



PBSS9110Z

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

Rev. 01 — 9 June 2004

Product data sheet

1. Product profile

1.1 General description

PNP low V_{CEsat} transistor in a SOT223 (SC-73) plastic package.

1.2 Features

- SOT223 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

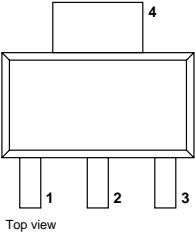
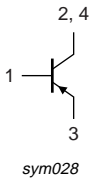
Table 1: Quick reference data

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 Ω

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2. Pinning information

Table 2: Discrete pinning

Pin	Description	Simplified outline	Symbol
1	base	 <p>Top view</p>	 <p>sym028</p>
2, 4	collector		
3	emitter		

3. Ordering information

Table 3: Ordering information

Type number	Package		Version
	Name	Description	
PBSS9110Z	-	plastic surface mounted package; collector pad for good heat transfer; 4 leads	SOT223

4. Marking

Table 4: Marking

Type number	Marking code
PBSS9110Z	PB9110 [1]

[1] Made in Hong Kong

5. Limiting values

Table 5: Limiting values

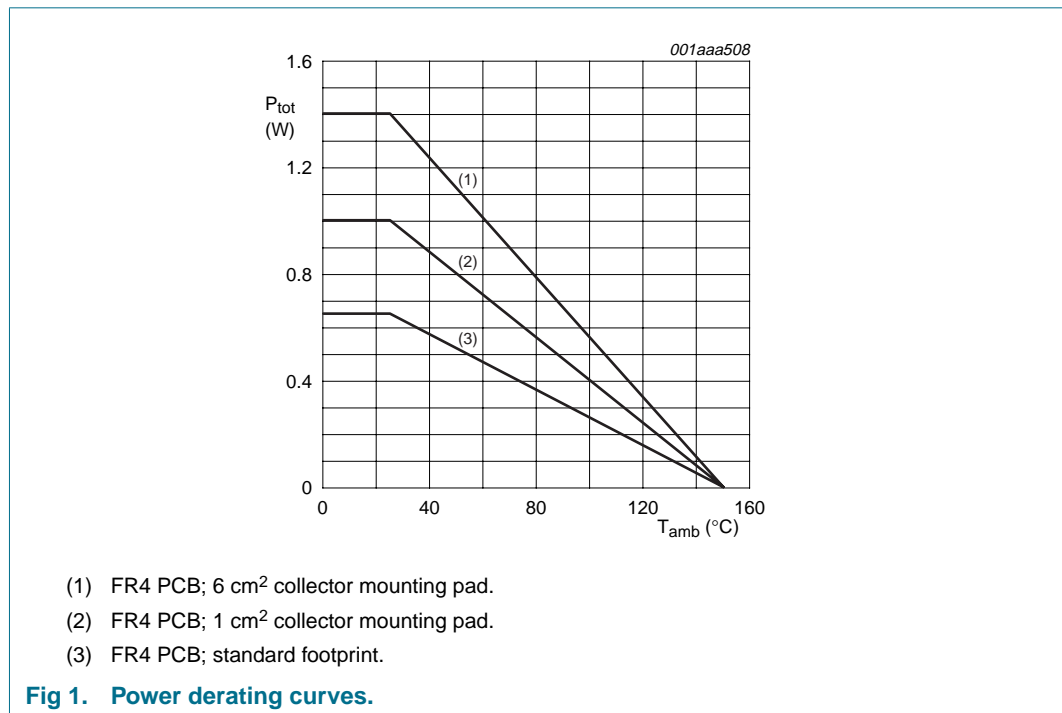
In accordance with the Absolute Maximum Rating System (IEC 60134).

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]	-	650	mW
			[2]	-	1000	mW
			[3]	-	1.4	W
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 cm² collector mounting pad.

[3] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, 6 cm² collector mounting pad.

