



# TB100

## NPN power transistor

19 December 2013

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. Quick reference data

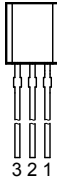
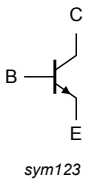
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_C$	collector current	DC	-	-	1	A
$P_{tot}$	total power dissipation	$T_{lead} \leq 25\text{ °C}$ ; <a href="#">Fig. 1</a>	-	-	2	W
$T_j$	junction temperature		-	-	150	°C
$V_{CESM}$	collector-emitter peak voltage	$V_{BE} = 0\text{ V}$	-	-	700	V
<b>Static characteristics</b>						
$h_{FE}$	DC current gain	$V_{CE} = 5\text{ V}$ ; $I_C = 10\text{ mA}$ ; $T_{lead} = 25\text{ °C}$ ; <a href="#">Fig. 5</a> ; <a href="#">Fig. 6</a>	12	22	32	
		$V_{CE} = 5\text{ V}$ ; $I_C = 100\text{ mA}$ ; $T_{lead} = 25\text{ °C}$ ; <a href="#">Fig. 5</a> ; <a href="#">Fig. 6</a>	14	24	34	
		$V_{CE} = 5\text{ V}$ ; $I_C = 0.75\text{ A}$ ; $T_{lead} = 25\text{ °C}$ ; <a href="#">Fig. 5</a> ; <a href="#">Fig. 6</a>	12	15.5	20	



## 5. Pinning information

Table 2. Pinning information

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

## 6. Ordering information

Table 3. Ordering information

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

## 7. Marking

Table 4. Marking codes

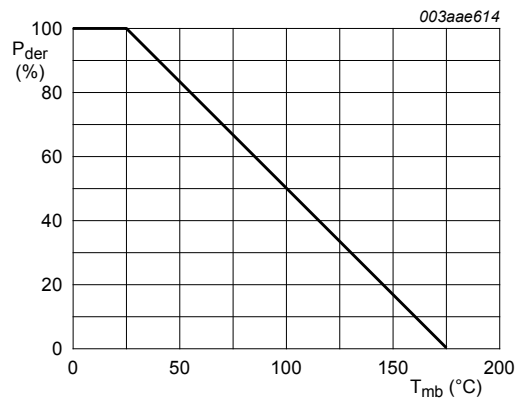
Type number	Marking code
TB100	TB100

## 8. Limiting values

**Table 5. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CESM}$	collector-emitter peak voltage	$V_{BE} = 0\text{ V}$	-	700	V
$V_{CBO}$	collector-base voltage	$I_E = 0\text{ A}$	-	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	$T_{lead} \leq 25\text{ °C}$ ; <a href="#">Fig. 1</a>	-	2	W
$T_{stg}$	storage temperature		-65	150	°C
$T_j$	junction temperature		-	150	°C



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

$$P_{der} = \frac{P_{tot}}{P_{tot(25^{\circ}\text{C})}} \times 100\%$$

## 9. Thermal characteristics

Table 6. 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	printed circuit board mounted; lead length = 4 mm; <a href="#">Fig. 2</a>	-	150	-	K/W

