# TB100

## NPN power transistor

30 September 2016 — Product data sheet

## 1. General description

High voltage, high speed, planar passivated NPN power switching transistor in a SOT54 (TO92) plastic package intended for use in low power SMPS emitter switching circuits.

## 2. Features and benefits

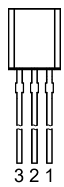
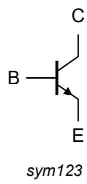
- Fast switching
- High base current drive capability
- High voltage capability
- Very low switching and conduction losses

## 3. Applications

- Emitter-switched low power SMPS circuits
- Self Oscillating Power Supplies
- AC-DC converters
- DC-AC inverters

## 4. Pinning information

**Table 1. Pinning information**

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

## 5. Ordering information

**Table 2. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| TB100 | TO-92 | plastic single-ended leaded (through hole) package; 3 leads | SOT54 |

## 6. Marking

**Table 3. Marking codes**

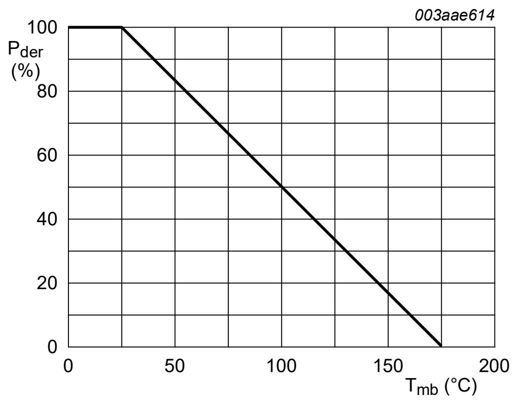
| Type number | Marking code |
|---|---|
| TB100 | TB100 |

# 7. Limiting values

**Table 4. 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 |
| $I_C$ | collector current | DC | | - | 1 | A |
| $I_{CM}$ | peak collector current | | | - | 2 | A |
| $I_B$ | base current | | | - | 0.5 | A |
| $I_{BM}$ | peak base current | | | - | 3 | A |
| $P_{tot}$ | total power dissipation | $T_{lead} \leq$ 25 °C; Fig. 1 | | - | 2 | W |
| $T_{stg}$ | storage temperature | | | -65 | 150 | °C |
| $T_j$ | junction temperature | | | - | 150 | °C |




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

**Fig. 1. Normalized total power dissipation as a function of mounting base temperature**

## 8. Thermal characteristics

**Table 5. Thermal characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $R_{th(j-lead)}$ | thermal resistance from junction to lead | | | - | - | 60 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | printed circuit board mounted; lead length = 4 mm; Fig. 2 | | - | 150 | - | K/W |

