

# PBSS8110Y

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

Rev. 01 — 2 June 2004

Product data sheet

## 1. Product profile

### 1.1 General description

NPN low  $V_{CEsat}$  transistor in a SOT363 (SC-88) plastic package.

### 1.2 Features

- SOT363 package
- Low collector-emitter saturation voltage  $V_{CEsat}$
- High collector current capability  $I_C$  and  $I_{CM}$
- High efficiency reduces 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		-	-	200	m $\Omega$

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## 2. Pinning information

**Table 2: Discrete pinning**

Pin	Description	Simplified outline	Symbol
1, 2, 5, 6	collector	<p>SOT363</p>	<p>sym014</p>
3	base		
4	emitter		

## 3. Ordering information

**Table 3: Ordering information**

Type number	Package		
	Name	Description	Version
PBSS8110Y	-	plastic surface mounted package; 6 leads	SOT363

## 4. Marking

**Table 4: Marking**

Type number	Marking code <sup>[1]</sup>
PPBSS8110Y	81*

- [1] \* = p: made in Hong Kong.  
 \* = t: made in Malaysia.  
 \* = W: made in China.

## 5. Limiting values

**Table 5: Limiting values**

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

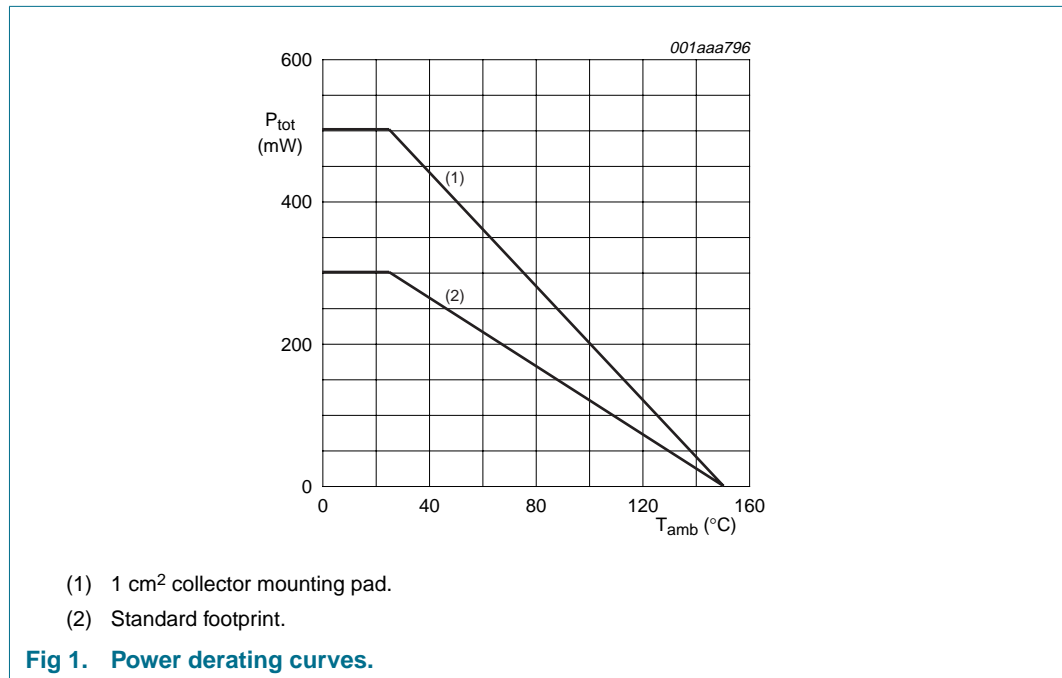
Symbol	Parameter	Conditions	Min	Max	Unit
$V_{CBO}$	collector-base voltage	open emitter	-	120	V
$V_{CEO}$	collector-emitter voltage	open base	-	100	V
$V_{EBO}$	emitter-base voltage	open collector	-	5	V
$I_{CM}$	peak collector current	$T_{j(max)}$	-	3	A
$I_C$	continuous collector current		-	1	A
$I_B$	continuous base current		-	0.3	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	<sup>[1]</sup> -	290	mW
			<sup>[2]</sup> -	480	mW
			<sup>[3]</sup> -	625	mW

**Table 5: Limiting values ...continued**

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

Symbol	Parameter	Conditions	Min	Max	Unit
$T_j$	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.
- [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.

