



# THE DATASHEET OF BUL416T



## High voltage fast-switching NPN power transistor

### Features

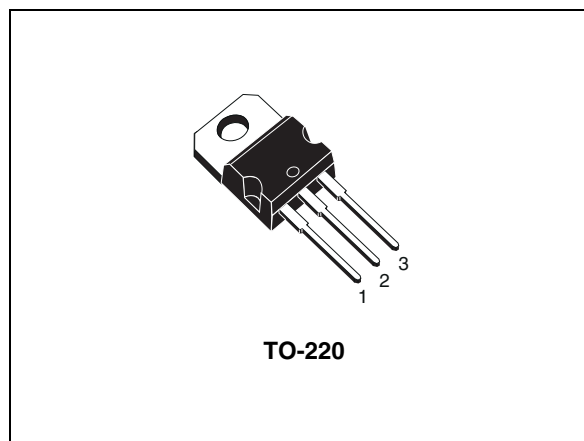
- High voltage capability
- Low spread of dynamic parameters
- Very high switching speed

### Applications

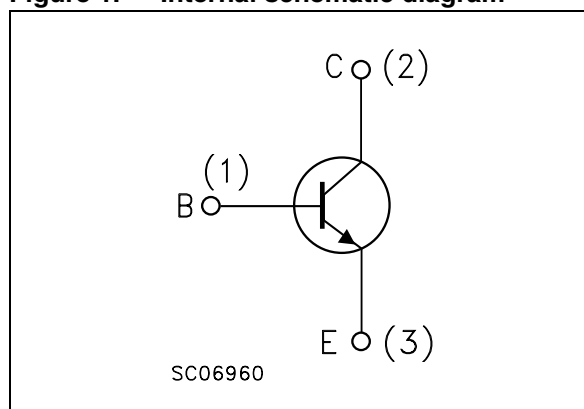
- Electronic ballast for fluorescent lighting
- Switch mode power supplies

### Description

The BUL416T is an high voltage fast-switching NPN power transistor manufactured in planar technology with diffused collector. This device is designed for lighting and SMPS applications where high voltage capability is needed coupled with high switching speed.



**Figure 1. Internal schematic diagram**



**Table 1. Device summary**

Order code	Marking	Package	Packaging
BUL416T	BUL416T	TO-220	Tube

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-emitter voltage ( $V_{BE} = 0$ )	1600	V
$V_{CEO}$	Collector-emitter voltage ( $I_B = 0$ )	800	V
$V_{EBO}$	Emitter-base voltage ( $I_C = 0$ )	9	V
$I_C$	Collector current	6	A
$I_{CM}$	Collector peak current ( $t_P < 5$ ms)	9	A
$I_B$	Base current	5	A
$I_{BM}$	Base peak current ( $t_P < 5$ ms)	8	A
$P_{TOT}$	Total dissipation at $T_C \leq 25$ °C	110	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	1.14	°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.

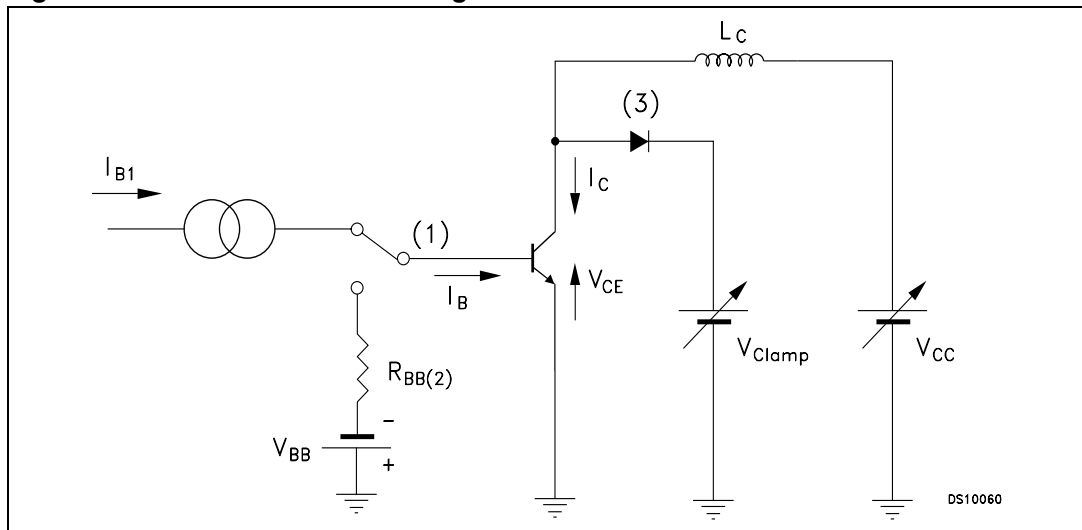
**Table 4. Electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{\text{CES}}$	Collector cut-off current ( $V_{\text{BE}} = 0$ )	$V_{\text{CE}} = 1600\text{ V}$			100	$\mu\text{A}$
		$V_{\text{CE}} = 1600\text{ V}$ $T_{\text{c}} = 125\text{ °C}$			500	$\mu\text{A}$
$I_{\text{CEO}}$	Collector cut-off current ( $I_{\text{B}} = 0$ )	$V_{\text{CE}} = 800\text{ V}$			250	$\mu\text{A}$
$V_{\text{CEO(sus)}}^{(1)}$	Collector-emitter sustaining voltage ( $I_{\text{B}} = 0$ )	$I_{\text{C}} = 100\text{ mA}$	800			V
$V_{\text{EBO}}$	Emitter-base voltage ( $I_{\text{C}} = 0$ )	$I_{\text{E}} = 10\text{ mA}$	9			V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 2\text{ A}$ $I_{\text{B}} = 0.4\text{ A}$			1.2	V
		$I_{\text{C}} = 4\text{ A}$ $I_{\text{B}} = 1.33\text{ A}$			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
		$I_{\text{C}} = 4\text{ A}$ $I_{\text{B}} = 1.33\text{ A}$			1.5	V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 10\text{ mA}$ $V_{\text{CE}} = 5\text{ V}$	10			
		$I_{\text{C}} = 0.7\text{ A}$ $V_{\text{CE}} = 5\text{ V}$	18		32	
$t_{\text{s}}$ $t_{\text{f}}$	Inductive load Storage time Fall time	$I_{\text{C}} = 3\text{ A}$ $I_{\text{B1}} = 1\text{ A}$				
		$V_{\text{BE(off)}} = -5\text{ V}$ $R_{\text{BB}} = 0$ $V_{\text{CL}} = 200\text{ V}$ $L = 200\text{ }\mu\text{H}$		1.8		$\mu\text{s}$ ns

