



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

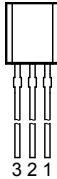
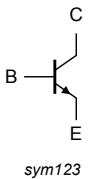
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_C	collector current	DC	-	-	1	A
P_{tot}	total power dissipation	$T_{lead} \leq 25\text{ }^\circ\text{C}$; Fig. 1	-	-	2	W
T_j	junction temperature		-	-	150	$^\circ\text{C}$
V_{CESM}	collector-emitter peak voltage	$V_{BE} = 0\text{ V}$	-	-	700	V
Static characteristics						
h_{FE}	DC current gain	$V_{CE} = 5\text{ V}$; $I_C = 10\text{ mA}$; $T_{lead} = 25\text{ }^\circ\text{C}$; Fig. 5 ; Fig. 6	12	22	32	
		$V_{CE} = 5\text{ V}$; $I_C = 100\text{ mA}$; $T_{lead} = 25\text{ }^\circ\text{C}$; Fig. 5 ; Fig. 6	14	24	34	
		$V_{CE} = 5\text{ V}$; $I_C = 0.75\text{ A}$; $T_{lead} = 25\text{ }^\circ\text{C}$; Fig. 5 ; Fig. 6	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	$T_{lead} \leq 25\text{ °C}$; Fig. 1	-	2	W
T_{stg}	storage temperature		-65	150	°C
T_j	junction temperature		-	150	°C

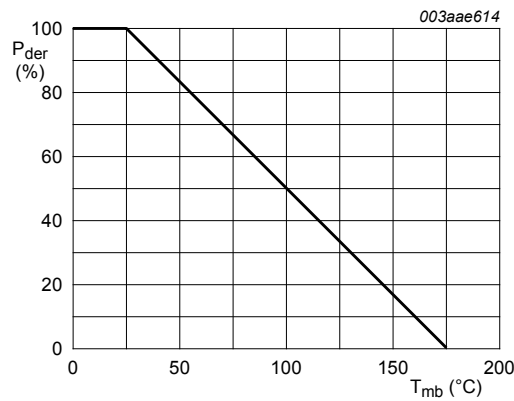


Fig. 1. Normalized total power dissipation as a function of mounting base temperature

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

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; Fig. 2	-	150	-	K/W

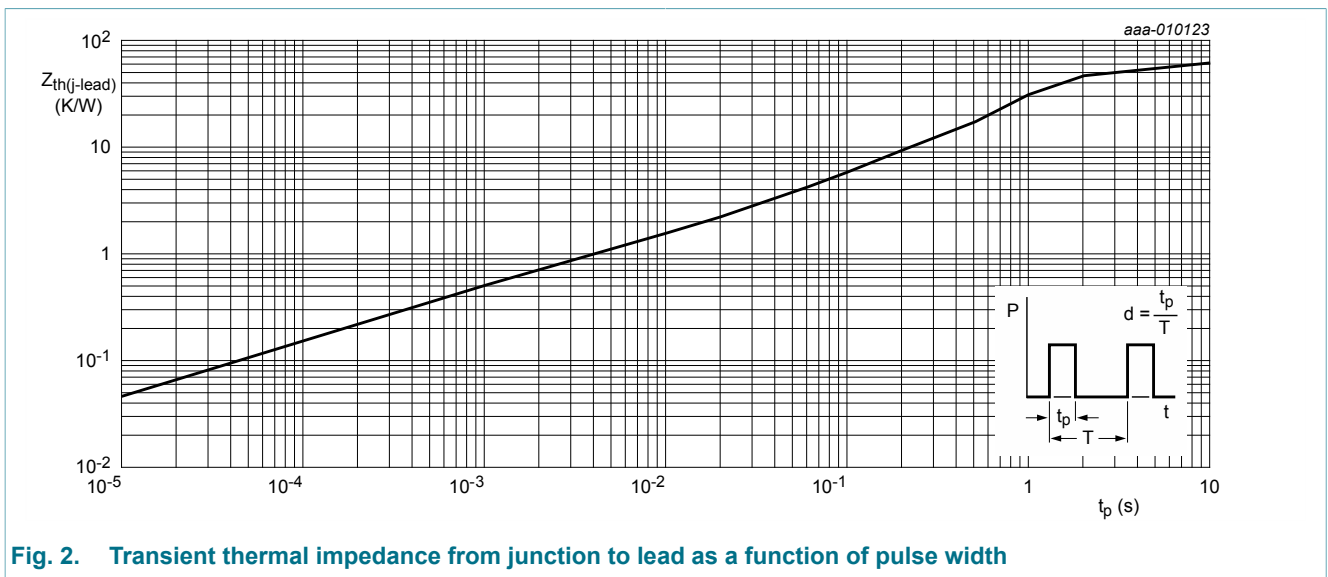


Fig. 2. Transient thermal impedance from junction to lead as a function of pulse width

