

PBSS9110D

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

Rev. 01 — 11 June 2004

Objective data sheet

1. Product profile

1.1 General description

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

2. Pinning information

Table 2: Discrete pinning

Pin	Description	Simplified outline	Symbol
1, 2, 5, 6	collector	<p style="text-align: center;">SOT457</p>	<p style="text-align: center;">sym030</p>
3	base		
4	emitter		

3. Ordering information

Table 3: Ordering information

Type number	Package		
	Name	Description	Version
PBSS9110D	-	plastic surface mounted package; 6 leads	SOT457

4. Marking

Table 4: Marking

Type number	Marking code
PBSS9110D	A7 ^[1]

[1] Made in Malaysia.

5. Limiting values

Table 5: Limiting values

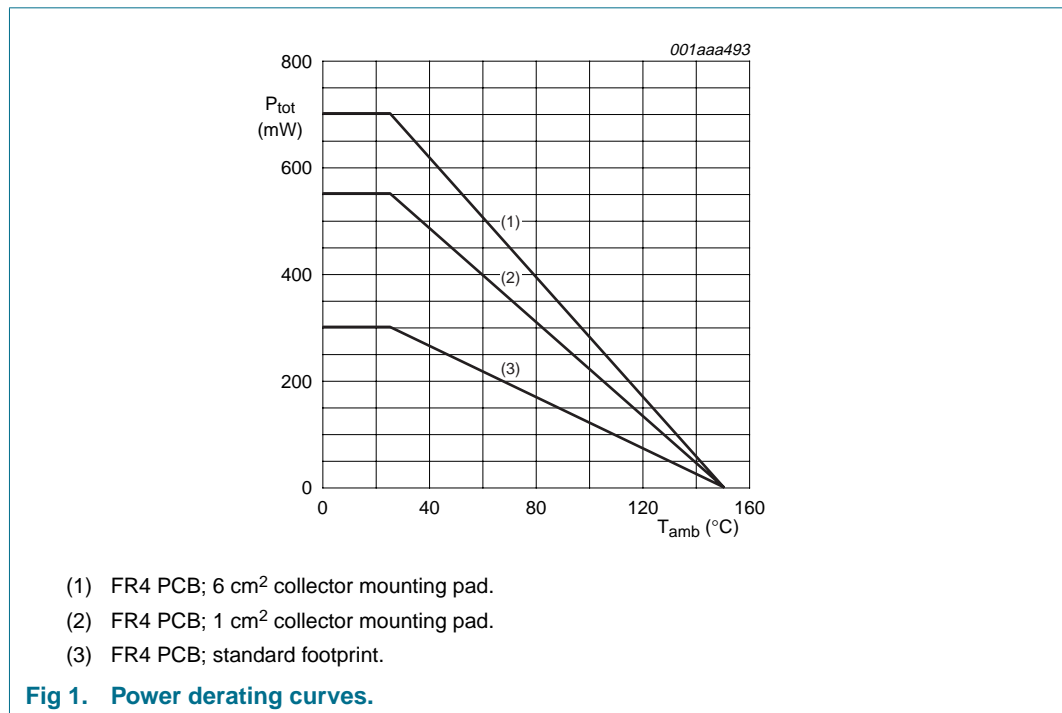
In accordance with the Absolute Maximum Rating System (IEC 60134).

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	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]	-	300	mW
		$T_{amb} \leq 25\text{ °C}$ [2]	-	550	mW
		$T_{amb} \leq 25\text{ °C}$ [3]	-	700	mW
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.

