BUL741
BUL741FP

High voltage fast-switching NPN power transistors

Features

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

Applications

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

Description

The devices are 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.

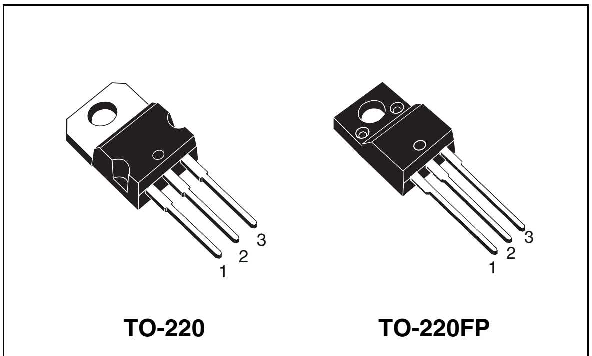


Figure 1. Internal schematic diagram

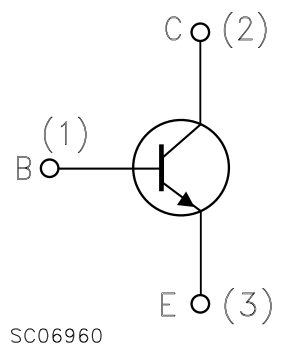


Table 1. Device summary

Order codes	Marking	Packages	Packaging
BUL741	BUL741	TO-220	Tube
BUL741FP	BUL741FP	TO-220FP	Tube

Contents

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 = 2 A, t_P < 10ms)	$V_{(BR)EBO}$	V
I_C	Collector current	2.5	A
I_{CM}	Collector peak current (t_P < 5 ms)	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 for TO-220	60	W
	Total dissipation at T_c = 25 °C for TO-220FP	30	
T_{stg}	Storage temperature	-65 to 150	°C
T_J	Max. operating junction temperature	150	°C

Table 3. Thermal data

Symbol	Parameter	TO-220	TO-220FP	Unit
R_{thJC}	Thermal resistance junction-case max	2.08	4.17	°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} = 0)	V_{CE} = 1050 V		0.2	10	µA
I_{CEO}	Collector cut-off current (I_B = 0)	V_{CE} = 400 V		10	250	µA
$V_{(BR)EBO}$	Emitter-base breakdown voltage (I_C = 0)	I_E = 1 mA	15	19	24	V
$V_{CEO(sus)}$ (1)	Collector-emitter sustaining voltage (I_B = 0)	I_C = 10 mA	400	450		V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 0.7 A I_B = 0.14 A I_C = 2 A I_B = 0.6 A		0.15 0.5	0.5 1.5	V V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = 2 A I_B = 0.6 A		1.1	1.5	V
h_{FE}	DC current gain	I_C = 0.1 A V_{CE} = 5 V I_C = 0.45 A V_{CE} = 3 V	48 25	70 35	100 50	
t_s t_f	Resistive load Storage time Fall time	V_{CC} = 125 V I_C = 1 A $I_{B(on)}$ = -$I_{B(off)}$ = 0.2 A t_p = 300 µs $V_{BB(off)}$ = - 5 V		2.5 350	3.5 500	µs ns
E_{ar}	Repetitive avalanche energy	L = 2 mH C = 1.8 nF $V_{BB(off)}$ = - 5V	5			mJ

