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STMicroelectronics
BUL98

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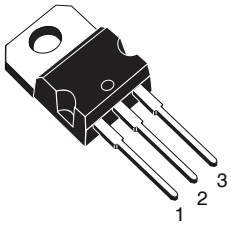
BUL98

High voltage fast-switching NPN power transistor

General features

- High voltage capability
- Minimum lot-to-lot spread for reliable operation
- Low base drive requirements
- Very high switching speed
- Fully characterized at 125 °C
- In compliance with the 2002/93/EC European Directive

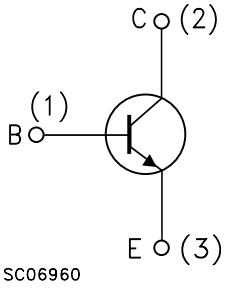


TO-220

Applications

- Electronic transformers for halogen lamps
- Switch mode power supply

Internal schematic diagram



Description

The device is manufactured using high voltage Multi-Epitaxial Planar technology for cost-effective high performance. It uses a Hollow Emitter structure to enhance switching speeds. The device is designed for use in lighting applications and low cost switch-mode power supplies.

Order code

Part Number	Marking	Package	Packing
BUL98	BUL98	TO-220	Tube

Contents

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CES}	Collector-emitter voltage (V_{BE} =0)	800	V
V_{CEO}	Collector-emitter voltage (I_B =0)	450	V
V_{EBO}	Emitter-base voltage (I_C =0)	9	V
I_C	Collector current	12	A
I_{CM}	Collector peak current (t_P < 5ms)	25	A
I_B	Base current	6	A
I_{BM}	Base peak current (t_P < 5ms)	12	A
P_{tot}	Total dissipation at $T_c \leq 25°C$	110	W
T_{stg}	Storage temperature	-65 to 150	°C
T_J	Max. operating junction temperature	150	°C

Table 2. Thermal data

Symbol	Parameter		Value	Unit
$R_{thj\text{-}case}$	Thermal resistance junction-case	max	1.14	°C/W

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} = 800V V_{CE} = 800V T_j = 125°C			100 500	µA µA
I_{CEO}	Collector-emitter current (I_B =0)	V_{CE} = 450V			100	µA
$V_{CEO(sus)}$ (1)	Collector-emitter sustaining voltage (I_B = 0)	I_C =10mA L = 25mH	450			V
V_{EBO}	Emitter-base voltage (I_C = 0)	I_E =10mA	9			V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C =5A I_B =1A I_C =9A I_B =1.8A I_C =12A I_B =2.4A		0.15 0.3 0.5	0.5 0.8 1.5	V V V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C =5A I_B =1A I_C =9A I_B =1.8A I_C =12A I_B =2.4A		0.95 1 1.1	1.2 1.3 1.4	V V V
h_{FE} (1)	DC current gain	I_C =10mA V_{CE} =5V I_C =5A V_{CE} =5V	10 15		 35	
t_s t_f	Inductive load Storage time Fall time	V_{CL} =350V I_C =9A $V_{BE(off)}$ =-5V I_{B1} =1.8A L =200µH $R_{BB(off)}$ =0Ω (see figure 8)		1.1 55	1.8 100	µs ns
t_s t_f	Inductive load Storage time Fall time	V_{CL} =350V I_C =9A $V_{BE(off)}$ =-5V I_{B1} =1.8A L =200µH $R_{BB(off)}$ =0Ω T_j = 100°C (see figure 8)		1.5 80		µs ns