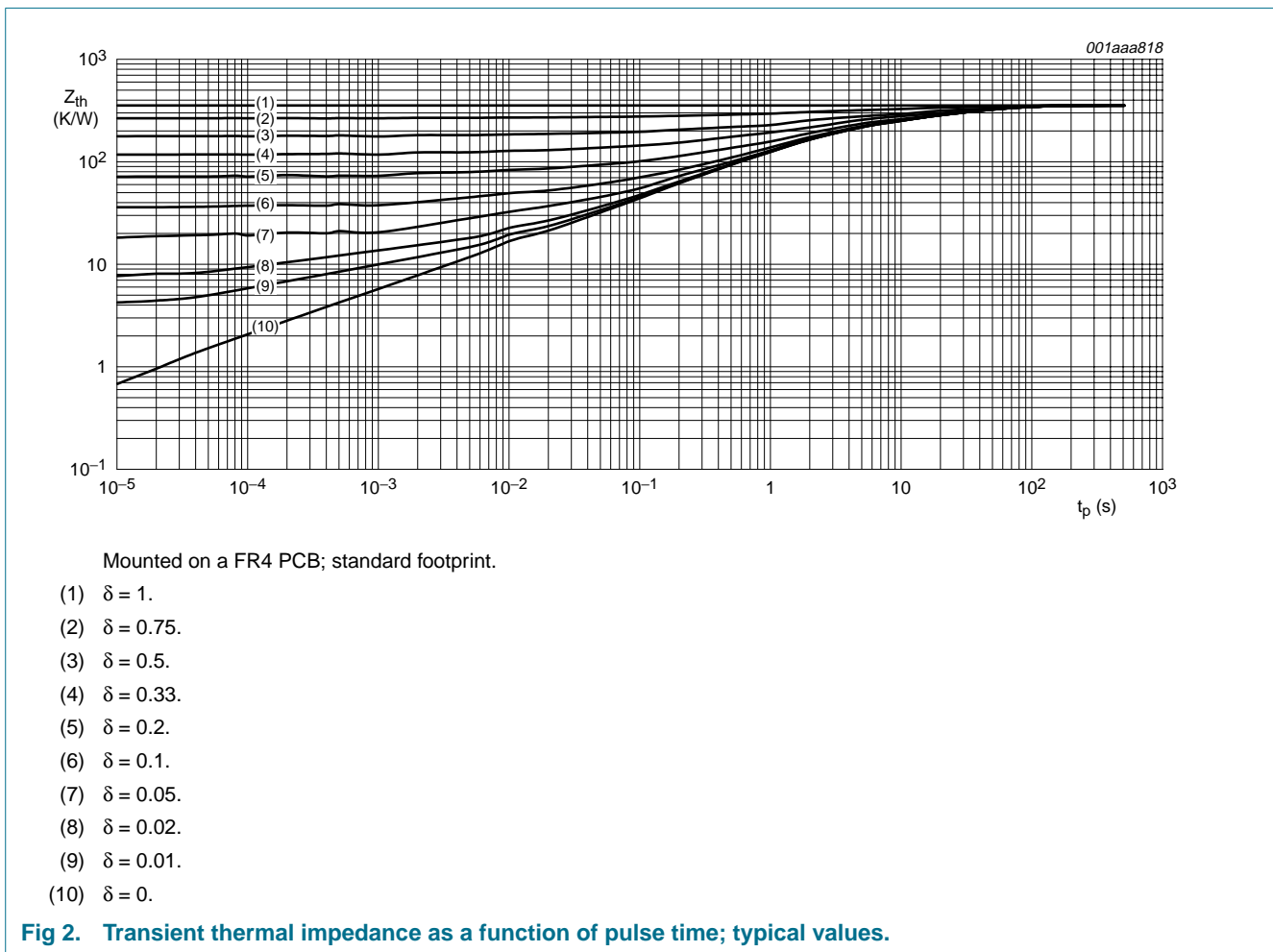


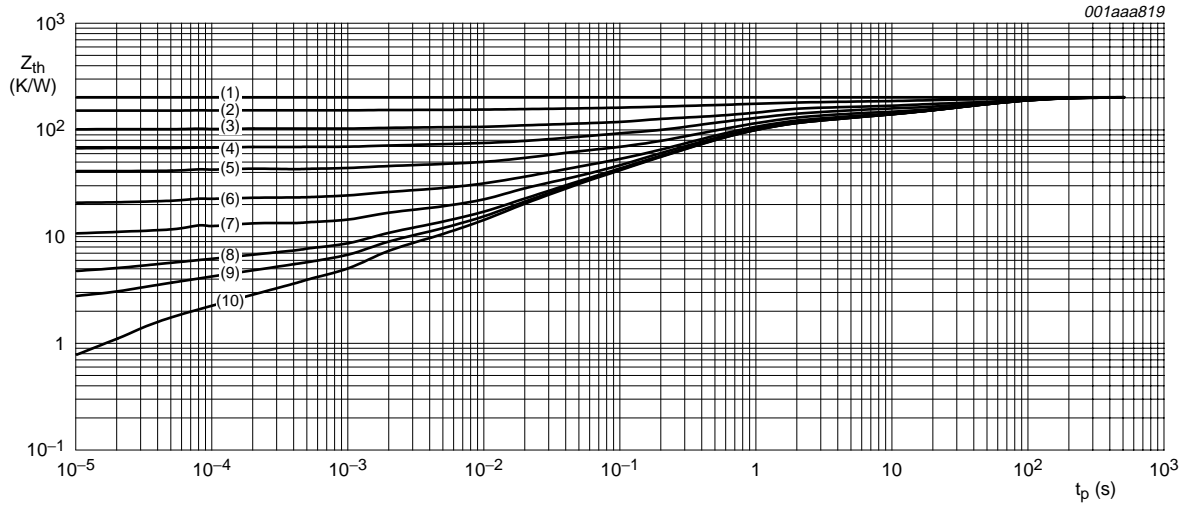
6. Thermal characteristics

Table 6: Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] 416	K/W
			[2] 227	K/W
			[3] 178	K/W
$R_{th(j-s)}$	thermal resistance from junction to soldering	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 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 a FR4 PCB; mounting pad for collector 1 cm².

- (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) $\delta = 0$.

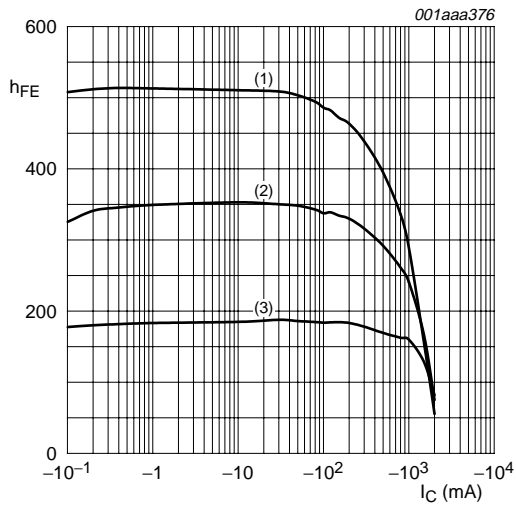