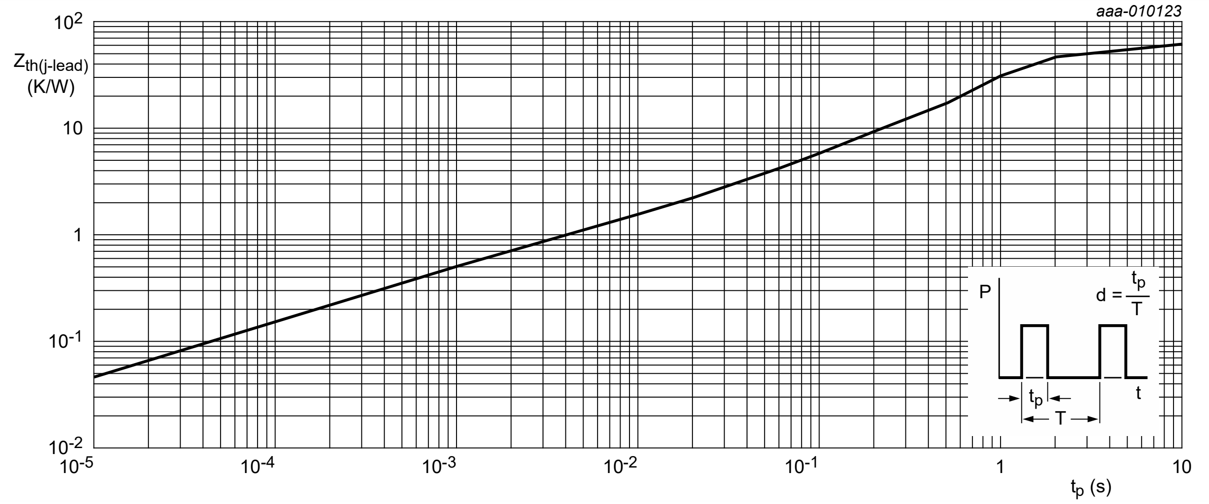



**Fig. 2. Transient thermal impedance from junction to lead as a function of pulse width**

## 9. Characteristics

**Table 6. 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 | | - | 0.8 | 100 | µA |
| | | $V_{BE}$ = 0 V; $V_{CE}$ = 700 V; $T_j$ = 125 °C | | - | 2 | 500 | µA |
| $I_{EBO}$ | emitter-base cut-off current (collector open) | $V_{EB}$ = 9 V; $I_C$ = 0 A; $T_{lead}$ = 25 °C | | - | 0.05 | 100 | µA |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C$ = 0.75 A; $I_B$ = 0.15 A; $T_{lead}$ = 25 °C; Fig. 3 | | - | 0.24 | 1 | V |
| $V_{BEsat}$ | base-emitter saturation voltage | $I_C$ = 0.75 A; $I_B$ = 0.15 A; $T_{lead}$ = 25 °C; Fig. 4 | | - | 0.93 | 1.3 | V |
| $h_{FE}$ | DC current gain | $I_C$ = 10 mA; $V_{CE}$ = 5 V; $T_{lead}$ = 25 °C; Fig. 5; Fig. 6 | | 12 | 22 | 32 | |
| | | $I_C$ = 100 mA; $V_{CE}$ = 5 V; $T_{lead}$ = 25 °C; Fig. 5; Fig. 6 | | 14 | 24 | 34 | |
| | | $I_C$ = 0.75 A; $V_{CE}$ = 5 V; $T_{lead}$ = 25 °C; Fig. 5; Fig. 6 | | 12 | 15.5 | 20 | |
| **Dynamic characteristics (resistive load)** | | | | | | | |
| $t_s$ | storage time | $I_C$ = 1 A; $I_{Bon}$ = 0.2 A; $I_{Boff}$ = -0.2 A; $R_L$ = 75 Ω; $V_{BB}$ = -4 V; $T_{lead}$ = 25 °C; Fig. 7; Fig. 8 | | - | 2 | - | µs |
| $t_f$ | fall time | | | - | 320 | - | ns |