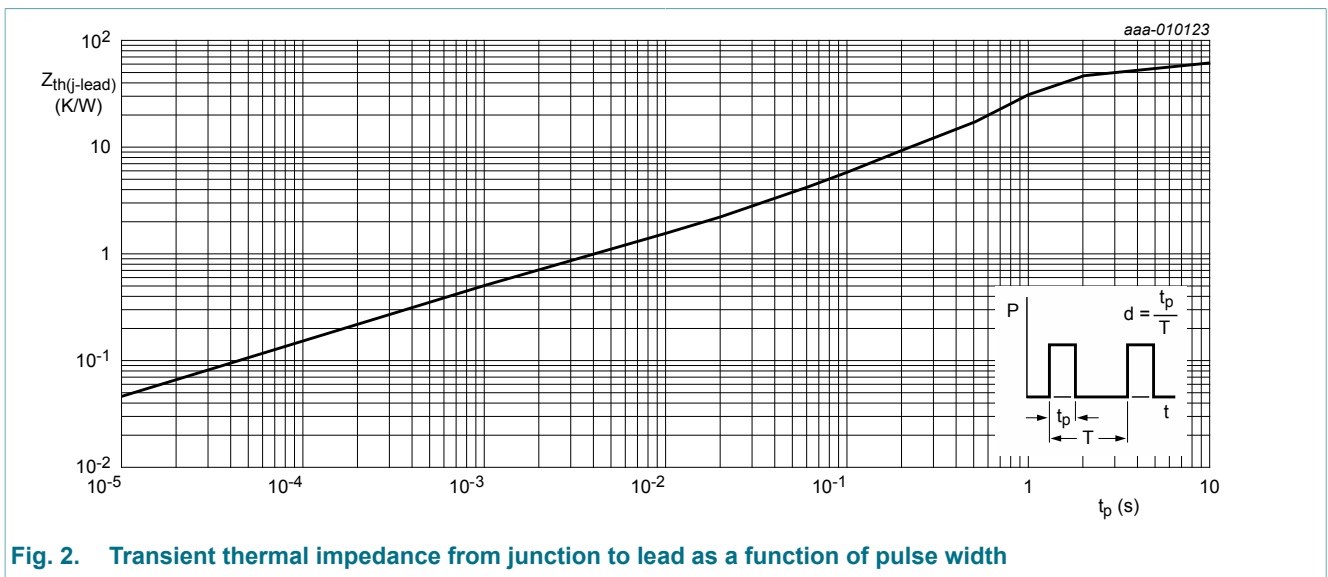


Fig. 2. Transient thermal impedance from junction to lead as a function of pulse width

### 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
I <sub>CES</sub>	collector-emitter cut-off current	V <sub>BE</sub> = 0 V; V <sub>CE</sub> = 700 V; T <sub>lead</sub> = 25 °C	-	0.8	100	μA
		V <sub>BE</sub> = 0 V; V <sub>CE</sub> = 700 V; T <sub>j</sub> = 125 °C	-	2	500	μA
I <sub>EBO</sub>	emitter-base cut-off current	V <sub>EB</sub> = 9 V; I <sub>C</sub> = 0 A; T <sub>lead</sub> = 25 °C	-	0.05	100	μA
V <sub>CEsat</sub>	collector-emitter saturation voltage	I <sub>C</sub> = 0.75 A; I <sub>B</sub> = 0.15 A; T <sub>lead</sub> = 25 °C; <a href="#">Fig. 3</a>	-	0.24	1	V
V <sub>BEsat</sub>	base-emitter saturation voltage	I <sub>C</sub> = 0.75 A; I <sub>B</sub> = 0.15 A; T <sub>lead</sub> = 25 °C; <a href="#">Fig. 4</a>	-	0.93	1.3	V
h <sub>FE</sub>	DC current gain	I <sub>C</sub> = 10 mA; V <sub>CE</sub> = 5 V; T <sub>lead</sub> = 25 °C; <a href="#">Fig. 5</a> ; <a href="#">Fig. 6</a>	12	22	32	
		I <sub>C</sub> = 100 mA; V <sub>CE</sub> = 5 V; T <sub>lead</sub> = 25 °C; <a href="#">Fig. 5</a> ; <a href="#">Fig. 6</a>	14	24	34	
		I <sub>C</sub> = 0.75 A; V <sub>CE</sub> = 5 V; T <sub>lead</sub> = 25 °C; <a href="#">Fig. 5</a> ; <a href="#">Fig. 6</a>	12	15.5	20	
<b>Dynamic characteristics (resistive load)</b>						
t <sub>s</sub>	storage time	I <sub>C</sub> = 1 A; I <sub>Bon</sub> = 0.2 A; I <sub>Boff</sub> = -0.2 A;	-	2	-	μs
t <sub>f</sub>	fall time	R <sub>L</sub> = 75 Ω; V <sub>BB</sub> = -4 V; T <sub>lead</sub> = 25 °C; <a href="#">Fig. 7</a> ; <a href="#">Fig. 8</a>	-	320	-	ns

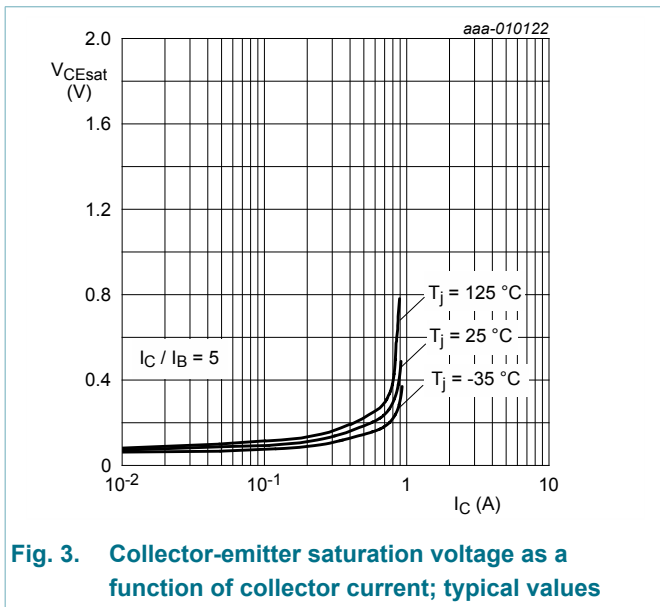


Fig. 3. Collector-emitter saturation voltage as a function of collector current; typical values