Fig 3. Transient thermal impedance as a function of pulse time; typical values.

7. Characteristics

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

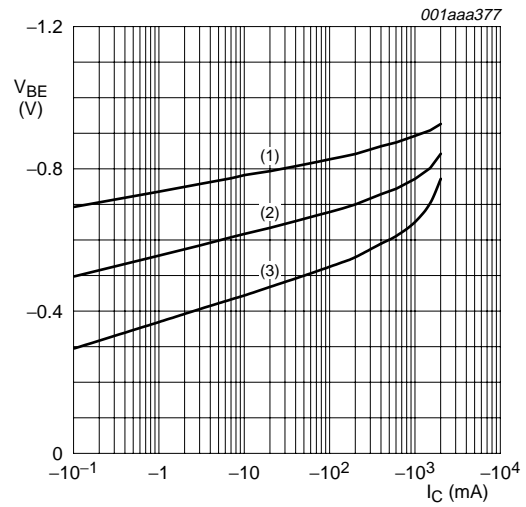
Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
I_{CBO}	collector-base cut-off current	$V_{CB} = -80\text{ V}; I_E = 0\text{ A}$	-	-	-100	nA	
		$V_{CB} = -80\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ °C}$	-	-	-50	μA	
I_{CES}	collector-emitter cut-off current	$V_{CE} = -80\text{ V}; I_{BE} = 0\text{ A}$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