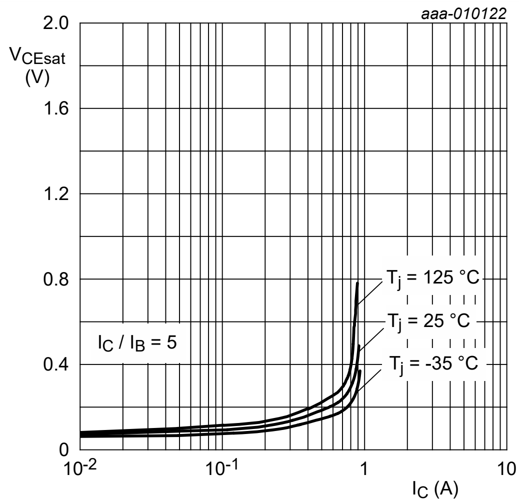



**Fig. 3. Collector-emitter saturation voltage as a function of collector current; typical values**

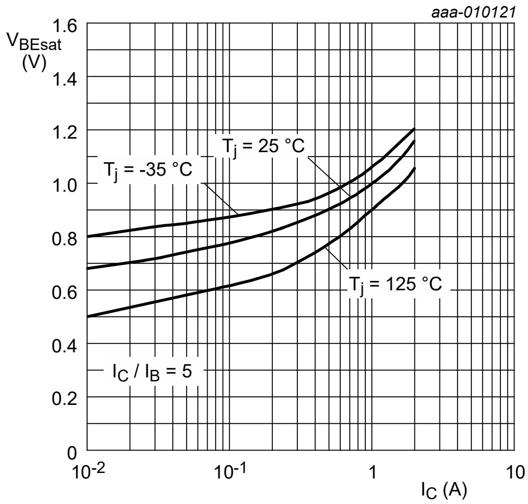



**Fig. 4. Base-emitter saturation voltage as a function of collector current; typical values**

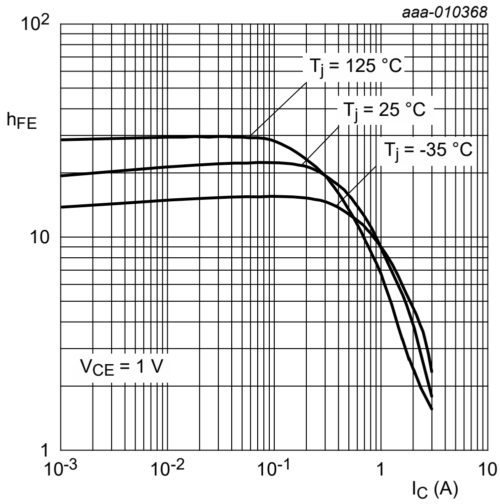



**Fig. 5. DC current gain as a function of collector current; typical values**

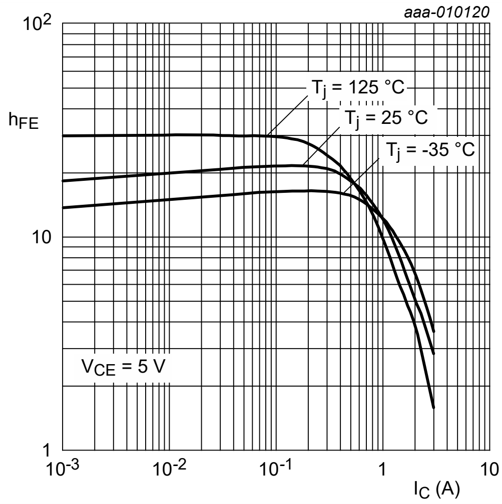



**Fig. 6. DC current gain as a function of collector current; typical values**

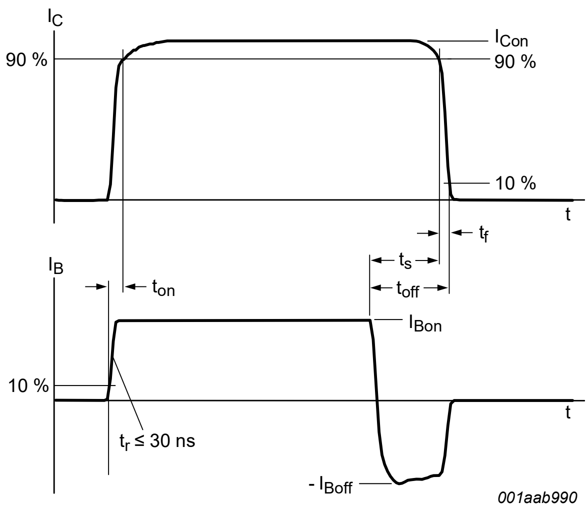
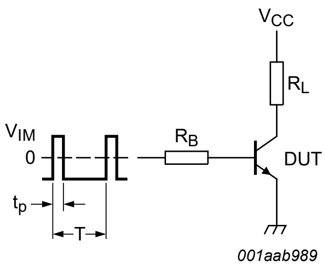



**Fig. 7. Switching times waveforms for resistive load**




$V_{IM} = -6$ to $+8$ V; $V_{CC} = 250$ V; $t_p = 20$ μs; $\delta = \frac{t_p}{T} = 0.01$

$R_B$ and $R_L$ calculated from $I_{Con}$ and $I_{Bon}$ requirements.