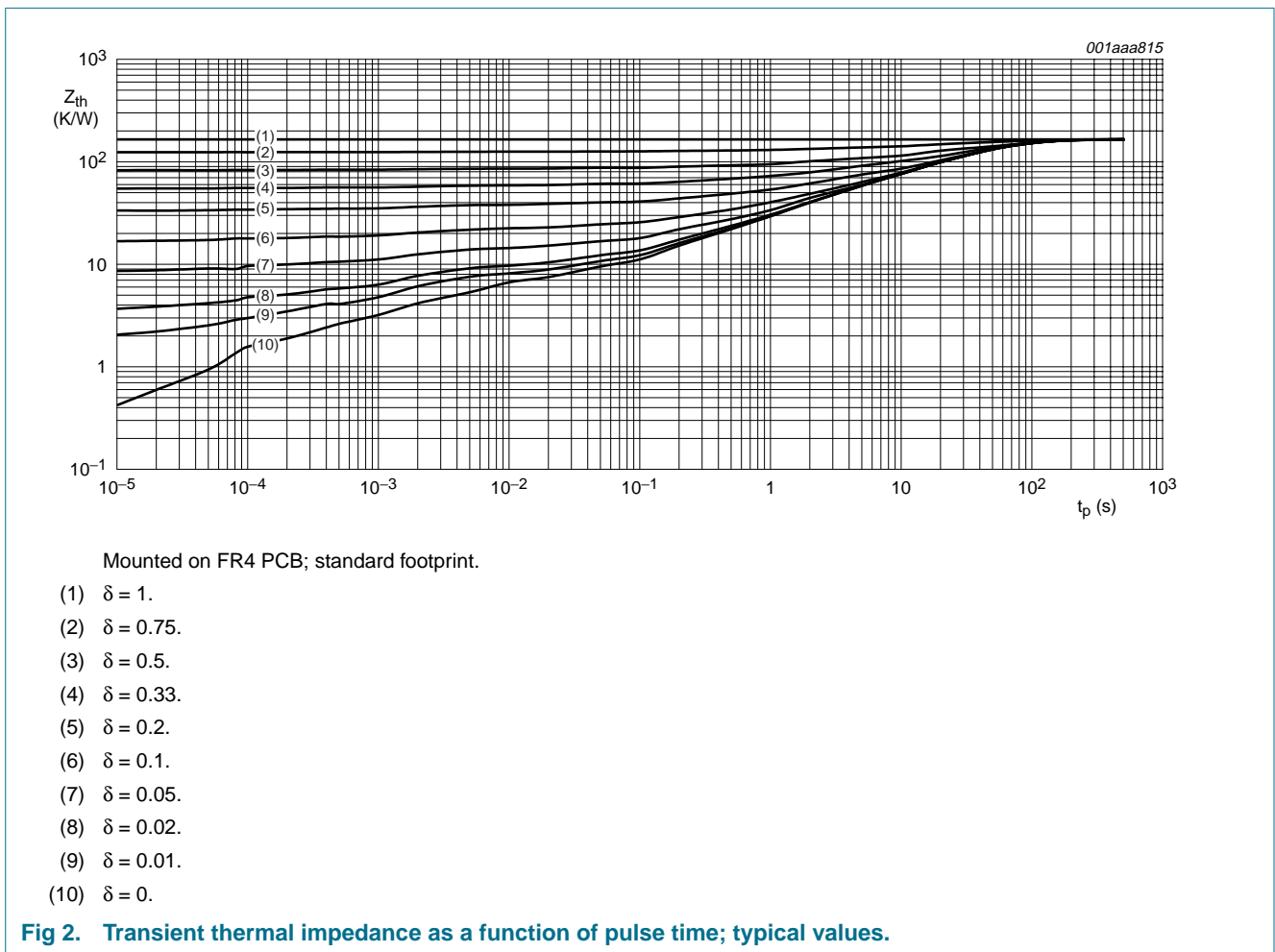


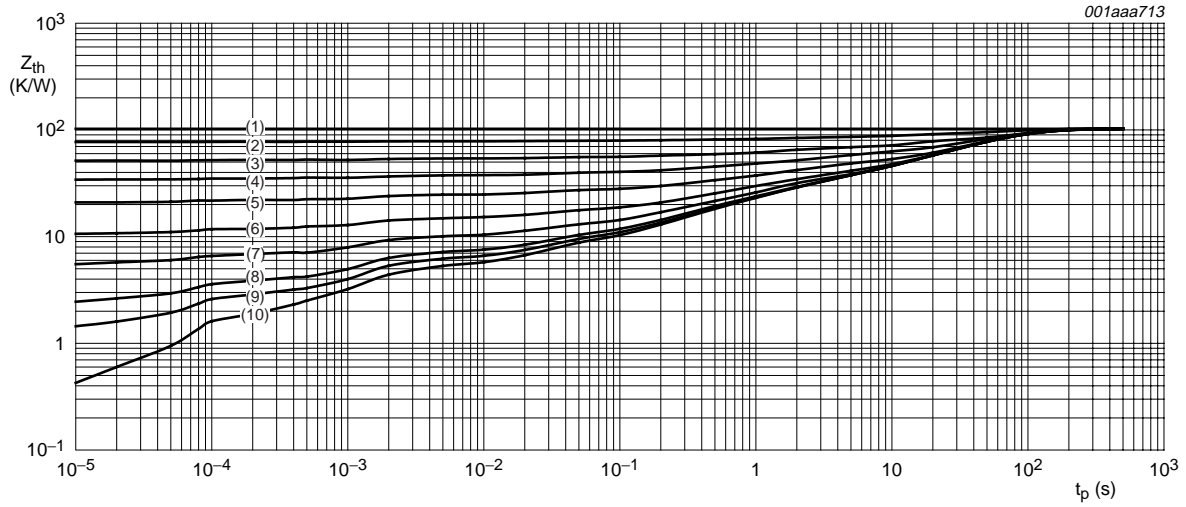
6. Thermal characteristics

Table 6: Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit	
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	192	K/W
			[2]	125	K/W
			[3]	89	K/W
$R_{th(j-s)}$	thermal resistance from junction to soldering	in free air	[1]	17	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 cm² collector mounting pad.
- [3] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, 6 cm² collector mounting pad.





Mounted on FR4 PCB; 1 cm² collector mounting pad.

- (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) $\delta = 0$.

