

# PBSS8110D

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

Rev. 02 — 11 December 2009

Product data sheet

## 1. Product profile

### 1.1 General description

NPN low  $V_{CEsat}$  transistor in a plastic SOT457 (SC-74) package.

### 1.2 Features

- SOT457 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
- DC-to-DC converter
- Peripheral driver
  - ◆ Driver in low supply voltage applications (e.g. lamps and LEDs)
  - ◆ Inductive load drivers (e.g. relays, buzzers and motors)

### 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		-	-	200	m $\Omega$

## 2. Pinning information

**Table 2. Discrete pinning**

Pin	Description	Simplified outline	Symbol
1, 2, 5, 6	collector		 sym014
3	base		
4	emitter		

## 3. Ordering information

**Table 3. Ordering information**

Type number	Package		
	Name	Description	Version
PBSS8110D	-	plastic surface mounted package; 6 leads	SOT457

## 4. Marking

**Table 4. Marking**

Type number	Marking code <sup>[1]</sup>
PBSS8110D	A8

[1] Made in Malaysia

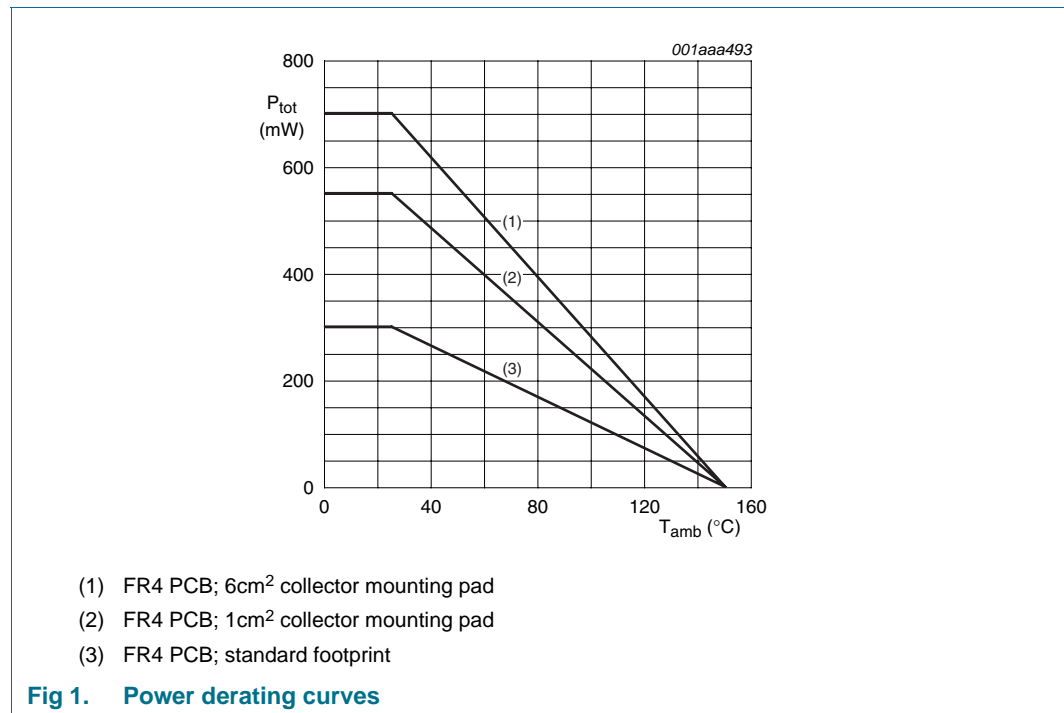
## 5. Limiting values

**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	
$I_C$	continuous collector current		-	1	A	
$I_B$	continuous base current		-	0.3	A	
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ }^\circ\text{C}$	[1]	-	300	mW
			[2]	-	550	mW
			[3]	-	700	mW
$T_j$	junction temperature		-	150	$^\circ\text{C}$	
$T_{amb}$	operating ambient temperature		-65	+150	$^\circ\text{C}$	
$T_{stg}$	storage temperature		-65	+150	$^\circ\text{C}$	

- [1] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, standard footprint.
- [2] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, 1cm<sup>2</sup> collector mounting pad.
- [3] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, 6cm<sup>2</sup> collector mounting pad.

