

PBRP123ET

PNP 800 mA, 40 V BISS RET; R1 = 2.2 k Ω , R2 = 2.2 k Ω

Rev. 01 — 16 January 2008

Product data sheet

1. Product profile

1.1 General description

800 mA PNP low V_{CEsat} Breakthrough In Small Signal (BISS) Resistor-Equipped Transistor (RET) in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

NPN complement: PBRN123ET.

1.2 Features

- 800 mA repetitive peak output current
- High current gain h_{FE}
- Built-in bias resistors
- Simplifies circuit design
- Low collector-emitter saturation voltage V_{CEsat}
- Reduces component count
- Reduces pick and place costs
- $\pm 10\%$ resistor ratio tolerance

1.3 Applications

- Digital application in automotive and industrial segments
- Medium current peripheral driver
- Switching loads

1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	-40	V
I_O	output current		[1][2]	-	-600	mA
I_{ORM}	repetitive peak output current	$t_p \leq 1$ ms; $\delta \leq 0.33$	[3]	-	-800	mA
R1	bias resistor 1 (input)		1.54	2.2	2.86	k Ω
R2/R1	bias resistor ratio		0.9	1	1.1	

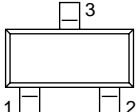
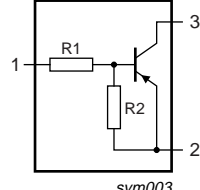
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for collector 1 cm².

[2] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Symbol
1	input (base)		 sym003
2	GND (emitter)		
3	output (collector)		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBRP123ET	-	plastic surface-mounted package; 3 leads	SOT23

4. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
PBRP123ET	*7H

- [1] * = -: made in Hong Kong
 * = 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	-	-40	V
V_{CEO}	collector-emitter voltage	open base	-	-40	V
V_{EBO}	emitter-base voltage	open collector	-	-10	V
V_I	input voltage				
	positive		-	+10	V
	negative		-	-22	V
I_O	output current		^{[1][2]} -	-600	mA
I_{ORM}	repetitive peak output current	$t_p \leq 1$ ms; $\delta \leq 0.33$	^[3] -	-800	mA

Table 5. Limiting values ...continued

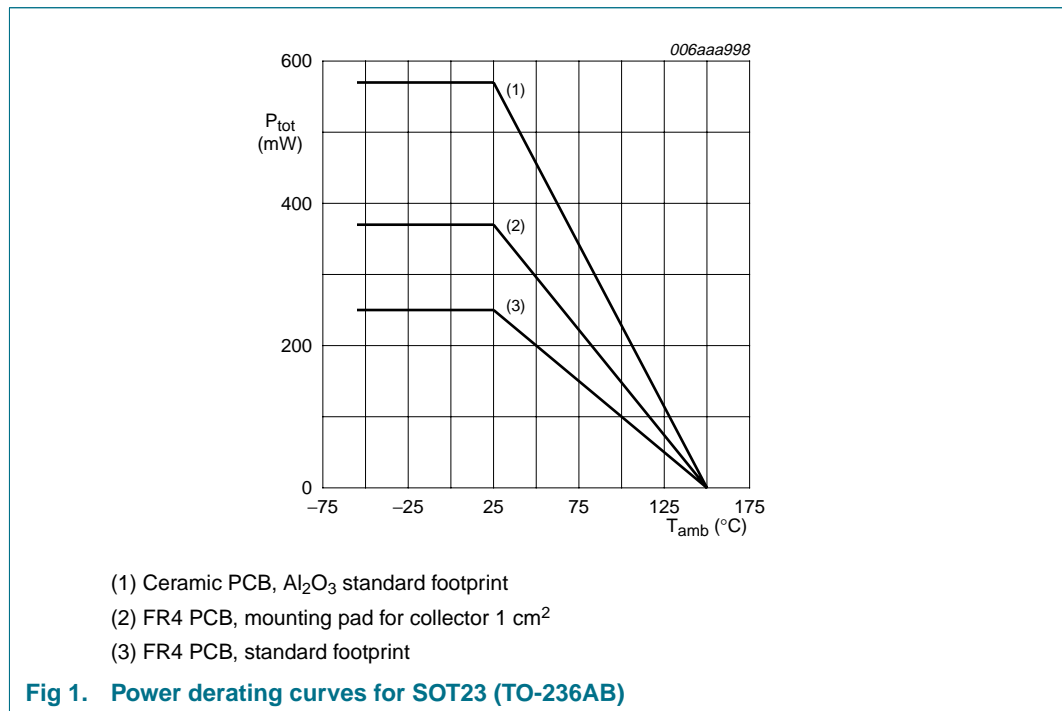
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit	
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[3]	-	250	mW
			[1]	-	370	mW
			[2]	-	570	mW
T_j	junction temperature		-	150	°C	
T_{amb}	ambient temperature		-55	+150	°C	
T_{stg}	storage temperature		-65	+150	°C	