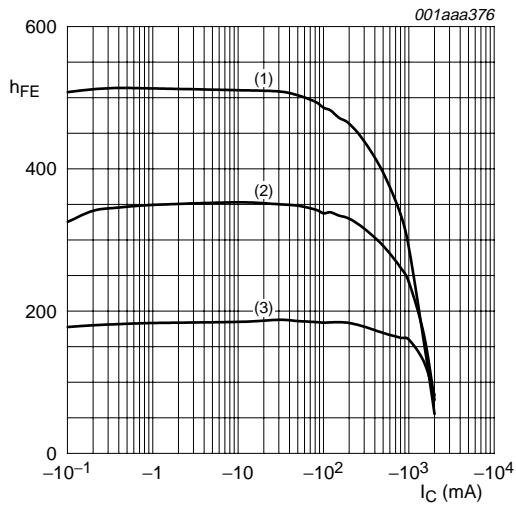
Fig 3. Transient thermal impedance as a function of pulse time; typical values.

7. Characteristics

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

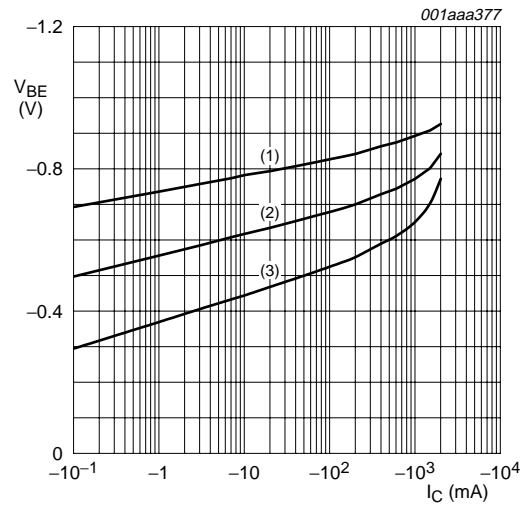
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
I_{CBO}	collector-base cut-off current	$V_{CB} = -80\text{ V}; I_E = 0\text{ A}$	-	-	-100	nA	
		$V_{CB} = -80\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$	-	-	-50	μA	
I_{CES}	collector-emitter cut-off current	$V_{CE} = -80\text{ V}; V_{BE} = 0\text{ V}$	-	-	-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: $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$.



