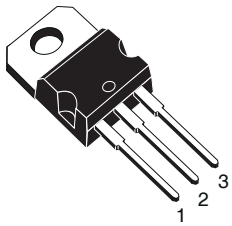
BUL741

High voltage fast-switching NPN power transistor

General features

- High voltage capability
- Low spread of dynamic parameters
- Minimum lot-to-lot spread for reliable operation
- Very high switching speed



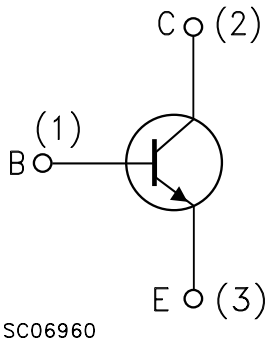
TO-220

Description

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

Thanks to an increased intermediate layer, it has an intrinsic ruggedness which enables the transistor to withstand an high collector current level during breakdown condition, without using the transil protection usually necessary in typical converters for lamp ballast.

Figure 1. Internal schematic diagram



Applications

- Electronic ballast for fluorescent lighting
- Switch mode power supplies.

Table 1. Device summary

Order code	Marking	Package	Packaging
BUL741	BUL741	TO-220	Tube

1 Electrical ratings

Table 2. Absolute maximum rating

Symbol	Parameter	Value	Unit
V_{CES}	Collector-emitter voltage (V_{BE} = 0)	1050	V
V_{CEO}	Collector-emitter voltage (I_B = 0)	400	V
V_{EBO}	Emitter-base voltage (I_C = 0, I_B = 2A, t_P < 10ms)	$V_{(BR)EBO}$	V
I_C	Collector current	2.5	A
I_{CM}	Collector peak current (t_P < 5ms)	5	A
I_B	Base current	1.5	A
I_{BM}	Base peak current (t_P < 5ms)	3	A
P_{tot}	Total dissipation at T_c = 25°C	60	W
T_{stg}	Storage temperature	-65 to 150	°C
T_J	Max. operating junction temperature	150	°C

Table 3. Thermal data

Symbol	Parameter		Value	Unit
$R_{thj\text{-}case}$	Thermal resistance junction-case	max	2.08	°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_{CES}	Collector cut-off current (V_{BE} =0V)	V_{CE} =1050V		0.2	10	µA
I_{CEO}	Collector cut-off current (I_B =0)	V_{CE} =400V		10	250	µA
$V_{(BR)EBO}$	Emitter-base breakdown voltage (I_C = 0)	I_E =1mA	15	19	24	V
$V_{CEO(sus)}$ (1)	Collector-emitter sustaining voltage (I_B = 0)	I_C =10mA	400	450		V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C =0.7A I_B =0.14A I_C =2A I_B =0.6A		0.15 0.5	0.5 1.5	V V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C =2A I_B =0.6A		1.1	1.5	V
h_{FE}	DC current gain	I_C =0.1A V_{CE} =5V I_C =0.45A V_{CE} =3V	48 25	70 35	100 50	
t_s t_f	Resistive load Storage time Fall time	V_{CC} =125V I_C =1A I_{B1} = -I_{B2} =0.2A t_p = 300µs $V_{BE(off)}$ =-5V		2.5 350	3.5 500	µs ns
E_{ar}	Repetitive avalanche energy	L =2mH C =1.8nF $V_{BE(off)}$ =-5V	5			mJ