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².

[2] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

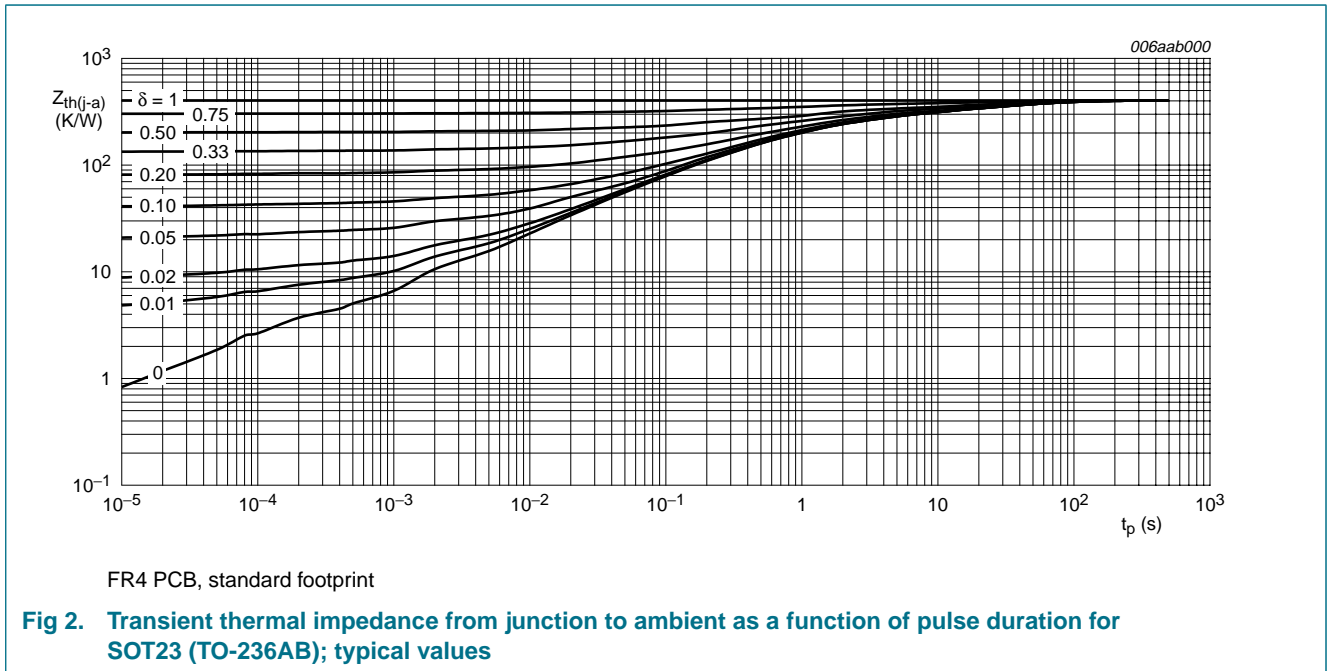


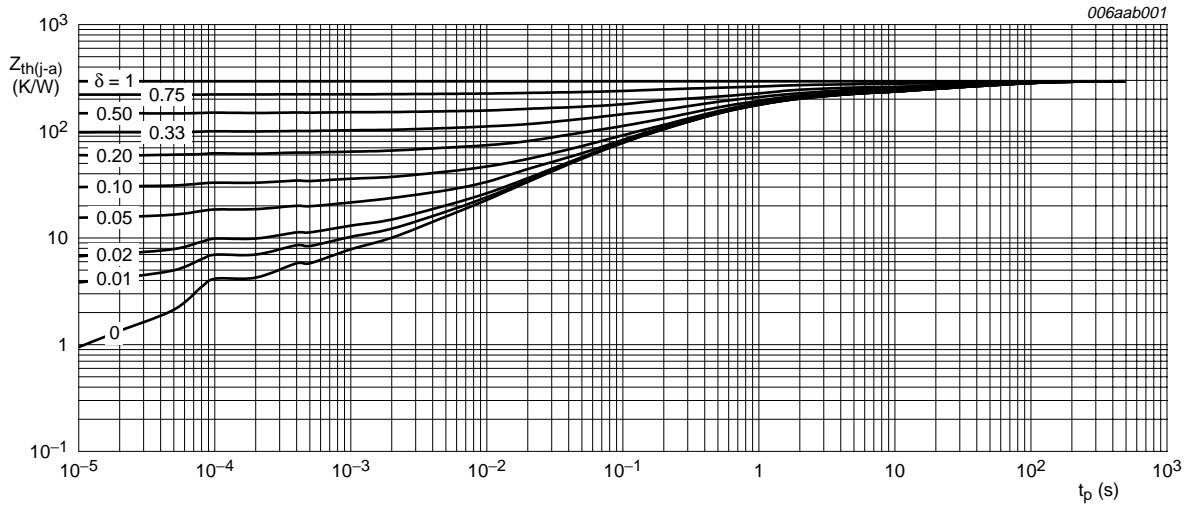
6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	500	K/W