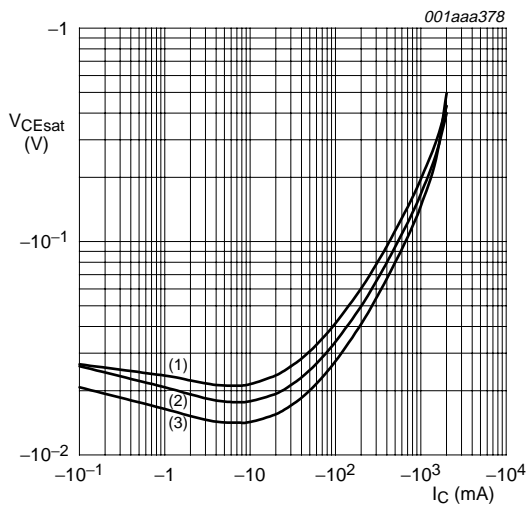
$V_{CE} = -10$ V.
 (1) $T_{amb} = 100$ °C.
 (2) $T_{amb} = 25$ °C.
 (3) $T_{amb} = -55$ °C.

Fig 4. DC current gain as a function of collector current; typical values.



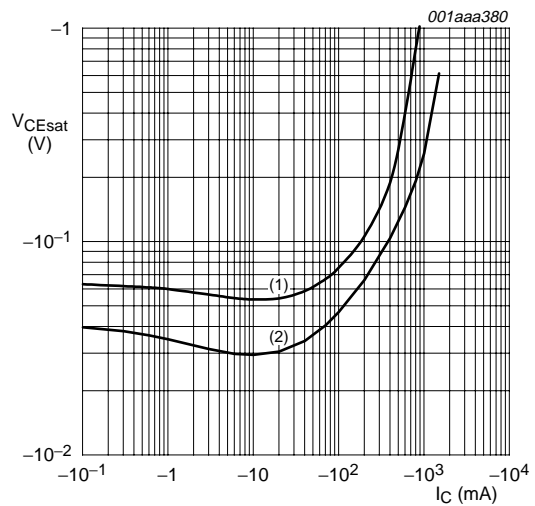
$V_{CE} = -10$ V.
 (1) $T_{amb} = -55$ °C.
 (2) $T_{amb} = 25$ °C.
 (3) $T_{amb} = 100$ °C.

Fig 5. Base-emitter voltage as a function of collector current; typical values.



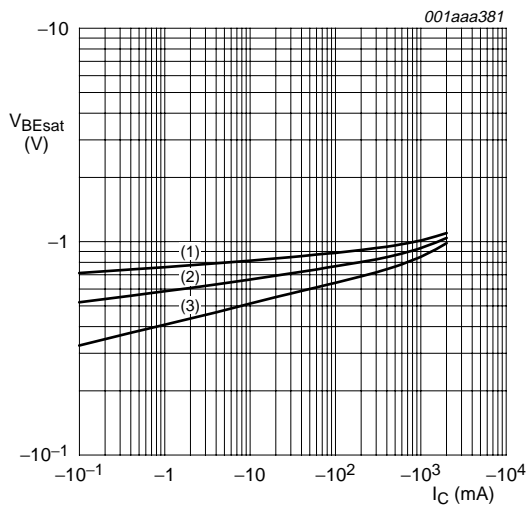
$I_C/I_B = 10$.
 (1) $T_{amb} = 100$ °C.
 (2) $T_{amb} = 25$ °C.
 (3) $T_{amb} = -55$ °C.