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

2.1 Typical characteristic

Figure 2. Safe operating area

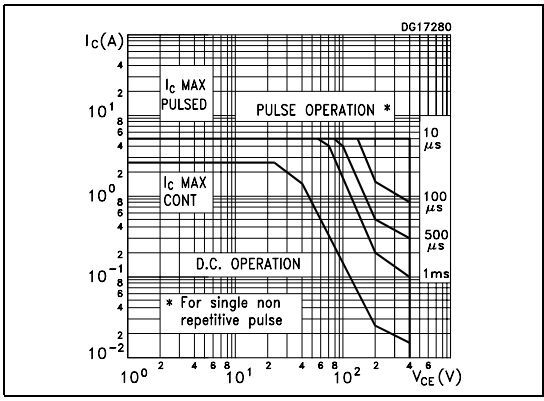


Figure 3. Derating curve

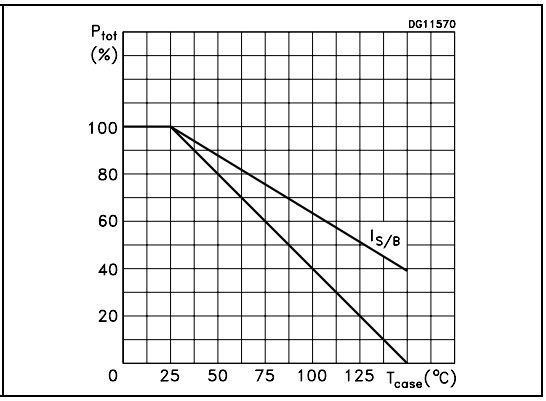


Figure 4. Output characteristics

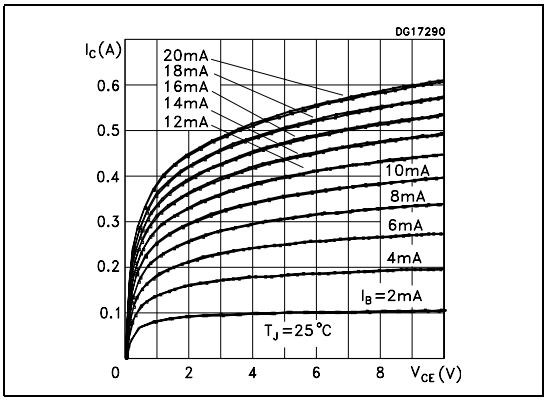


Figure 5. Reverse biased safe operating area

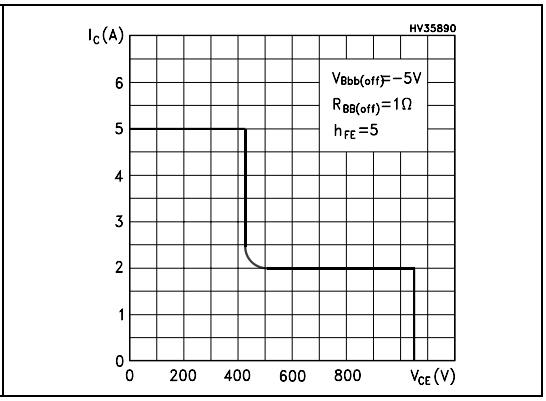


Figure 6. DC current gain

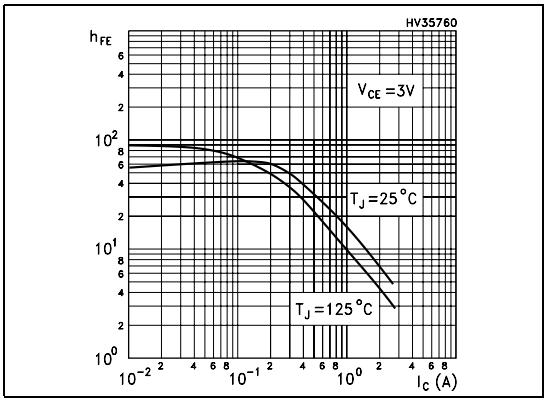


Figure 7. DC current gain

