# BUJ100LR

## NPN power transistor

3 October 2016 — Product data sheet

## 1. General description

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

## 2. Features and benefits

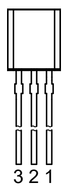
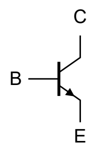
- Fast switching
- High voltage capability
- Very low switching and conduction losses

## 3. Applications

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

## 4. Pinning information

**Table 1. Pinning information**

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|---|---|---|---|---|
| 1 | B | base |   **TO-92 (SOT54)** |   sym123 |
| 2 | C | collector | | |
| 3 | E | emitter | | |

## 5. Ordering information

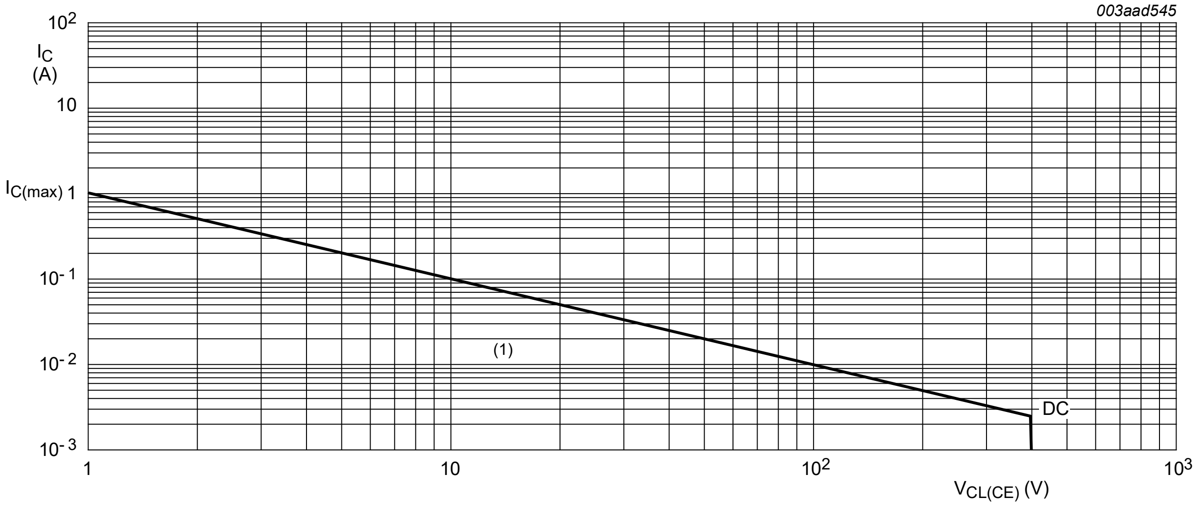
**Table 2. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| BUJ100LR | TO-92 | plastic single-ended leaded (through hole) package; 3 leads | SOT54 |

# 6. Limiting values

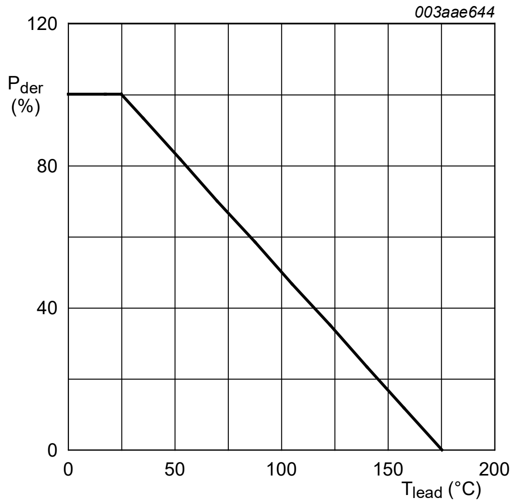
**Table 3. Limiting values**
*In accordance with the Absolute Maximum Rating System (IEC 60134).*

