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STH13009

High voltage fast-switching NPN power transistor

Preliminary data

Features

- High voltage capability
- Low spread of dynamic parameters
- Very high switching speed

Applications

- Switching mode power supplies

Description

The device is manufactured using high voltage Multi Epitaxial Planar technology for high switching speeds and high voltage capability. It uses a Hollow Emitter structure to enhance switching speeds.

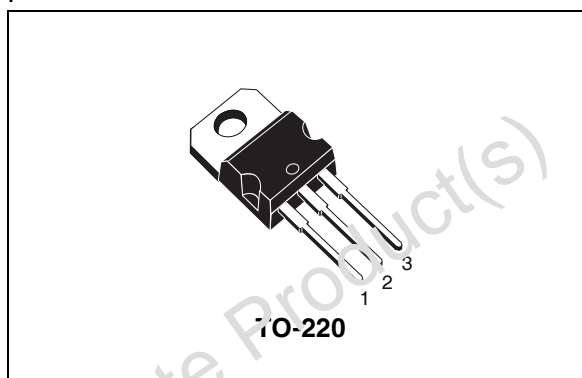


Figure 1. Internal schematic diagram

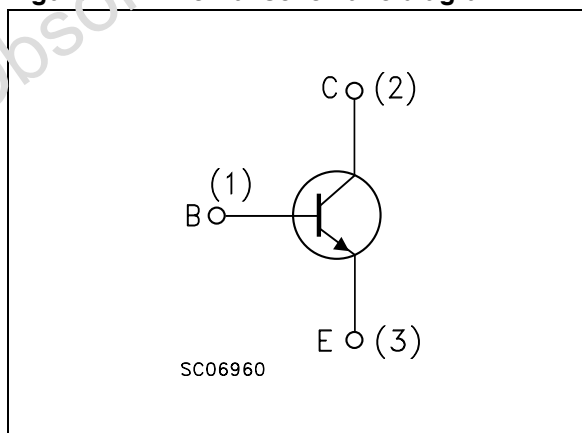


Table 1. Device summary

Order code	Marking	Package	Packaging
STH13009	H13009	TO-220	Tube

Absolute maximum ratings

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1 Absolute maximum ratings

Table 2. Absolute maximum ratings

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 ($I_C = 0$)	12	V
I_C	Collector current	12	A
I_{CM}	Collector peak current ($t_p < ms$)	24	A
I_B	Base current	6	A
I_{BM}	Base peak current ($t_p < ms$)	12	A
P_{TOT}	Total dissipation at $T_{case} = 25^{\circ}C$	100	W
T_{stg}	Storage temperature	65 to 150	$^{\circ}C$
T_J	Max. operating junction temperature	150	$^{\circ}C$

Table 3. Thermal data

Symbol	Parameters	Value	Unit
$R_{thj-case}$	Thermal resistance junction case max	1.25	$^{\circ}C/W$

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Electrical characteristics

2 Electrical characteristics

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

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CEV}	Collector cut-off current ($V_{\text{BE}} = -1.5\text{V}$)	$V_{\text{CE}} = 700\text{V}$ $V_{\text{CE}} = 700\text{V}$ $T_{\text{C}} = 100^{\circ}\text{C}$			10 500	μA μA
I_{EBO}	Emitter cut-off current ($I_{\text{C}} = 0$)	$V_{\text{EB}} = 10\text{V}$			10	μA
$V_{\text{CEO(sus)}}^{(1)}$	Collector-emitter sustaining voltage ($I_{\text{B}} = 0$)	$I_{\text{C}} = 10\text{mA}$	400			V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 4\text{A}$ $I_{\text{B}} = 0.8\text{A}$ $I_{\text{C}} = 5\text{A}$ $I_{\text{B}} = 1\text{A}$ $I_{\text{C}} = 8\text{A}$ $I_{\text{B}} = 1.6\text{A}$ $I_{\text{C}} = 12\text{A}$ $I_{\text{B}} = 2.4\text{A}$		0.2 0.25 0.35 0.6	0.5 0.6 1 2	V V V V
$V_{\text{BE(sat)}}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 5\text{A}$ $I_{\text{B}} = 1\text{A}$ $I_{\text{C}} = 8\text{A}$ $I_{\text{B}} = 1.6\text{A}$			1.2 1.6	V V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 5\text{A}$ $V_{\text{CE}} = 5\text{V}$ $I_{\text{C}} = 8\text{A}$ $V_{\text{CE}} = 5\text{V}$	18 11		30 23	
t_{s} t_{f}	Inductive load Storage time Fall time	$V_{\text{CC}} = 250\text{V}$ $I_{\text{C}} = 5\text{A}$ $I_{\text{B1}} = 1\text{A}$ $I_{\text{B2}} = -2\text{A}$ $L = 200\mu\text{H}$			1.7 100	μs ns

