



# PBSS9110S

100 V, 1 A PNP low  $V_{CEsat}$  (BISS) transistor

Rev. 02 — 10 August 2004

Product data sheet

## 1. Product profile

### 1.1 General description

PNP low  $V_{CEsat}$  transistor in a SOT54 (SC-43/TO-92) plastic package.

### 1.2 Features

- SOT54 package
- Low collector-emitter saturation voltage  $V_{CEsat}$
- High collector current capability  $I_C$  and  $I_{CM}$
- High efficiency leading to less heat generation.

### 1.3 Applications

- Major application segments:
  - ◆ Automotive 42 V power
  - ◆ Telecom infrastructure
  - ◆ Industrial.
- Peripheral driver:
  - ◆ Driver in low supply voltage applications (e.g. lamps and LEDs)
  - ◆ Inductive load driver (e.g. relays, buzzers and motors).
- DC-to-DC converter.

### 1.4 Quick reference data

Table 1: Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CEO}$	collector-emitter voltage		-	-	-100	V
$I_C$	collector current (DC)		-	-	-1	A
$I_{CM}$	peak collector current		-	-	-3	A
$R_{CEsat}$	equivalent on-resistance		-	-	320	m $\Omega$

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## 2. Pinning information

Table 2: Discrete pinning

Pin	Description	Simplified outline	Symbol
1	base		<p>sym029</p>
2	collector		
3	emitter		

## 3. Ordering information

Table 3: Ordering information

Type number	Package		Version
	Name	Description	
PBSS9110S	-	plastic single-ended leaded (through hole) package; 3 leads	SOT54

## 4. Marking

Table 4: Marking

Type number	Marking code
PBSS9110S	S9110S [1]

[1] Made in China.

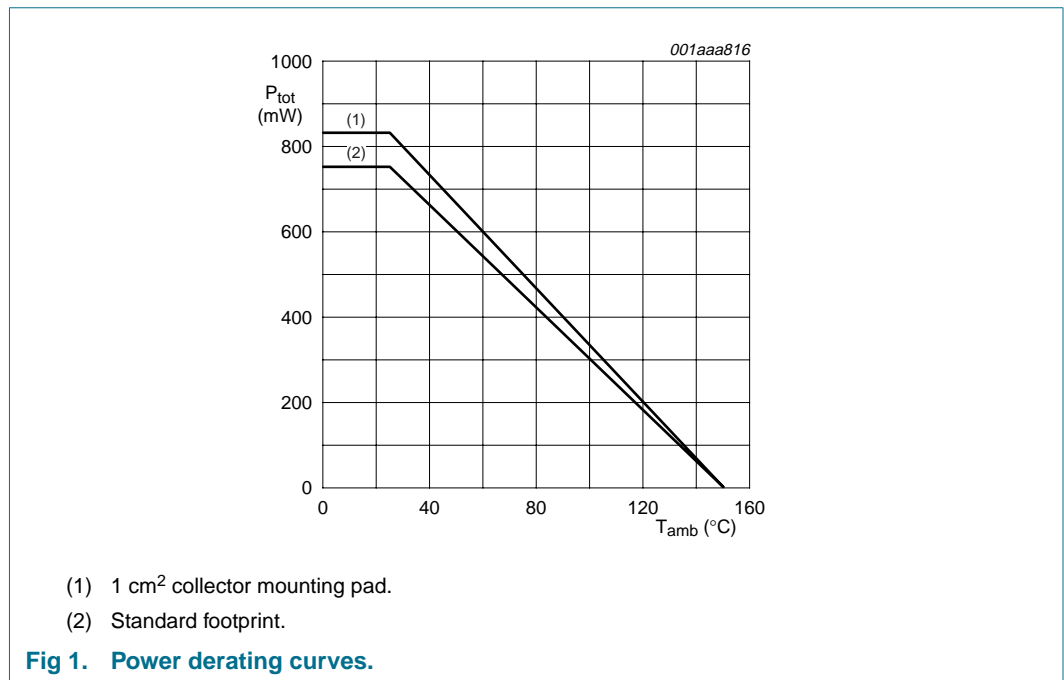
**5. Limiting values**

**Table 5: Limiting values**

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

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CBO}$	collector-base voltage	open emitter	-	-120	V
$V_{CEO}$	collector-emitter voltage	open base	-	-100	V
$V_{EBO}$	emitter-base voltage	open collector	-	-5	V
$I_{CM}$	peak collector current	$T_{j(max)}$	-	-3	A
$I_C$	collector current (DC)		-	-1	A
$I_B$	base current (DC)		-	-0.3	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$ [1]	-	830	mW
$T_j$	junction temperature		-	150	°C
$T_{amb}$	operating ambient temperature		-65	+150	°C
$T_{stg}$	storage temperature		-65	+150	°C

[1] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, standard footprint.

