STH13009

High voltage fast-switching NPN power transistor

Preliminary data

Features

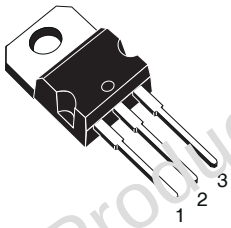
- High voltage capability
- Low spread of dynamic parameters
- Very high switching speed

Applications

- Switching mode power supplies

Description

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



TO-220

Figure 1. Internal schematic diagram

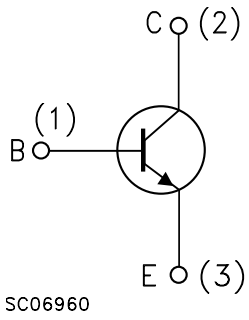


Table 1. Device summary

Order code	Marking	Package	Packaging
STH13009	H13009	TO-220	Tube

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°C	100	W
T_{stg}	Storage temperature	-65 to 150	°C
T_J	Max. operating junction temperature	150	°C

Table 3. Thermal data

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

2 Electrical characteristics

(T_{case} = 25°C; unless otherwise specified)

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CEV}	Collector cut-off current (V_{BE} = -1.5V)	V_{CE} = 700 V V_{CE} = 700 V T_C = 100°C			10 500	µA µA
I_{EBO}	Emitter cut-off current (I_C = 0)	V_{EB} = 10 V			10	µA
$V_{CEO(sus)}$ (1)	Collector-emitter sustaining voltage (I_B = 0)	I_C = 10 mA	400			V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 4 A I_B = 0.8 A I_C = 5 A I_B = 1 A I_C = 8 A I_B = 1.6 A I_C = 12 A I_B = 2.4 A		0.2 0.25 0.35 0.6	0.5 0.6 1 2	V V V V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = 5 A I_B = 1 A I_C = 8 A I_B = 1.6 A			1.2 1.6	V V
h_{FE} (1)	DC current gain	I_C = 5 A V_{CE} =5 V I_C = 8 A V_{CE} =5 V	18 11		30 23	
t_s t_f	Inductive load Storage time Fall time	V_{CC} = 250 V I_C = 5A I_{B1}= 1 A I_{B2} = -2 A L = 200 µH		1.7 100	2.5 140	µs ns