			[2]	-	-	338	K/W
			[3]	-	-	219	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	-	105	K/W	

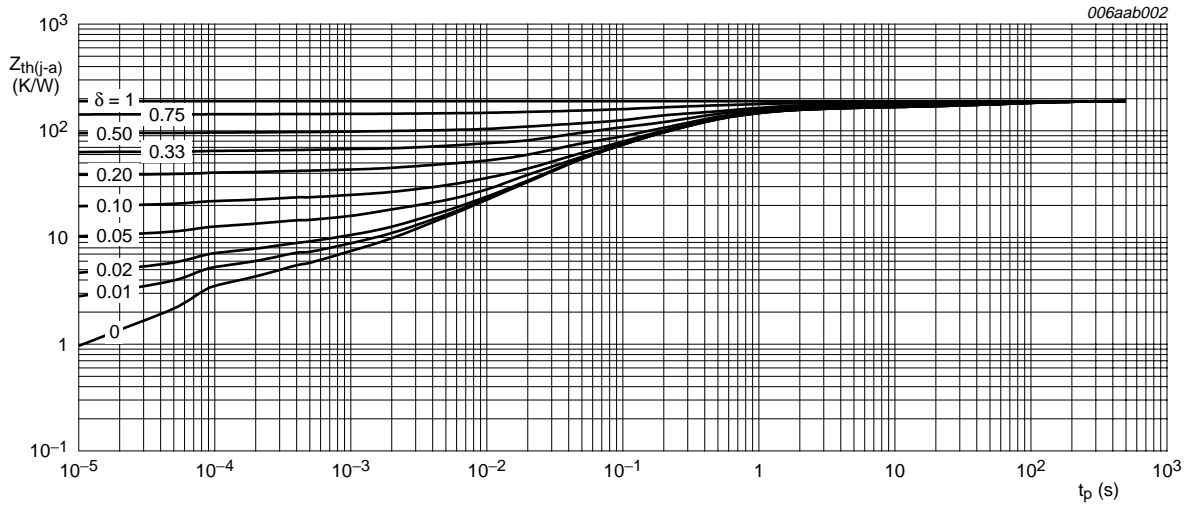
- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².
- [3] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.