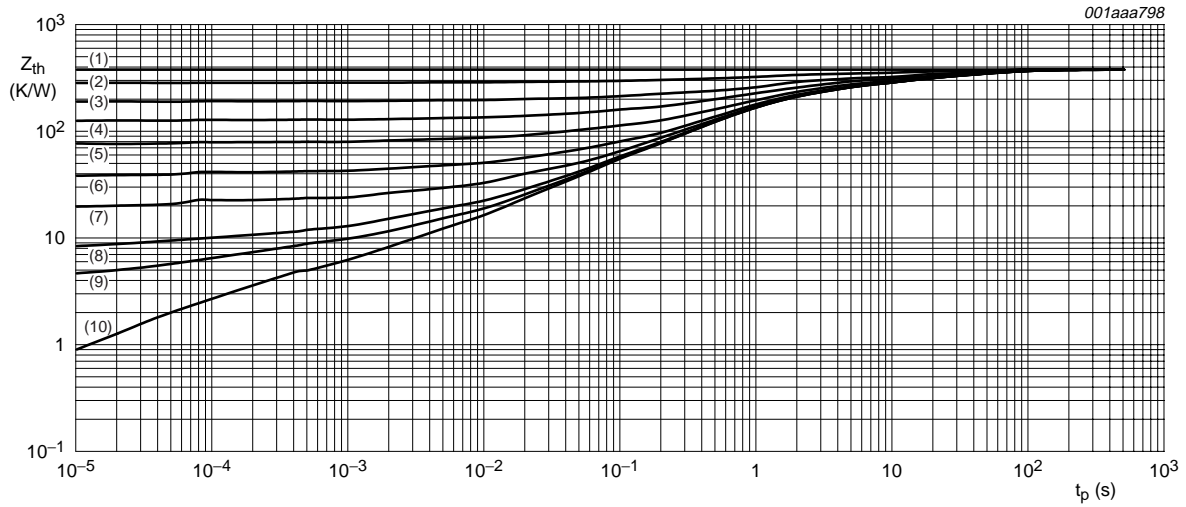


## 6. Thermal characteristics

**Table 6: Thermal characteristics**

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] 431	K/W
			[2] 260	K/W
			[3] 200	K/W
$R_{th(j-s)}$	thermal resistance from junction to soldering point	in free air	[1] 85	K/W

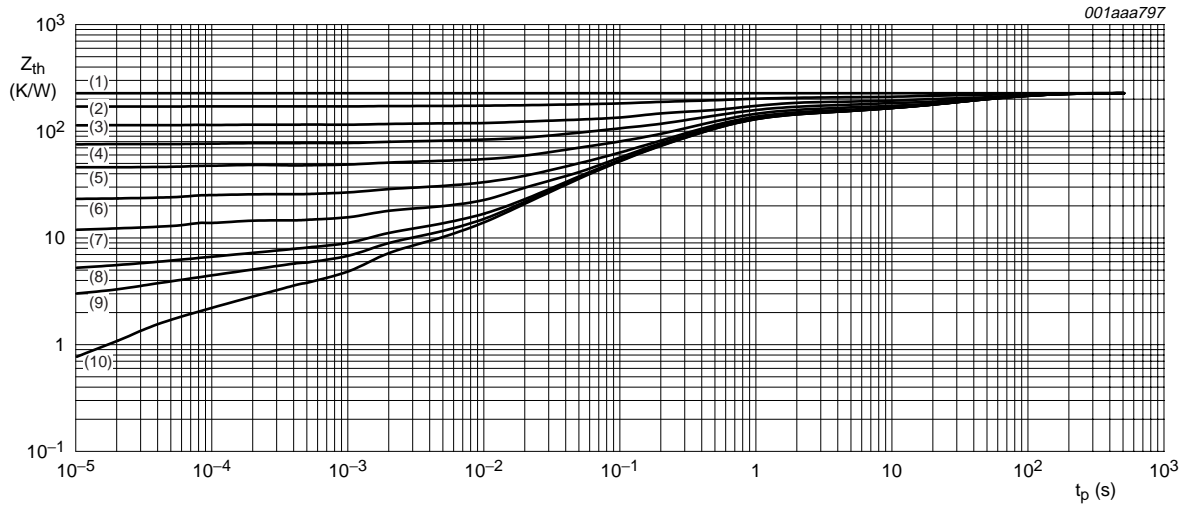
- [1] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, standard footprint.
- [2] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, 1 cm<sup>2</sup> collector mounting pad.
- [3] Device mounted on a FR4 printed-circuit board, single-sided copper,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



Mounted on FR4 PCB; standard footprint.