1. Pulse test: pulse duration ≤300 µs, duty cycle ≤2 %

2.1 Typical characteristic

Figure 2. Safe operating area

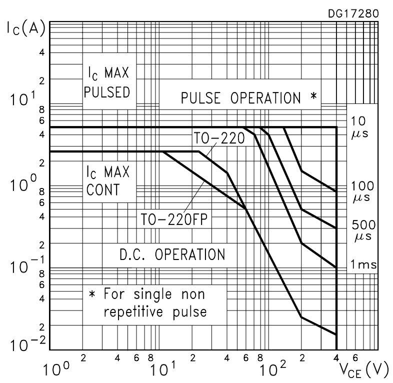


Figure 3. Derating curve

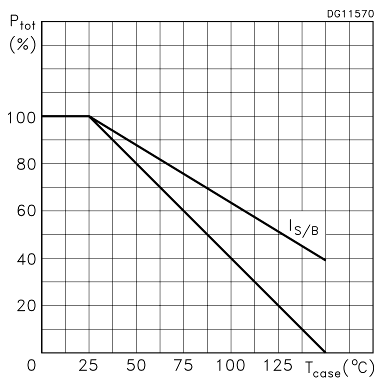


Figure 4. Output characteristics

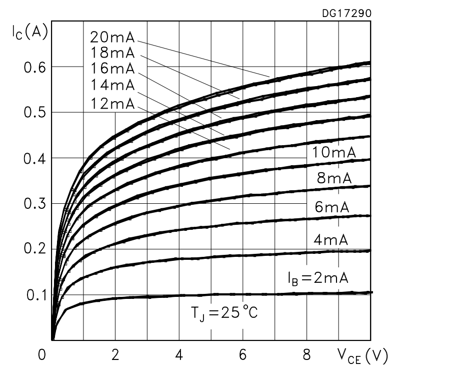


Figure 5. Reverse biased safe operating area

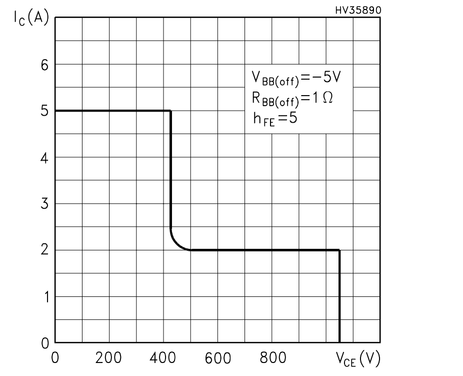


Figure 6. DC current gain (V_{CE} = 3 V)

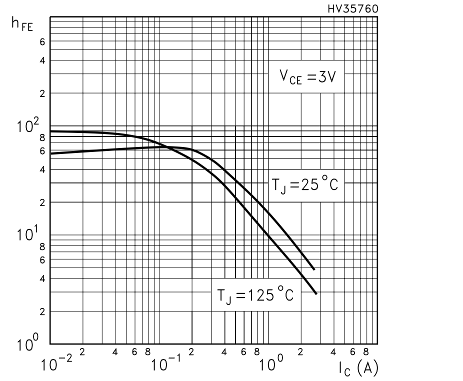


Figure 7. DC current gain (V_{CE} = 5 V)

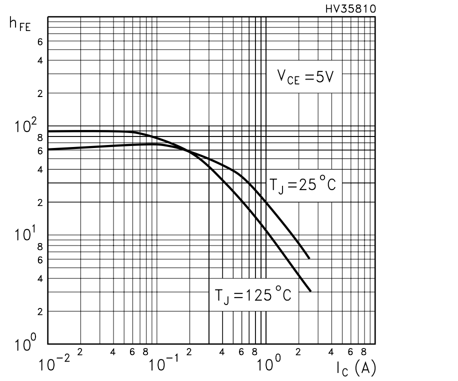


Figure 8. Base-emitter saturation voltage

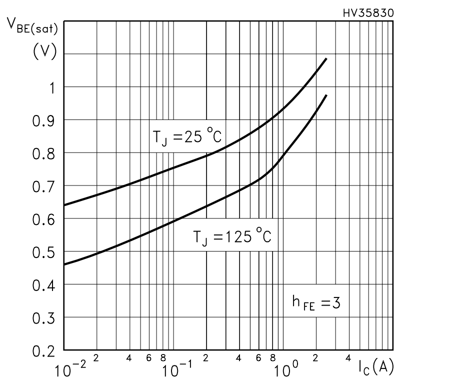


Figure 9. Collector-emitter saturation voltage

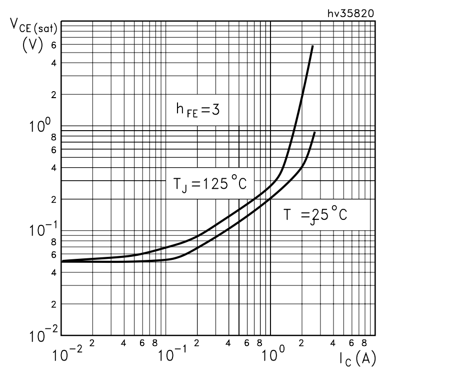


Figure 10. Resistive load switching on (h_{FE} = 5)