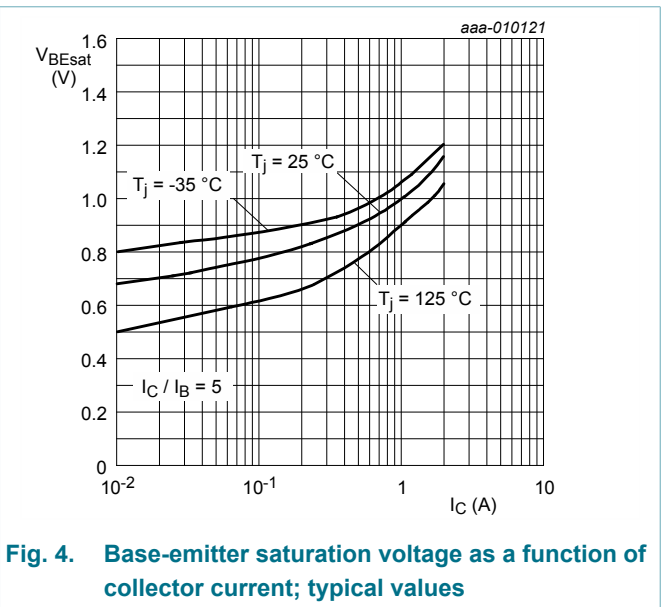


Fig. 4. Base-emitter saturation voltage as a function of collector current; typical values

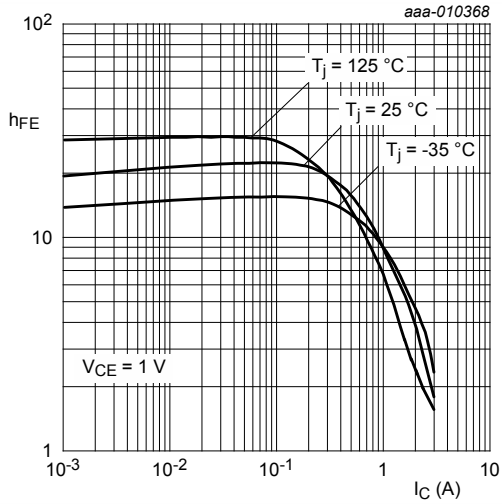


Fig. 5. DC current gain as a function of collector current; typical values

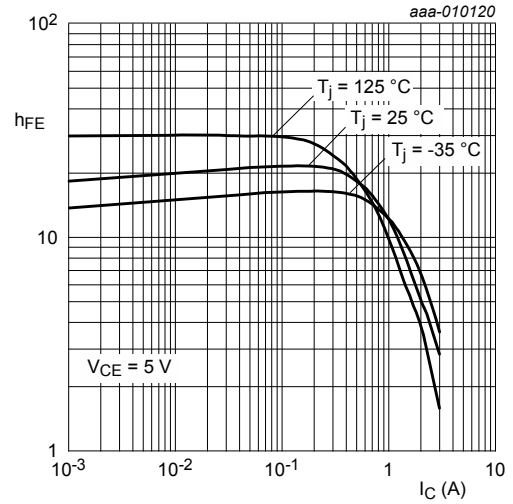


Fig. 6. DC current gain as a function of collector current; typical values

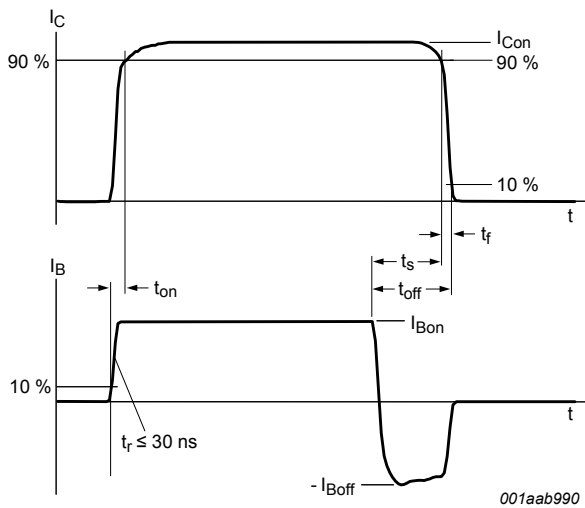


Fig. 7. Switching times waveforms for resistive load

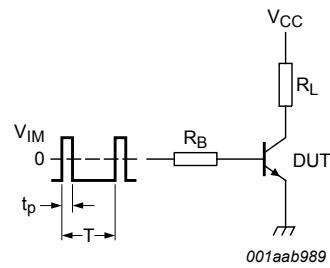


Fig. 8. Test circuit for resistive load switching

$V_{IM} = -6 \text{ to } +8 \text{ V}; V_{CC} = 250 \text{ V}; t_p = 20 \mu\text{s}; \delta = \frac{t_p}{T} = 0.01$   
 $R_B$  and  $R_L$  calculated from  $I_{Con}$  and  $I_{Bon}$  requirements.