- (1)  $\delta = 1.$
- (2)  $\delta = 0.75.$
- (3)  $\delta = 0.5.$
- (4)  $\delta = 0.33.$
- (5)  $\delta = 0.2.$
- (6)  $\delta = 0.1.$
- (7)  $\delta = 0.05.$
- (8)  $\delta = 0.02.$
- (9)  $\delta = 0.01.$
- (10)  $\delta = 0.$

**Fig 2. Transient thermal impedance as a function of pulse time; typical values.**



Mounted on FR4 PCB; mounting pad for collector = 1 cm<sup>2</sup>.

- (1)  $\delta = 1$ .
- (2)  $\delta = 0.75$ .
- (3)  $\delta = 0.5$ .
- (4)  $\delta = 0.33$ .
- (5)  $\delta = 0.2$ .
- (6)  $\delta = 0.1$ .
- (7)  $\delta = 0.05$ .
- (8)  $\delta = 0.02$ .
- (9)  $\delta = 0.01$ .
- (10)  $\delta = 0$ .

Fig 3. Transient thermal impedance as a function of pulse time; typical values.

## 7. Characteristics

**Table 7: Characteristics**

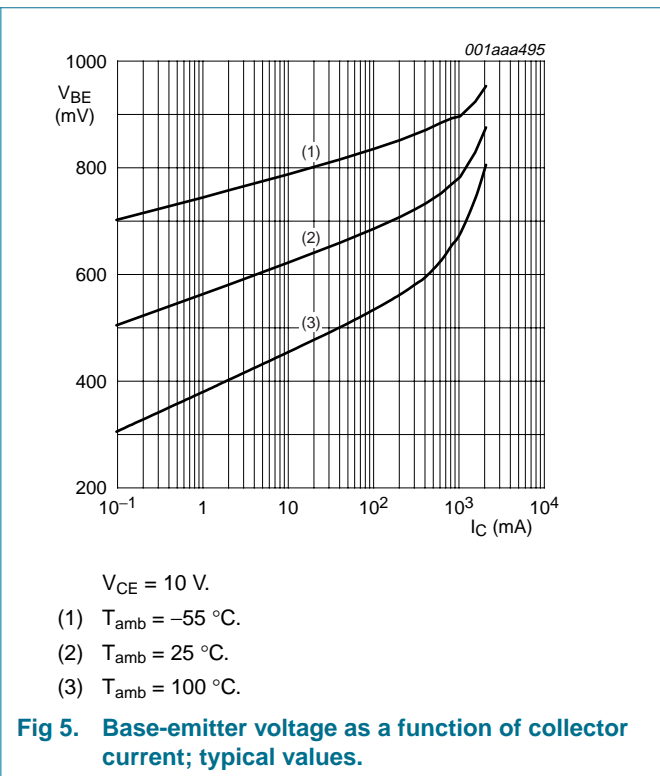
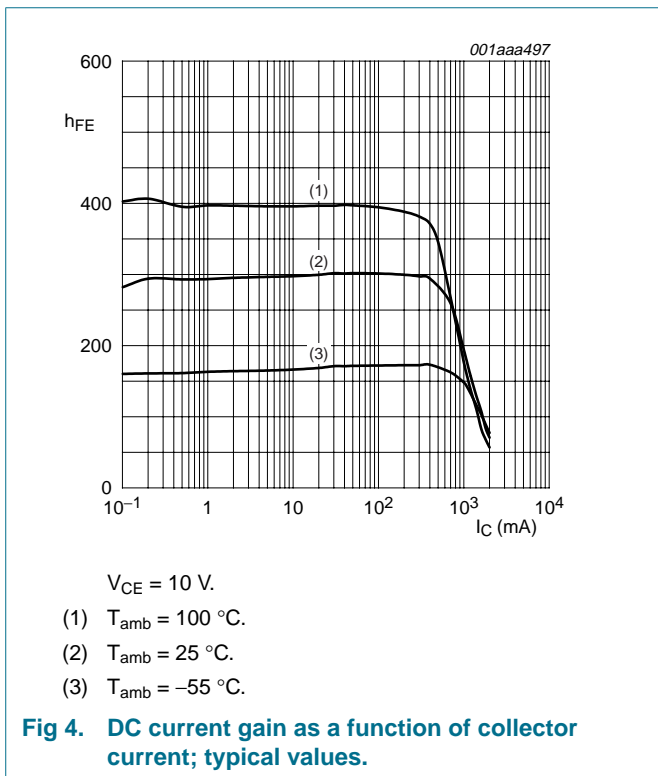
$T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified.