FR4 PCB, mounting pad for collector 1 cm²

Fig 3. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT23 (TO-236AB); typical values



Ceramic PCB, Al₂O₃ standard footprint

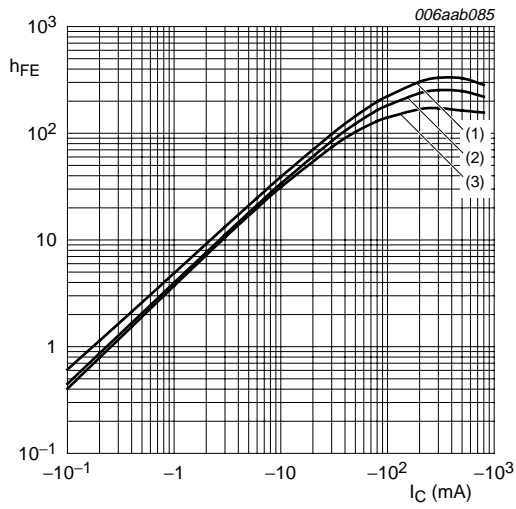
Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT23 (TO-236AB); typical values

7. Characteristics

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

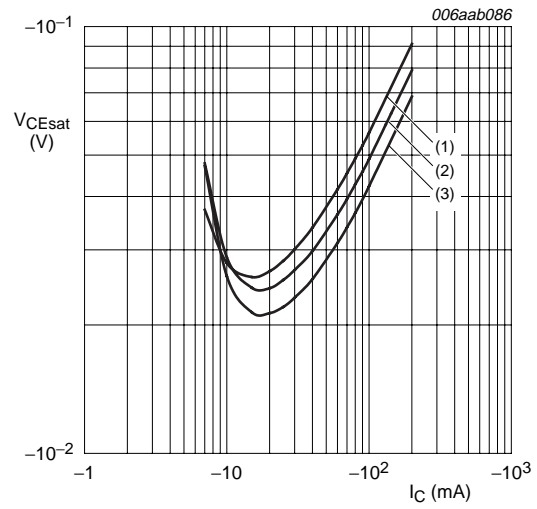
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{CBO}	collector-base cut-off current	$V_{CB} = -30\text{ V};$ $I_E = 0\text{ A}$	-	-	-100	nA
I_{CEO}	collector-emitter cut-off current	$V_{CE} = -30\text{ V};$ $I_B = 0\text{ A}$	-	-	-0.5	μA
I_{EBO}	emitter-base cut-off current	$V_{EB} = -5\text{ V};$ $I_C = 0\text{ A}$	-	-	-2	mA
h_{FE}	DC current gain	$V_{CE} = -5\text{ V};$ $I_C = -50\text{ mA}$	70	120	-	
		$V_{CE} = -5\text{ V};$ $I_C = -300\text{ mA}$	[1] 180	250	-	
		$V_{CE} = -5\text{ V};$ $I_C = -600\text{ mA}$	[1] 170	240	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = -50\text{ mA};$ $I_B = -2.5\text{ mA}$	-	-35	-45	mV
		$I_C = -200\text{ mA};$ $I_B = -10\text{ mA}$	-	-70	-100	mV
		$I_C = -500\text{ mA};$ $I_B = -10\text{ mA}$	[1] -	-200	-300	mV
		$I_C = -600\text{ mA};$ $I_B = -6\text{ mA}$	[1] -	-450	-750	mV
$V_{I(off)}$	off-state input voltage	$V_{CE} = -5\text{ V};$ $I_C = -100\text{ }\mu\text{A}$	-0.6	-1	-1.8	V
$V_{I(on)}$	on-state input voltage	$V_{CE} = -0.3\text{ V};$ $I_C = -20\text{ mA}$	-1	-1.3	-2	V
R1	bias resistor 1 (input)		1.54	2.2	2.86	k Ω
R2/R1	bias resistor ratio		0.9	1	1.1	
C_c	collector capacitance	$V_{CB} = -10\text{ V};$ $I_E = i_e = 0\text{ A};$ $f = 1\text{ MHz}$	-	11	-	pF

