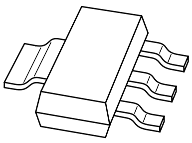

PBSS8110Z

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

Rev. 01 — 26 April 2004 Product data sheet

1. Product profile

1.1 General description

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

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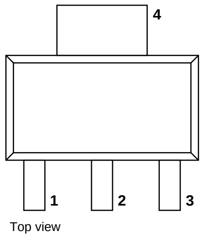
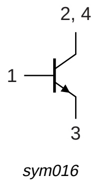
2. Pinning information

Table 2: Discrete pinning

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

3. Ordering information

Table 3: Ordering information

Type number	Package		
	Name	Description	Version
PBSS8110Z	-	plastic surface mounted package; collector pad for good heat transfer; 4 leads	SOT223

4. Marking

Table 4: Marking

Type number	Marking code [1]
PBSS8110Z	PB8110

[1] Made in Hong Kong.

5. Limiting values

Table 5: Limiting values

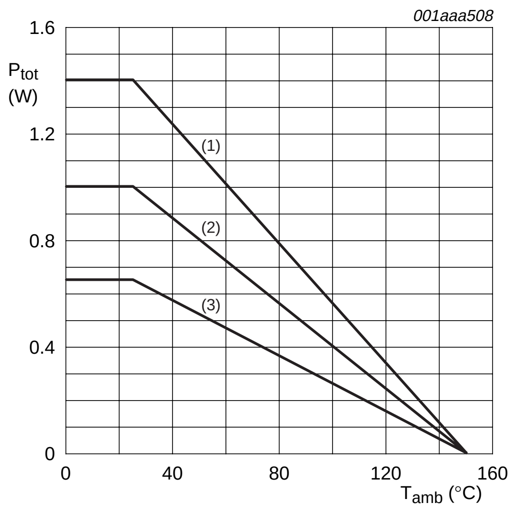
In accordance with the Absolute Maximum Rating System (IEC 60134).

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	$T_{amb} \leq 25$ °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 cm^2 collector mounting pad.

[3] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, 6 cm^2 collector mounting pad.



(1) FR4 PCB; 6 cm^2 collector mounting pad.

(2) FR4 PCB; 1 cm^2 collector mounting pad.

(3) FR4 PCB; standard footprint.

Fig 1. Power derating curves.

6. Thermal characteristics

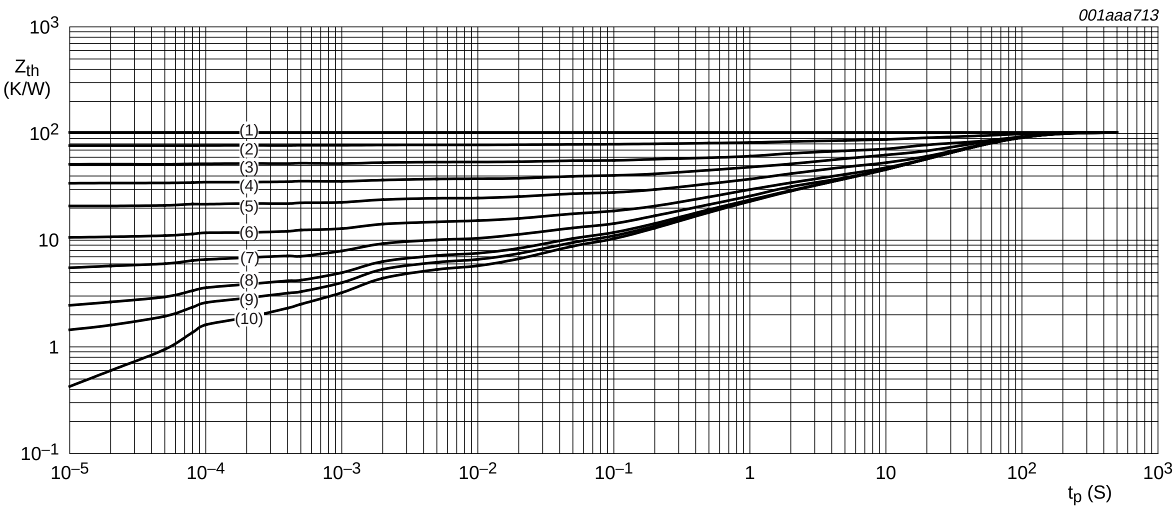
Table 6: Thermal characteristics

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 point	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 cm^2 collector mounting pad.

[3] Device mounted on a FR4 printed-circuit board, single-sided copper, tin-plated, 6 cm^2 collector mounting pad.



Mounted on FR4 PCB; standard footprint.