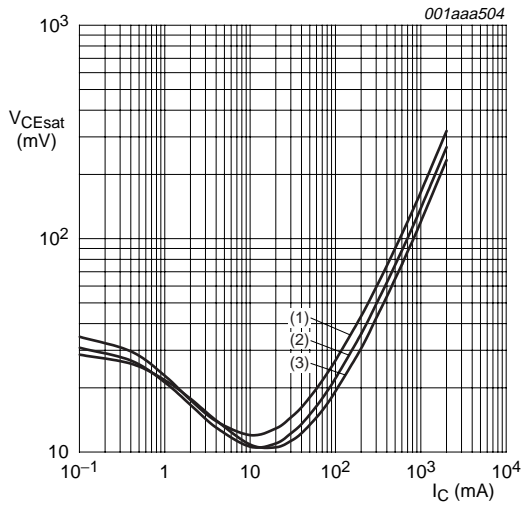
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 80\text{ V}; I_E = 0\text{ A}$	-	-	100	nA	
		$V_{CB} = 80\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^\circ\text{C}$	-	-	50	$\mu\text{A}$	
$I_{CES}$	collector-emitter cut-off current	$V_{CE} = 80\text{ V}; V_{BE} = 0\text{ V}$	-	-	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	$V_{CE} = 10\text{ V}; I_C = 1\text{ mA}$	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	-	-	

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CEsat}$	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	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:  $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02$ .

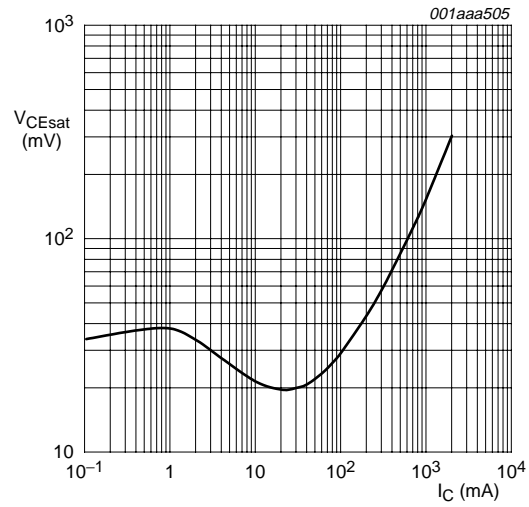




$I_C/I_B = 10$ .

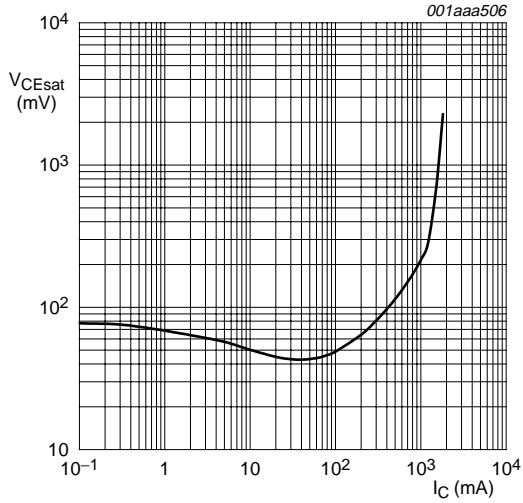
- (1)  $T_{amb} = 100\text{ °C}$ .
- (2)  $T_{amb} = 25\text{ °C}$ .
- (3)  $T_{amb} = -55\text{ °C}$ .