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



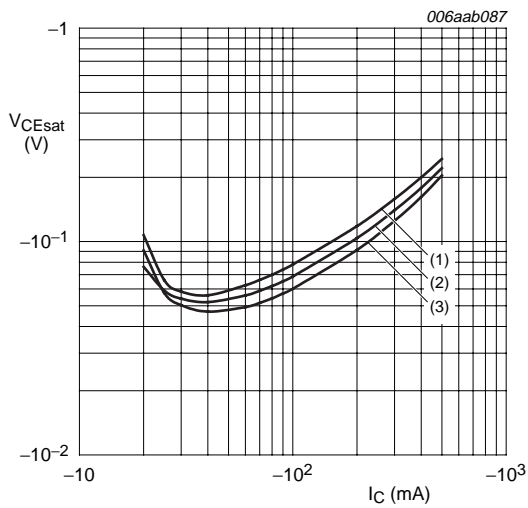
$V_{CE} = -5\text{ V}$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

Fig 5. DC current gain as a function of collector current; typical values



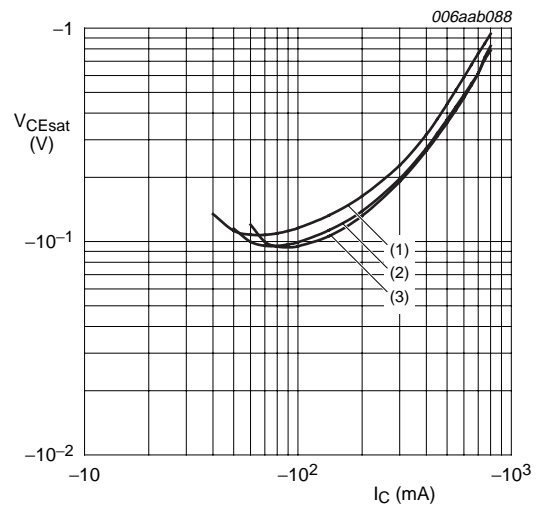
$I_C/I_B = 20$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



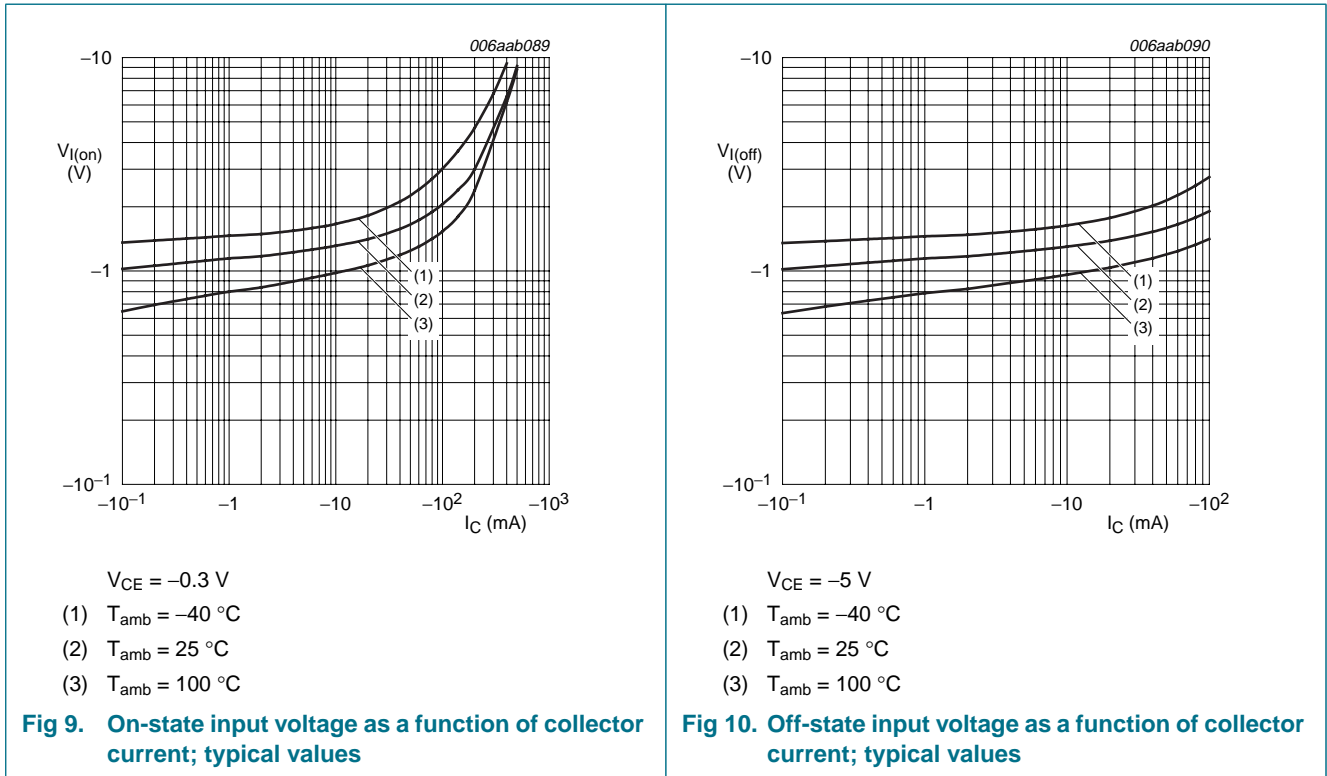
$I_C/I_B = 50$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

