# BUL416T

## High voltage fast-switching NPN power transistor

### Features

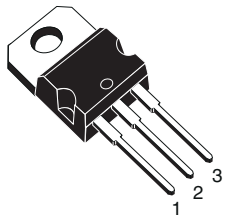
- High voltage capability
- Low spread of dynamic parameters
- Very high switching speed

### 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.




**TO-220**

**Figure 1. Internal schematic diagram**

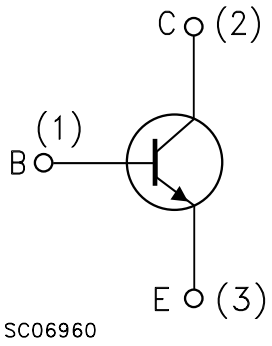



**Table 1. Device summary**

| 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

$T_{case}$ = 25 °C unless otherwise specified.

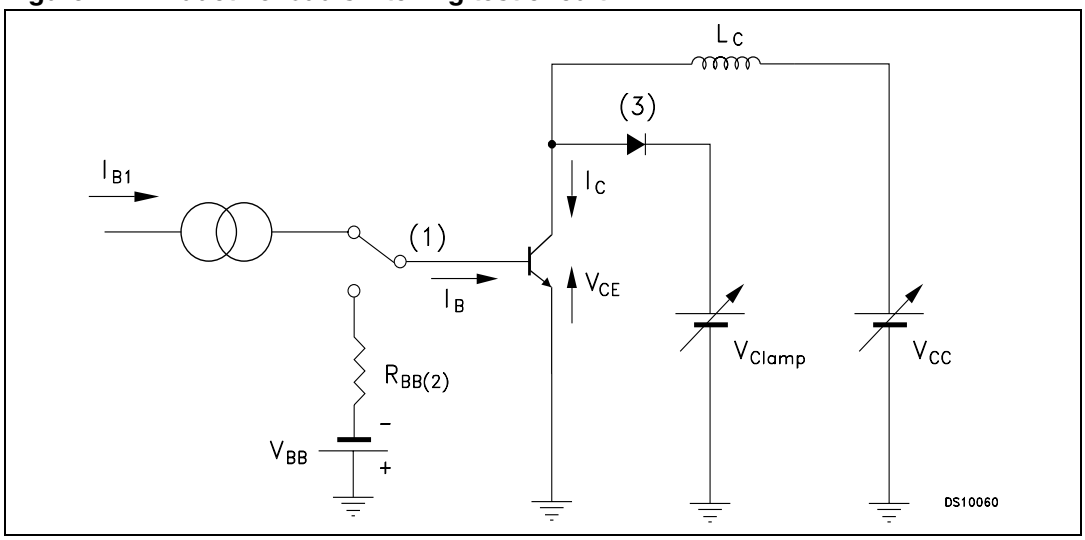
**Table 4. Electrical characteristics**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{CES}$ | Collector cut-off current ($V_{BE}$ = 0) | $V_{CE}$ = 1600 V<br>$V_{CE}$ = 1600 V $T_c$ = 125 °C | | | 100<br>500 | µA<br>µA |
| $I_{CEO}$ | Collector cut-off current ($I_B$ = 0) | $V_{CE}$ = 800 V | | | 250 | µA |
| $V_{CEO(sus)}$ (1) | Collector-emitter sustaining voltage ($I_B$ = 0) | $I_C$ =100 mA | 800 | | | V |
| $V_{EBO}$ | Emitter-base voltage ($I_C$ = 0) | $I_E$ = 10 mA | 9 | | | V |
| $V_{CE(sat)}$ (1) | Collector-emitter saturation voltage | $I_C$ = 2 A $I_B$ = 0.4 A<br>$I_C$ = 4 A $I_B$ = 1.33 A | | | 1.2<br>1.5 | V<br>V |
| $V_{BE(sat)}$ (1) | Base-emitter saturation voltage | $I_C$ = 2 A $I_B$ = 0.4 A<br>$I_C$ = 4 A $I_B$ = 1.33 A | | | 1.2<br>1.5 | V<br>V |
| $h_{FE}$ (1) | DC current gain | $I_C$ = 10 mA $V_{CE}$ = 5 V<br>$I_C$ = 0.7 A $V_{CE}$ = 5 V | 10<br>18 | | <br>32 | |
| <br>$t_s$<br>$t_f$ | Inductive load<br>Storage time<br>Fall time | $I_C$ = 3 A $I_{B1}$ = 1 A<br>$V_{BE(off)}$ = - 5 V $R_{BB}$ = 0<br>$V_{CL}$ = 200 V L = 200 µH | | <br>1.8<br>800 | | <br>µs<br>ns |