1. Pulsed duration = 300 ms, duty cycle ≥1.5%.

2.1 Electrical characteristic (curves)

Figure 2. Safe operating area

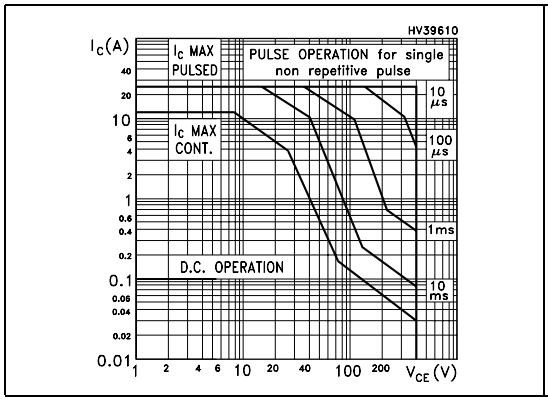


Figure 3. Derating curve

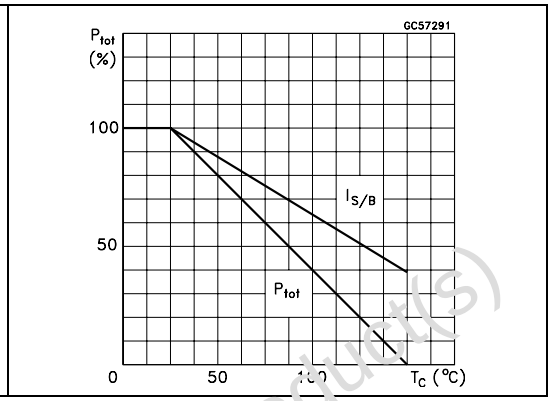


Figure 4. DC current gain

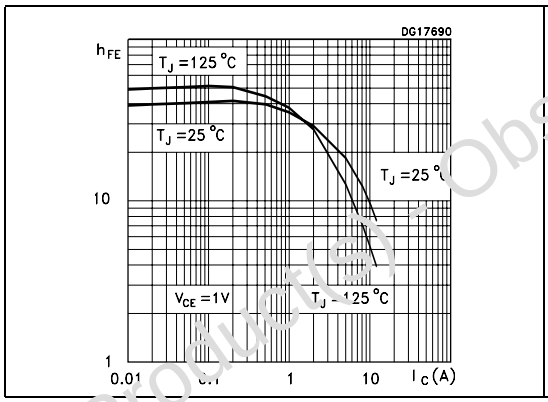


Figure 5. DC current gain

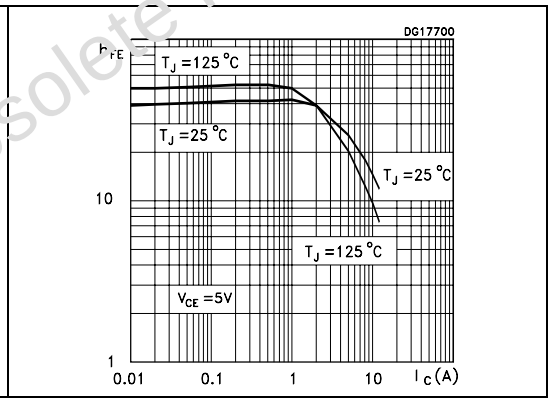


Figure 6. Collector-emitter saturation voltage

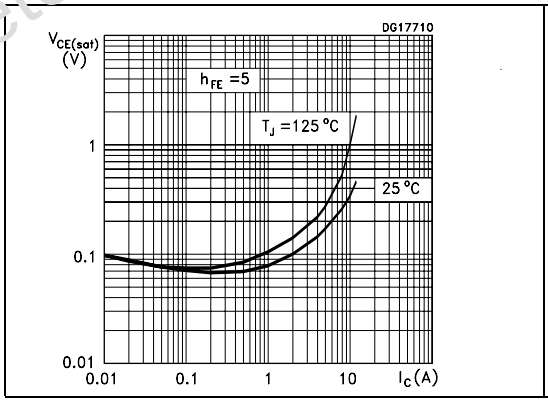


Figure 7. Base-emitter saturation voltage

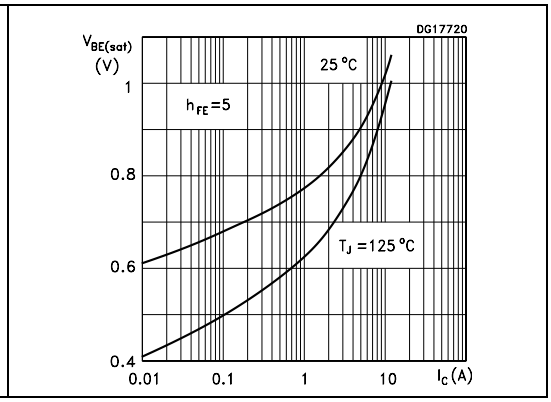