1. Pulsed duration = 300 ms, duty cycle $\geq 1.5\%$.

Electrical characteristics

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2.1 Electrical characteristic (curves)

Figure 2. Safe operating area

Figure 3. Derating curve

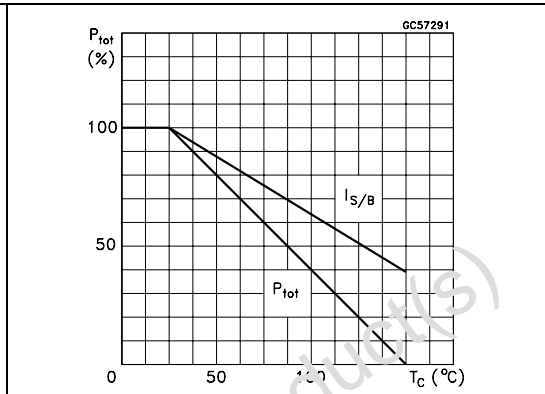
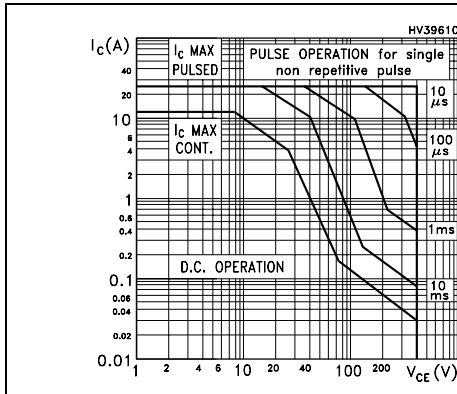


