

# PBSS8110Y

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

Rev. 02 — 21 November 2009

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

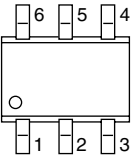
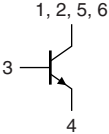
### 1.4 Quick reference data

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 $\Omega$

## 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
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

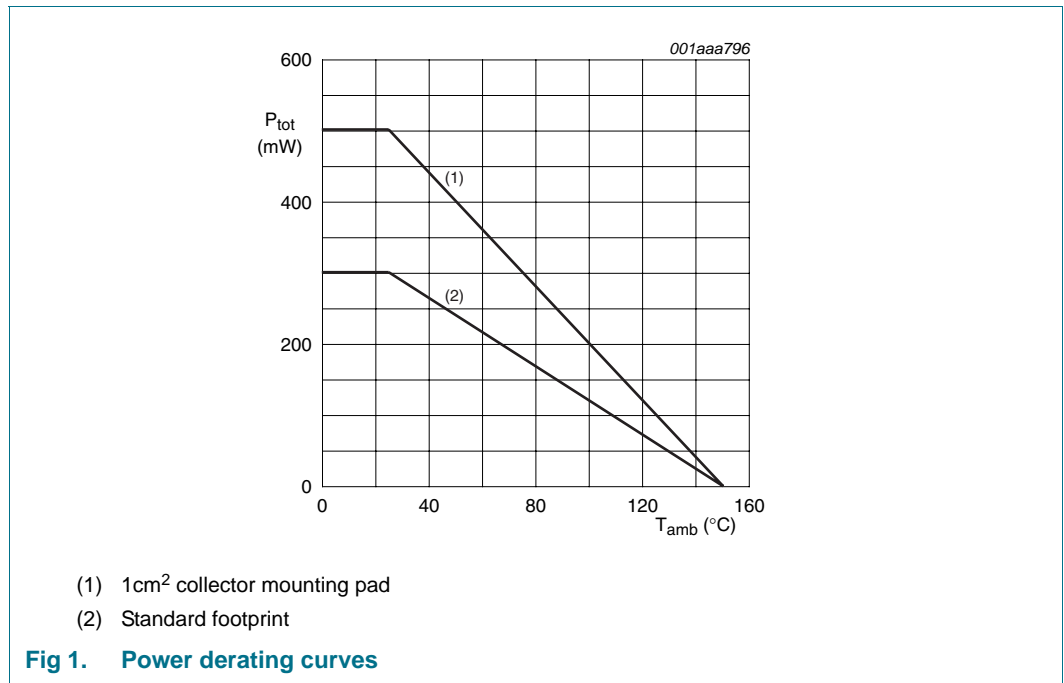
In accordance with the Absolute Maximum Rating System (IEC 60134).

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	$T_{amb} \leq 25\text{ °C}$	[1] -	290	mW
			[2] -	480	mW
			[3] -	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			+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, 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.