(1) δ = 1.

(2) δ = 0.75.

(3) δ = 0.5.

(4) δ = 0.33.

(5) δ = 0.2.

(6) δ = 0.1.

(7) δ = 0.05.

(8) δ = 0.02.

(9) δ = 0.01.

(10) δ = 0.

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

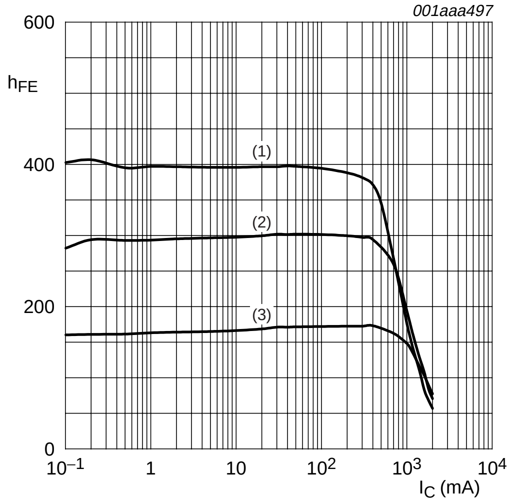
7. Characteristics

Table 7: Characteristics

T_j = 25 °C; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	V_{CB} = 80 V; I_E = 0 A	-	-	100	nA
		V_{CB} = 80 V; I_E = 0 A; T_j = 150 °C	-	-	50	µA
I_{CES}	collector-emitter cut-off current	V_{CE} 80 V; V_{BE} = 0 V	-	-	100	nA
I_{EBO}	emitter-base cut-off current	V_{EB} = 4 V; I_C = 0 A	-	-	100	nA
h_{FE}	DC current gain	V_{CE} = 10 V; I_C = 1 mA	150	-	-	
		V_{CE} = 10 V; I_C = 250 mA	150	-	500	
		V_{CE} = 10 V; I_C = 0.5 A [1]	100	-	-	
		V_{CE} = 10 V; I_C = 1 A [1]	80	-	-	
V_{CEsat}	collector-emitter saturation voltage	I_C = 100 mA; I_B = 10 mA	-	-	40	mV
		I_C = 500 mA; I_B = 50 mA	-	-	120	mV
		I_C = 1 A; I_B = 100 mA	-	-	200	mV
R_{CEsat}	equivalent on-resistance	I_C = 1 A; I_B = 100 mA [1]	-	160	200	mΩ
V_{BEsat}	base-emitter saturation voltage	I_C = 1 A; I_B = 100 mA	-	-	1.05	V
V_{BEon}	base-emitter turn-on voltage	V_{CE} 10 V; I_C = 1 A	-	-	0.9	V
f_T	transition frequency	V_{CE} = 10 V; I_C = 50 mA; f = 100 MHz	100	-	-	MHz
C_c	collector capacitance	V_{CB} = 10 V; I_E = I_e = 0 A; f = 1 MHz	-	-	7.5	pF

[1] Pulse test $t_p \leq 300$ µs; $\delta \leq 0.02$.



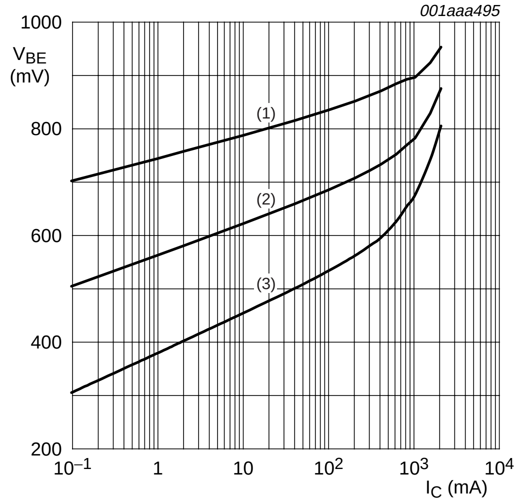
V_{CE} = 10 V.

(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.



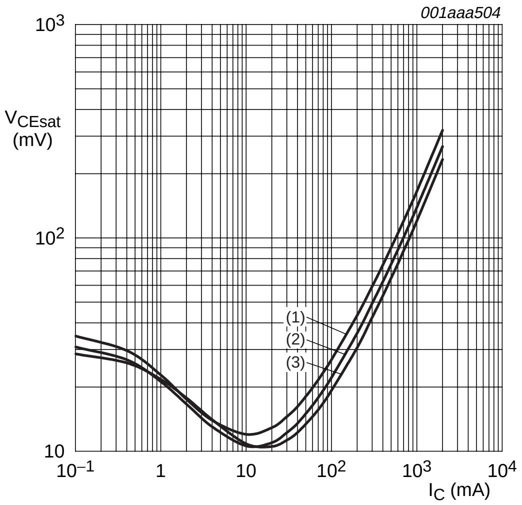
V_{CE} = 10 V.

