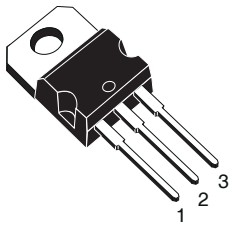
BUL704

High voltage fast-switching NPN Power Transistor

General features

- NPN Transistor
- High voltage capability
- Low spread of dynamic parameters
- Minimum lot-to-lot spread for reliable operation
- Very high switching speed
- In compliance with the 2002/93/EC European Directive



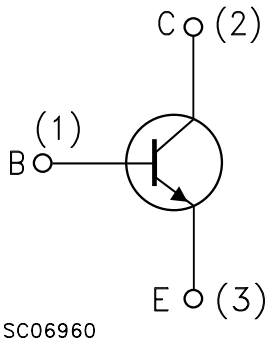
TO-220

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.

Internal schematic diagram



Applications

- Electronic ballast for fluorescent lighting
- Dedicated for PFC solution in HF ballast half-bridge voltage fed

Order codes

Part Number	Marking	Package	Packing
BUL704	BUL704	TO-220	Tube

Contents

1 Electrical ratings

Table 1. 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)	10	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	70	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	1.78	°C/W
$R_{thj\text{-}amb}$	Thermal resistance junction-amb	max	62.5	°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} =-1.5V)	V_{CE} =700V V_{CE} =700V T_j =125°C			100 500	µA µA
I_{CEO}	Collector cut-off current (I_B =0)	V_{CE} =400V			250	µA
V_{EBO}	Emitter-base voltage (I_C = 0)	I_E =10mA	10			V
$V_{CEO(sus)}$ (1)	Collector-emitter sustaining voltage (I_B = 0)	I_C =100mA L =25mH	400			V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C =1A I_B =0.2A I_C =2.5A I_B =0.5A			0.5 0.8	V V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C =1A I_B =0.2A I_C =2.5A I_B =0.5A			1.1 1.2	V V
h_{FE}	DC current gain	I_C =10mA V_{CE} =5V I_C =2A V_{CE} =5V	10 14		 28	
t_s t_f	Resistive load Storage time Fall time	V_{CC} =125V I_C =2A I_{B1} = -I_{B2} =0.4A t_p = 30µs (see fig.12)	1.5	 0.2	3 0.4	µs µs
t_s t_f	Inductive load Storage time Fall time	I_C =2A I_{B1} =0.4A $V_{BE(off)}$ =-5V R_{BB} =0Ω V_{clamp}=200V (see fig.13)		 0.6 0.1	 1 0.2	 µs µs