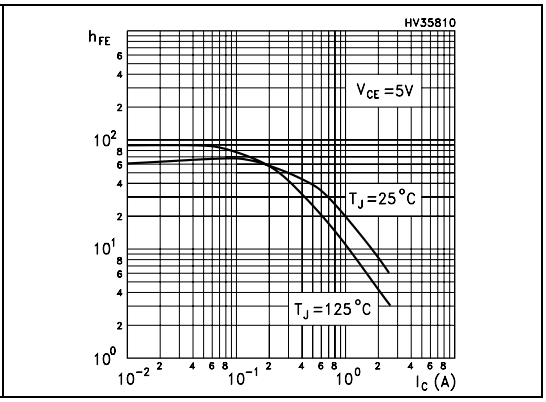


Figure 8. Base-emitter saturation voltage

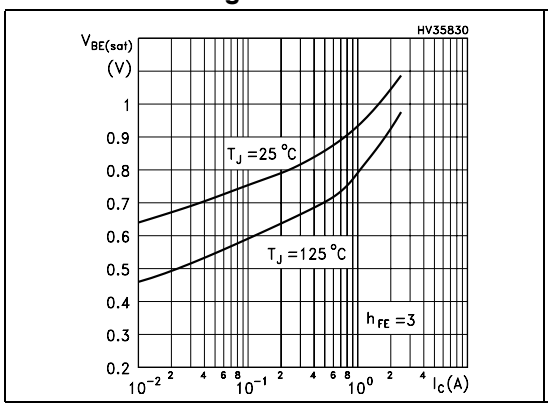


Figure 9. Collector-emitter saturation voltage

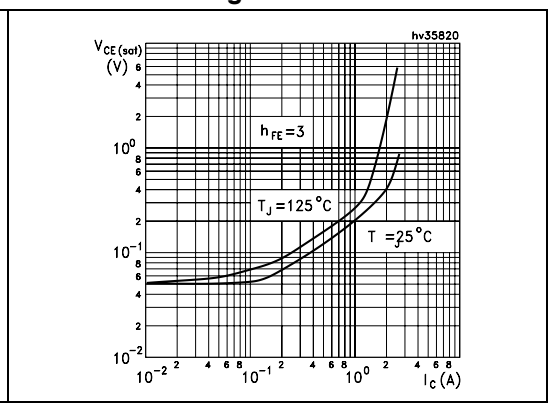


Figure 10. Resistive load switching on times

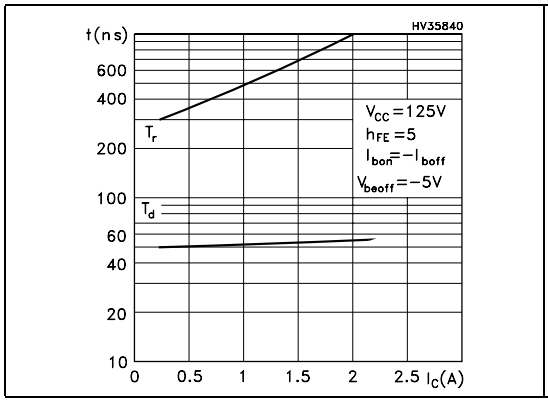


Figure 11. Resistive load switching on times

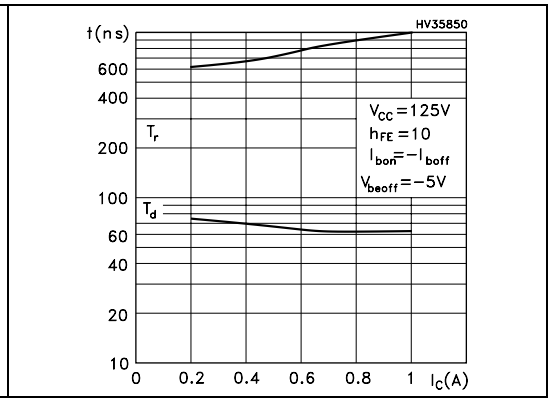


Figure 12. Resistive load switching off times

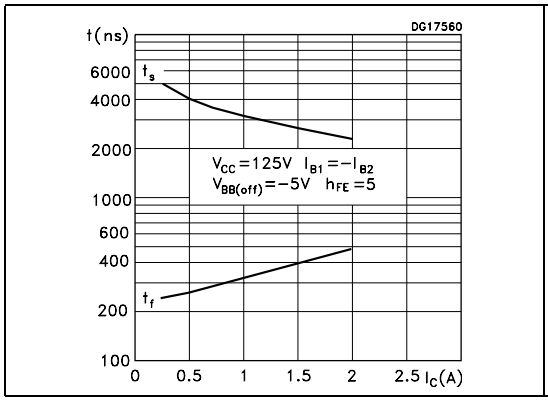
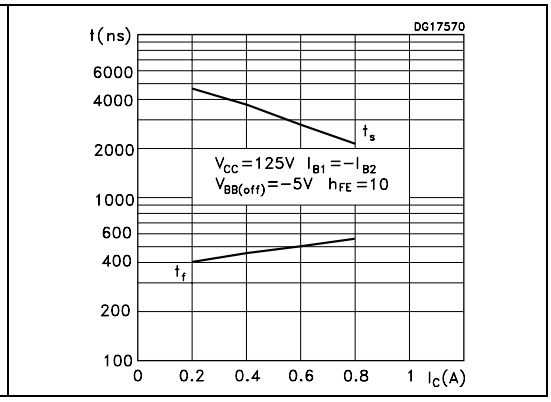