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{CESM}$ | collector-emitter peak voltage | $V_{BE}$ = 0 V | | - | 700 | V |
| $V_{CBO}$ | collector-base voltage | $I_E$ = 0 A | | - | 700 | V |
| $V_{CEO}$ | collector-emitter voltage | $I_B$ = 0 A | | - | 400 | V |
| $V_{EBO}$ | emitter-base voltage | $I_C$ = 0 A; I(Emitter) = 10 mA | | - | 9 | V |
| $I_C$ | collector current | DC; Fig. 1 | | - | 1 | A |
| $I_{CM}$ | peak collector current | | | - | 2 | A |
| $I_B$ | base current | DC | | - | 0.5 | A |
| $I_{BM}$ | peak base current | | | - | 1 | A |
| $P_{tot}$ | total power dissipation | $T_{lead} \leq$ 25 °C; Fig. 2 | | - | 2.1 | W |
| $T_{stg}$ | storage temperature | | | -65 | 150 | °C |
| $T_j$ | junction temperature | | | - | 150 | °C |




$T_{lead} \leq$ 25 °C (1) Region of permissible DC operation

**Fig. 1. Forward bias safe operating area**




$$P_{der} = \frac{P_{tot}}{P_{tot(25°C)}} \times 100\,\%$$

**Fig. 2. Normalized total power dissipation as a function of lead temperature**

## 7. Thermal characteristics

**Table 4. Thermal characteristics**

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

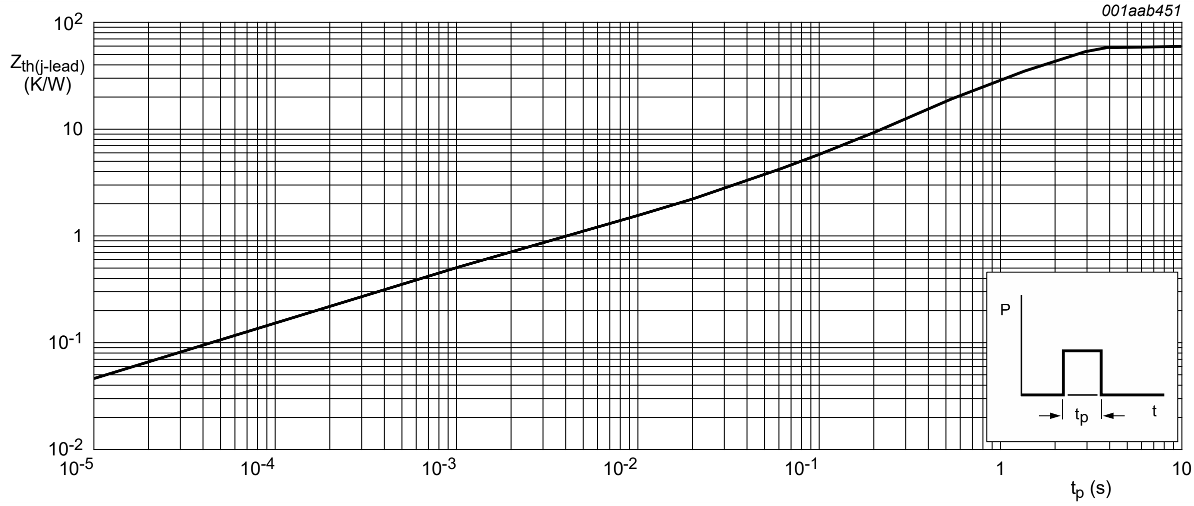



**Fig. 3. Transient thermal impedance from junction to lead as a function of pulse width**

## 8. Characteristics

Table 5. Characteristics

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **Static characteristics** | | | | | | | |
| $I_{CES}$ | collector-emitter cut-off current (base shorted) | $V_{BE}$ = 0 V; $V_{CE}$ = 700 V; $T_j$ = 125 °C | | - | - | 5 | mA |