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



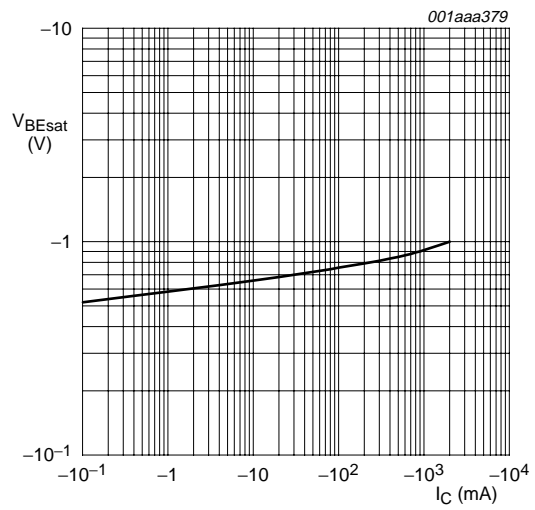
$T_{amb} = 25$ °C.
 (1) $I_C/I_B = 50$.
 (2) $I_C/I_B = 20$.

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



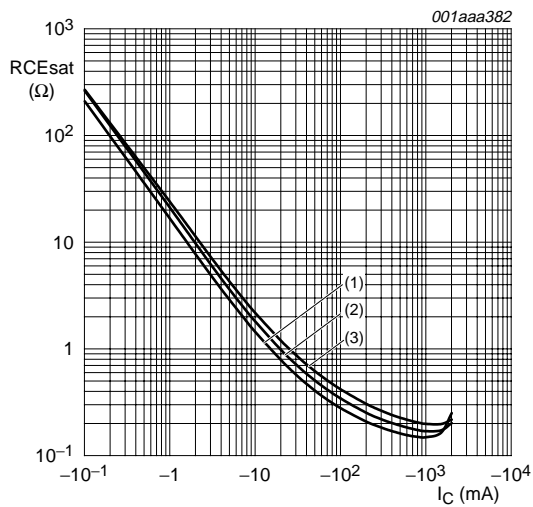
$I_C/I_B = 10$.
 (1) $T_{amb} = -55\text{ °C}$.
 (2) $T_{amb} = 25\text{ °C}$.
 (3) $T_{amb} = 100\text{ °C}$.

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



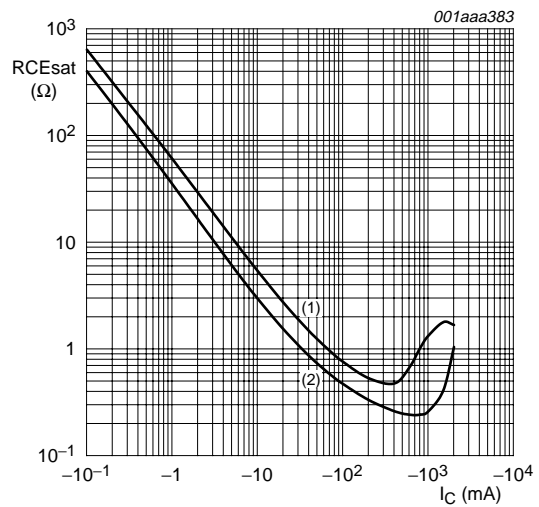
$I_C/I_B = 20$.
 $T_{amb} = 25\text{ °C}$.

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



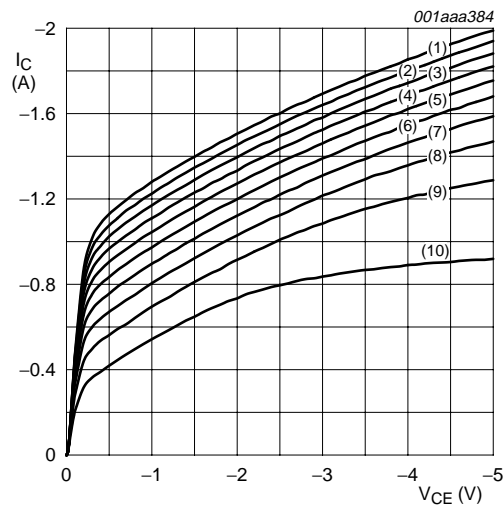
$I_C/I_B = 10$.
 (1) $T_{amb} = -55\text{ °C}$.
 (2) $T_{amb} = 25\text{ °C}$.
 (3) $T_{amb} = 100\text{ °C}$.

Fig 10. 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 11. 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 12. Collector current as a function of collector-emitter voltage; typical values.