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

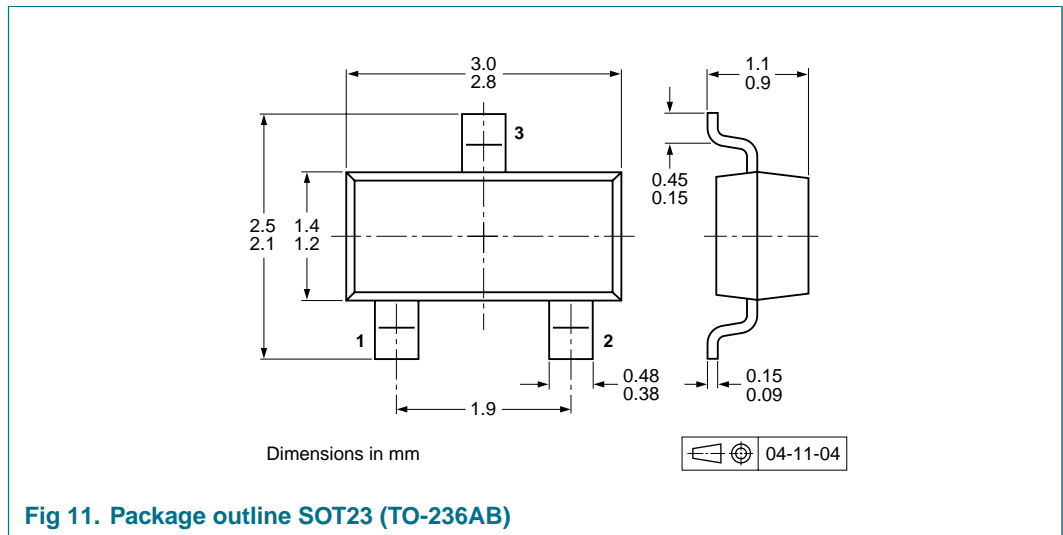


$I_C/I_B = 100$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



8. Package outline



9. Packing information

Table 8. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

Type number	Package	Description	Packing quantity	
			3000	10000
PBRP123ET	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235

[1] For further information and the availability of packing methods, see [Section 13](#).