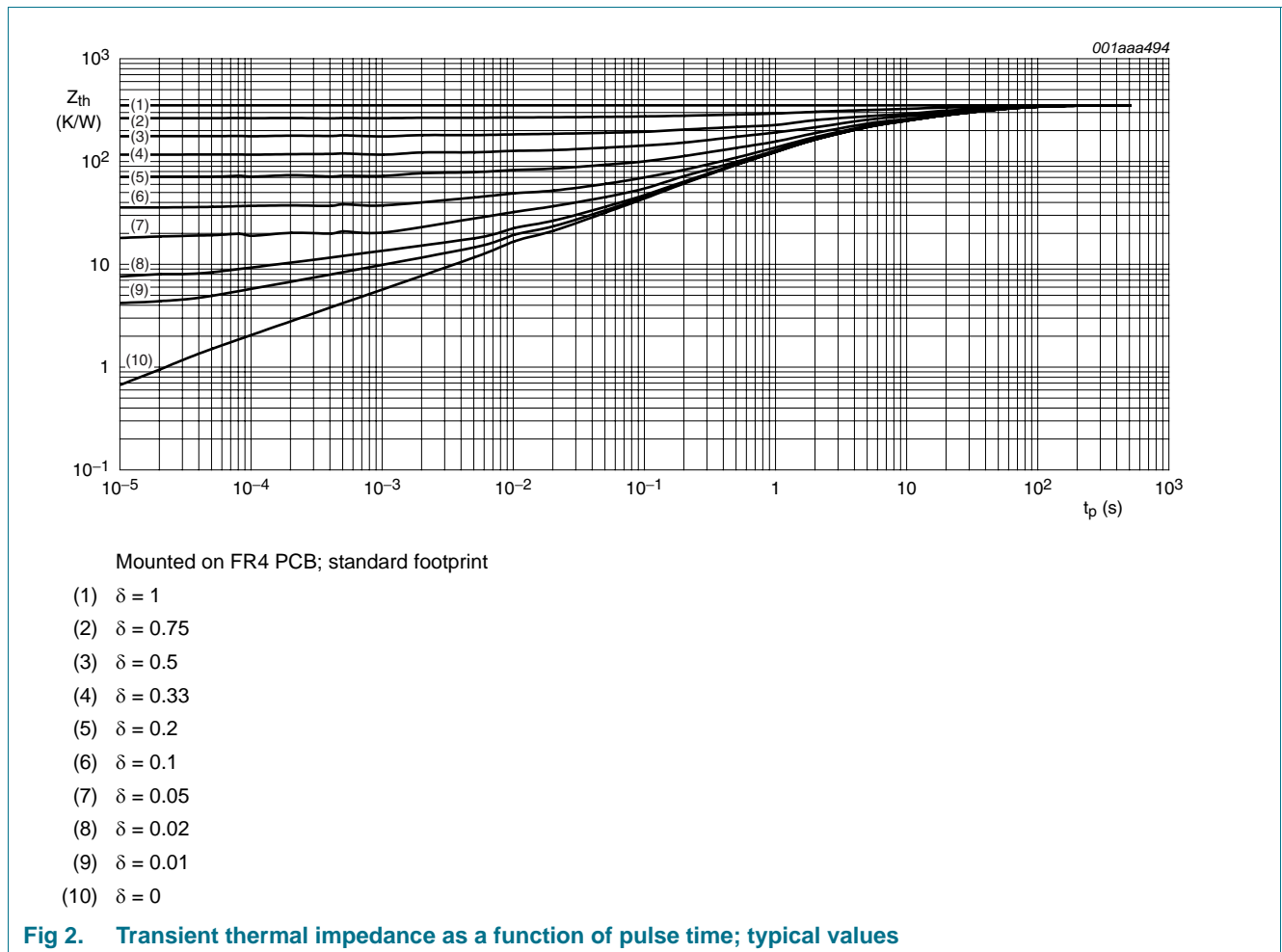


## 6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit	
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	416	K/W
			[2]	227	K/W
			[3]	178	K/W
$R_{th(j-s)}$	thermal resistance from junction to soldering point	in free air	[1]	83	K/W

- [1] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, standard footprint.
- [2] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, 1 cm<sup>2</sup> collector mounting pad.
- [3] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, 6 cm<sup>2</sup> collector mounting pad.