Figure 4. DC current gain

Figure 5. DC current gain

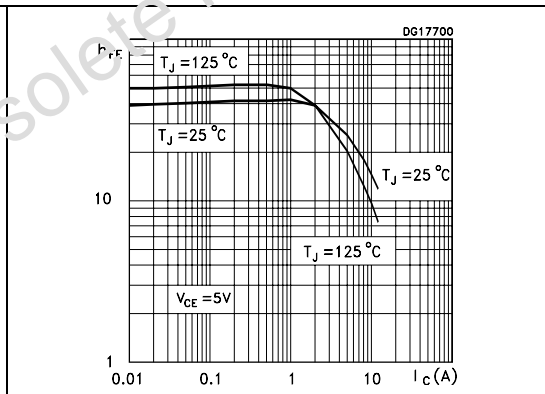
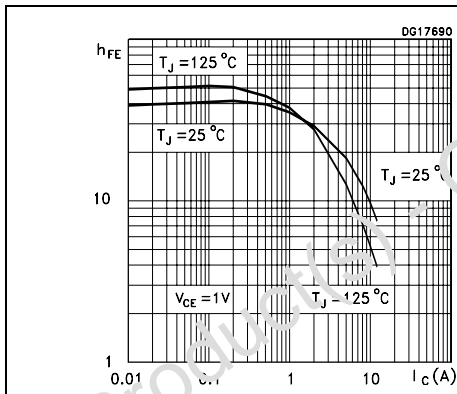
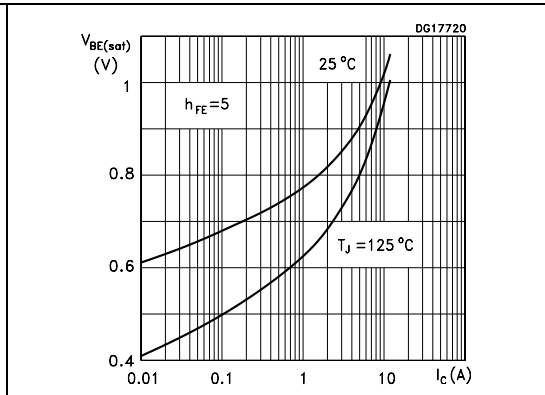
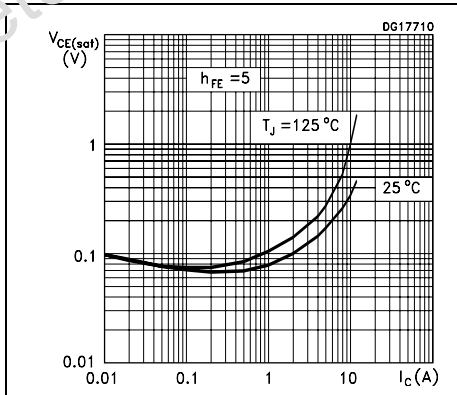


Figure 6. Collector-emitter saturation voltage

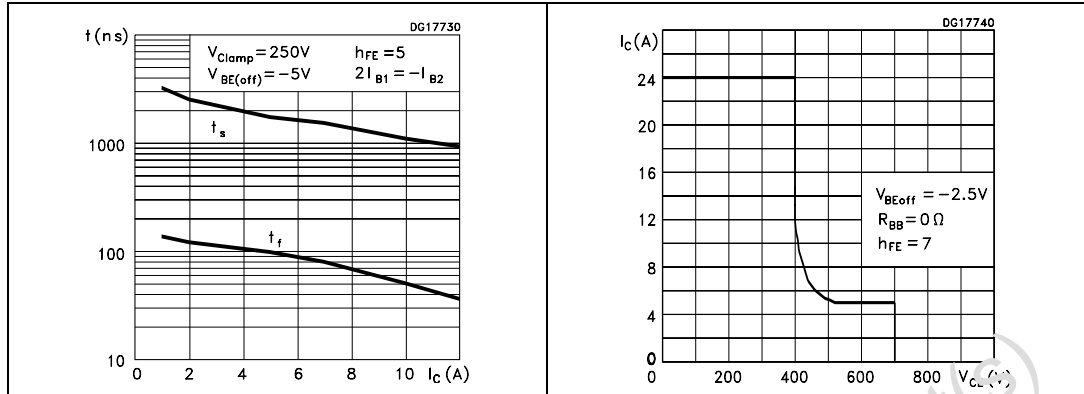
Figure 7. Base-emitter saturation voltage



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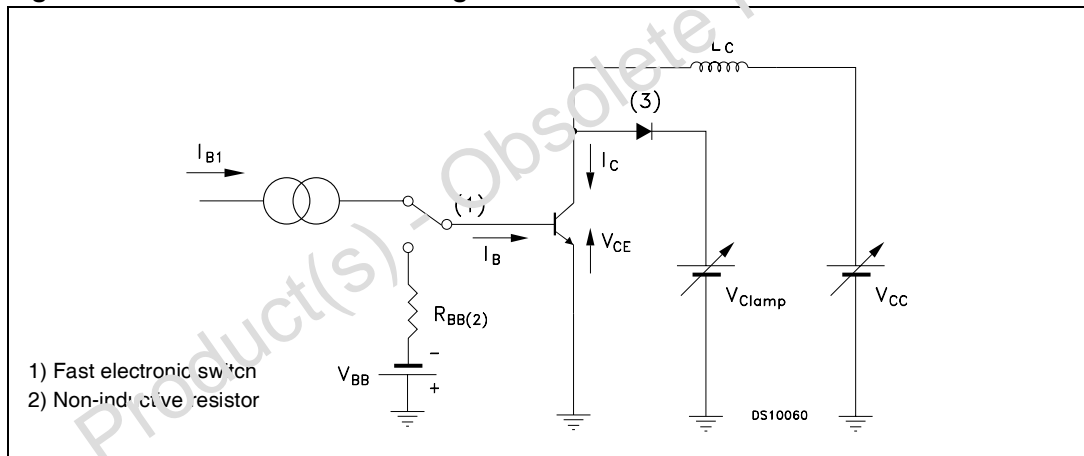
Electrical characteristics

