B2	5.20		5.40	0.204		0.213
C	0.45		0.60	0.018		0.024
C2	0.48		0.60	0.019		0.024
D	6.00		6.20	0.236		0.244
E	6.40		6.60	0.252		0.260
G	4.40		4.60	0.173		0.181
H	9.35		10.10	0.368		0.398
L2		0.8			0.031	
L4	0.60		1.00	0.024		0.039
V2	0°		8°	0°		0°



4 Revision history

Table 4. Revision history

Date	Revision	Changes
19-Jun-2006	1	Initial release.

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