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I _{CES}	collector-emitter cut-off current	V _{BE} = 0 V; V _{CE} = 700 V; T _{lead} = 25 °C	-	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	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;	-	2	-	μs
t _f	fall time	R _L = 75 Ω; V _{BB} = -4 V; T _{lead} = 25 °C; Fig. 7 ; Fig. 8	-	320	-	ns

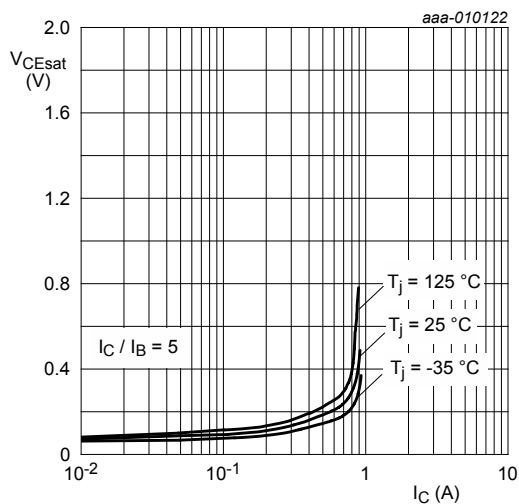


Fig. 3. Collector-emitter saturation voltage as a function of collector current; typical values

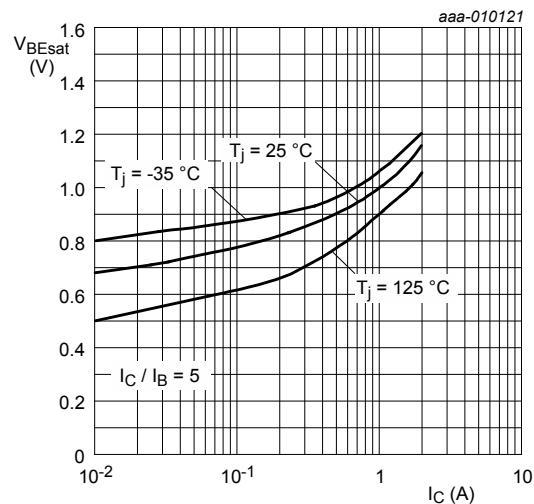


Fig. 4. Base-emitter saturation voltage as a function of collector current; typical values