Figure 8. Inductive load switching time Figure 9. Reverse biased safe operating area



2.2 Test circuit

Figure 10. Inductive load switching test circuit



3 Package mechanical data

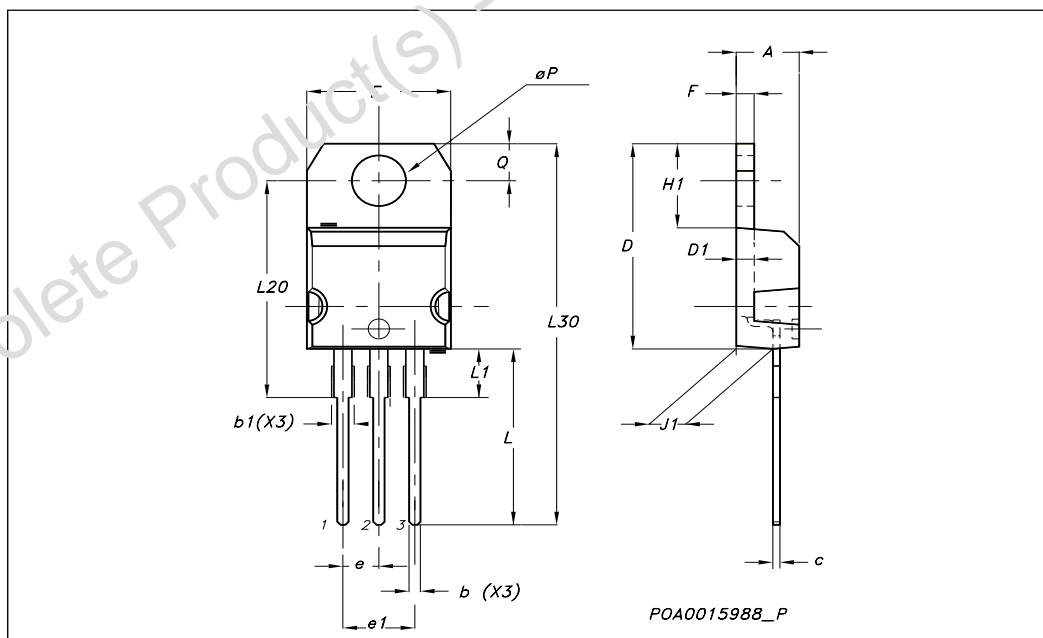
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Obsolete Product(s) - Obsolete Product(s)

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Package mechanical data

TO-220 Mechanical data			
DIM.	mm.		
	MIN.	TYP	MAX.
A	4.40		4.60
b	0.61		0.88
b1	1.14		1.70
c	0.49		0.70
D	15.25		15.75
D1		1.27	
E	10		10.40
e	2.40		2.70
e1	4.95		5.1
F	1.23		1.32
H1	6.20		6.60
J1	2.40		2.72
L	13		14
L1	3.50		3.93
L20		16.40	
L30		28.90	
øP	3.75		3.85
Q	2.65		2.95



4 Revision history

Table 5. Document revision history

Date	Revision	Changes
15-Oct-2007	1	Initial Release

Obsolete Product(s) - Obsolete Product(s)

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