

### Features

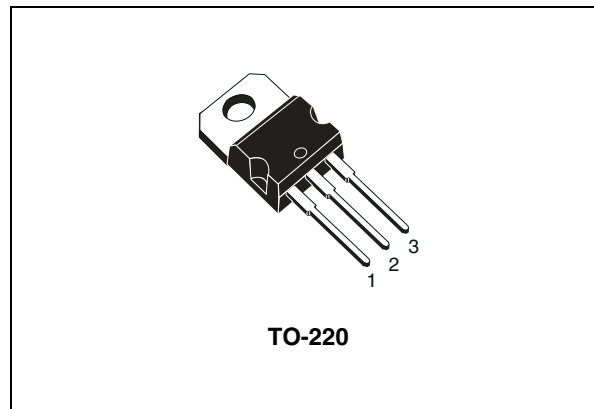
- Low spread of dynamic parameters
- High voltage capability
- Minimum lot-to-lot spread for reliable operation
- Very high switching speed

### Applications

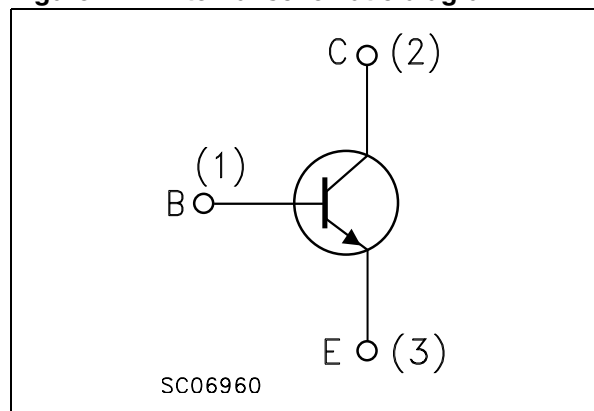
- Electronic ballast for fluorescent lighting up to 256 W (8 x 32 W)
- Switch mode power supplies

### Description

The device is manufactured using the diffused collector in planar technology adopting new and enhanced high voltage structure. 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 code	Marking	Package	Packaging
BUL743	BUL743	TO-220	Tube

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-emitter voltage ( $V_{BE} = 0$ )	1200	V
$V_{CEO}$	Collector-emitter voltage ( $I_B = 0$ )	500	V
$V_{EBO}$	Emitter-base voltage ( $I_C = 0$ , $I_B = 6$ A, $t_p < 10$ ms)	$V_{(BR)EBO}$	V
$I_C$	Collector current	12	A
$I_{CM}$	Collector peak current ( $t_p < 5$ ms)	24	A
$I_B$	Base current	6	A
$I_{BM}$	Base peak current ( $t_p < 5$ ms)	12	A
$P_{tot}$	Total dissipation at $T_c = 25$ °C	100	W
$T_{stg}$	Storage temperature	-65 to 150	°C
$T_J$	Max. operating junction temperature	150	°C

**Table 3. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction - case	1.25	°C/W
$R_{thj-amb}$	Thermal resistance junction - ambient	62.5	°C/W

## 2 Electrical characteristics

( $T_{\text{case}} = 25\text{ °C}$  unless otherwise specified)

**Table 4. Electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{\text{CES}}$	Collector cut-off current ( $V_{\text{BE}} = 0$ )	$V_{\text{CE}} = 1200\text{ V}$		0.2	10	$\mu\text{A}$
$I_{\text{CEO}}$	Collector cut-off current ( $I_{\text{B}} = 0$ )	$V_{\text{CE}} = 500\text{ V}$		10	250	$\mu\text{A}$
$V_{(\text{BR})\text{EBO}}$	Emitter base breakdown voltage ( $I_{\text{C}} = 0$ )	$I_{\text{E}} = 1\text{ mA}$	15	19	24	V
$V_{\text{CEO(sus)}}^{(1)}$	Collector-emitter sustaining voltage ( $I_{\text{B}} = 0$ )	$I_{\text{C}} = 50\text{ mA}$	500			V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 3\text{ A}$ $I_{\text{B}} = 0.6\text{ A}$ $I_{\text{C}} = 10\text{ A}$ $I_{\text{B}} = 2.5\text{ A}$		0.15 0.6	0.5 1.5	V V
$V_{\text{BE(sat)}}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 10\text{ A}$ $I_{\text{B}} = 2.5\text{ A}$		1.1	1.5	V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 0.5\text{ A}$ $V_{\text{CE}} = 5\text{ V}$ $I_{\text{C}} = 2\text{ A}$ $V_{\text{CE}} = 3\text{ V}$	35 24	55 34	80 45	
$t_{\text{s}}$ $t_{\text{f}}$	Resistive load Storage time Fall time	$I_{\text{C}} = 6\text{ A}$ $V_{\text{CC}} = 125\text{ V}$ $I_{\text{B(on)}} = -I_{\text{B(off)}} = 1.2\text{ A}$ $t_{\text{p}} = 300\text{ }\mu\text{s}$ $V_{\text{BE(off)}} = -5\text{ V}$		2.5 400	3.8 500	$\mu\text{s}$ ns
$E_{\text{ar}}$	Repetitive avalanche energy	$L = 2\text{ mH}$ $C = 1.8\text{ nF}$ $V_{\text{BE(off)}} = -5\text{ V}$	3			mJ