Figure 13. Resistive load switching off times



2.2 Test circuits

Figure 14. Resistive load switching test circuitit

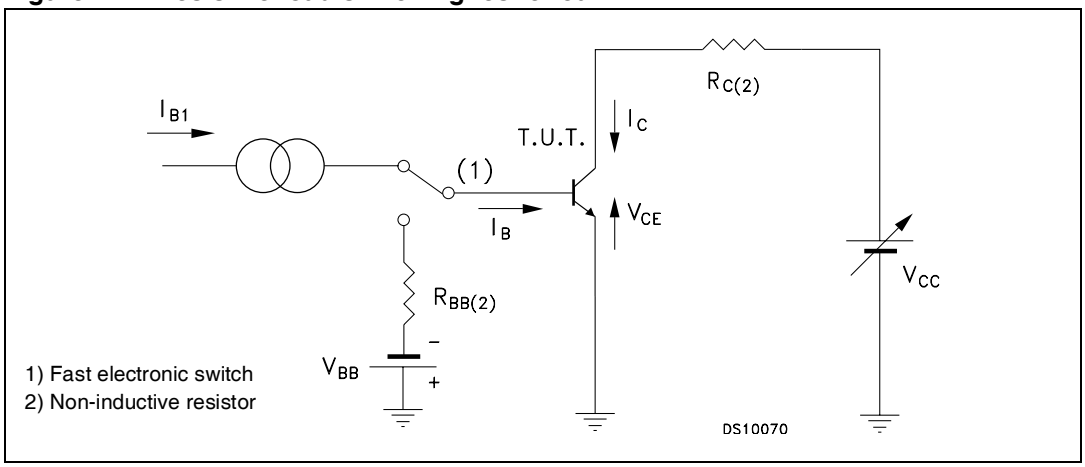
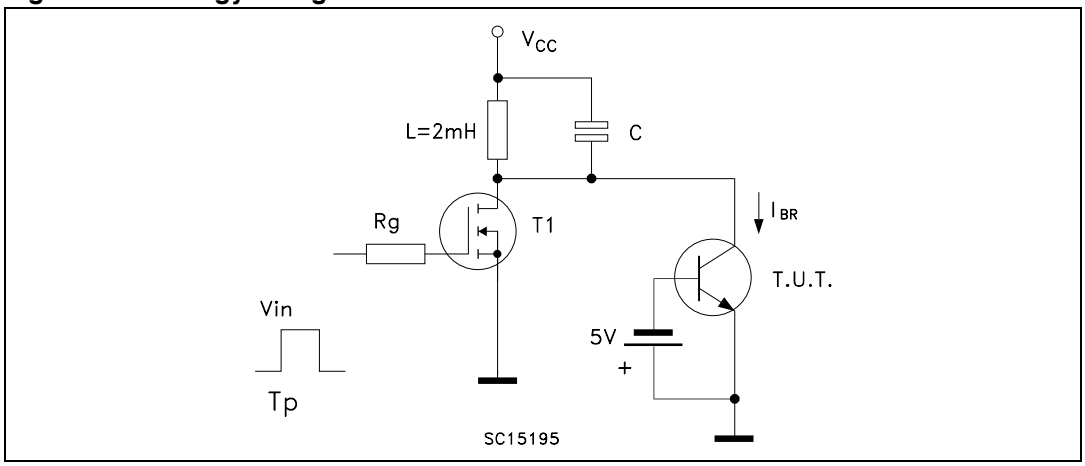


Figure 15. Energy rating test circuit

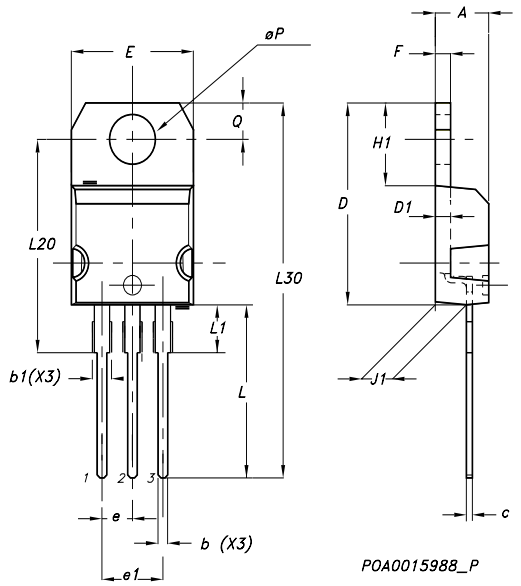


3 Package mechanical data

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. Revision history

Date	Revision	Changes
11-Apr-2007	1	Initial release.
10-Jul-2007	2	Figure 12 and 13 have been updated.

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