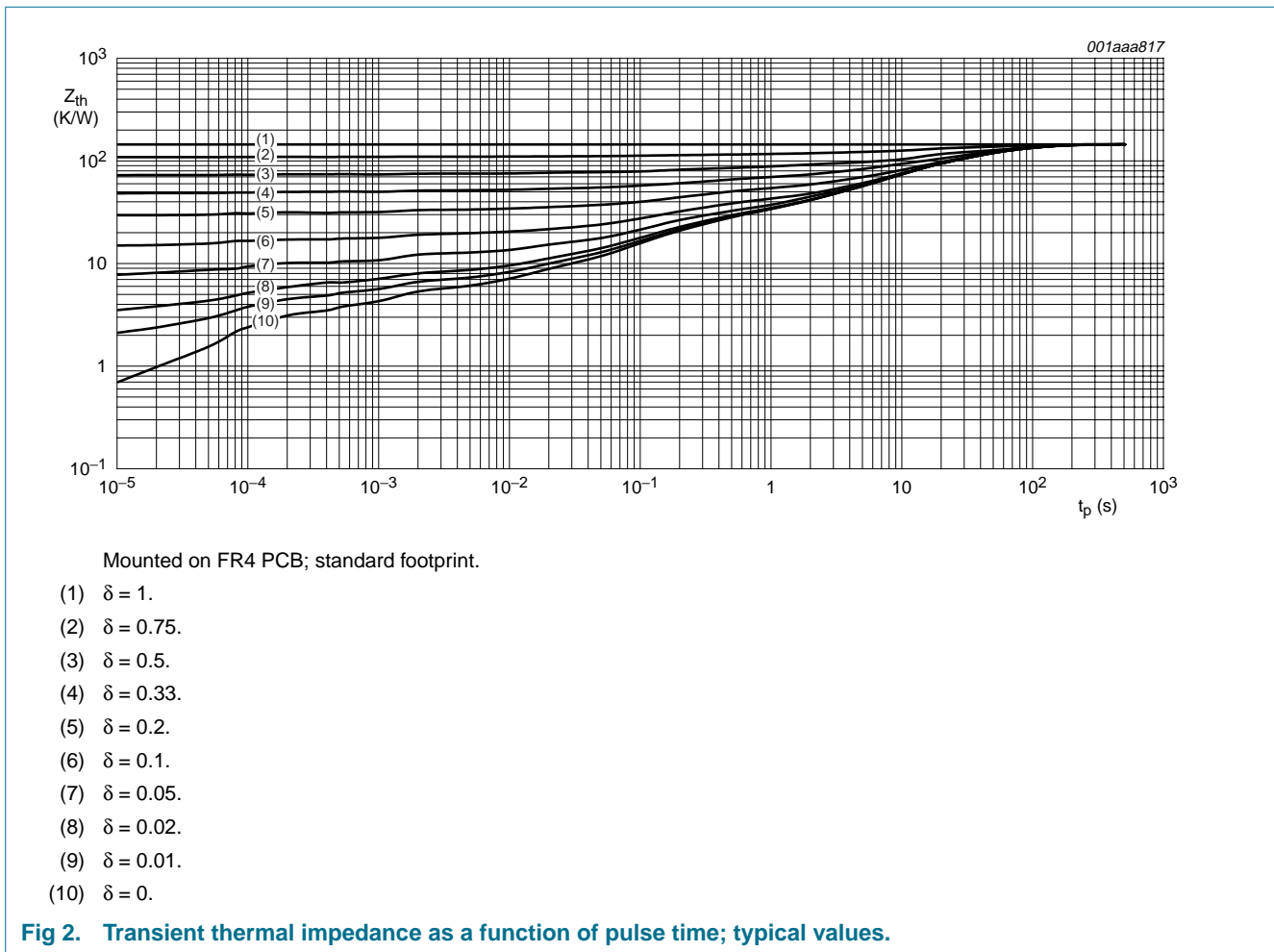


## 6. Thermal characteristics

**Table 6: Thermal characteristics**

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] 150	K/W

[1] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, standard footprint.