1. Pulsed duration = 300  $\mu\text{s}$ , duty cycle  $\leq 1.5\%$

## 2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

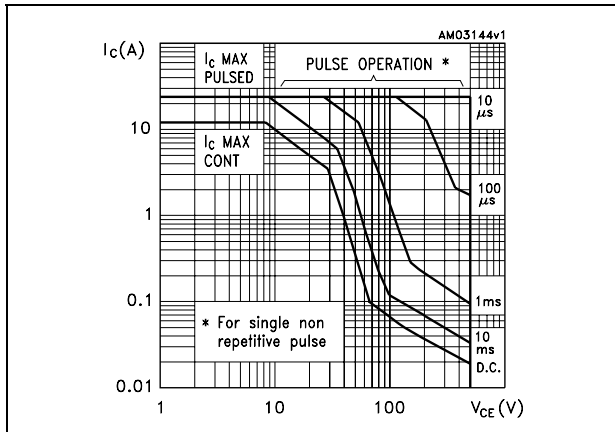


Figure 3. Derating curve

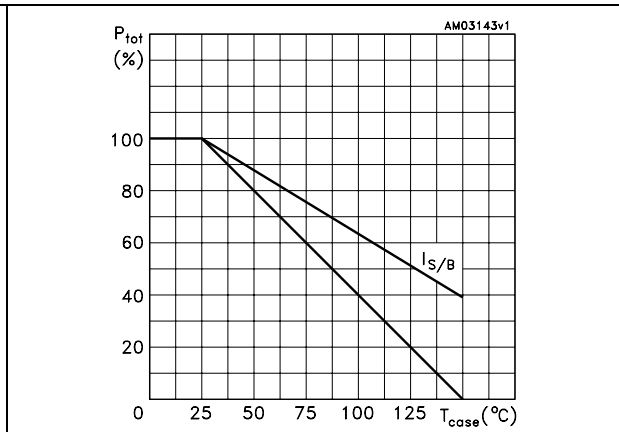


Figure 4. DC current gain ( $V_{CE} = 3 V$ )

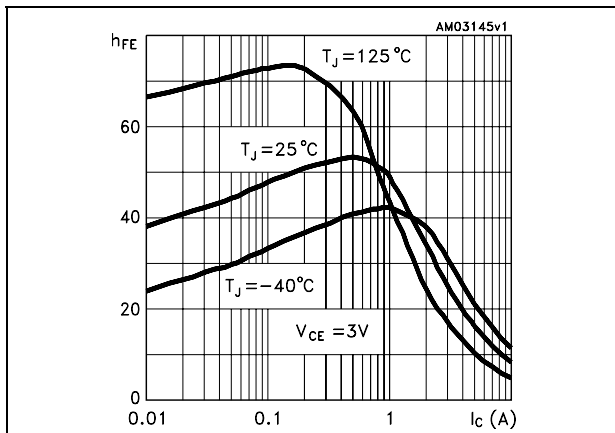


Figure 5. DC current gain ( $V_{CE} = 5 V$ )