| $I_{EBO}$ | emitter-base cut-off current (collector open) | $V_{EB}$ = 9 V; $I_C$ = 0 A; $T_{lead}$ = 25 °C | | - | - | 1 | mA |
| $V_{CEOsus}$ | collector-emitter sustaining voltage (base open) | $I_B$ = 0 A; $I_C$ = 1 mA; $L_C$ = 25 mH; $T_{lead}$ = 25 °C; Fig. 4; Fig. 5 | | 400 | - | - | V |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C$ = 0.25 A; $I_B$ = 50 mA; $T_{lead}$ = 25 °C; Fig. 6 | | - | 0.2 | 0.5 | V |
| | | $I_C$ = 0.5 A; $I_B$ = 125 mA; $T_{lead}$ = 25 °C; Fig. 6 | | - | 0.3 | 1 | V |
| | | $I_C$ = 0.75 A; $I_B$ = 250 mA; $T_{lead}$ = 25 °C; Fig. 6 | | - | 0.4 | 1.5 | V |
| $V_{BEsat}$ | base-emitter saturation voltage | $I_C$ = 0.25 A; $I_B$ = 50 mA; $T_{lead}$ = 25 °C; Fig. 7 | | - | - | 1 | V |
| | | $I_C$ = 0.5 A; $I_B$ = 125 mA; $T_{lead}$ = 25 °C; Fig. 7 | | - | - | 1.2 | V |
| $h_{FE}$ | DC current gain | $I_C$ = 0.5 mA; $V_{CE}$ = 2 V; $T_{lead}$ = 25 °C | | 12 | - | - | |
| | | $I_C$ = 0.4 A; $V_{CE}$ = 5 V; $T_{lead}$ = 25 °C; Fig. 8; Fig. 9 | | 10 | - | 30 | |
| | | $I_C$ = 0.8 A; $V_{CE}$ = 5 V; $T_{lead}$ = 25 °C; Fig. 8; Fig. 9 | | 5 | 7.5 | 20 | |
| **Dynamic characteristics** | | | | | | | |
| $t_f$ | fall time | $I_C$ = 1 A; $I_{Bon}$ = 200 mA; $V_{BB}$ = -5 V; $L_B$ = 1 μH; $T_{lead}$ = 25 °C; inductive load; Fig. 10; Fig. 11 | | - | 80 | - | ns |

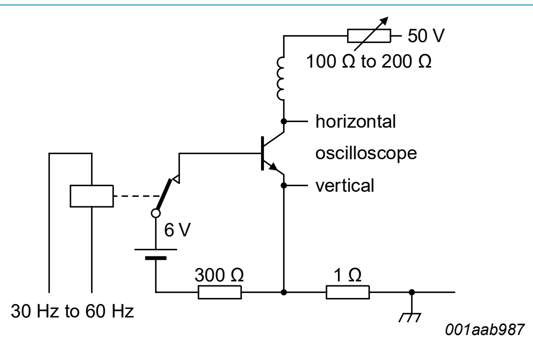



Fig. 4. Test circuit for collector-emitter sustaining voltage

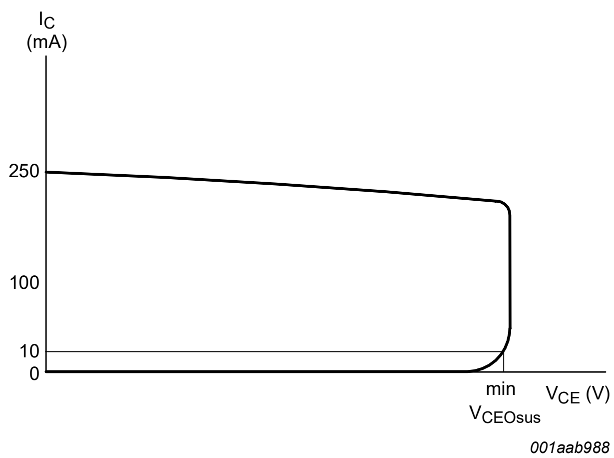
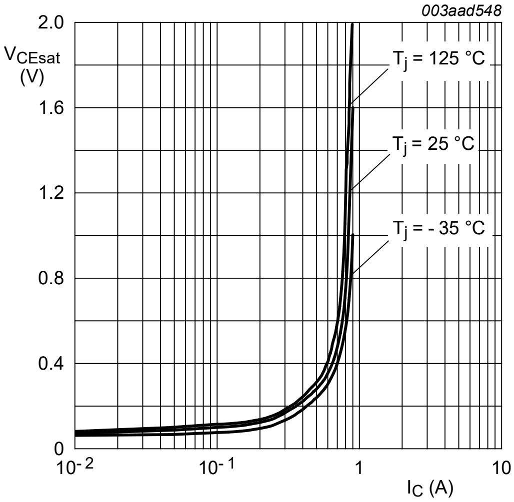
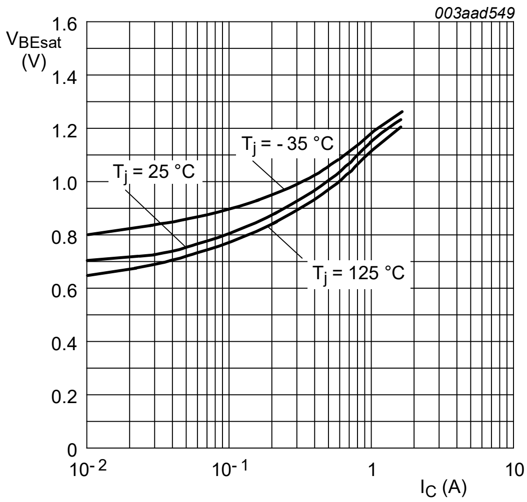