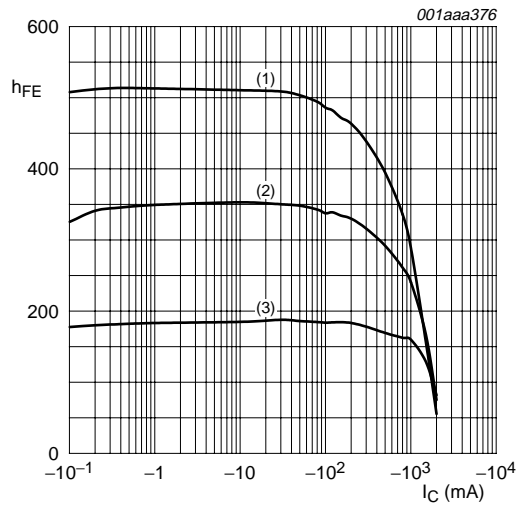


## 7. Characteristics

**Table 7: Characteristics**
 $T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

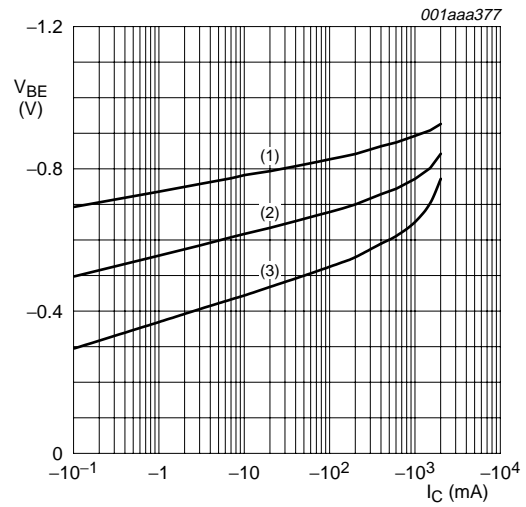
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$I_{CBO}$	collector-base cut-off current	$V_{CB} = -80\text{ V}; I_E = 0\text{ A}$	-	-	-100	nA	
		$V_{CB} = -80\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$	-	-	-50	$\mu\text{A}$	
$I_{CES}$	collector-emitter cut-off current	$V_{CE} = -80\text{ V}; V_{BE} = 0\text{ V}$	-	-	-100	nA	
$I_{EBO}$	emitter-base cut-off current	$V_{EB} = -4\text{ V}; I_C = 0\text{ A}$	-	-	-100	nA	
$h_{FE}$	DC current gain	$V_{CE} = -5\text{ V}; I_C = -1\text{ mA}$	150	-	-		
		$V_{CE} = -5\text{ V}; I_C = -250\text{ mA}$	150	-	-		
		$V_{CE} = -5\text{ V}; I_C = -0.5\text{ A}$	[1]	150	-	450	
		$V_{CE} = -5\text{ V}; I_C = -1\text{ A}$	[1]	125	-	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -250\text{ mA}; I_B = -25\text{ mA}$	-	-	-120	mV	
		$I_C = -500\text{ mA}; I_B = -50\text{ mA}$	-	-	-180	mV	
		$I_C = -1\text{ A}; I_B = -100\text{ mA}$	-	-	-320	mV	
$R_{CEsat}$	equivalent on-resistance	$I_C = -1\text{ A}; I_B = -100\text{ mA}$	[1]	-	170	320	$\text{m}\Omega$
$V_{BEsat}$	base-emitter saturation voltage	$I_C = -1\text{ A}; I_B = -100\text{ mA}$	-	-	-1.1	V	
$V_{BEon}$	base-emitter turn-on voltage	$I_C = -1\text{ A}; V_{CE} = -5\text{ V}$	-	-	-1.0	V	
$f_T$	transition frequency	$I_C = -50\text{ mA}; V_{CE} = -10\text{ V}; f = 100\text{ MHz}$	100	-	-	MHz	
$C_c$	collector capacitance	$I_E = I_e = 0\text{ A}; V_{CB} = -10\text{ V}; f = 1\text{ MHz}$	-	-	17	pF	

[1] Pulse test:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$ .