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



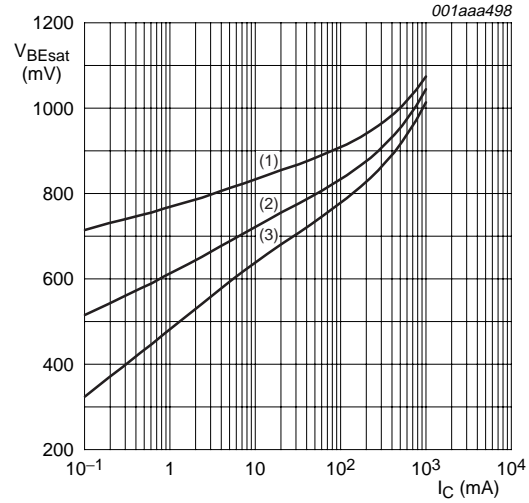
$I_C/I_B = 20$ ;  $T_{amb} = 25\text{ °C}$ .

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



$I_C/I_B = 50$ ;  $T_{amb} = 25\text{ °C}$ .

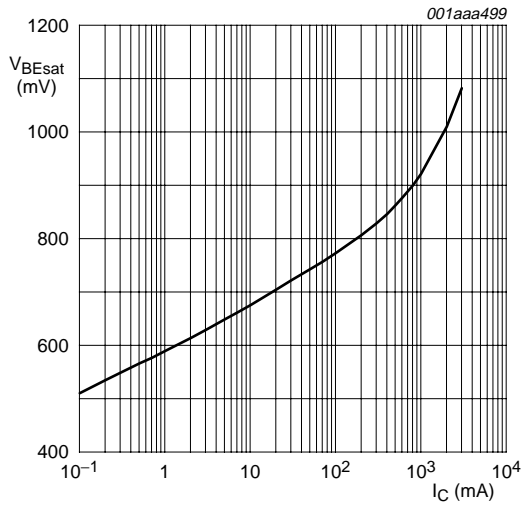
**Fig 8. Collector-emitter saturation voltage as a function of collector current; typical values.**



$I_C/I_B = 10$ .

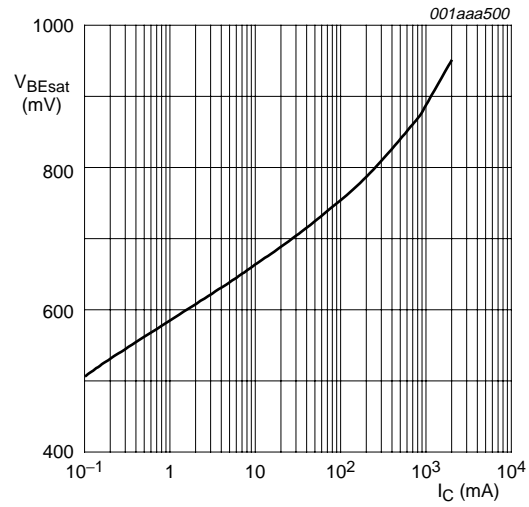
- (1)  $T_{amb} = -55\text{ °C}$ .
- (2)  $T_{amb} = 25\text{ °C}$ .
- (3)  $T_{amb} = 100\text{ °C}$ .

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



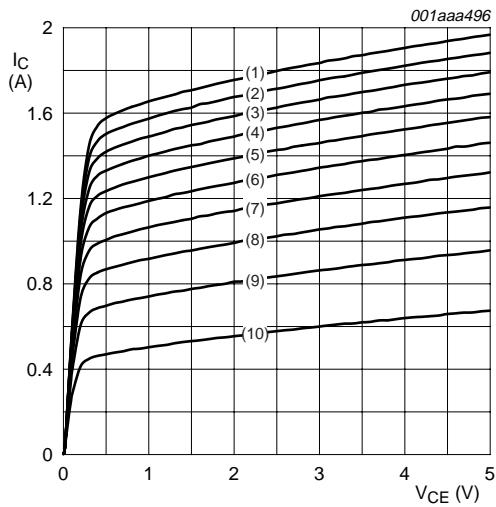
$I_C/I_B = 20$ ;  $T_{amb} = 25\text{ }^\circ\text{C}$ .