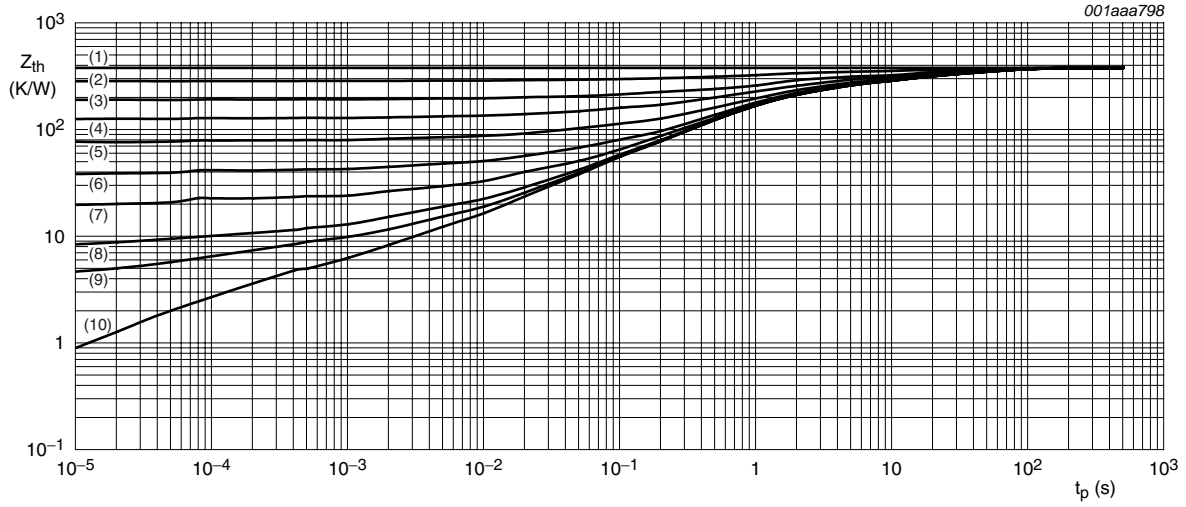


## 6. Thermal characteristics

**Table 6. Thermal characteristics**

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

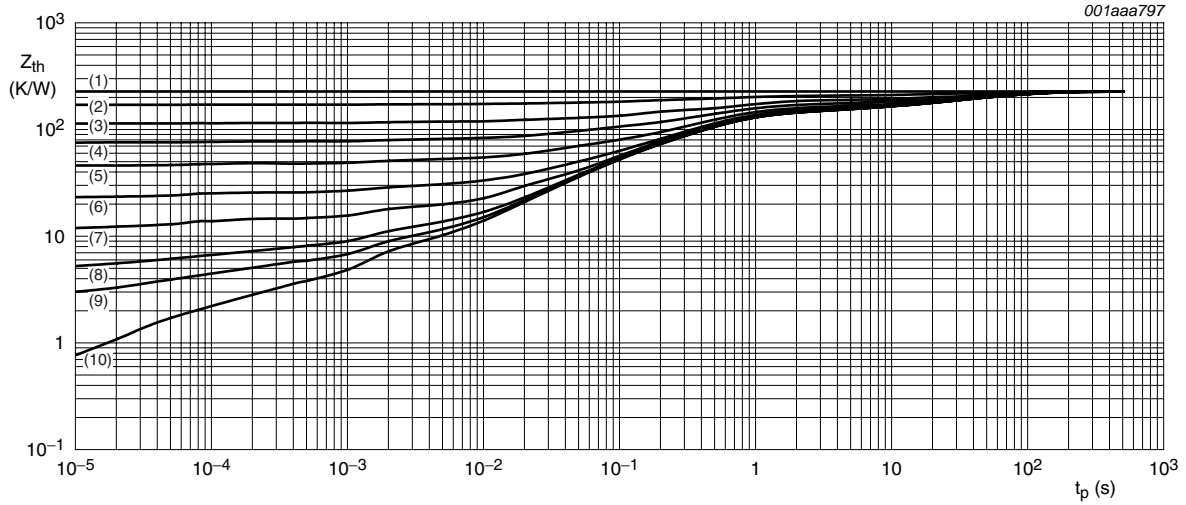
- [1] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, standard footprint.
- [2] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, 1cm<sup>2</sup> collector mounting pad.
- [3] Device mounted on a FR4 printed-circuit board, single-sided copper,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



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 = 1cm<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.