8. Package outline

Plastic surface mounted package; collector pad for good heat transfer; 4 leads

SOT223

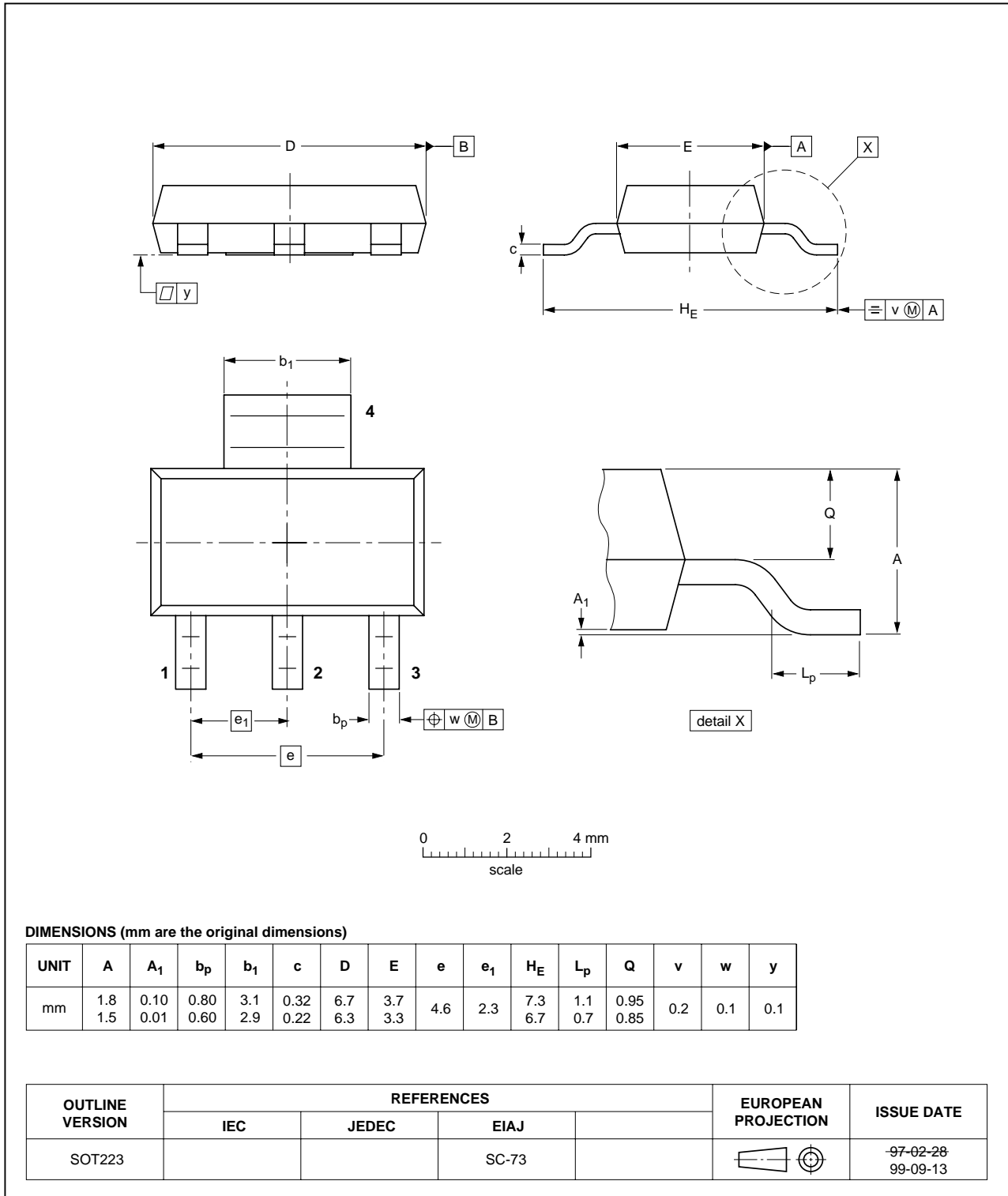


Fig 13. Package outline.

9. Revision history

Table 8: Revision history

Document ID	Release date	Data sheet status	Change notice	Order number	Supersedes
PBSS9110Z_1	20040609	Product data	-	9397 750 12845	-

10. Data sheet status

Level	Data sheet status ^[1]	Product status ^[2] ^[3]	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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