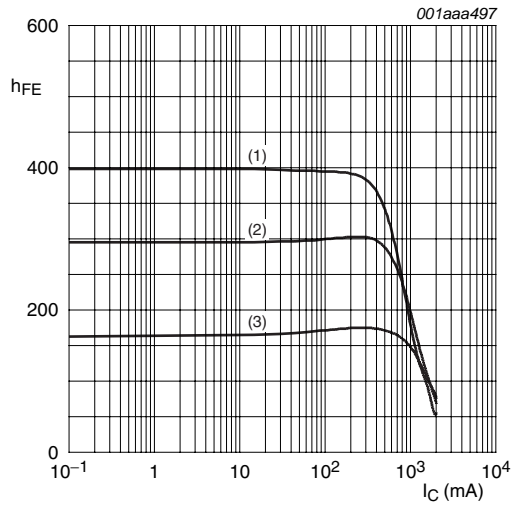
## 7. Characteristics

**Table 7. Characteristics**

$T_j = 25\text{ °C}$  unless otherwise specified.

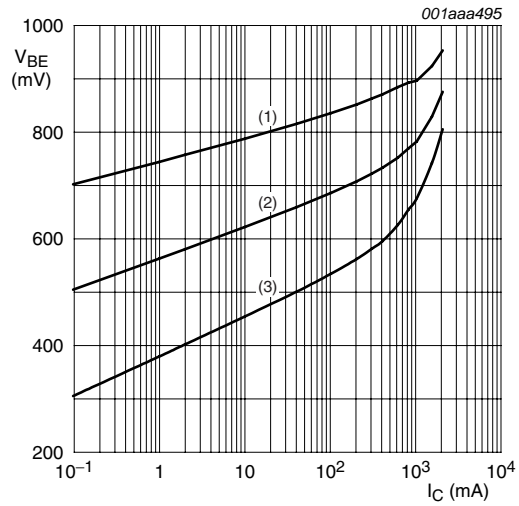
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 80\text{ V}; I_E = 0\text{ A}$	-	-	100	nA	
		$V_{CB} = 80\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ °C}$	-	-	50	$\mu\text{A}$	
$I_{CES}$	collector-emitter cut-off current	$V_{CE} = 80\text{ V}; V_{BE} = 0\text{ V}$	-	-	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	$V_{CE} = 10\text{ V}; I_C = 1\text{ mA}$	150	-	-		
		$V_{CE} = 10\text{ V}; I_C = 250\text{ mA}$	150	-	500		
		$V_{CE} = 10\text{ V}; I_C = 0.5\text{ A}$	[1]	100	-	-	
		$V_{CE} = 10\text{ V}; I_C = 1\text{ A}$	[1]	80	-	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = 100\text{ mA}; I_B = 10\text{ mA}$	-	-	40	mV	
		$I_C = 500\text{ mA}; I_B = 50\text{ mA}$	-	-	120	mV	
		$I_C = 1\text{ A}; I_B = 100\text{ mA}$	-	-	200	mV	
$R_{CEsat}$	equivalent on-resistance	$I_C = 1\text{ A}; I_B = 100\text{ mA}$	[1]	160	200	$\text{m}\Omega$	
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 1\text{ A}; I_B = 100\text{ mA}$	-	-	1.05	V	
$V_{BEon}$	base-emitter turn-on voltage	$V_{CE} = 10\text{ V}; I_C = 1\text{ A}$	-	-	0.9	V	
$f_T$	transition frequency	$V_{CE} = 10\text{ V}; I_C = 50\text{ mA}; f = 100\text{ MHz}$	100	-	-	MHz	
$C_c$	collector capacitance	$V_{CB} = 10\text{ V}; I_E = I_e = 0\text{ A}; f = 1\text{ MHz}$	-	-	7.5	pF	