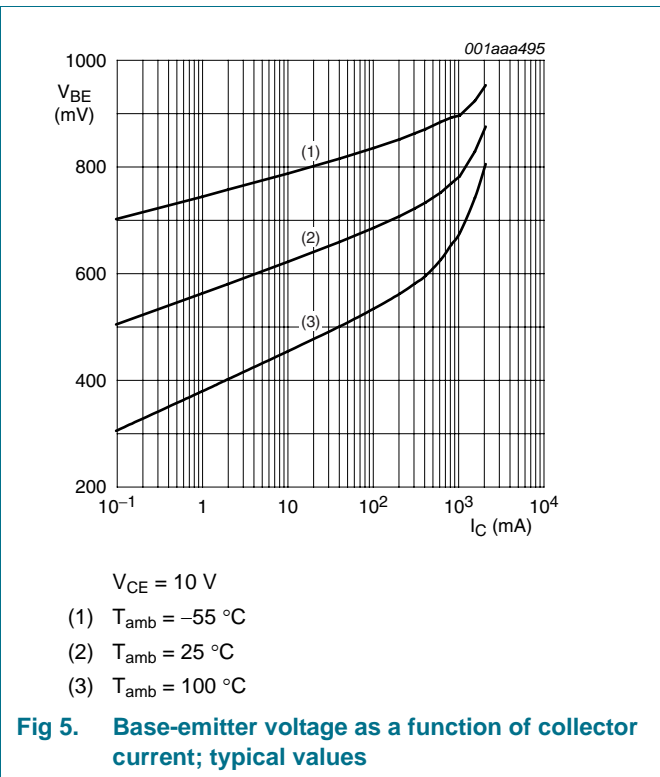
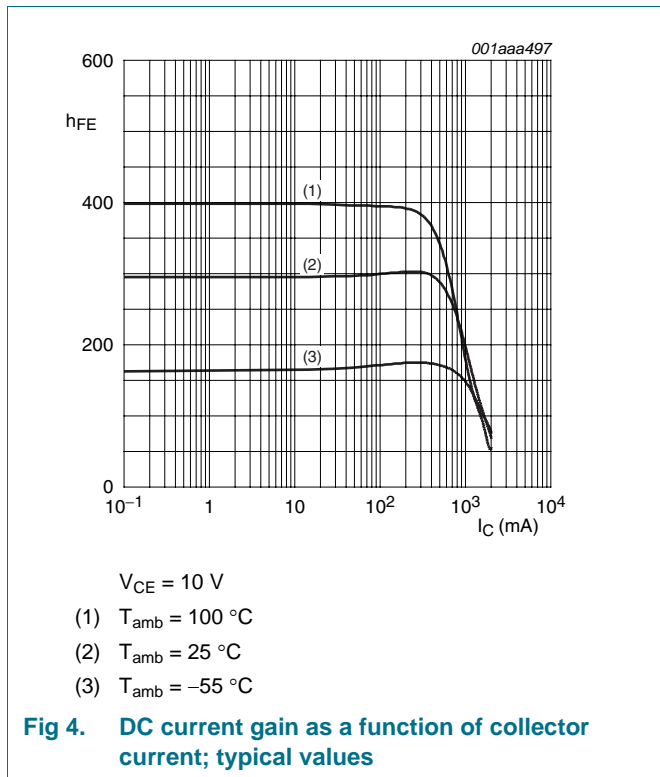
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{CBO}$	collector-base cut-off current	$V_{CB} = 80\text{ V}; I_E = 0\text{ A}$	-	-	100	nA
		$V_{CB} = 80\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^\circ\text{C}$	-	-	50	$\mu\text{A}$
$I_{CES}$	collector-emitter cut-off current	$V_{CE} = 80\text{ V};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

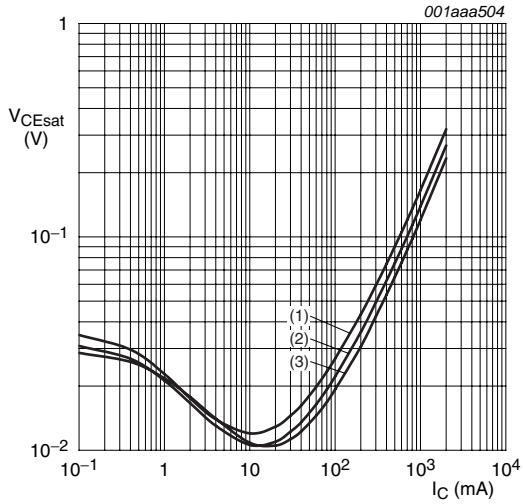
**Table 7. Characteristics ...continued**

$T_j = 25\text{ °C}$  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

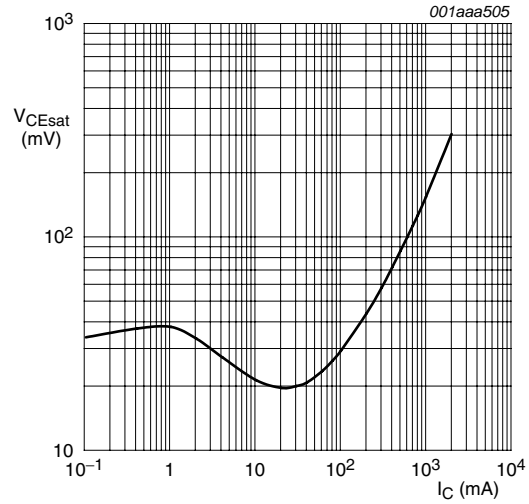
[1] Pulse test:  $t_p \leq 300\text{ }\mu\text{s}; \delta \leq 0.02$ .