10. Soldering

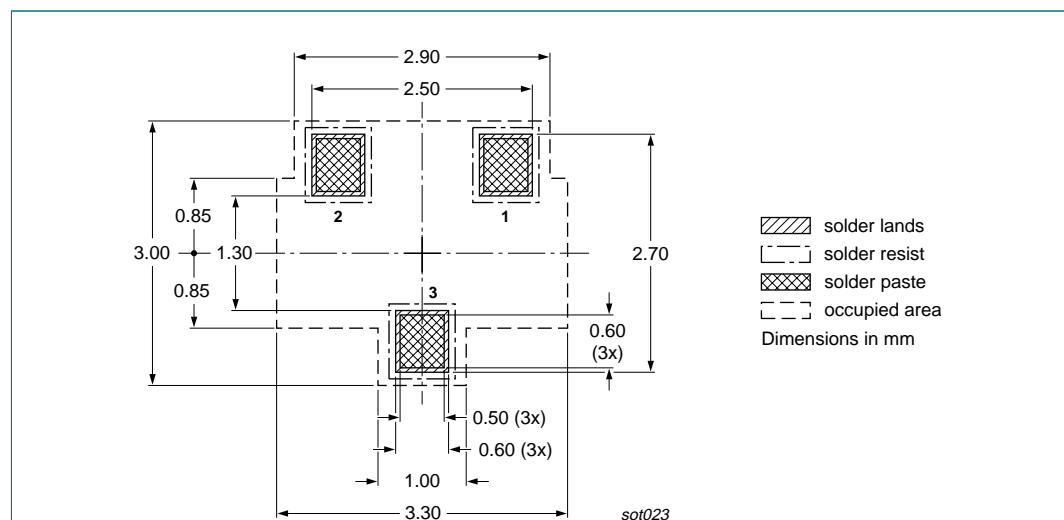


Fig 12. Reflow soldering footprint SOT23 (TO-236AB)

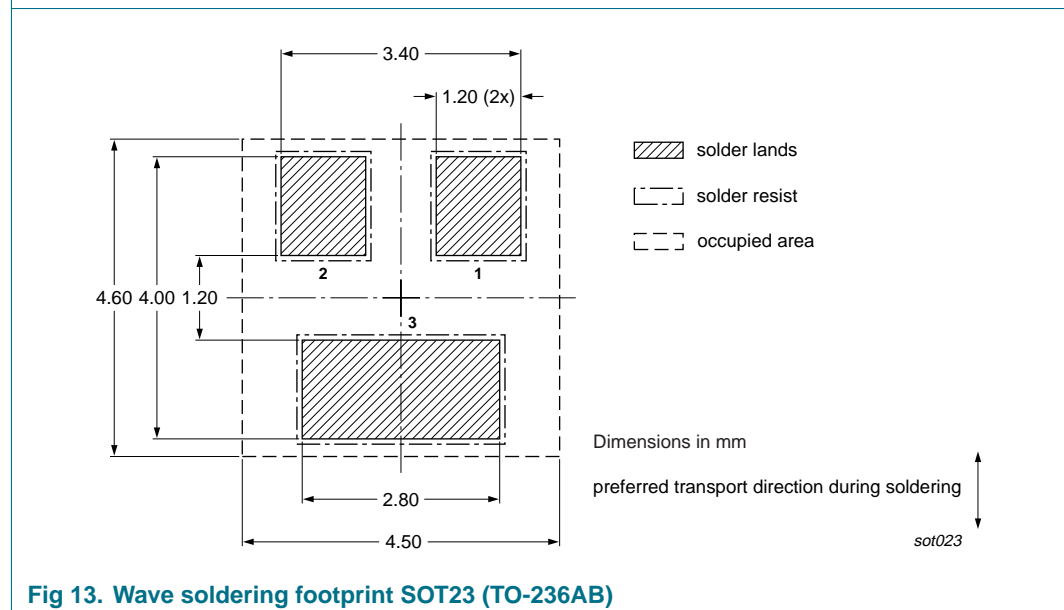


Fig 13. Wave soldering footprint SOT23 (TO-236AB)

11. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBRP123ET_1	20080116	Product data sheet	-	-

12. Legal information

12.1 Data sheet status

Document status ^{[1][2]}	Product status ^[3]	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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Date of release: 16 January 2008

Document identifier: PBRP123ET_1