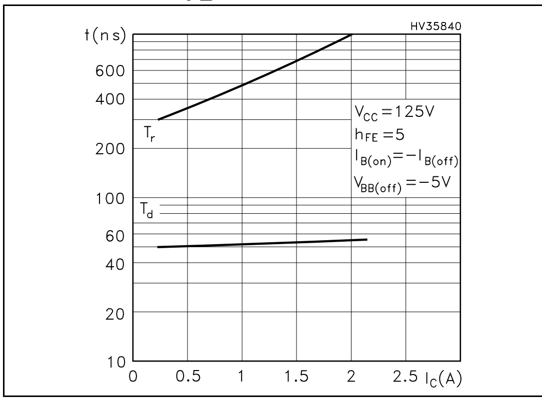


Figure 11. Resistive load switching on (h_{FE} = 10)

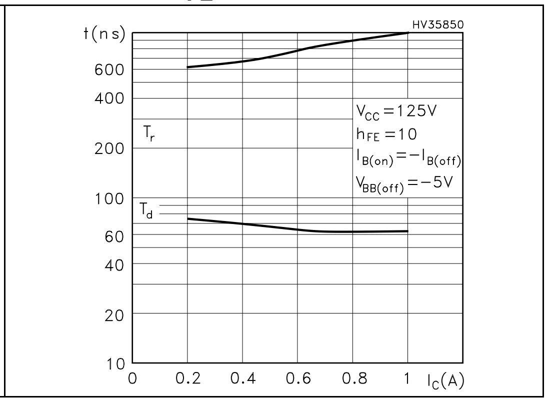


Figure 12. Resistive load switching off (h_{FE} = 5)

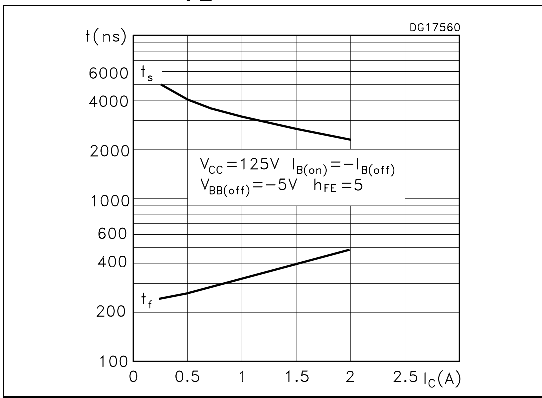
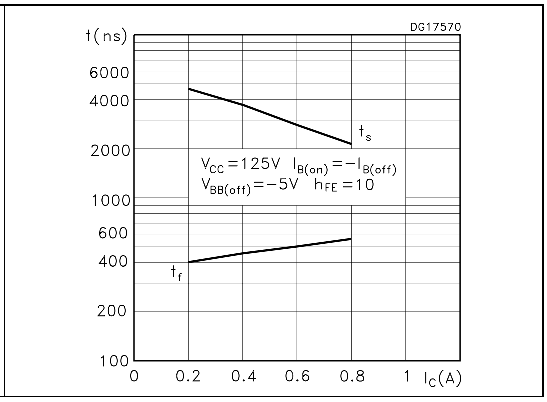
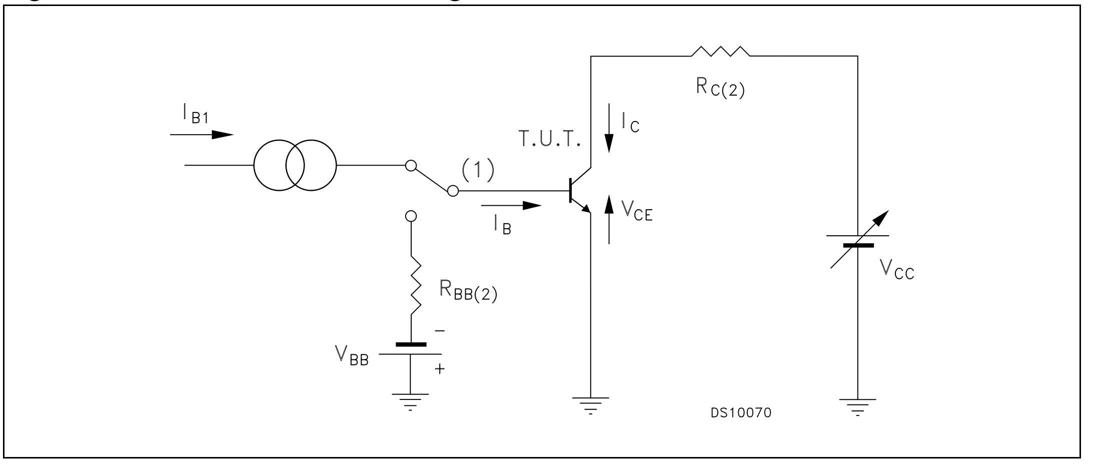


