



# THE DATASHEET OF BUL59



## High voltage fast-switching NPN power transistor

### Features

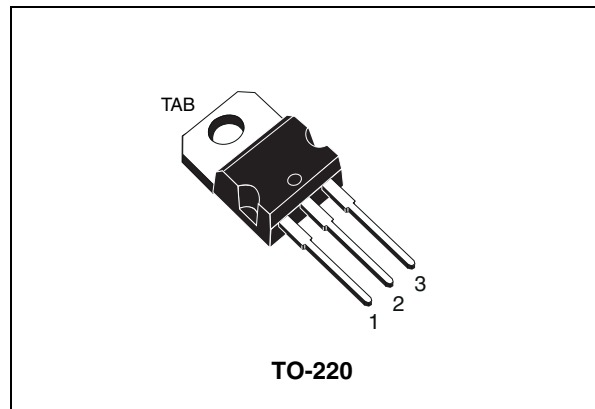
- High voltage capability
- Very high switching speed
- High ruggedness

### Applications

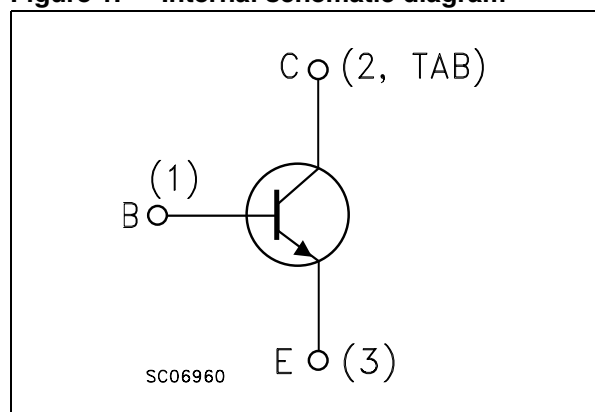
- Electronic transformers for halogen lamps
- Switch mode power supplies

### Description

The BUL59 is manufactured using planar technology with epitaxial collector adopting new and enhanced high voltage structure.



**Figure 1. Internal schematic diagram**



**Table 1. Device summary**

Order code	Marking	Package	Packaging
BUL59	BUL59	TO-220	Tube

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-emitter voltage ( $V_{BE} = 0$ )	850	V
$V_{CEO}$	Collector-emitter voltage ( $I_B = 0$ )	400	V
$V_{EBO}$	Emitter-base voltage ( $I_C = 0$ )	9	V
$I_C$	Collector current	8	A
$I_{CM}$	Collector peak current ( $t_P < 5$ ms)	16	A
$I_B$	Base current	4	A
$I_{BM}$	Base peak current ( $t_P < 5$ ms)	8	A
$P_{TOT}$	Total dissipation at $T_C = 25$ °C	90	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
$R_{thJC}$	Thermal resistance junction-case max	1.39	°C/W
$R_{thJA}$	Thermal resistance junction-ambient max	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 ( $V_{\text{BE}} = 0$ )	$V_{\text{CE}} = 850\text{ V}$			200	$\mu\text{A}$
		$V_{\text{CE}} = 850\text{ V}$ $T_{\text{C}} = 125\text{ °C}$			500	$\mu\text{A}$
$I_{\text{EBO}}$	Emitter cut-off current ( $I_{\text{C}} = 0$ )	$V_{\text{EB}} = 9\text{ V}$			100	$\mu\text{A}$
$V_{\text{CEO(sus)}}^{(1)}$	Collector-emitter sustaining voltage ( $I_{\text{B}} = 0$ )	$I_{\text{C}} = 10\text{ mA}$	400			V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 2\text{ A}$ $I_{\text{B}} = 0.4\text{ A}$			0.5	V
		$I_{\text{C}} = 5\text{ A}$ $I_{\text{B}} = 1\text{ A}$			1.5	V
$V_{\text{BE(sat)}}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 2\text{ A}$ $I_{\text{B}} = 0.4\text{ A}$			1.2	V
		$I_{\text{C}} = 5\text{ A}$ $I_{\text{B}} = 1\text{ A}$			1.6	V
$V_{\text{CEW}}$	Maximum collector emitter voltage at turn off without snubber	$I_{\text{C}} = 11\text{ A}$ $I_{\text{B(on)}} = 1.83\text{ A}$ $V_{\text{BE(off)}} = -5\text{ V}$	450			V
$h_{\text{FE}}$	DC current gain	$I_{\text{C}} = 2\text{ A}$ $V_{\text{CE}} = 5\text{ V}$	8		40	
		$I_{\text{C}} = 5\text{ A}$ $V_{\text{CE}} = 5\text{ V}$	6		30	
		$I_{\text{C}} = 8\text{ A}$ $V_{\text{CE}} = 10\text{ V}$	4			
$t_{\text{s}}$	Inductive load Storage time	$I_{\text{C}} = 2\text{ A}$ $I_{\text{B(on)}} = 0.4\text{ A}$ $V_{\text{BE(off)}} = -5\text{ V}$ $R_{\text{BB}} = 0$		1.1		$\mu\text{s}$
$t_{\text{f}}$	Fall time	$V_{\text{CC}} = 250\text{ V}$ $L = 200\text{ }\mu\text{H}$		0.4		$\mu\text{s}$