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



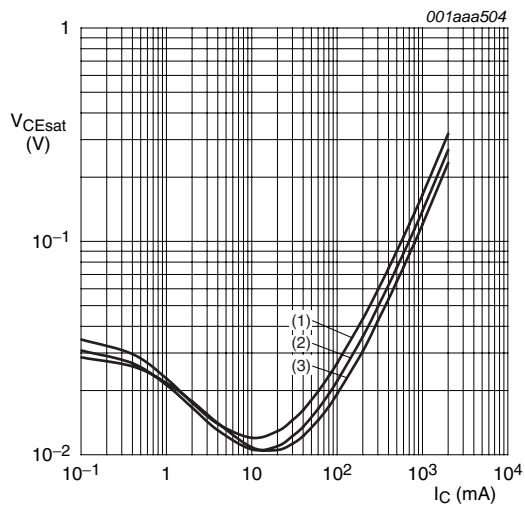
$V_{CE} = 10\text{ V}$   
 (1)  $T_{amb} = 100\text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25\text{ }^\circ\text{C}$   
 (3)  $T_{amb} = -55\text{ }^\circ\text{C}$

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



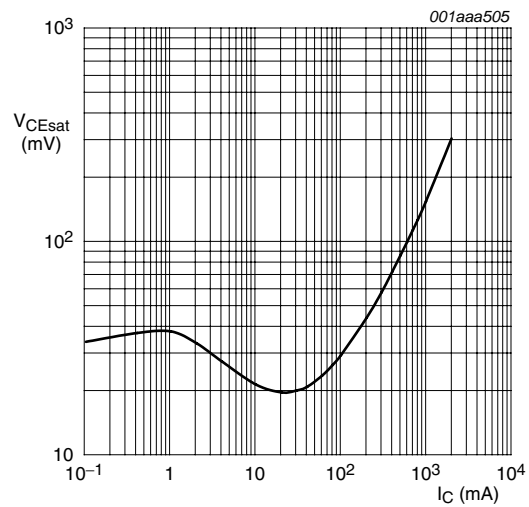
$V_{CE} = 10\text{ V}$   
 (1)  $T_{amb} = -55\text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25\text{ }^\circ\text{C}$   
 (3)  $T_{amb} = 100\text{ }^\circ\text{C}$

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



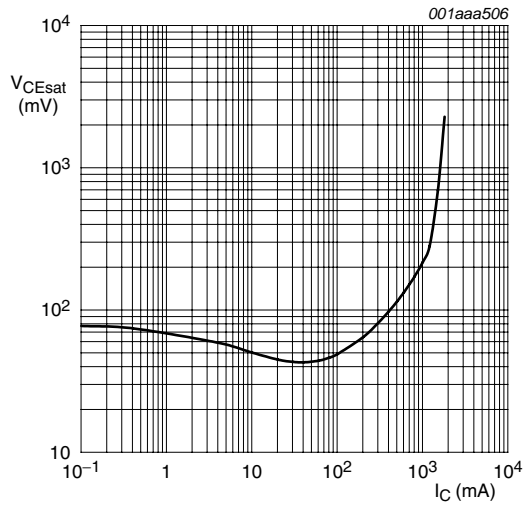
$I_C/I_B = 10$   
 (1)  $T_{amb} = 100\text{ }^\circ\text{C}$   
 (2)  $T_{amb} = 25\text{ }^\circ\text{C}$   
 (3)  $T_{amb} = -55\text{ }^\circ\text{C}$