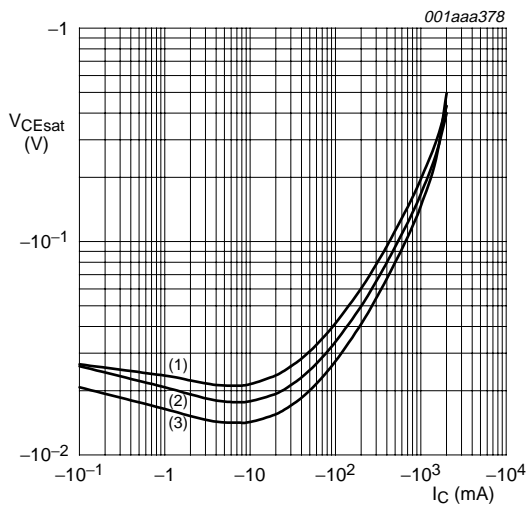
$V_{CE} = -10$  V.  
 (1)  $T_{amb} = 100$  °C.  
 (2)  $T_{amb} = 25$  °C.  
 (3)  $T_{amb} = -55$  °C.

**Fig 3. DC current gain as a function of collector current; typical values.**



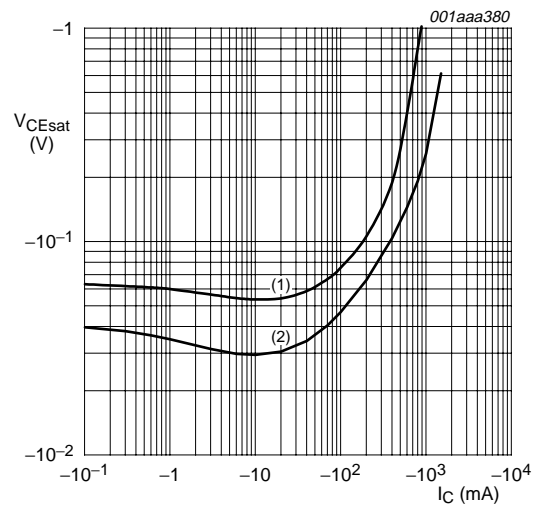
$V_{CE} = -10$  V.  
 (1)  $T_{amb} = -55$  °C.  
 (2)  $T_{amb} = 25$  °C.  
 (3)  $T_{amb} = 100$  °C.

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



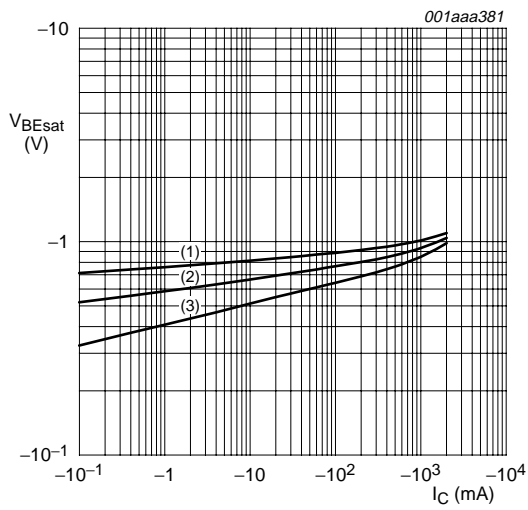
$I_C/I_B = 10$ .  
 (1)  $T_{amb} = 100$  °C.  
 (2)  $T_{amb} = 25$  °C.  
 (3)  $T_{amb} = -55$  °C.

**Fig 5. Collector-emitter saturation voltage as a function of collector current; typical values.**



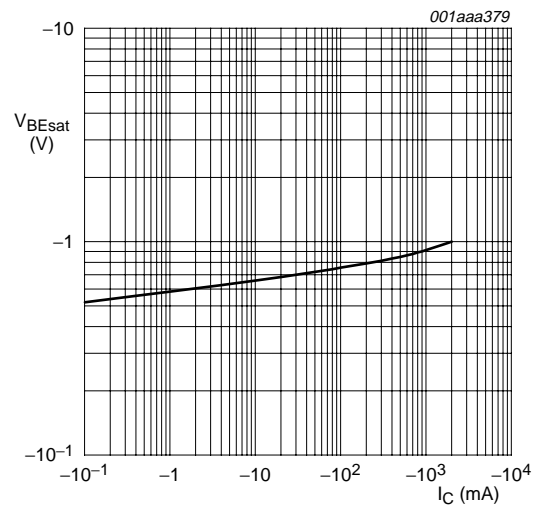
$T_{amb} = 25$  °C.  
 (1)  $I_C/I_B = 50$ .  
 (2)  $I_C/I_B = 20$ .