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



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

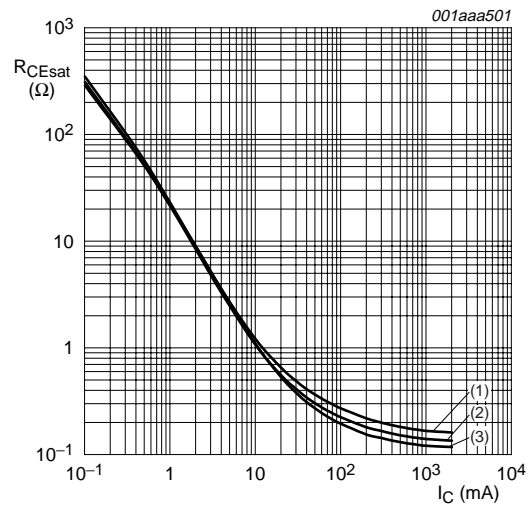
**Fig 11. Base-emitter saturation voltage as a function of collector current; typical values.**



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

- (1)  $I_B = 35\text{ mA}$ .
- (2)  $I_B = 31.5\text{ mA}$ .
- (3)  $I_B = 28\text{ mA}$ .
- (4)  $I_B = 24.5\text{ mA}$ .
- (5)  $I_B = 21\text{ mA}$ .
- (6)  $I_B = 17.5\text{ mA}$ .
- (7)  $I_B = 14\text{ mA}$ .
- (8)  $I_B = 10.5\text{ mA}$ .
- (9)  $I_B = 7\text{ mA}$ .
- (10)  $I_B = 3.5\text{ mA}$ .

**Fig 12. Collector current as a function of collector-emitter voltage; typical values.**

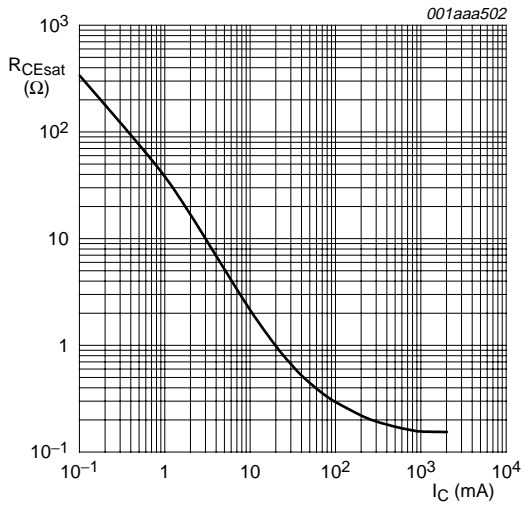


$I_C/I_B = 10$ .

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

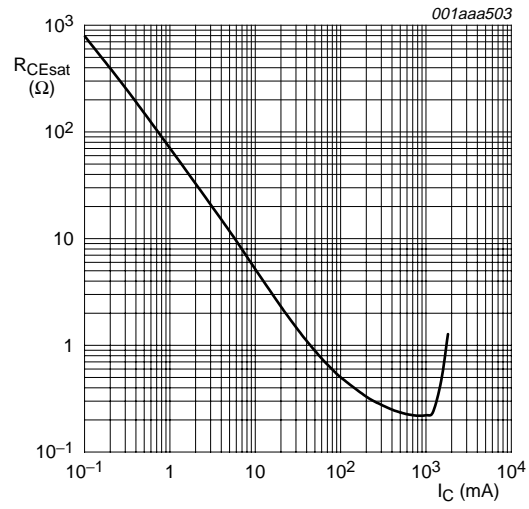
**Fig 13. Equivalent on-resistance as a function of collector current; typical values.**





$I_C/I_B = 20$ ;  $T_{amb} = 25$  °C.

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



$I_C/I_B = 50$ ;  $T_{amb} = 25$  °C.