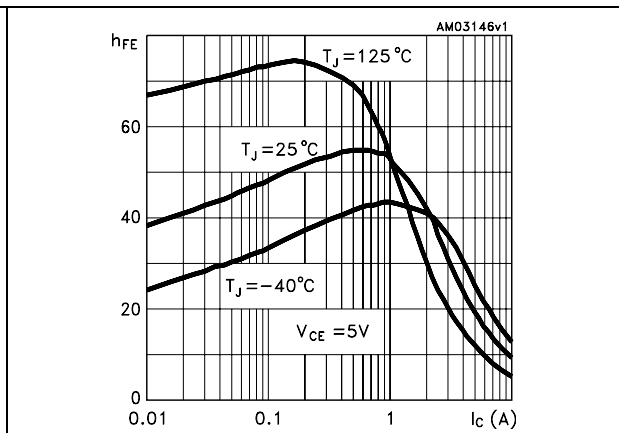


Figure 6. Collector-emitter saturation voltage

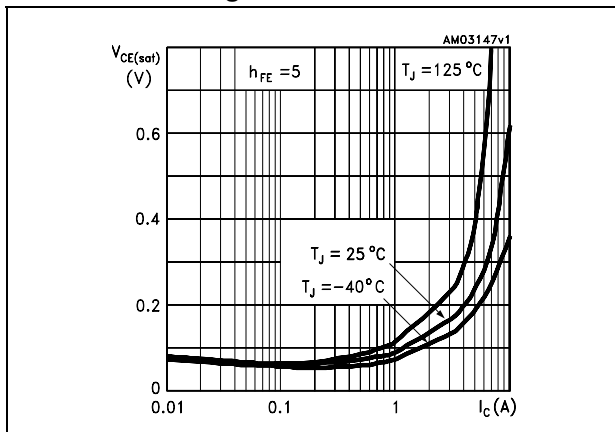


Figure 7. Base-emitter saturation voltage

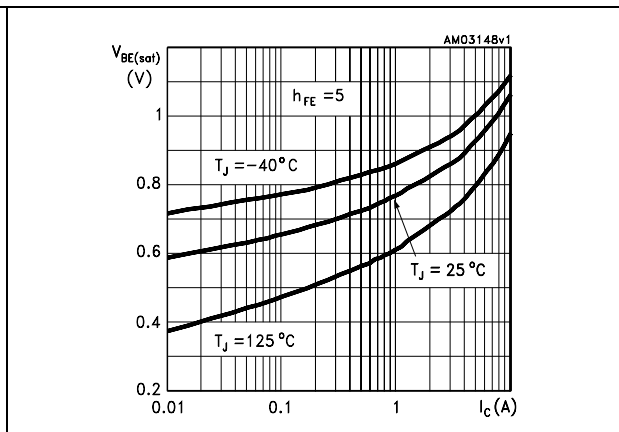


Figure 8. Output characteristics

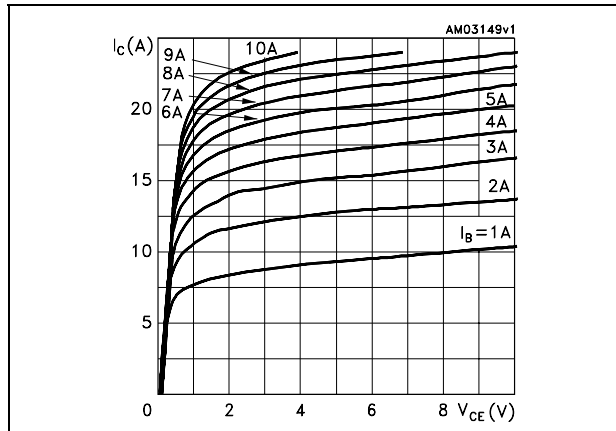


Figure 9. Reverse biased safe operating area

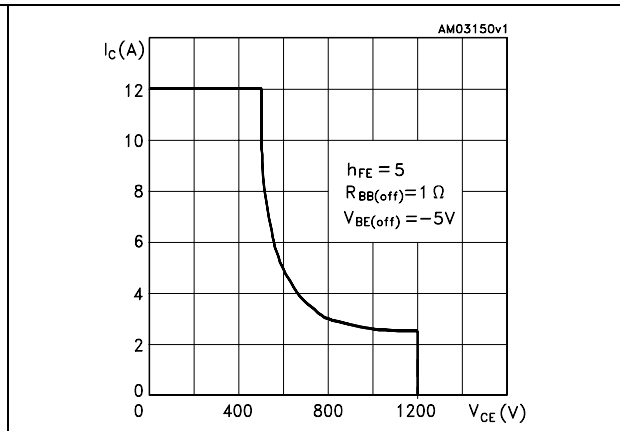


Figure 10. Resistive load switching time (on)