1. Pulse test: pulse duration ≤ 300 µs, duty cycle ≤ 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® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*.
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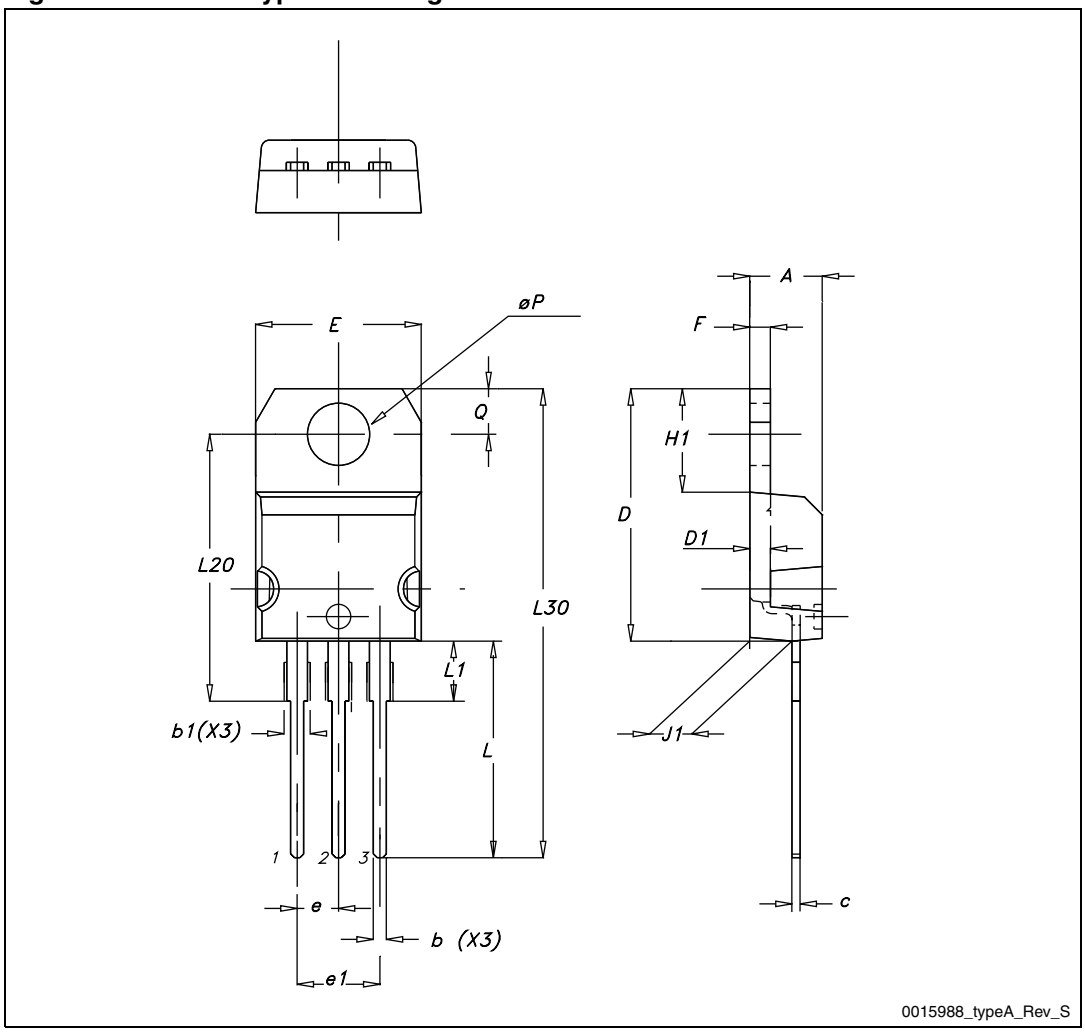
Table 5. TO-220 type A mechanical data

| 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 | |
| ∅P | 3.75 | | 3.85 |
| Q | 2.65 | | 2.95 |

**Figure 3. TO-220 type A drawing**



# 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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