Figure 13. Resistive load switching off (h_{FE} = 10)



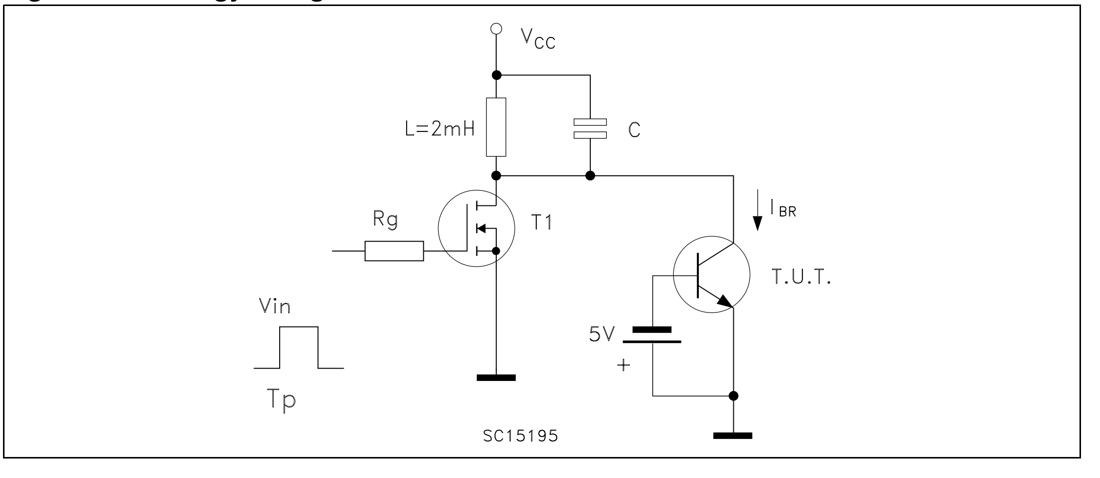
2.2 Test circuits

Figure 14. Resistive load switching test circuit



1. Fast electronic switch
2. Non-inductive resistor

Figure 15. Energy rating test circuit

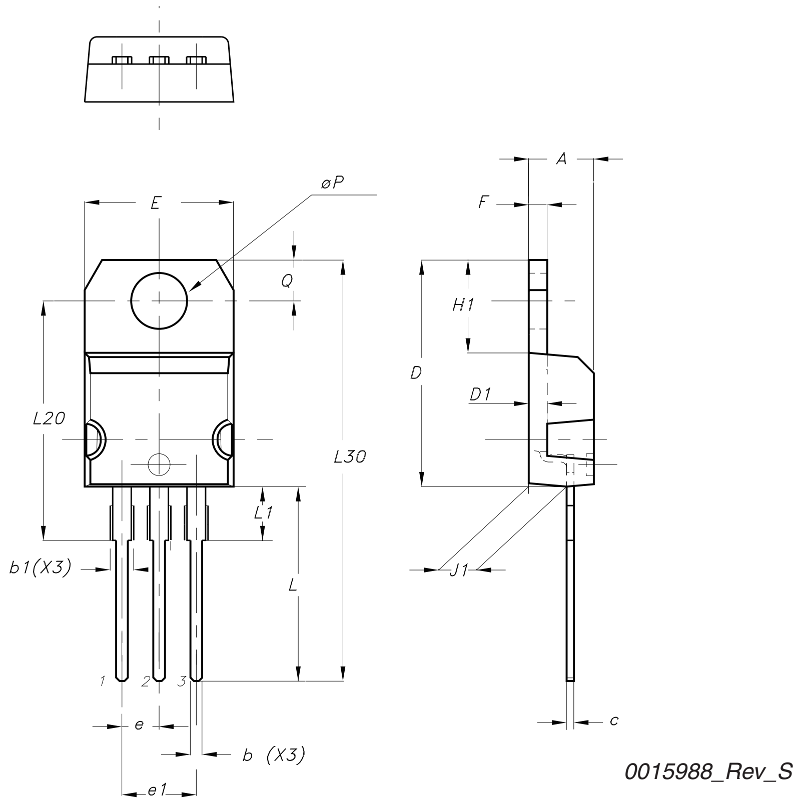


3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

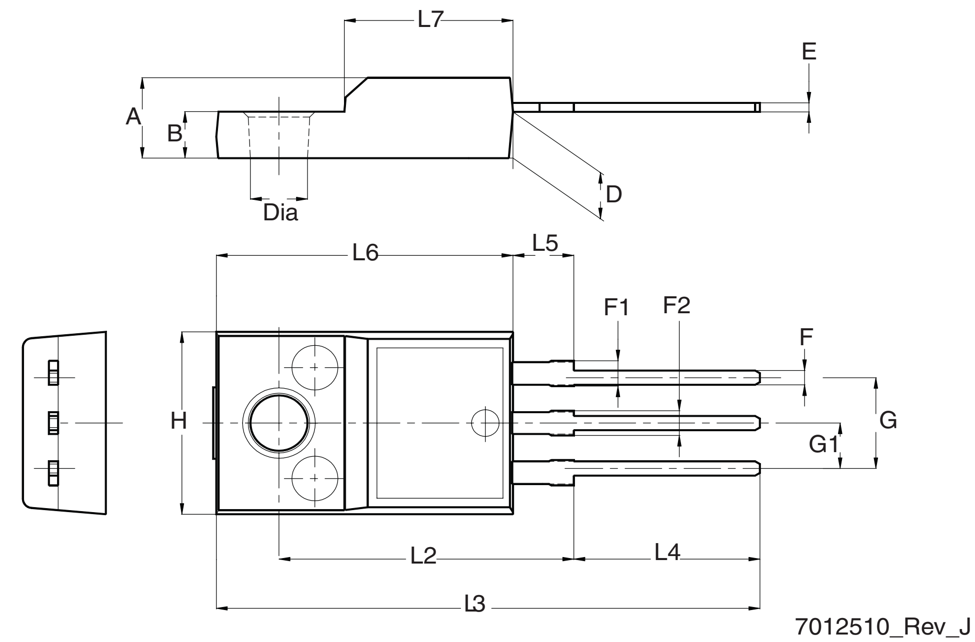
TO-220 type A mechanical data

Dim	mm		
	Min	Typ	Max
A	4.40		4.60
b	0.61		0.88
b1	1.14		1.70
c	0.48		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	
∅P	3.75		3.85
Q	2.65		2.95



TO-220FP mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.4		4.6
B	2.5		2.7
D	2.5		2.75
E	0.45		0.7
F	0.75		1
F1	1.15		1.70
F2	1.15		1.5
G	4.95		5.2
G1	2.4		2.7
H	10		10.4
L2		16	
L3	28.6		30.6
L4	9.8		10.6
L5	2.9		3.6
L6	15.9		16.4
L7	9		9.3
Dia	3		3.2



4 Revision history

Table 5. Document revision history

Date	Revision	Changes
11-Apr-2007	1	Initial release.
10-Jul-2007	2	Figure 12 and 13 have been updated.
18-Aug-2009	3	Added new package TO-220FP and mechanical data.