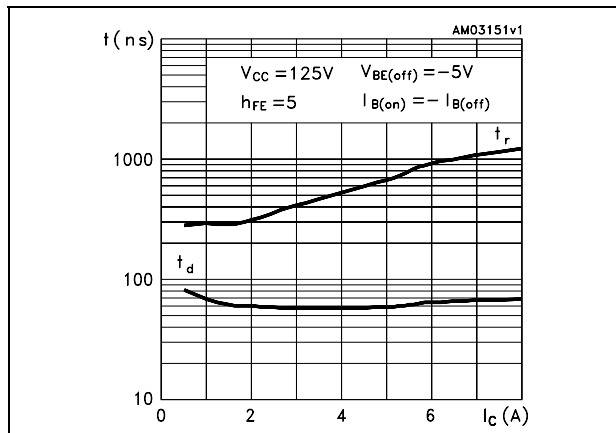
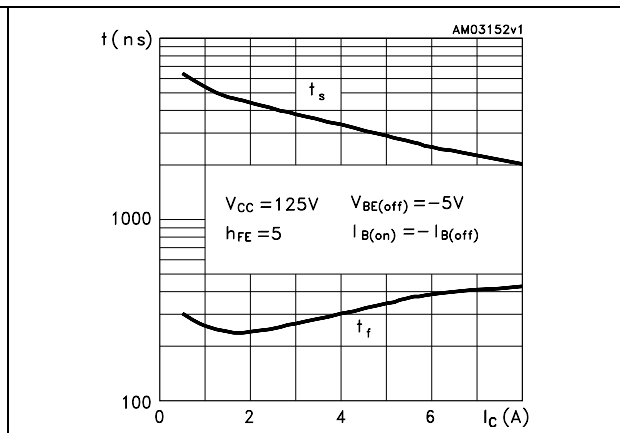


Figure 11. Resistive load switching time (off)



## 2.2 Test circuits

Figure 12. Energy rating test circuit

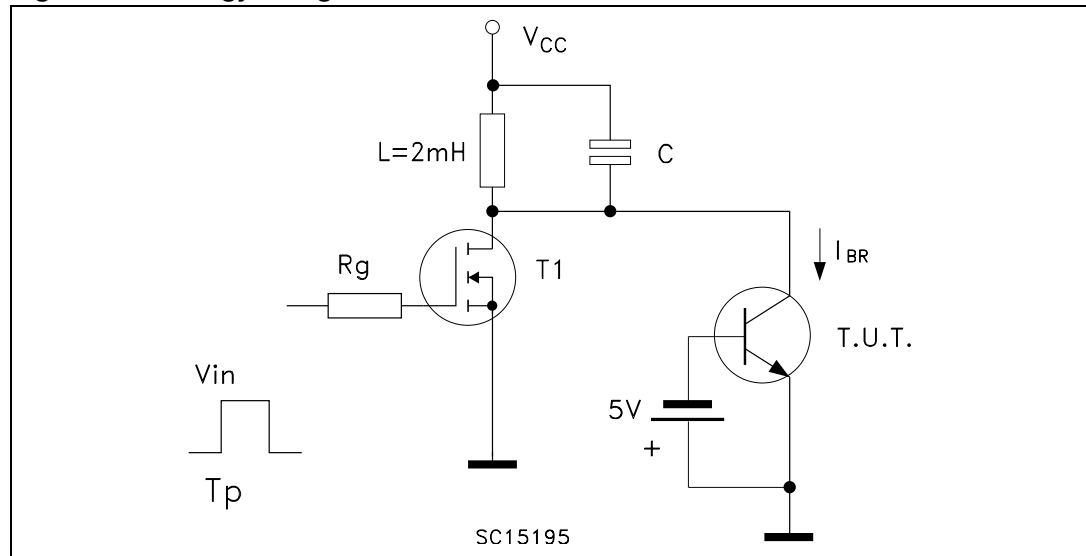
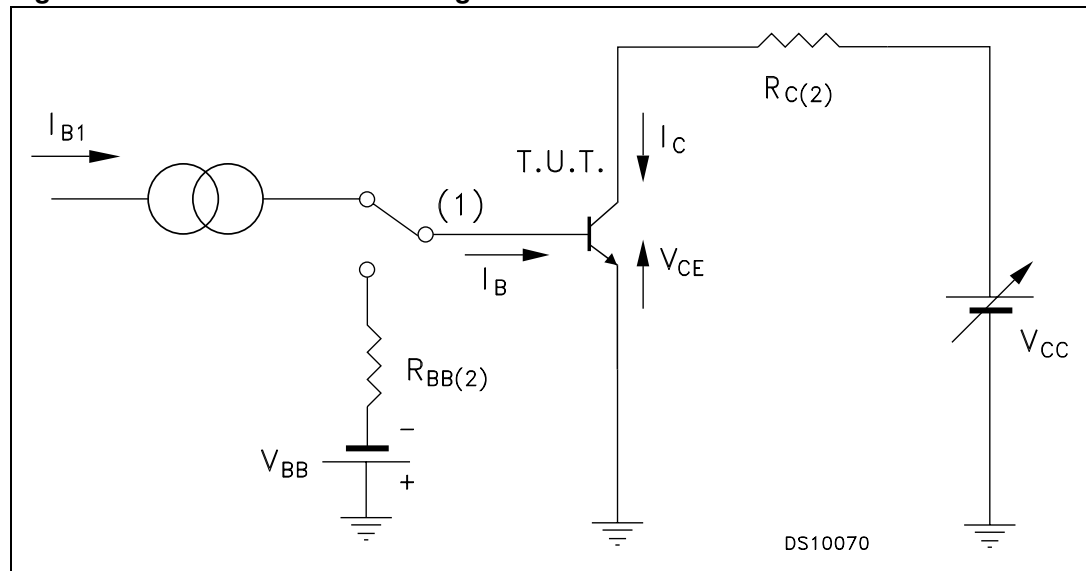