(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.



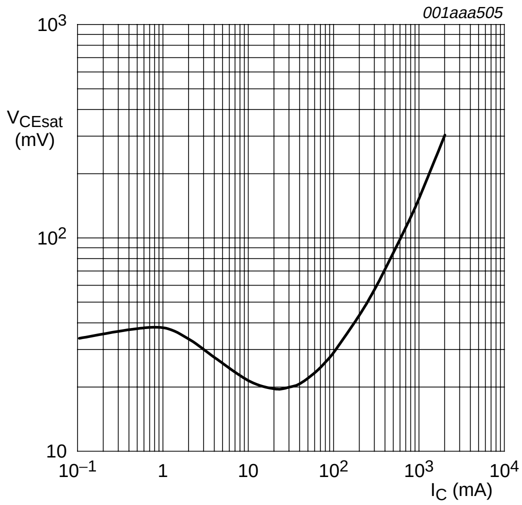
I_C/I_B = 10.

(1) T_{amb} = 100 °C.

(2) T_{amb} = 25 °C.

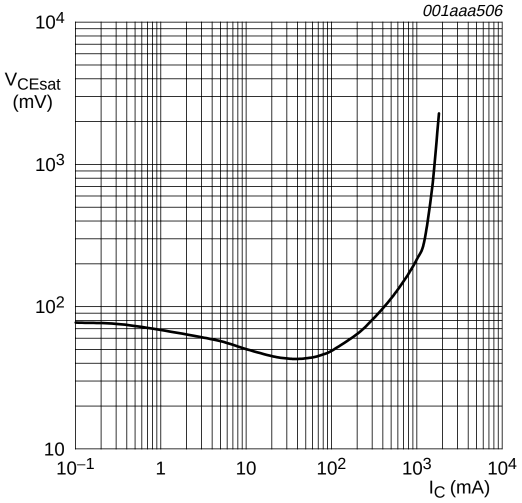
(3) T_{amb} = –55 °C.

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



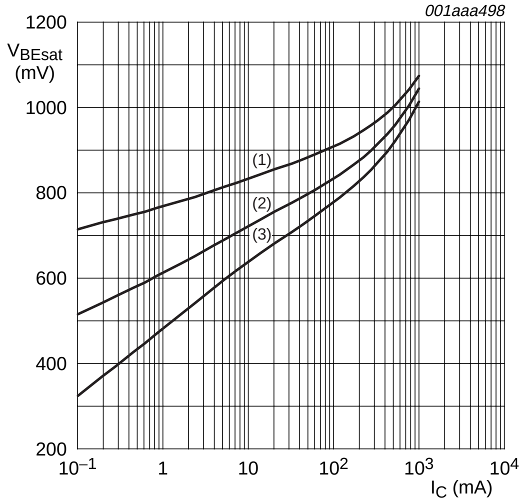
I_C/I_B = 20; T_{amb} = 25 °C.

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



$I_C/I_B = 50$; $T_{amb} = 25$ °C.

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



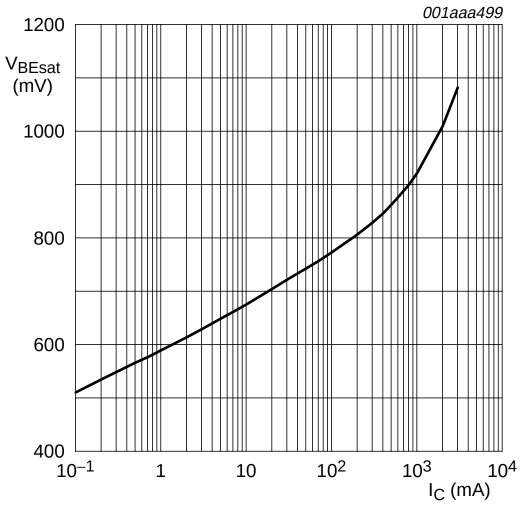
$I_C/I_B = 10$.

(1) $T_{amb} = -55$ °C.

(2) $T_{amb} = 25$ °C.