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



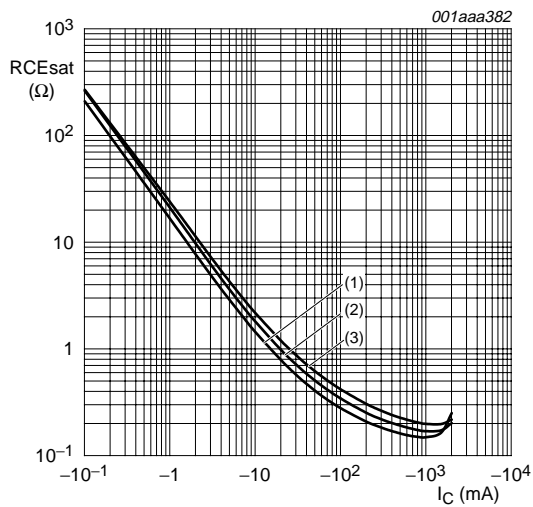
$I_C/I_B = 10$ .  
 (1)  $T_{amb} = -55\text{ °C}$ .  
 (2)  $T_{amb} = 25\text{ °C}$ .  
 (3)  $T_{amb} = 100\text{ °C}$ .

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



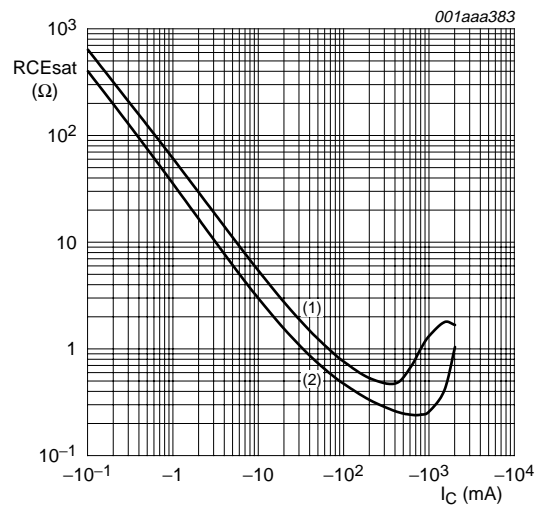
$I_C/I_B = 20$ .  
 $T_{amb} = 25\text{ °C}$ .

**Fig 8. Base-emitter saturation voltage as a function of collector current; typical values.**



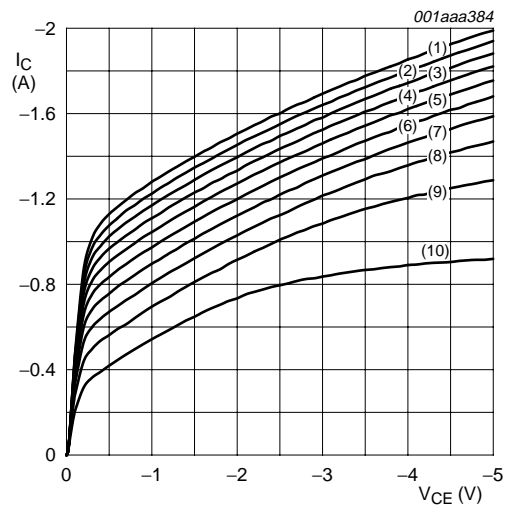
$I_C/I_B = 10$ .  
 (1)  $T_{amb} = -55\text{ °C}$ .  
 (2)  $T_{amb} = 25\text{ °C}$ .  
 (3)  $T_{amb} = 100\text{ °C}$ .

**Fig 9. Equivalent on-resistance as a function of collector current; typical values.**



$T_{amb} = 25\text{ °C}$ .  
 (1)  $I_C/I_B = 50$ .  
 (2)  $I_C/I_B = 20$ .

**Fig 10. Equivalent on-resistance as a function of collector current; typical values.**



- (1)  $I_B = -45$  mA.
- (2)  $I_B = -40.5$  mA.
- (3)  $I_B = -36$  mA.
- (4)  $I_B = -31.5$  mA.
- (5)  $I_B = -27$  mA.
- (6)  $I_B = -22.5$  mA.
- (7)  $I_B = -18$  mA.
- (8)  $I_B = -13.5$  mA.
- (9)  $I_B = -9$  mA.
- (10)  $I_B = -4.5$  mA.

Fig 11. Collector current as a function of collector-emitter voltage; typical values.