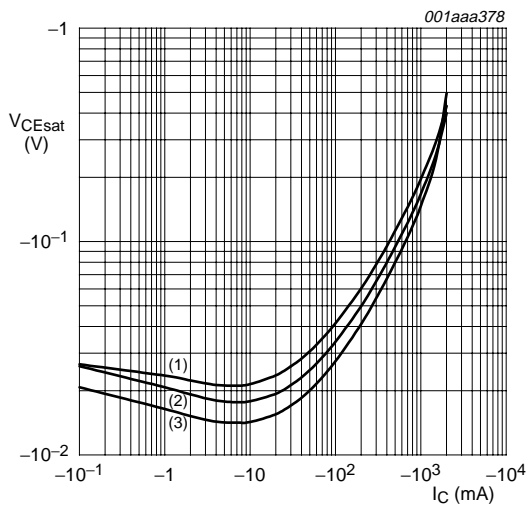
$V_{CE} = -10$ V.
 (1) $T_{amb} = 100$ °C.
 (2) $T_{amb} = 25$ °C.
 (3) $T_{amb} = -55$ °C.

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



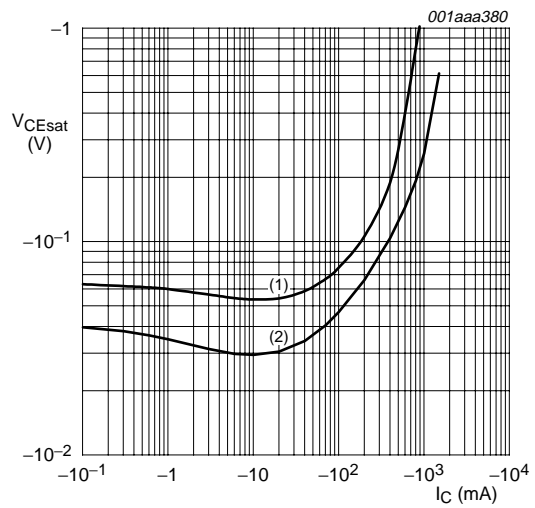
$V_{CE} = -10$ V.
 (1) $T_{amb} = -55$ °C.
 (2) $T_{amb} = 25$ °C.
 (3) $T_{amb} = 100$ °C.

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



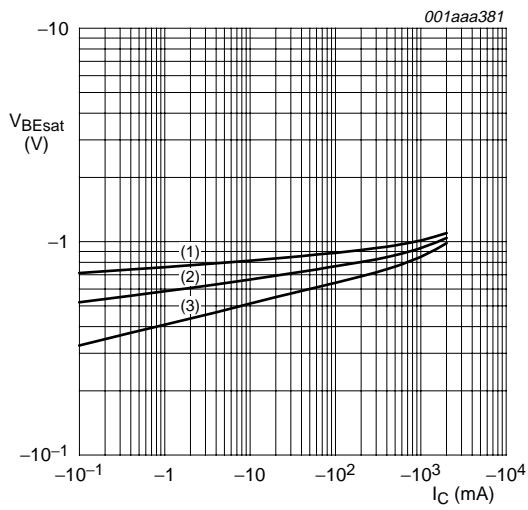
$I_C/I_B = 10$.
 (1) $T_{amb} = 100$ °C.
 (2) $T_{amb} = 25$ °C.
 (3) $T_{amb} = -55$ °C.

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



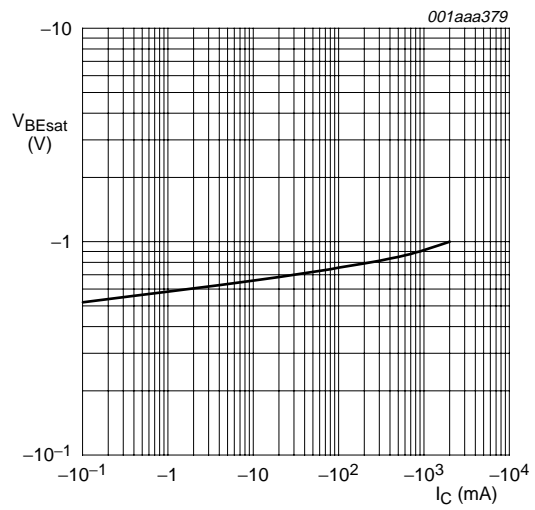
$T_{amb} = 25$ °C.
 (1) $I_C/I_B = 50$.
 (2) $I_C/I_B = 20$.