Figure 8. Inductive load switching time

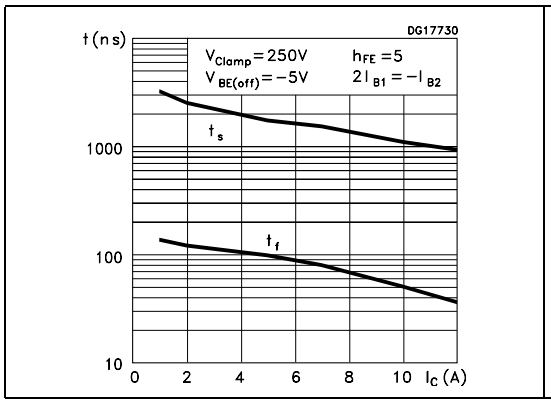
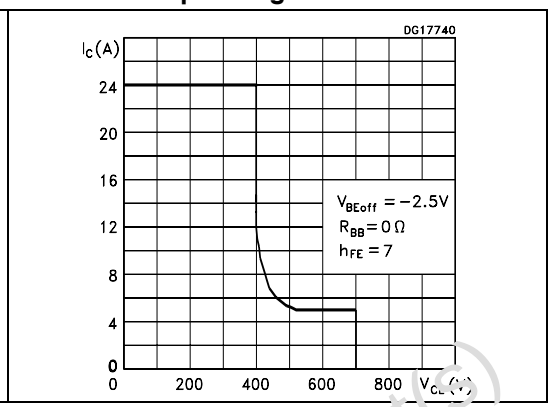
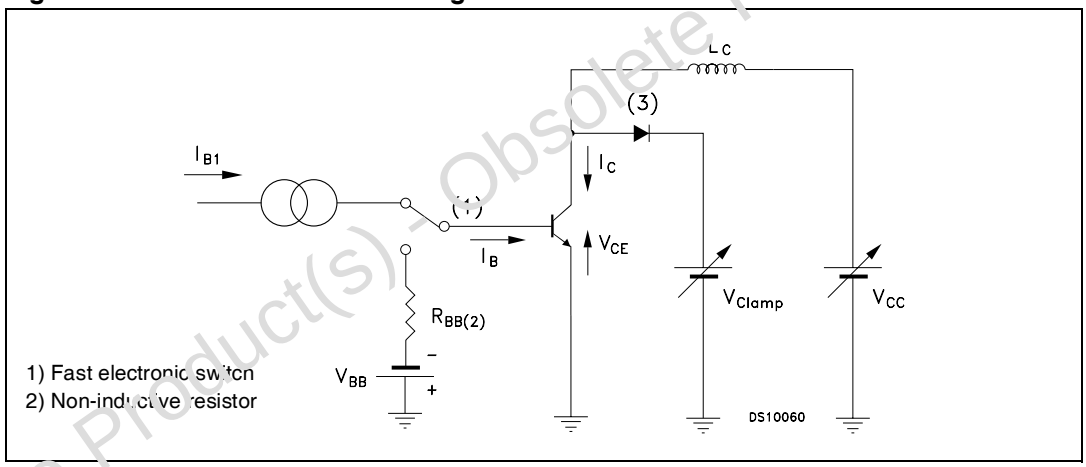


Figure 9. Reverse biased safe operating area



2.2 Test circuit

Figure 10. Inductive load switching test circuit

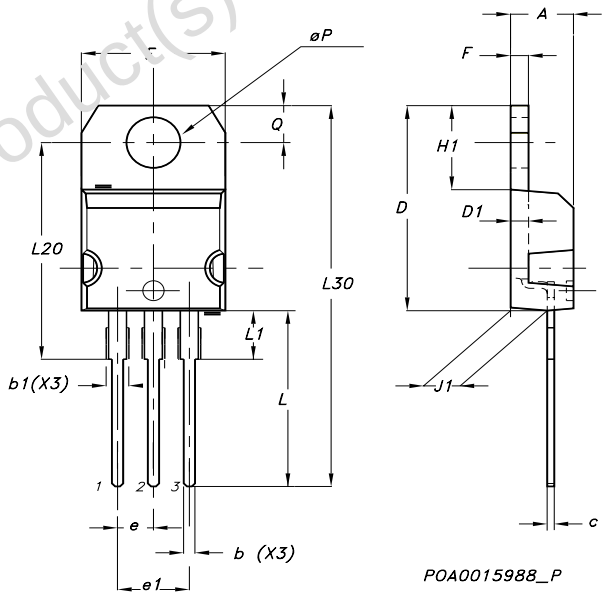


3 Package mechanical data

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-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		5.15
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