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

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

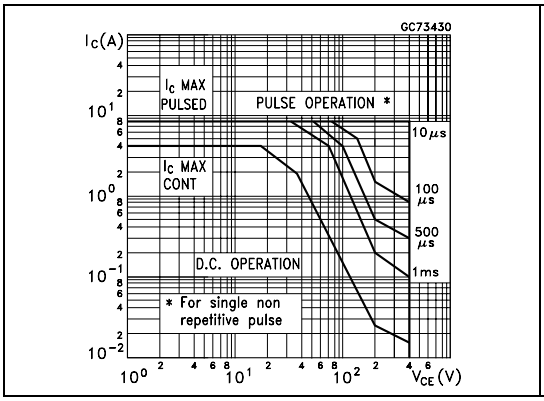


Figure 2. Derating Curve

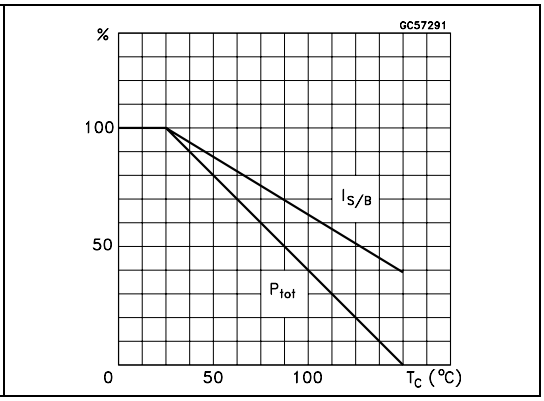


Figure 3. DC current gain

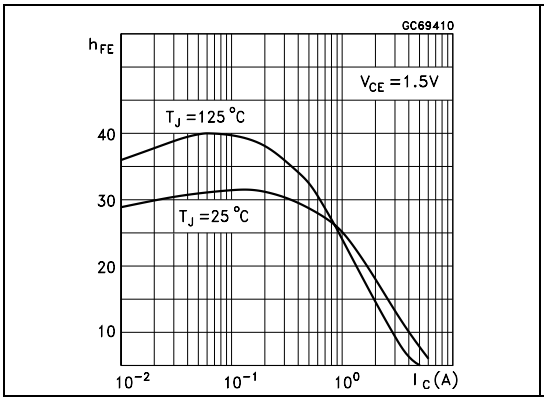


Figure 4. DC current gain

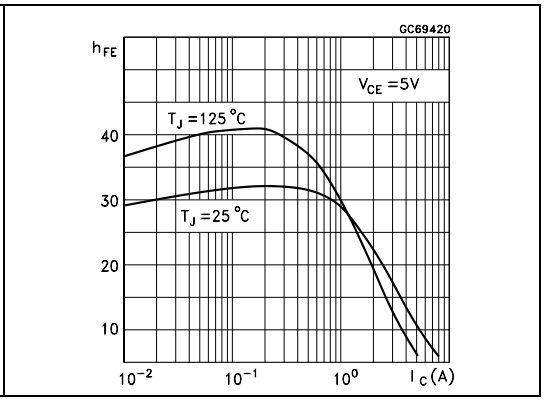


Figure 5. Collector-emitter saturation voltage

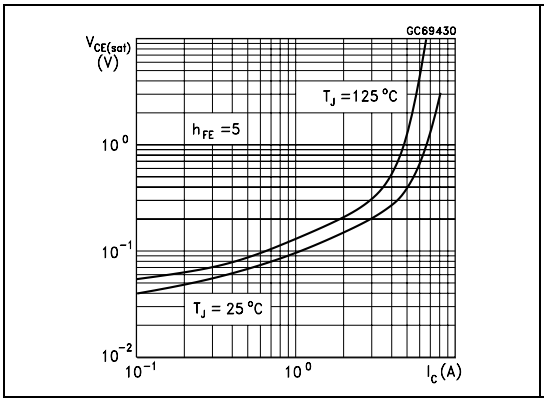


Figure 6. Base-emitter saturation voltage

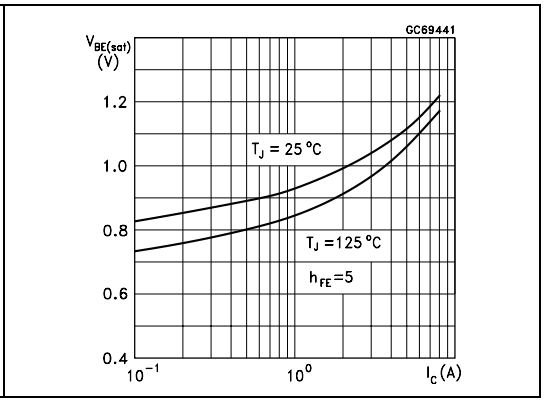


Figure 7. Inductive load fall time

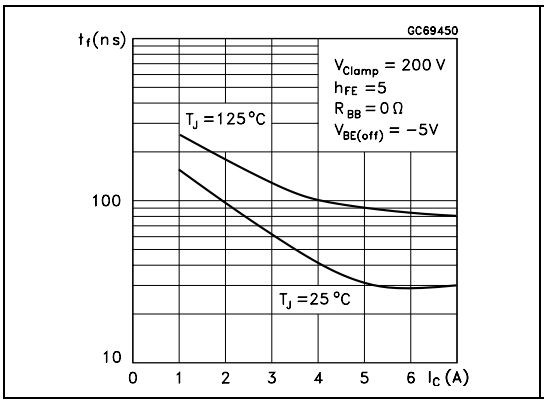


Figure 8. Inductive load storage time

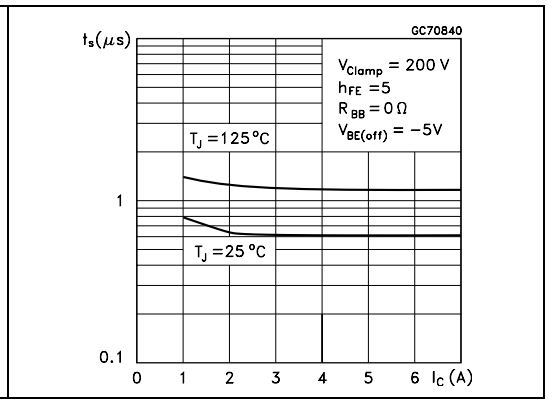


Figure 9. Resistive load fall time