Fig. 5. Oscilloscope display for collector-emitter sustaining voltage test waveform



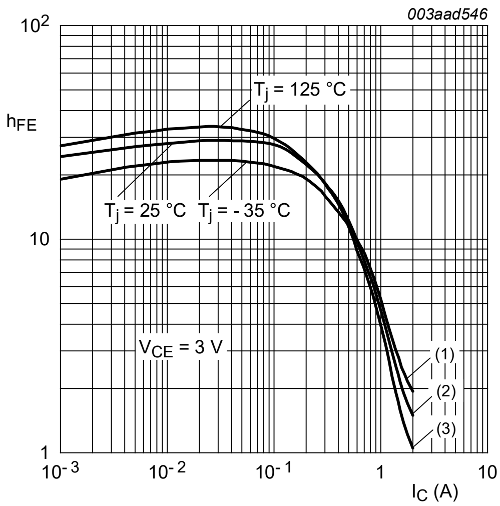

$$\frac{I_C}{I_B} = 5$$

**Fig. 6. Collector-emitter saturation voltage as a function of collector current; typical values**



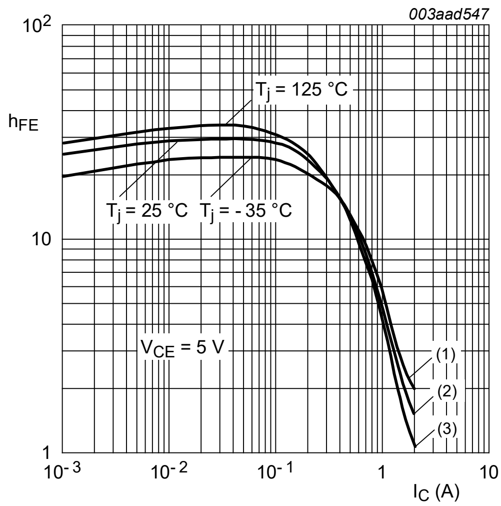

$$\frac{I_C}{I_B} = 5$$

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



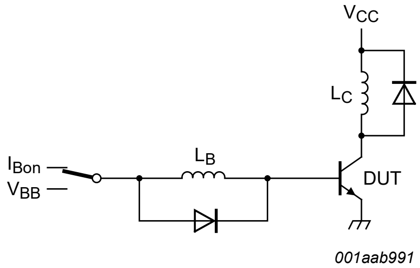

(1) $T_j = -35$ °C (2) $T_j = 25$ °C (3) $T_j = 125$ °C

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




