1. General description

High voltage, high speed, planar passivated NPN power switching transistor in a SOT54 (TO-92) plastic package.

2. Features and benefits

- Fast switching
- High voltage capability
- Very low switching and conduction losses

3. Applications

- Compact fluorescent lamps (CFL)
- Electronic lighting ballasts
- Inverters
- Off-line self-oscillating power supplies

4. Pinning information

<table>
<thead>
<tr>
<th>Pin</th>
<th>Symbol</th>
<th>Description</th>
<th>Simplified outline</th>
<th>Graphic symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B</td>
<td>base</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>C</td>
<td>collector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>E</td>
<td>emitter</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package Name</th>
<th>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUJ100LR</td>
<td>TO-92</td>
<td>plastic single-ended leaded (through hole) package; 3 leads</td>
<td>SOT54</td>
</tr>
</tbody>
</table>
6. Limiting values

Table 3. Limiting values
In accordance with the Absolute Maximum Rating System (IEC 60134).

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_{CESM}</td>
<td>collector-emitter peak voltage</td>
<td>V_{BE} = 0 V</td>
<td>-</td>
<td>700</td>
<td>V</td>
</tr>
<tr>
<td>V_{CBO}</td>
<td>collector-base voltage</td>
<td>I_{E} = 0 A</td>
<td>-</td>
<td>700</td>
<td>V</td>
</tr>
<tr>
<td>V_{CEO}</td>
<td>collector-emitter voltage</td>
<td>I_{B} = 0 A</td>
<td>-</td>
<td>400</td>
<td>V</td>
</tr>
<tr>
<td>V_{EBO}</td>
<td>emitter-base voltage</td>
<td>I_{C} = 0 A; I(Emitter) = 10 mA</td>
<td>-</td>
<td>9</td>
<td>V</td>
</tr>
<tr>
<td>I_{C}</td>
<td>collector current</td>
<td>DC; Fig. 1</td>
<td>-</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>I_{CM}</td>
<td>peak collector current</td>
<td></td>
<td>-</td>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>I_{B}</td>
<td>base current</td>
<td>DC</td>
<td>-</td>
<td>0.5</td>
<td>A</td>
</tr>
<tr>
<td>I_{BM}</td>
<td>peak base current</td>
<td></td>
<td>-</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>P_{tot}</td>
<td>total power dissipation</td>
<td>T_{lead} ≤ 25 °C; Fig. 2</td>
<td>-</td>
<td>2.1</td>
<td>W</td>
</tr>
<tr>
<td>T_{stg}</td>
<td>storage temperature</td>
<td></td>
<td>-65</td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td>T_{j}</td>
<td>junction temperature</td>
<td></td>
<td>-</td>
<td>150</td>
<td>°C</td>
</tr>
</tbody>
</table>

Fig. 1. Forward bias safe operating area
Fig. 2. Normalized total power dissipation as a function of lead temperature

\[ P_{\text{der}} = \frac{P_{\text{tot}}}{P_{\text{tot}(25^\circ \text{C})}} \times 100\% \]
7. Thermal characteristics

Table 4. Thermal characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_{\text{th(j-lead)}}$</td>
<td>thermal resistance from junction to lead</td>
<td>Fig. 3</td>
<td></td>
<td></td>
<td>60</td>
<td>K/W</td>
</tr>
<tr>
<td>$R_{\text{th(j-a)}}$</td>
<td>thermal resistance from junction to ambient free air</td>
<td>printed circuit board mounted; lead length 4 mm</td>
<td></td>
<td>150</td>
<td></td>
<td>K/W</td>
</tr>
</tbody>
</table>

Fig. 3. Transient thermal impedance from junction to lead as a function of pulse width
8. Characteristics