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



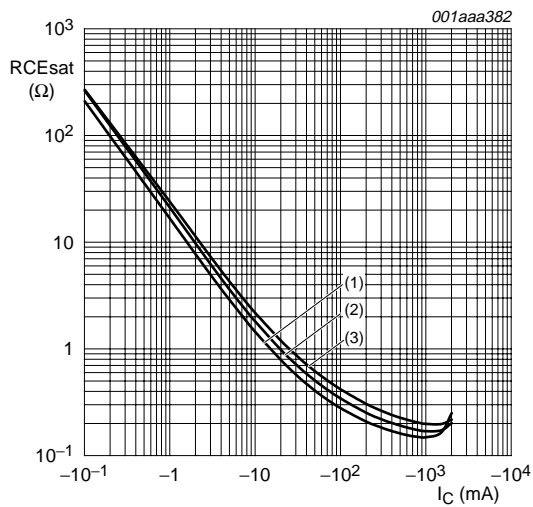
$I_C/I_B = 10$.
 (1) $T_{amb} = -55\text{ °C}$.
 (2) $T_{amb} = 25\text{ °C}$.
 (3) $T_{amb} = 100\text{ °C}$.

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



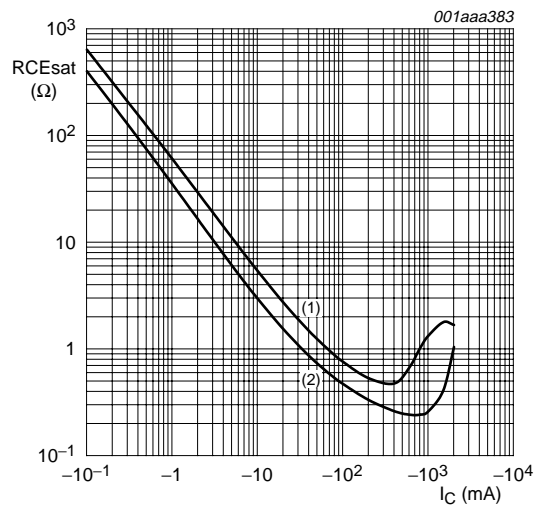
$I_C/I_B = 20$.
 $T_{amb} = 25\text{ °C}$.

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



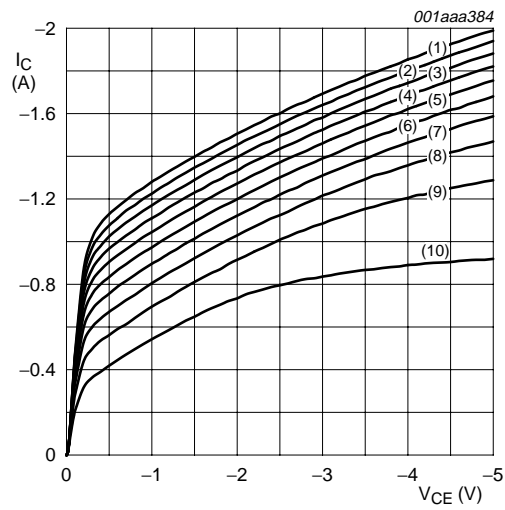
$I_C/I_B = 10$.
 (1) $T_{amb} = -55\text{ °C}$.
 (2) $T_{amb} = 25\text{ °C}$.
 (3) $T_{amb} = 100\text{ °C}$.