**Fig 15. Equivalent on-resistance as a function of collector current; typical values.**

8. Package outline

Plastic surface mounted package; 6 leads

SOT363

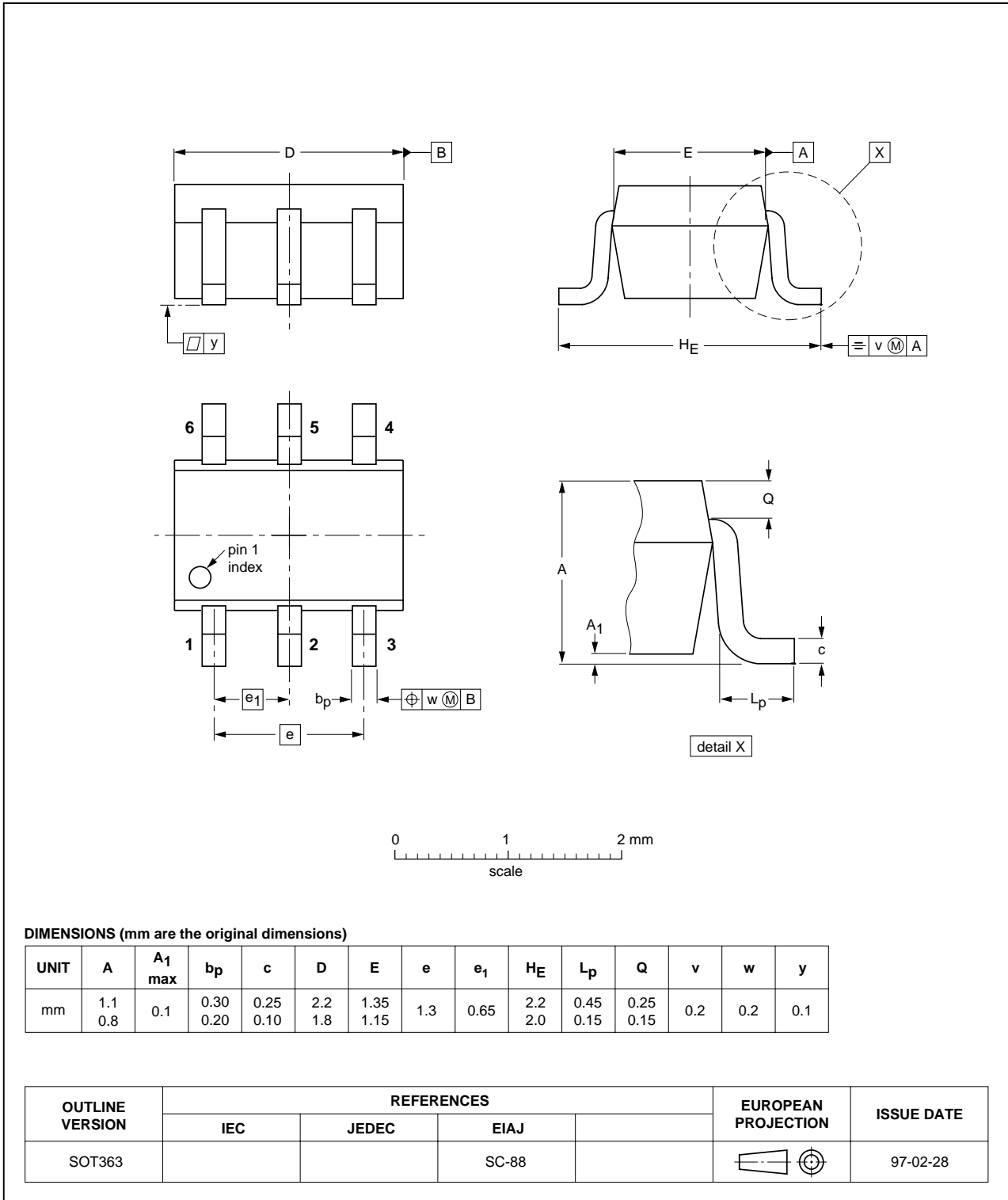


Fig 16. Package outline.

## 9. Revision history

**Table 8: Revision history**

Document ID	Release date	Data sheet status	Change notice	Order number	Supersedes
PBSS8110Y_1	20040602	Product data	-	9397 750 12567	-

## 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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**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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