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



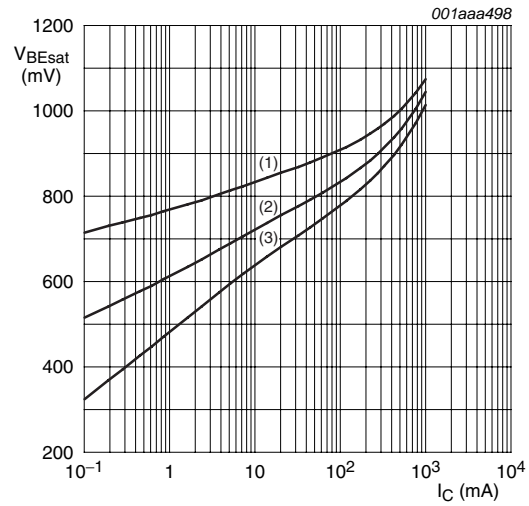
$I_C/I_B = 20; T_{amb} = 25\text{ }^\circ\text{C}$

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



$I_C/I_B = 50$ ;  $T_{amb} = 25\text{ }^\circ\text{C}$

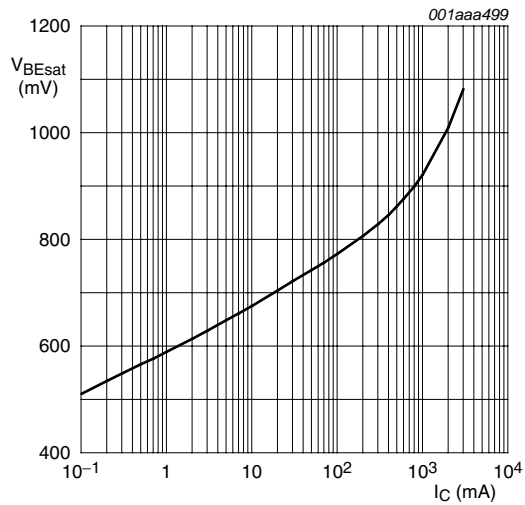
**Fig 7. Collector-emitter saturation voltage as a function of collector current; typical values**



$I_C/I_B = 10$

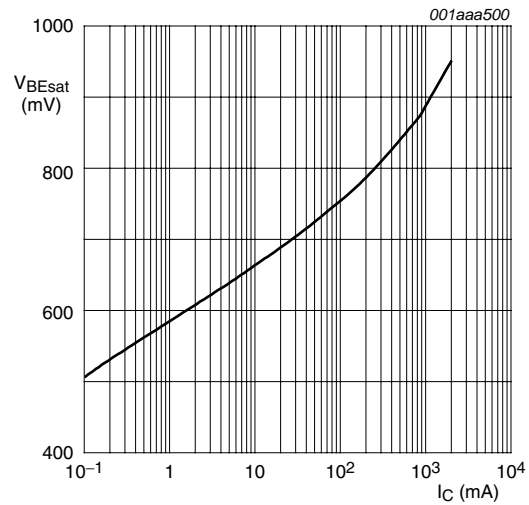
- (1)  $T_{amb} = -55\text{ }^\circ\text{C}$
- (2)  $T_{amb} = 25\text{ }^\circ\text{C}$
- (3)  $T_{amb} = 100\text{ }^\circ\text{C}$

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



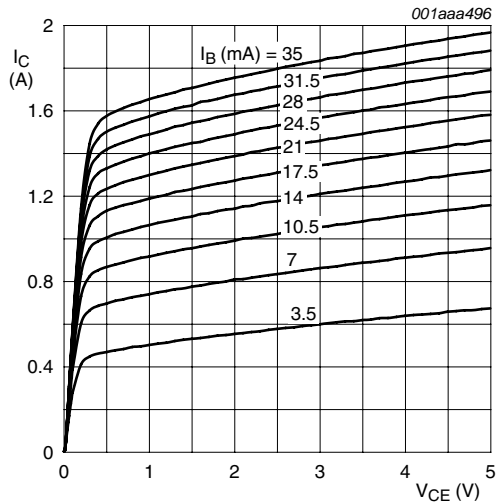
$I_C/I_B = 20$ ;  $T_{amb} = 25\text{ }^\circ\text{C}$