**Fig. 8. Test circuit for resistive load switching**

## 10. Package outline

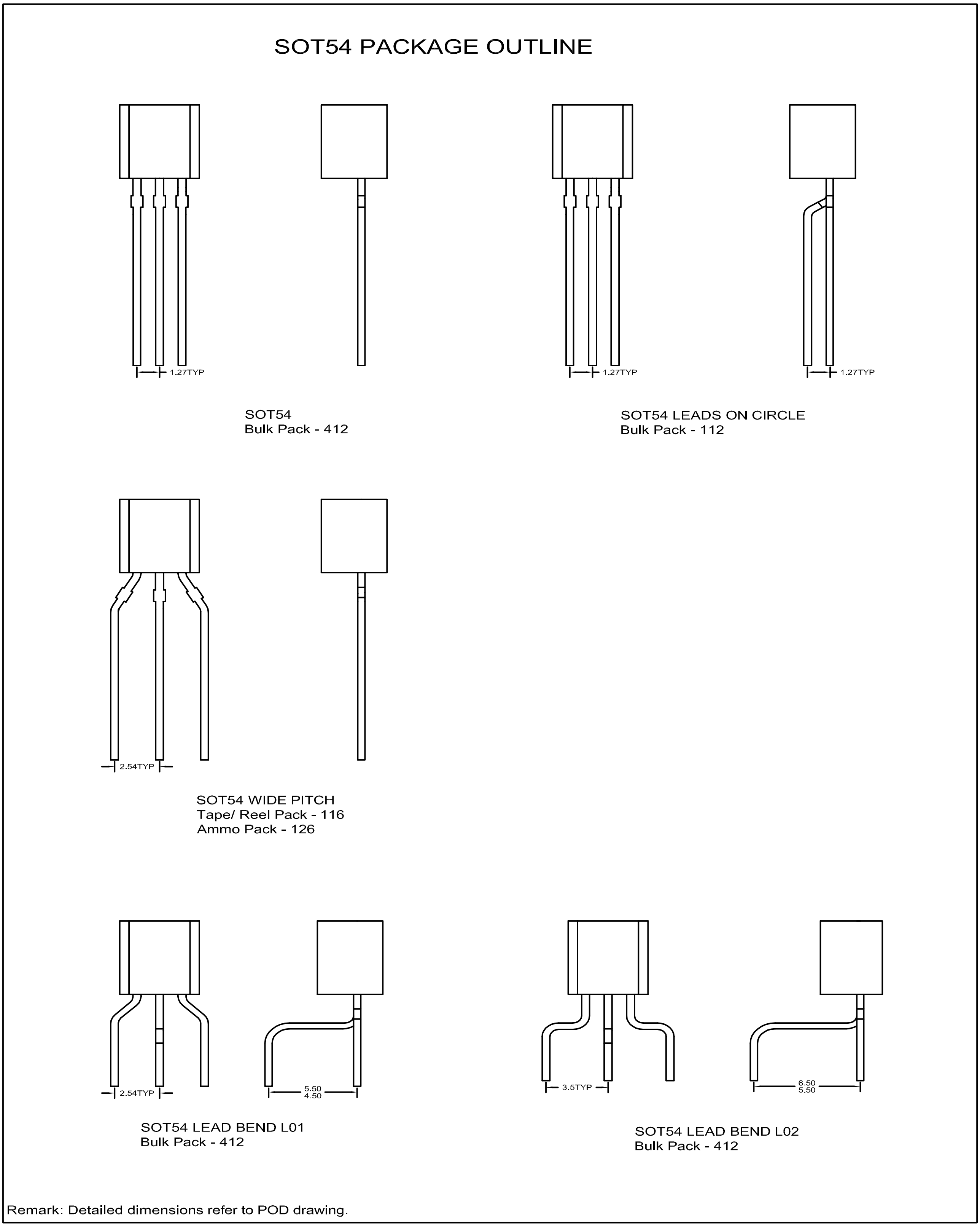



**Fig. 9. Package outline TO-92 (SOT54)**

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|---|---|---|
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**Date of release: 30 September 2016**