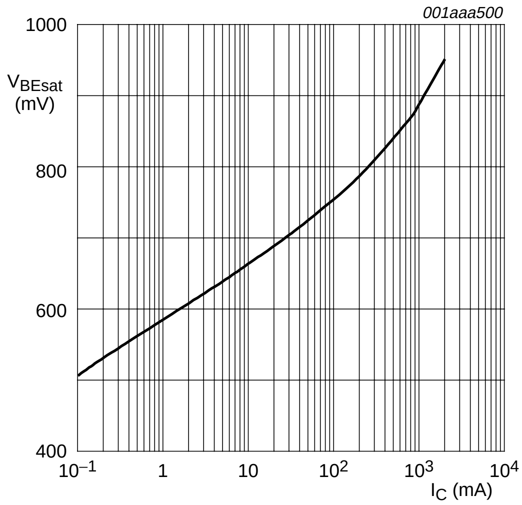
(3) $T_{amb} = 100$ °C.

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



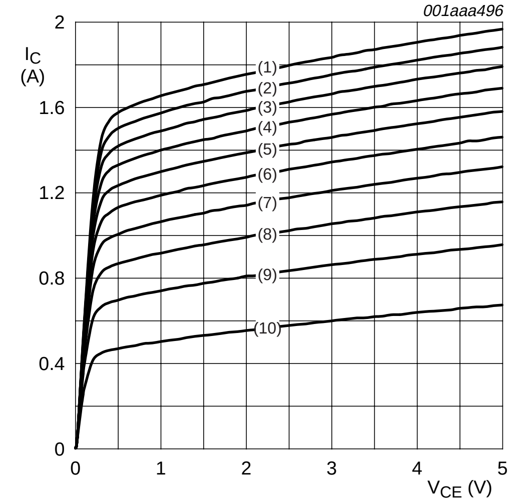
$I_C/I_B = 20$; $T_{amb} = 25$ °C.

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



$I_C/I_B = 50$; $T_{amb} = 25$ °C.

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



T_{amb} = 25 °C.

(1) I_B = 35 mA.

(2) I_B = 31.5 mA.

(3) I_B = 28 mA.

(4) I_B = 24.5 mA.

(5) I_B = 21 mA.

(6) I_B = 17.5 mA.

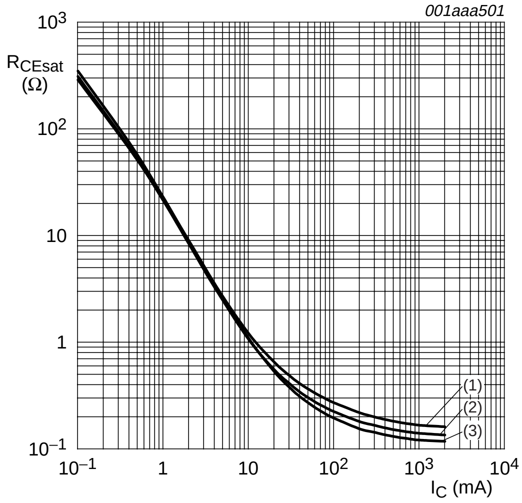
(7) I_B = 14 mA.

(8) I_B = 10.5 mA.

(9) I_B = 7 mA.

(10) I_B = 3.5 mA.

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



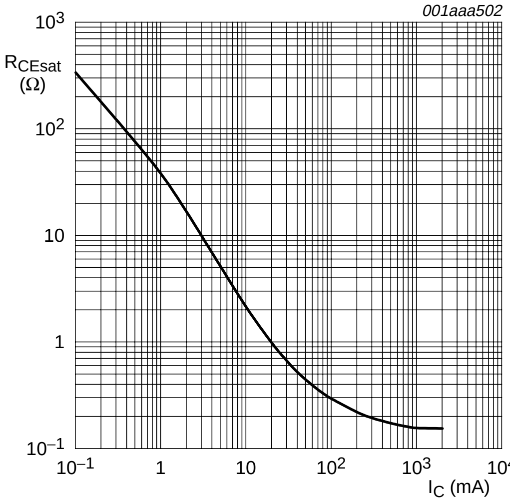
I_C/I_B = 10.

(1) T_{amb} = 100 °C.

(2) T_{amb} = 25 °C.

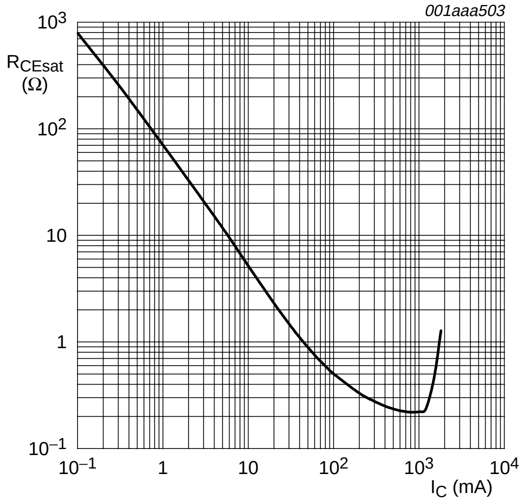
(3) T_{amb} = −55 °C.