Note (1) Pulsed duration = 300 µs, duty cycle ≤1.5%

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

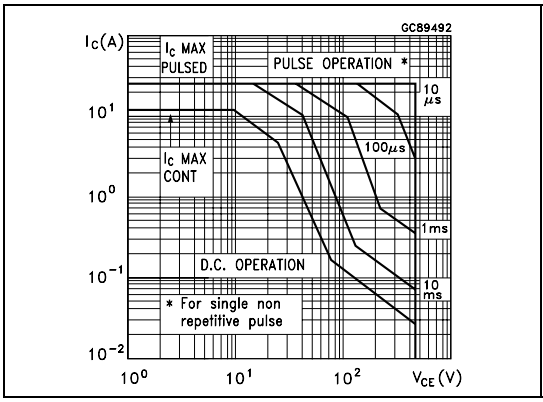


Figure 2. Derating curve

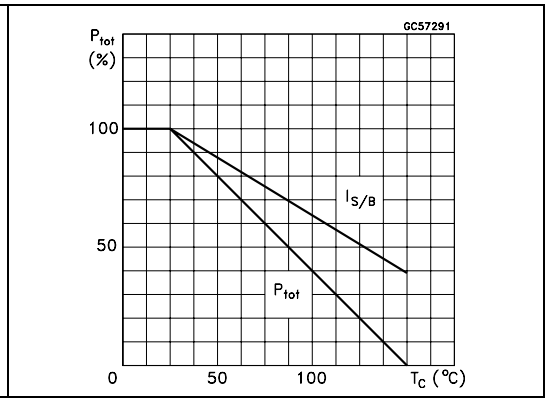


Figure 3. Collector-emitter saturation voltage

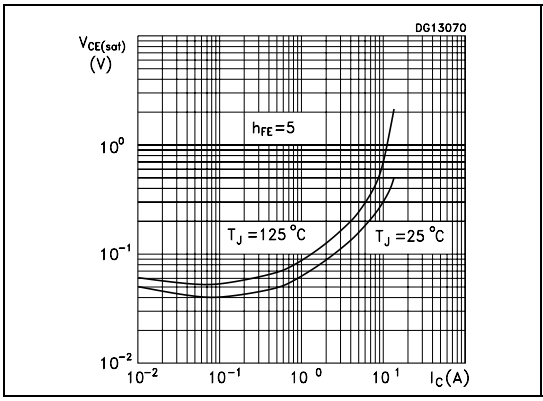


Figure 4. Base-emitter saturation voltage

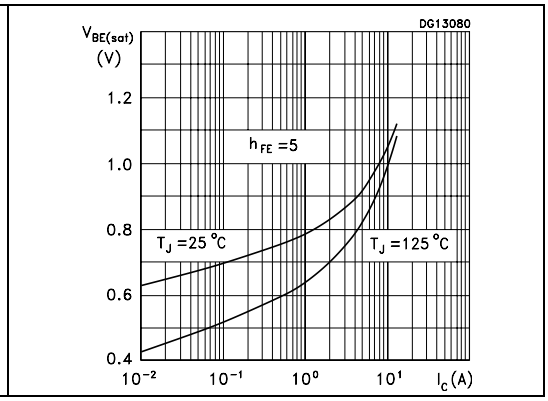


Figure 5. DC current gain

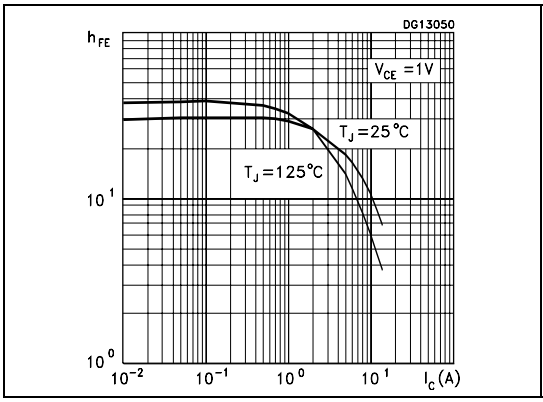


Figure 6. DC current gain

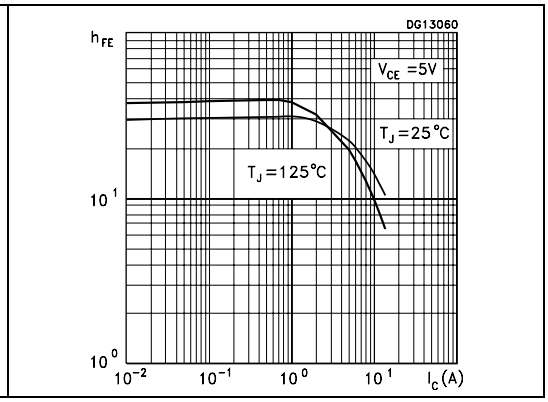
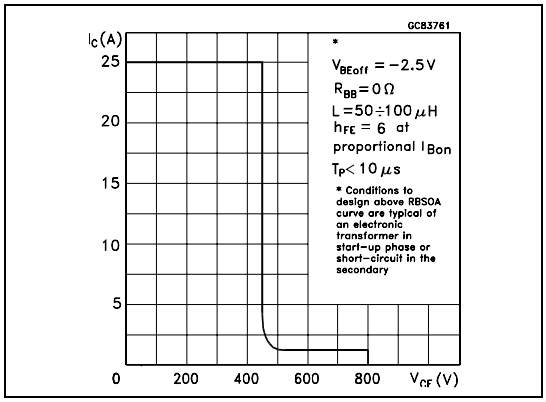
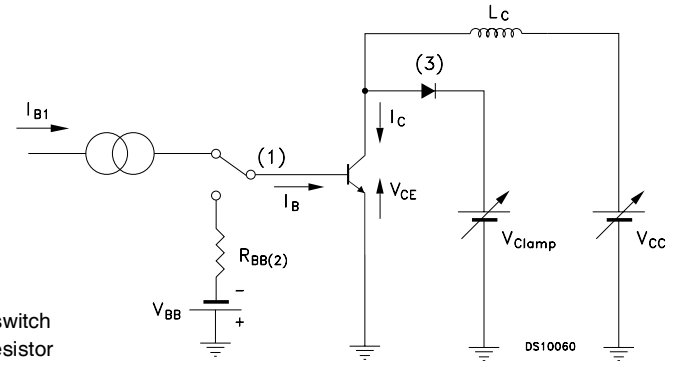


Figure 7. Reverse biased safe operating area



2.2 Test circuits

Figure 8. Inductive load switching test circuit



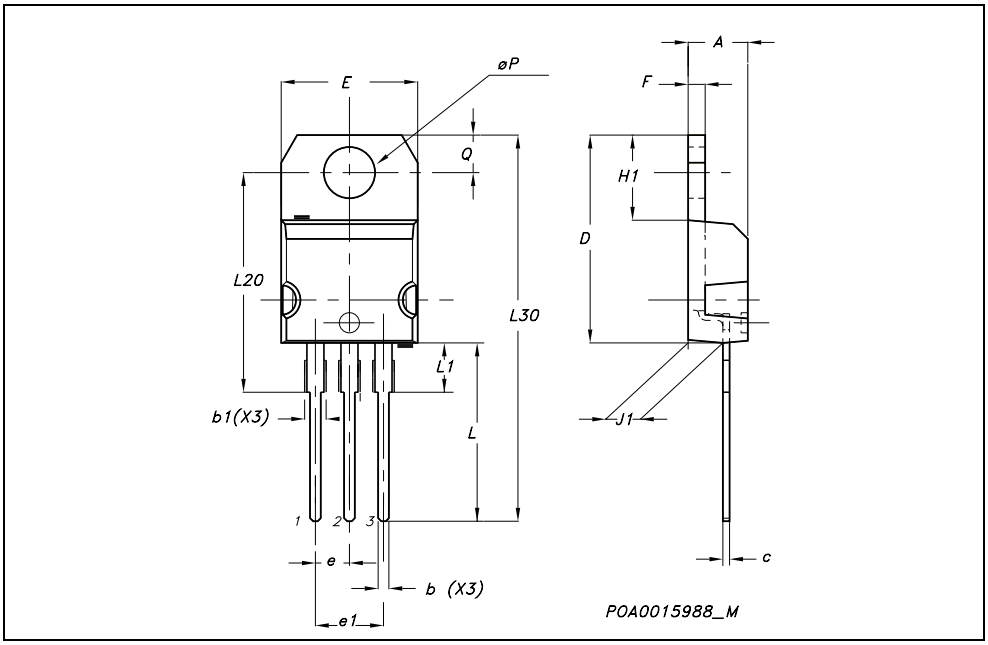
1) Fast electronic switch
2) Non-inductive resistor
3) Fast recovery rectifier

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.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
b	0.61		0.88	0.024		0.034
b1	1.15		1.70	0.045		0.066
c	0.49		0.70	0.019		0.027
D	15.25		15.75	0.60		0.620
E	10		10.40	0.393		0.409
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.194		0.202
F	1.23		1.32	0.048		0.052
H1	6.20		6.60	0.244		0.256
J1	2.40		2.72	0.094		0.107
L	13		14	0.511		0.551
L1	3.50		3.93	0.137		0.154
L20		16.40			0.645	
L30		28.90			1.137	
øP	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116



4 Revision history

Table 4. Revision history

Date	Revision	Changes
30-Jun-2005	1	First release.
07-Nov-2006	2	The document has been reformatted

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