### 11. Package outline

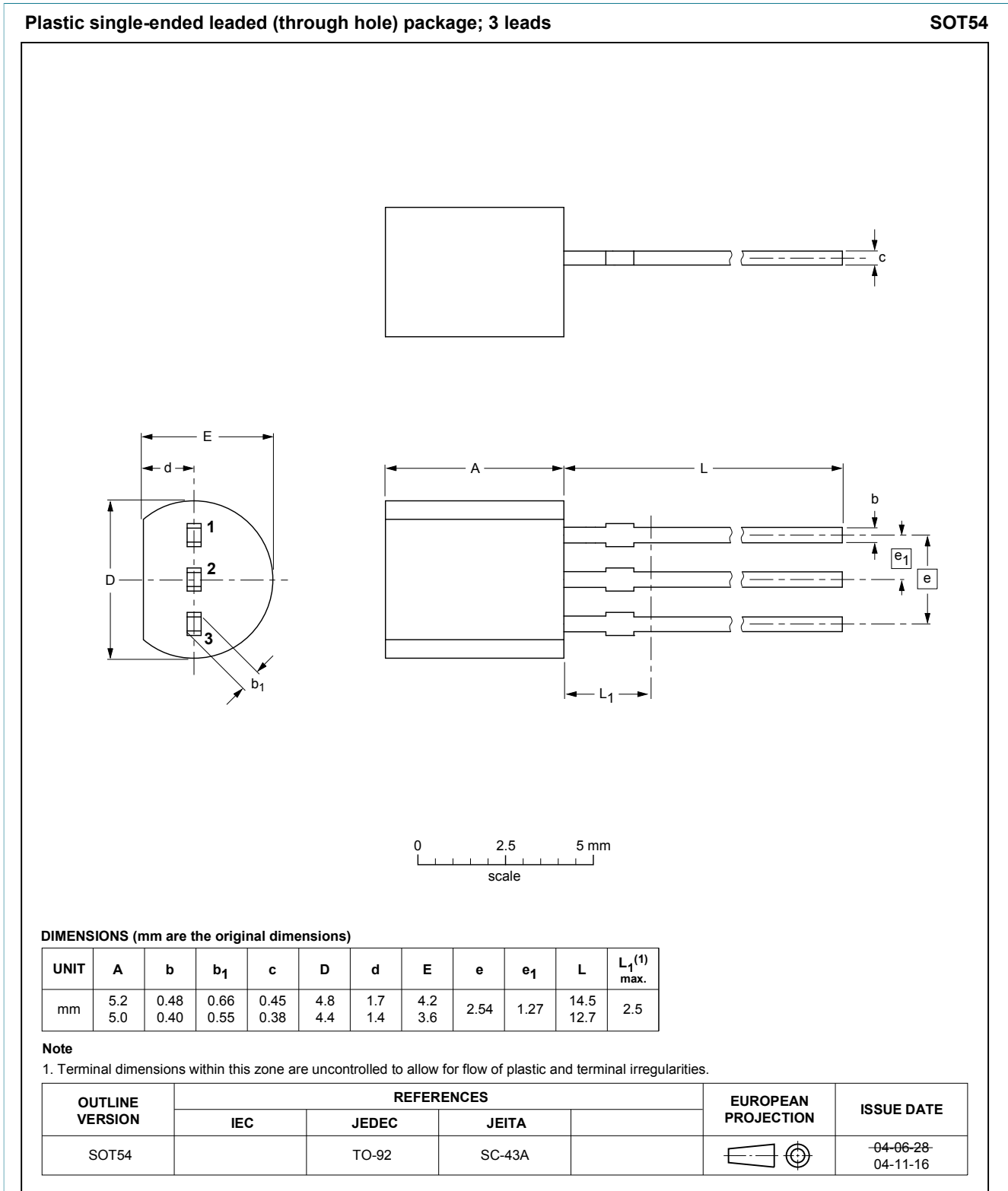


Fig. 9. Package outline TO-92 (SOT54)

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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