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; 6 leads

SOT457

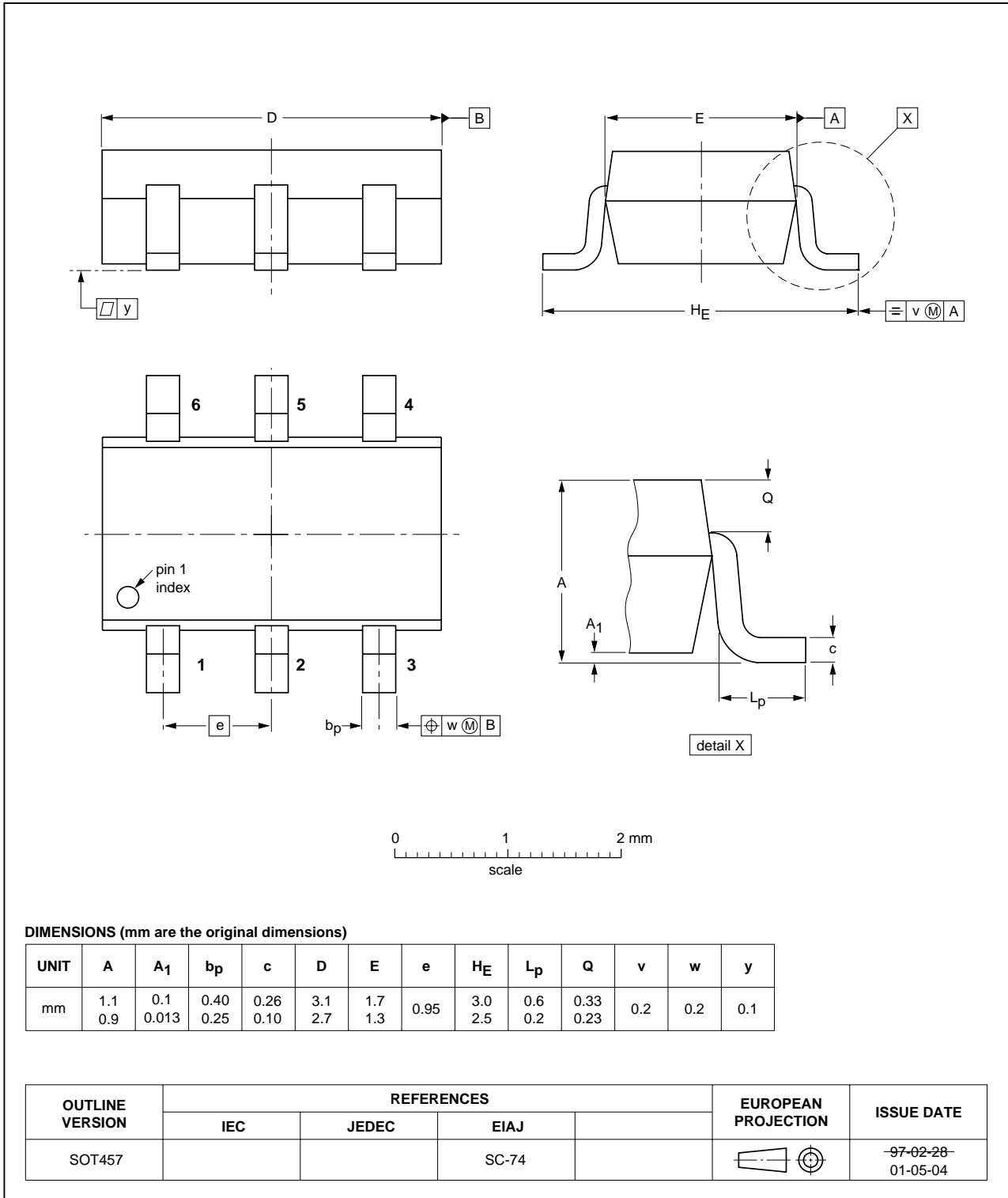


Fig 13. Package outline.

9. Revision history

Table 8: Revision history

Document ID	Release date	Data sheet status	Change notice	Order number	Supersedes
PBSS9110D_1	20040611	Objective data	-	9397 750 12842	-

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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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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