**8. Package outline**

Plastic single-ended leaded (through hole) package; 3 leads

SOT54

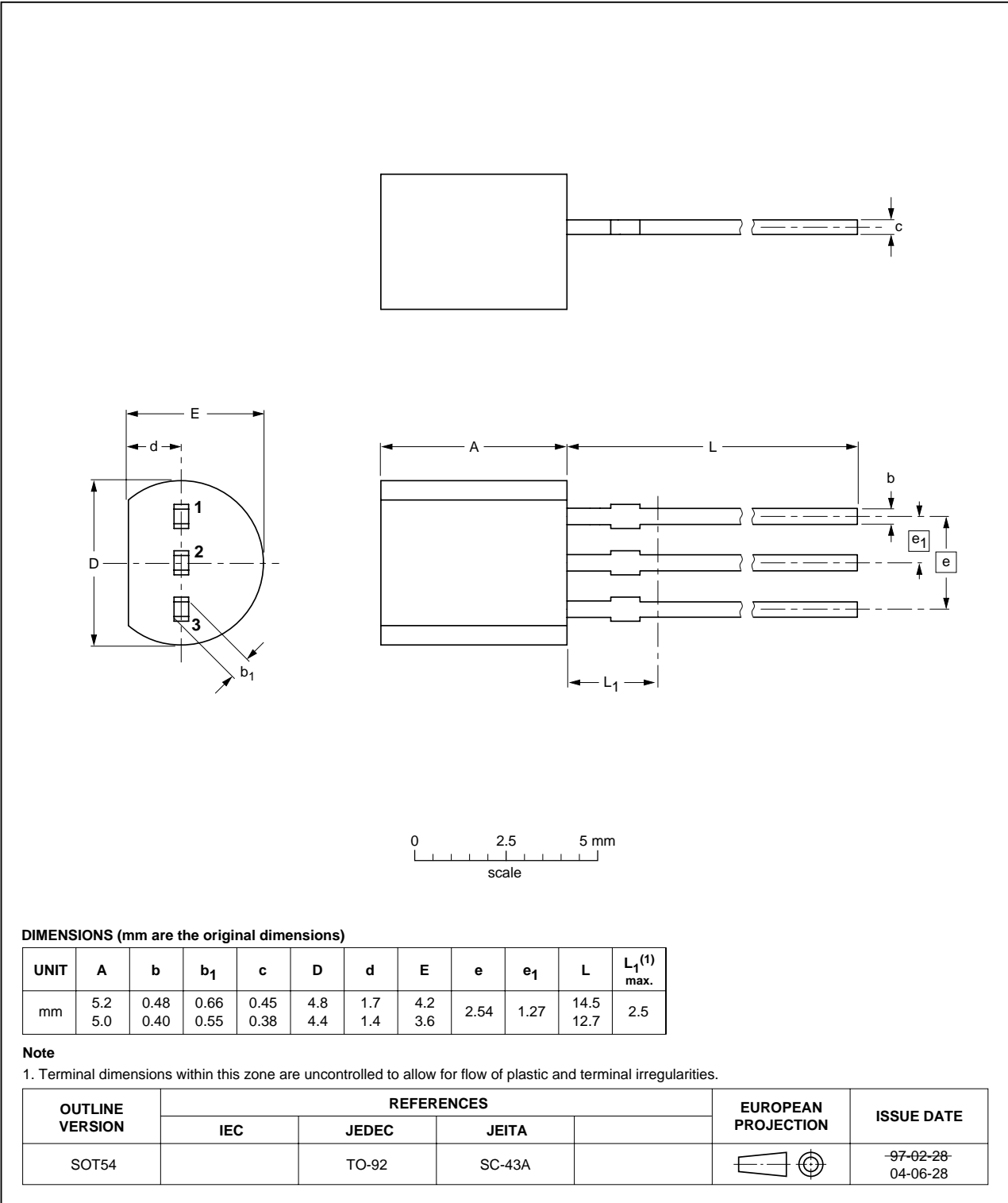


Fig 12. Package outline.

## 9. Revision history

Table 8: Revision history

Document ID	Release date	Data sheet status	Change notice	Order number	Supersedes
PBSS9110S_2	20040810	Product data	-	9397 750 13644	PBSS9110S_1
Modifications:	• Package outline updated, see <a href="#">Section 8 "Package outline"</a> .				
PBSS9110S_1	20040607	Product data	-	9397 750 12843	-

## 10. Data sheet status

Level	Data sheet status <sup>[1]</sup>	Product status <sup>[2]</sup> <sup>[3]</sup>	Definition
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
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[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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**Limiting values definition** — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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