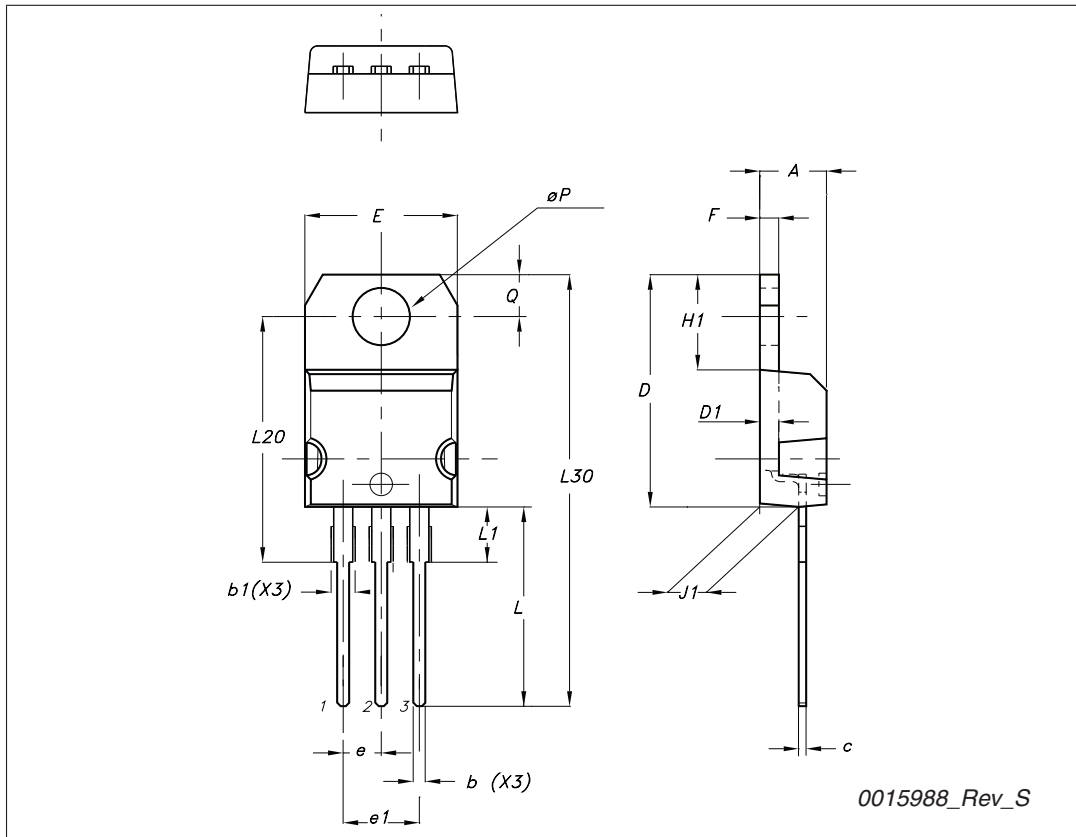
1. Pulse test: pulse duration  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

### 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 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



## 4 Revision history

**Table 5. Document revision history**

Date	Revision	Changes
21-Jun-2004	6	Document migration, no content change.
24-Feb-2010	7	Modified: <i>Description on page 1</i> , updated TO-220 package mechanical data.

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