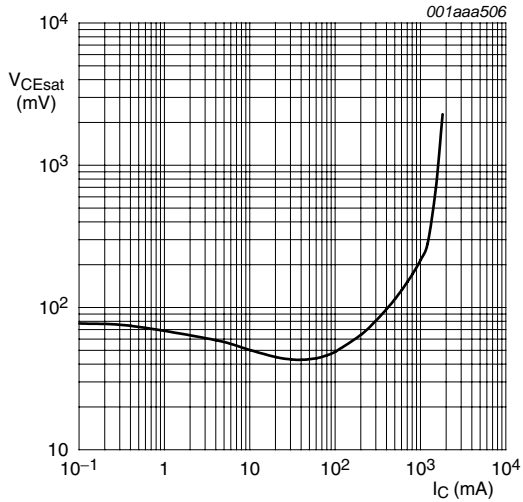
$I_C/I_B = 10$   
 (1)  $T_{amb} = 100\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = -55\text{ °C}$

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



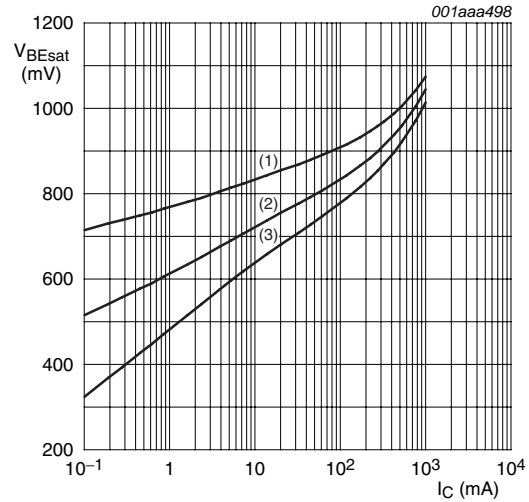
$I_C/I_B = 20; T_{amb} = 25\text{ °C}$

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



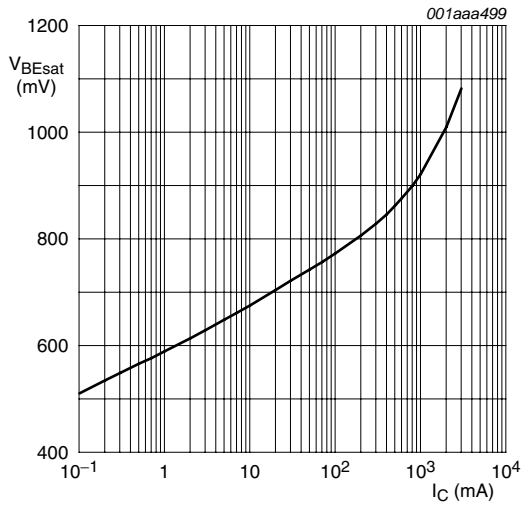
$I_C/I_B = 50; T_{amb} = 25\text{ °C}$

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



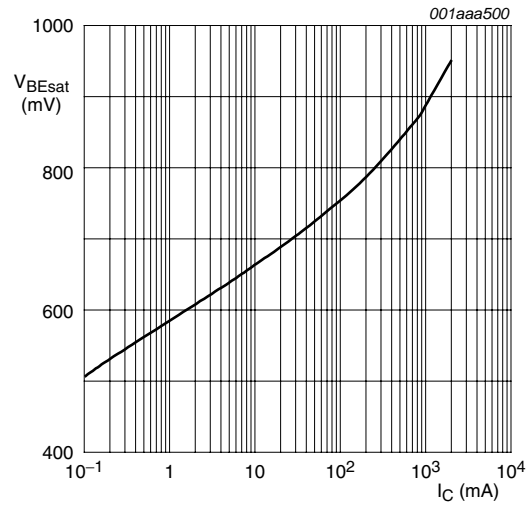
$I_C/I_B = 10$   
 (1)  $T_{amb} = -55\text{ °C}$   
 (2)  $T_{amb} = 25\text{ °C}$   
 (3)  $T_{amb} = 100\text{ °C}$