**Fig 9. Base-emitter saturation voltage as a function of collector current; typical values**



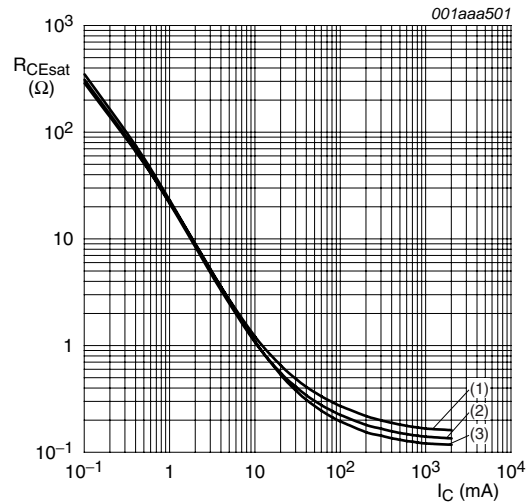
$I_C/I_B = 50$ ;  $T_{amb} = 25\text{ }^\circ\text{C}$

**Fig 10. Base-emitter saturation voltage as a function of collector current; typical values**



$T_{amb} = 25\text{ }^\circ\text{C}$

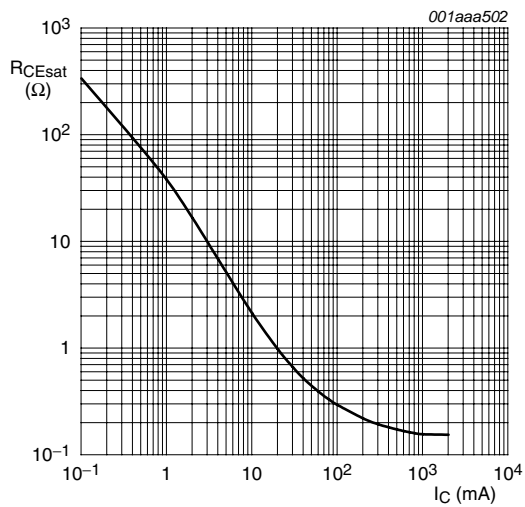
**Fig 11. Collector current as a function of collector-emitter voltage; typical values**



$I_C/I_B = 10$

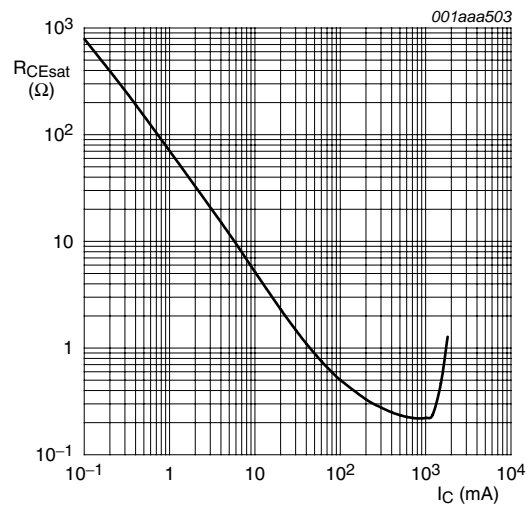
- (1)  $T_{amb} = 100\text{ }^\circ\text{C}$
- (2)  $T_{amb} = 25\text{ }^\circ\text{C}$
- (3)  $T_{amb} = -55\text{ }^\circ\text{C}$