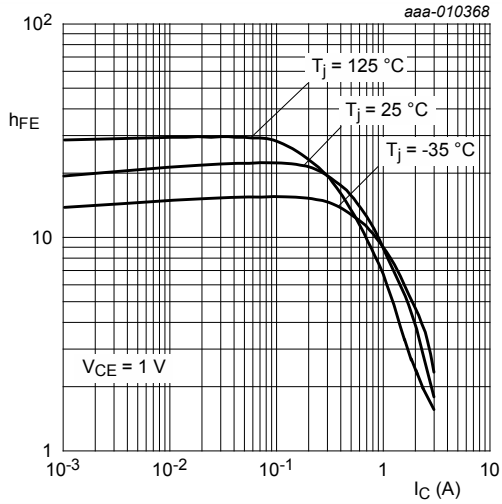


Fig. 5. DC current gain as a function of collector current; typical values

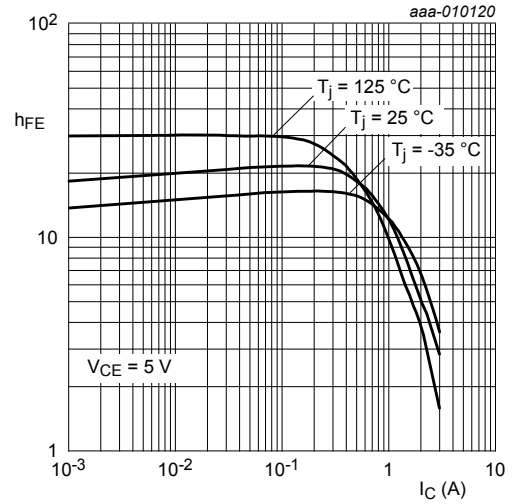


Fig. 6. DC current gain as a function of collector current; typical values

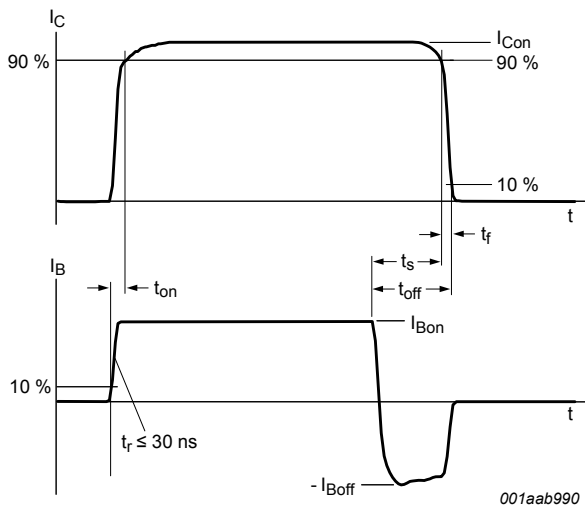


Fig. 7. Switching times waveforms for resistive load

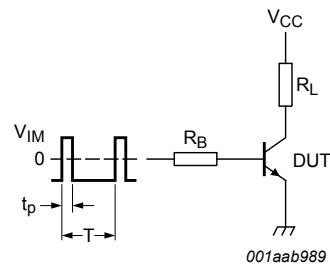


Fig. 8. Test circuit for resistive load switching

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

11. Package outline

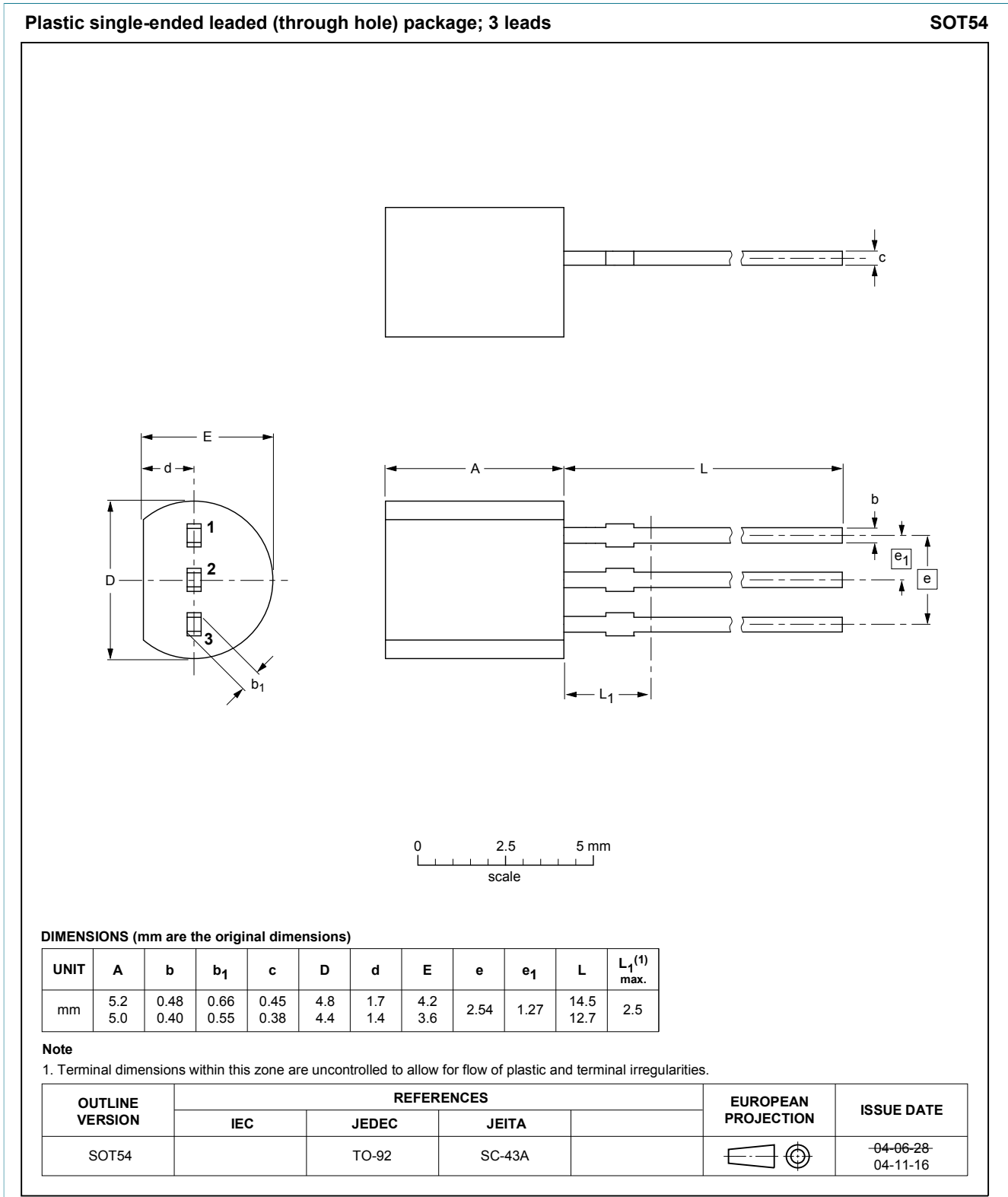


Fig. 9. Package outline TO-92 (SOT54)

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Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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