Figure 13. Resistive load switching test circuit



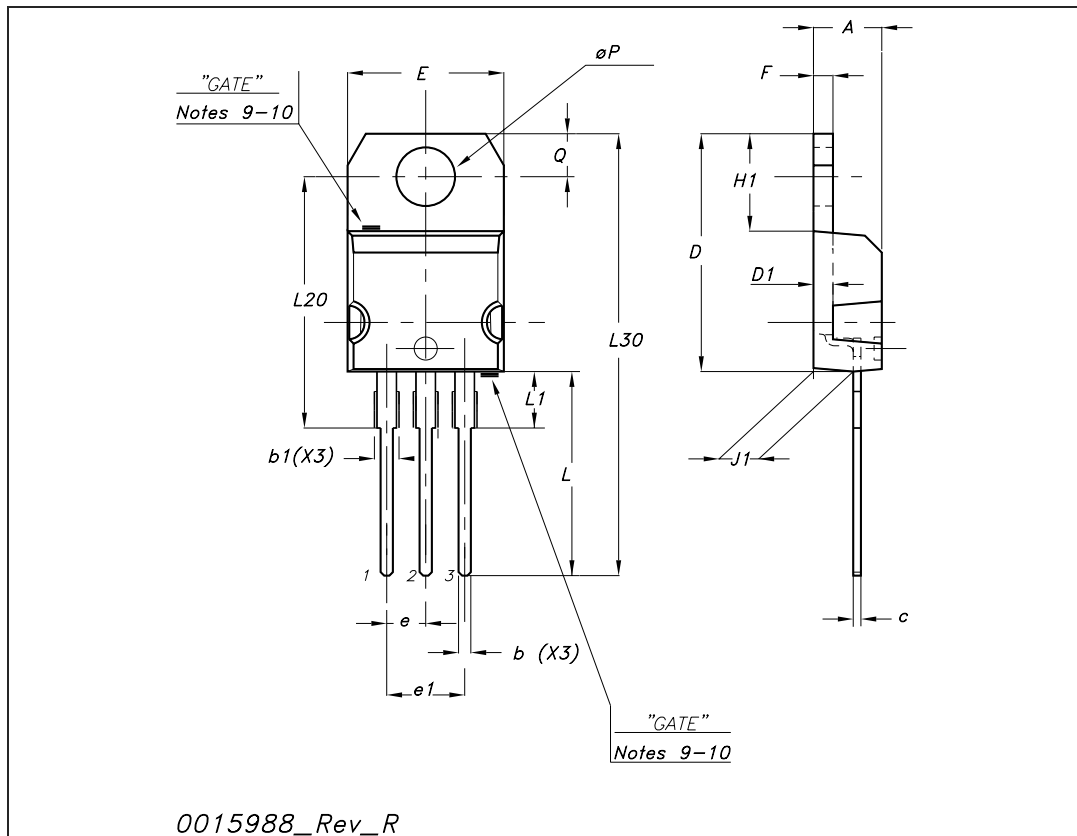
1. Fast electronic switch
2. Non-inductive resistor

### 3 Package mechanical data

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

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	1.14		1.70	0.044		0.066
c	0.48		0.70	0.019		0.027
D	15.25		15.75	0.6		0.62
D1		1.27			0.050	
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		0.051
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	
∅P	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116





## 4 Revision history

**Table 5. Document revision history**

Date	Revision	Changes
09-Dec-2008	1	First release
20-Mar-2009	2	Added <a href="#">Section 2.1</a> <i>Section 2.1: Electrical characteristics (curves) on page 4</i>
25-May-2009	3	Document status promoted from preliminary data to datasheet

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