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



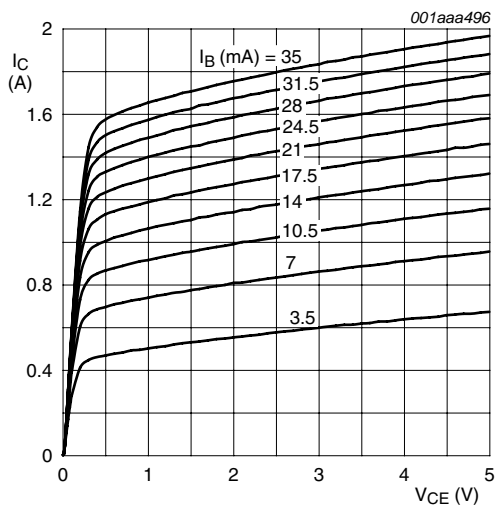
$I_C/I_B = 20$ ;  $T_{amb} = 25\text{ }^\circ\text{C}$

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



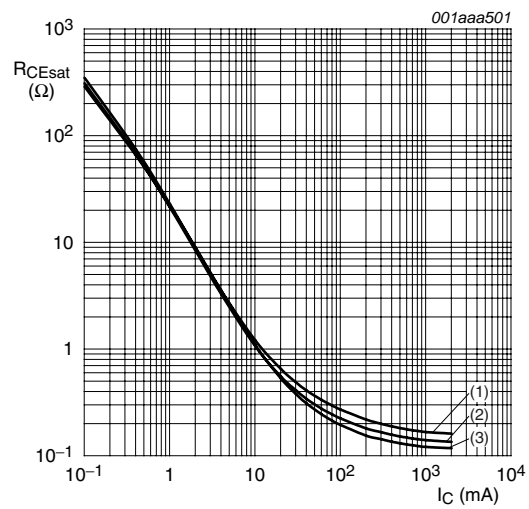
$I_C/I_B = 50$ ;  $T_{amb} = 25\text{ }^\circ\text{C}$

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



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

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

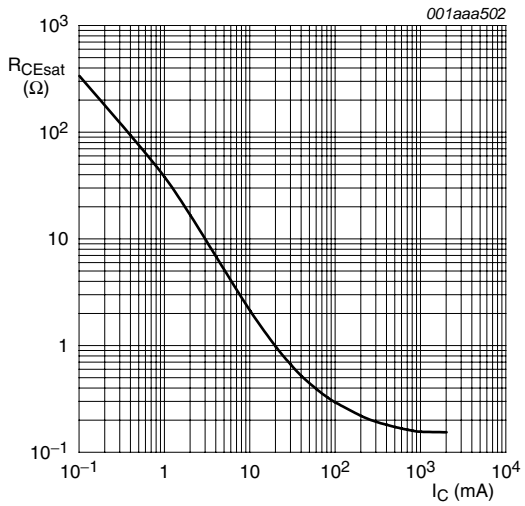


$I_C/I_B = 10$

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

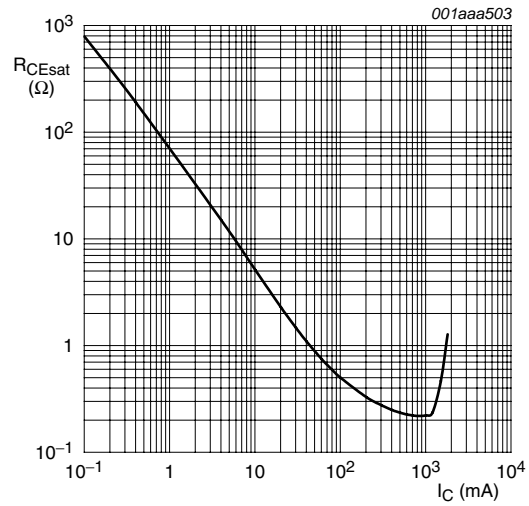
**Fig 13. Equivalent on-resistance as a function of collector current; typical values**