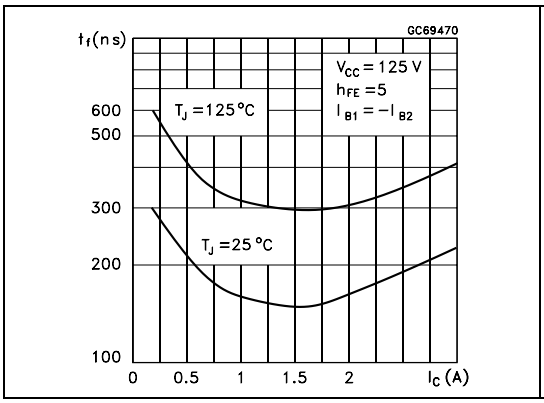


Figure 10. Resistive load storage time

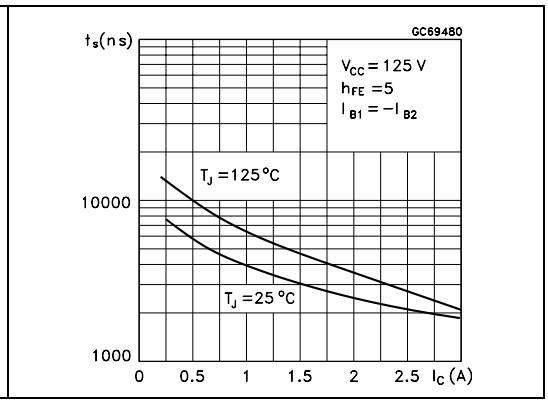
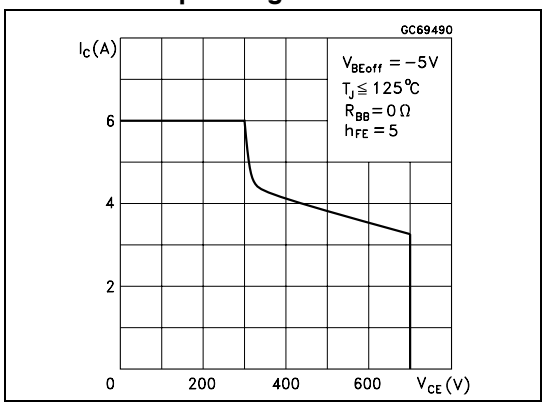
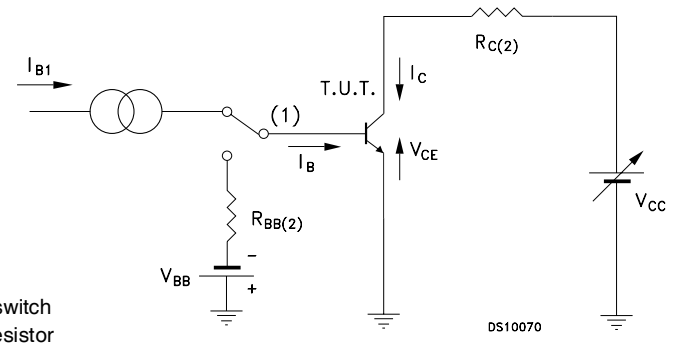


Figure 11. Reverse biased safe operating area



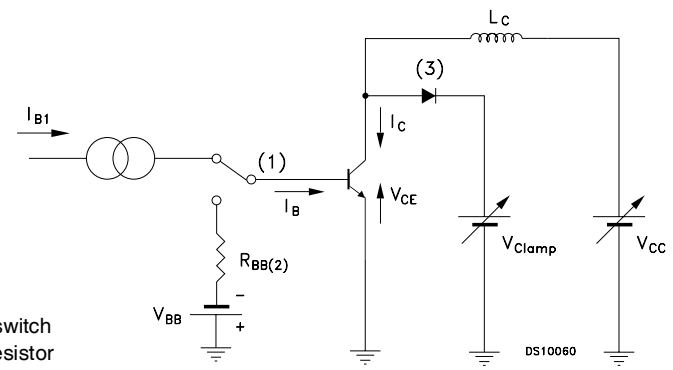
2.2 Test circuits

Figure 12. Resistive load switching test circuit



1) Fast electronic switch
2) Non-inductive resistor

Figure 13. Inductive load switching test circuit



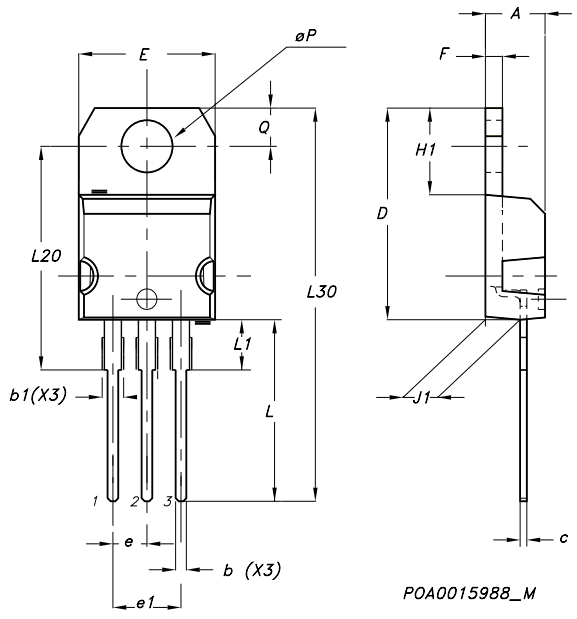
1) Fast electronic switch
2) Non-inductive resistor
3) Fast recovery rectifier

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-May-2006	1	Initial release.

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