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

## 2.1 Test circuits

Figure 2. Inductive load switching test circuit



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

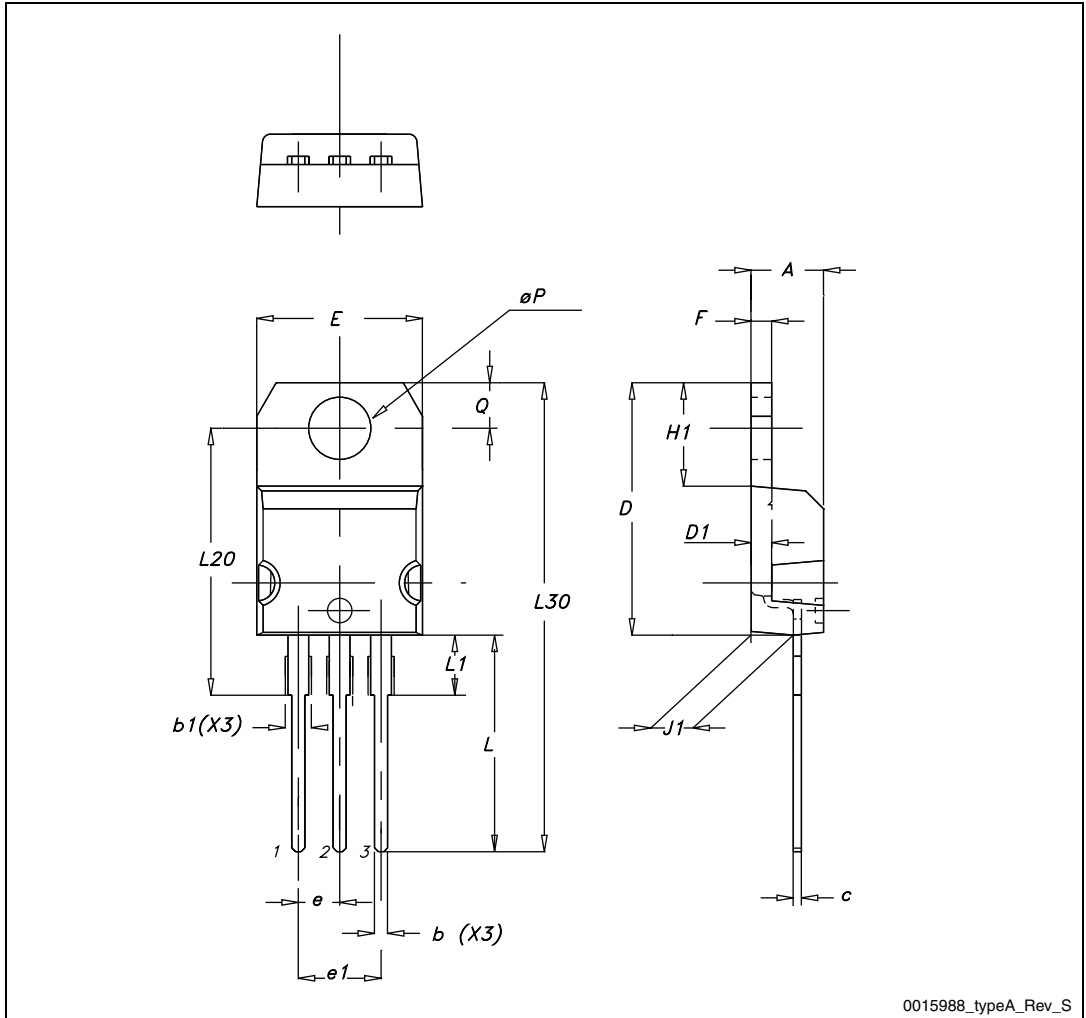
### 3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in 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.

Table 5. 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	
ØP	3.75		3.85
Q	2.65		2.95

Figure 3. TO-220 type A drawing



0015988\_typeA\_Rev\_S

## 4 Revision history

**Table 6. Document revision history**

Date	Revision	Changes
06-Aug-2009	1	Initial release.
25-Jan-2010	2	Document status promoted from preliminary data to datasheet.

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