**Fig 12. Equivalent on-resistance as a function of collector current; typical values**



$I_C/I_B = 20; T_{amb} = 25\text{ }^\circ\text{C}$

**Fig 13. Equivalent on-resistance as a function of collector current; typical values**



$I_C/I_B = 50; T_{amb} = 25\text{ }^\circ\text{C}$

**Fig 14. Equivalent on-resistance as a function of collector current; typical values**

## 8. Package outline

Plastic surface-mounted package (TSOP6); 6 leads

SOT457

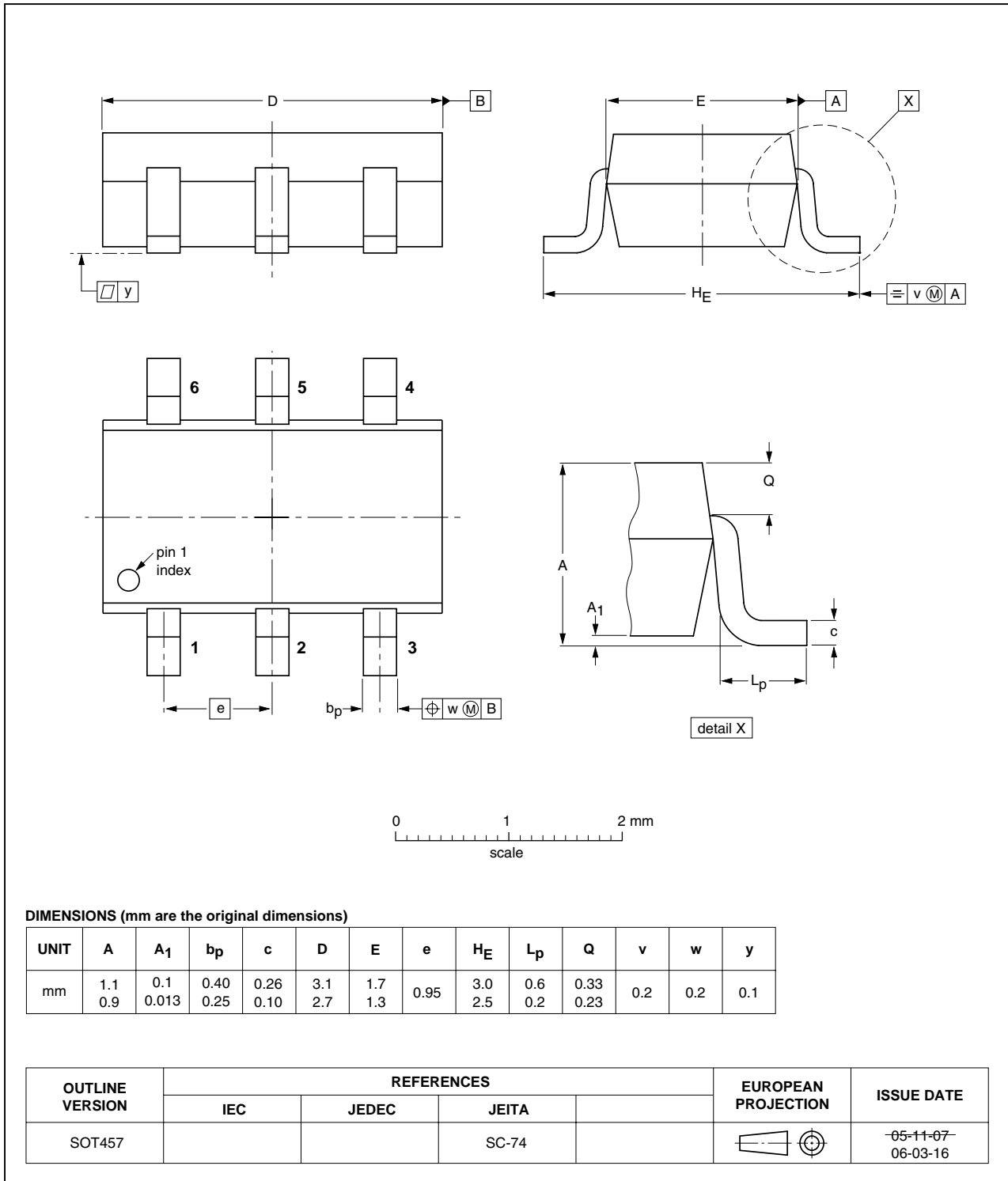


Fig 15. Package outline

## 9. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBSS8110D_2	20091211	Product data	-	PBSS8110D_1
Modifications:	<ul style="list-style-type: none"> <li>• This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content.</li> <li>• <a href="#">Table 2 “Discrete pinning”</a>: amended</li> <li>• <a href="#">Figure 3 “DC current gain as a function of collector current; typical values”</a>: updated</li> <li>• <a href="#">Figure 11</a>: updated</li> <li>• <a href="#">Figure 15 “Package outline”</a>: updated</li> </ul>			
PBSS8110D_1	20040423	Product data	-	-

## 10. Legal information

### 10.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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