(1) $T_j = -35$ °C (2) $T_j = 25$ °C (3) $T_j = 125$ °C

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




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

**Fig. 10. Test circuit for inductive load switching**

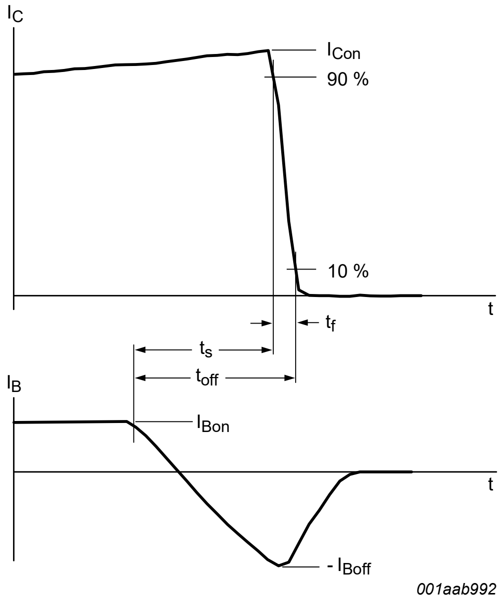



**Fig. 11. Switching times waveforms for inductive load**

## 9. Package outline

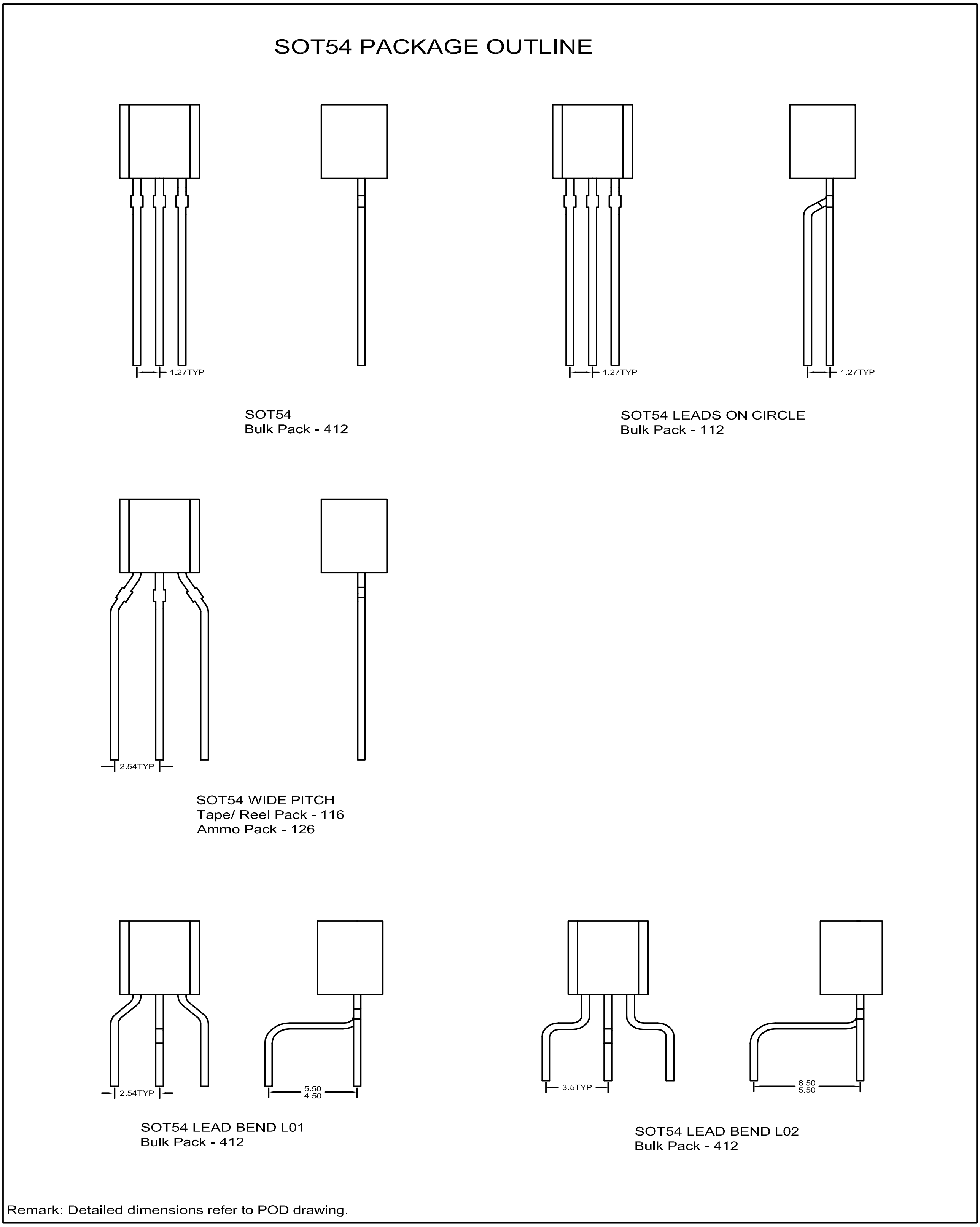



**Fig. 12. Package outline TO-92 (SOT54)**

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|---|---|---|
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