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

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



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

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

## 8. Package outline

Plastic surface-mounted package; 6 leads

SOT363

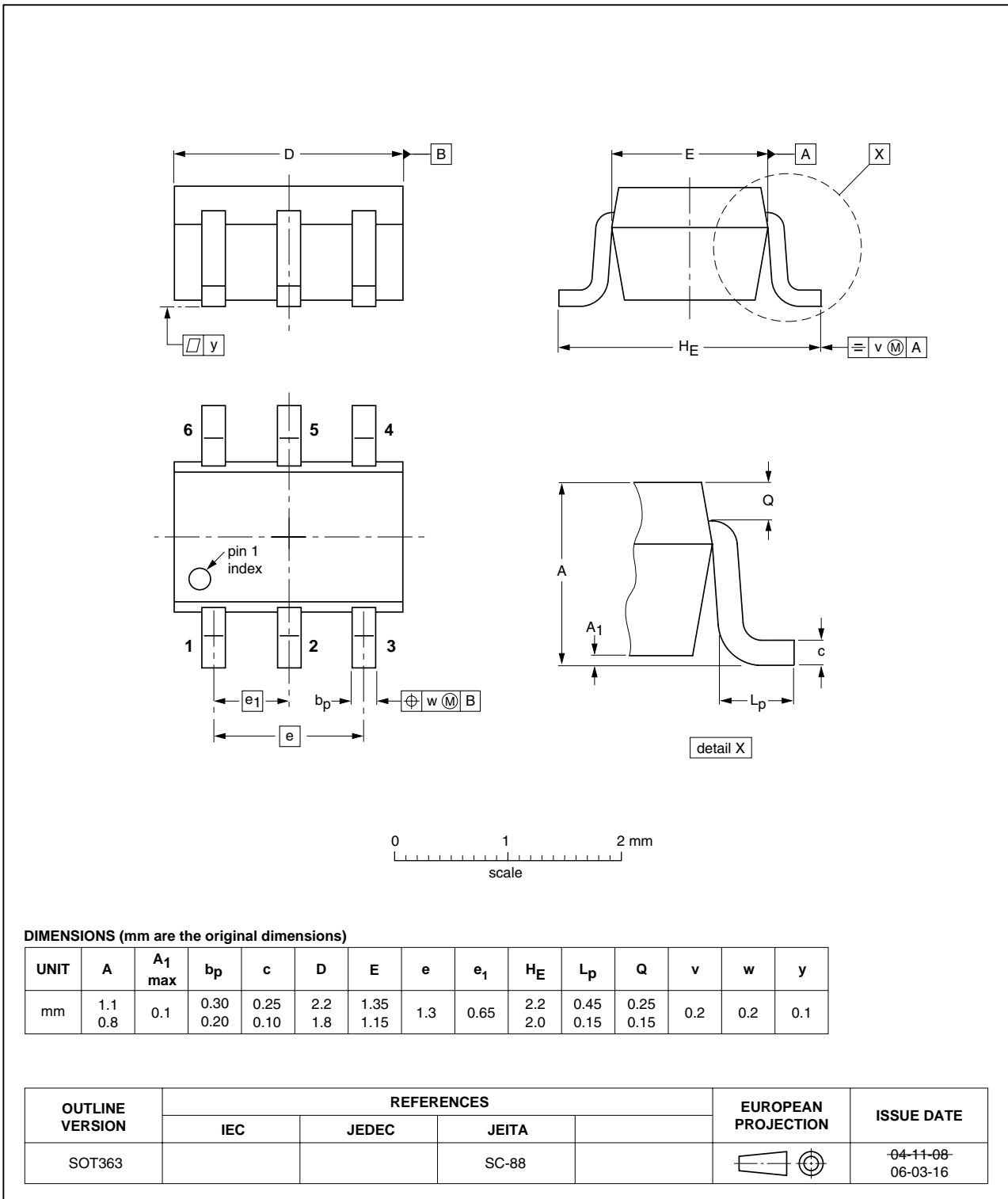


Fig 16. Package outline

## 9. Revision history

**Table 8. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBSS8110Y_2	20091121	Product data	-	PBSS8110Y_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 4 “DC current gain as a function of collector current; typical values”</a>: updated</li> <li>• <a href="#">Figure 6 “Collector-emitter saturation voltage as a function of collector current; typical values”</a>: <math>V_{CEsat}</math> unit amended from mV to V</li> <li>• <a href="#">Figure 12 “Collector current as a function of collector-emitter voltage; typical values”</a>: updated</li> <li>• <a href="#">Figure 16 “Package outline”</a>: updated</li> </ul>			
PBSS8110Y_1	20040602	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".

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