Table 5. Characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_{\text{CES}}$</td>
<td>collector-emitter cut-off current (base shorted)</td>
<td>$V_{\text{BE}} = 0 , \text{V}; V_{\text{CE}} = 700 , \text{V}; T_j = 125 ^\circ \text{C}$</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>mA</td>
</tr>
<tr>
<td>$I_{\text{EBO}}$</td>
<td>emitter-base cut-off current (collector open)</td>
<td>$V_{\text{EB}} = 9 , \text{V}; I_{\text{C}} = 0 , \text{A}; T_{\text{lead}} = 25 ^\circ \text{C}$</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>mA</td>
</tr>
<tr>
<td>$V_{\text{CEO}}$</td>
<td>collector-emitter sustaining voltage (base open)</td>
<td>$I_{\text{B}} = 0 , \text{A}; I_{\text{C}} = 1 , \text{mA}; L_{\text{C}} = 25 , \text{mH}; T_{\text{lead}} = 25 ^\circ \text{C}; \text{Fig. 4; Fig. 5}$</td>
<td>400</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$V_{\text{C}}$</td>
<td>collector-emitter saturation voltage</td>
<td>$I_{\text{C}} = 0.25 , \text{A}; I_{\text{B}} = 50 , \text{mA}; T_{\text{lead}} = 25 ^\circ \text{C}; \text{Fig. 6}$</td>
<td>-</td>
<td>0.2</td>
<td>0.5</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{\text{C}} = 0.5 , \text{A}; I_{\text{B}} = 125 , \text{mA}; T_{\text{lead}} = 25 ^\circ \text{C}; \text{Fig. 6}$</td>
<td>-</td>
<td>0.3</td>
<td>1</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{\text{C}} = 0.75 , \text{A}; I_{\text{B}} = 250 , \text{mA}; T_{\text{lead}} = 25 ^\circ \text{C}; \text{Fig. 6}$</td>
<td>-</td>
<td>0.4</td>
<td>1.5</td>
<td>V</td>
</tr>
<tr>
<td>$h_{\text{FE}}$</td>
<td>base-emitter saturation voltage</td>
<td>$I_{\text{C}} = 0.25 , \text{A}; I_{\text{B}} = 50 , \text{mA}; T_{\text{lead}} = 25 ^\circ \text{C}; \text{Fig. 7}$</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{\text{C}} = 0.5 , \text{A}; I_{\text{B}} = 125 , \text{mA}; T_{\text{lead}} = 25 ^\circ \text{C}; \text{Fig. 7}$</td>
<td>-</td>
<td>-</td>
<td>1.2</td>
<td>V</td>
</tr>
</tbody>
</table>

Dynamic characteristics

$t_f$ | fall time | $I_{\text{C}} = 1 \, \text{A}; I_{\text{B}} = 200 \, \text{mA}; V_{\text{BB}} = -5 \, \text{V}; L_{\text{B}} = 1 \, \text{mH}; T_{\text{lead}} = 25 ^\circ \text{C}; \text{inductive load}; \text{Fig. 10; Fig. 11}$ | -   | 80  | -   | ns   |

Fig. 4. Test circuit for collector-emitter sustaining voltage

Fig. 5. Oscilloscope display for collector-emitter sustaining voltage test waveform
Fig. 6. Collector-emitter saturation voltage as a function of collector current; typical values

Fig. 7. Base-emitter saturation voltage as a function of collector current; typical values

Fig. 8. DC current gain as a function of collector current; typical values

Fig. 9. DC current gain as a function of collector current; typical values

(1) $T_j = -35 \, ^\circ C$
(2) $T_j = 25 \, ^\circ C$
(3) $T_j = 125 \, ^\circ C$
**Fig. 10.** Test circuit for inductive load switching

\[ V_{CC} = 300 \text{ V}; V_{BB} = -5 \text{ V}; L_C = 200 \mu\text{H}; L_B = 1 \mu\text{H} \]

**Fig. 11.** Switching times waveforms for inductive load
9. Package outline

**Fig. 12. Package outline TO-92 (SOT54)**

SOT54 PACKAGE OUTLINE

- **SOT54**
  - Bulk Pack - 412
- **SOT54 LEADS ON CIRCLE**
  - Bulk Pack - 112
- **SOT54 WIDE PITCH**
  - Tape/Reel Pack - 116
  - Ammo Pack - 126
- **SOT54 LEAD BEND L01**
  - Bulk Pack - 412
- **SOT54 LEAD BEND L02**
  - Bulk Pack - 412

Remark: Detailed dimensions refer to POD drawing.
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11. Contents

1. General description......................................................1
2. Features and benefits..................................................1
3. Applications..................................................................1
4. Pinning information....................................................1
5. Ordering information....................................................1
6. Limiting values............................................................2
7. Thermal characteristics...............................................4
8. Characteristics............................................................5
9. Package outline............................................................8
10. Legal information........................................................9

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