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



I_C/I_B = 20; T_{amb} = 25 °C.

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

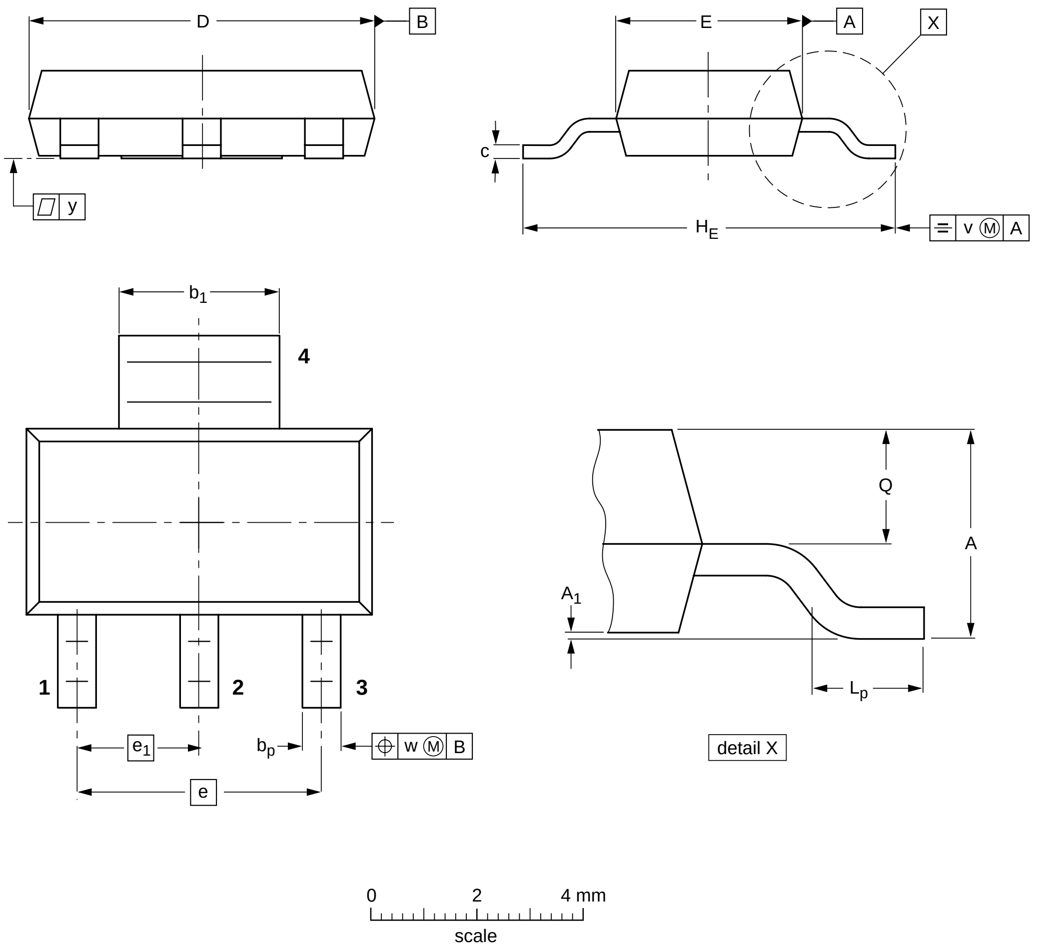


I_C/I_B = 50; T_{amb} = 25 °C.

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

8. Package outline

Plastic surface mounted package; collector pad for good heat transfer; 4 leads **SOT223**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b_p	b_1	c	D	E	e	e_1	H_E	L_p	Q	v	w	y
mm	1.8 1.5	0.10 0.01	0.80 0.60	3.1 2.9	0.32 0.22	6.7 6.3	3.7 3.3	4.6	2.3	7.3 6.7	1.1 0.7	0.95 0.85	0.2	0.1	0.1

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT223			SC-73			~~97-02-28~~ 99-09-13

Fig 15. Package outline.

9. Revision history

Table 8: Revision history

Document ID	Release date	Data sheet status	Change notice	Order number	Supersedes
PBSS8110Z_1	20040426	Product data	-	9397 750 12568	-

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.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
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[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.

[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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14. Contents

Date of release: 26 April 2004
Document order number: 9397 750 12568

Published in The Netherlands