

PBRP113ET

PNP 800 mA, 40 V BISS RET; R1 = 1 k Ω , R2 = 1 k Ω

Rev. 01 — 17 December 2007

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: PBRN113ET.

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)		0.7	1	1.3	k Ω
R2/R1	bias resistor ratio		0.9	1	1.1	

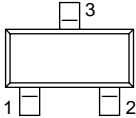
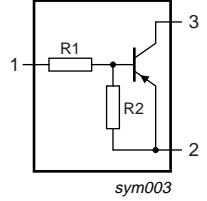
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for collector 1 cm².

[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)		 <p style="text-align: right; font-size: small;">sym003</p>
2	GND (emitter)		
3	output (collector)		

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBRP113ET	-	plastic surface-mounted package; 3 leads	SOT23

4. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
PBRP113ET	*7K

- [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		-	-10	V
I _O	output current		[1][2]	-600	mA
I _{ORM}	repetitive peak output current	t _p ≤ 1 ms; δ ≤ 0.33	[3]	-800	mA

Table 5. Limiting values ...continued

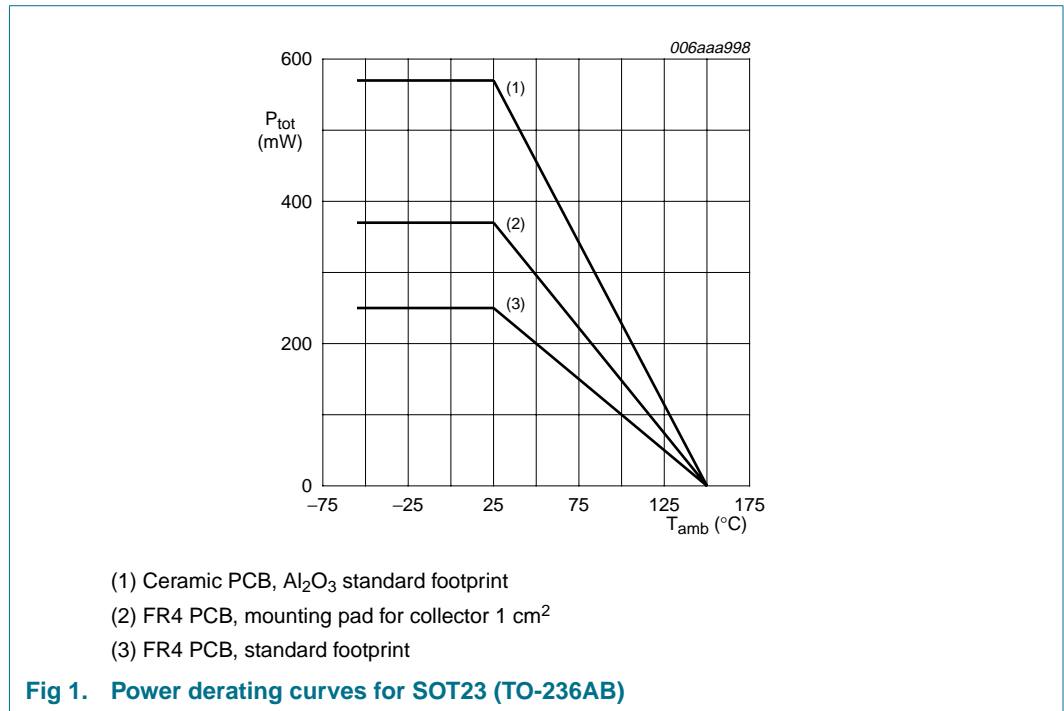
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit	
P _{tot}	total power dissipation	T _{amb} ≤ 25 °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.

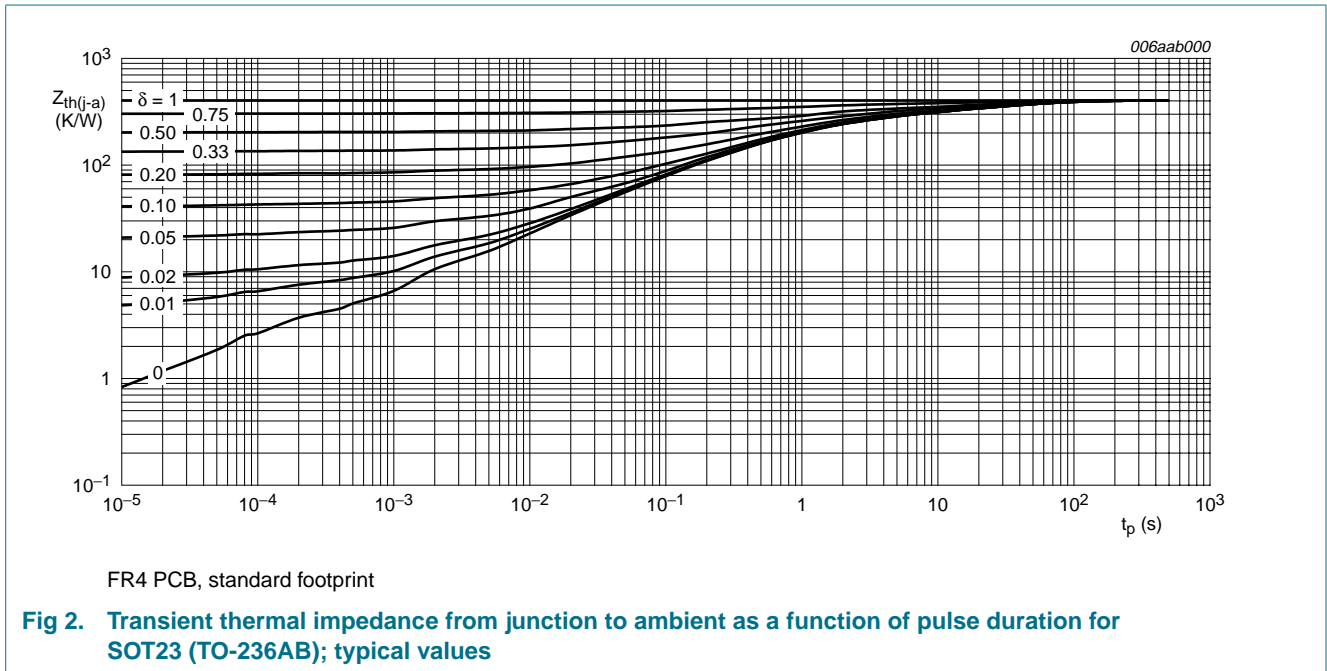


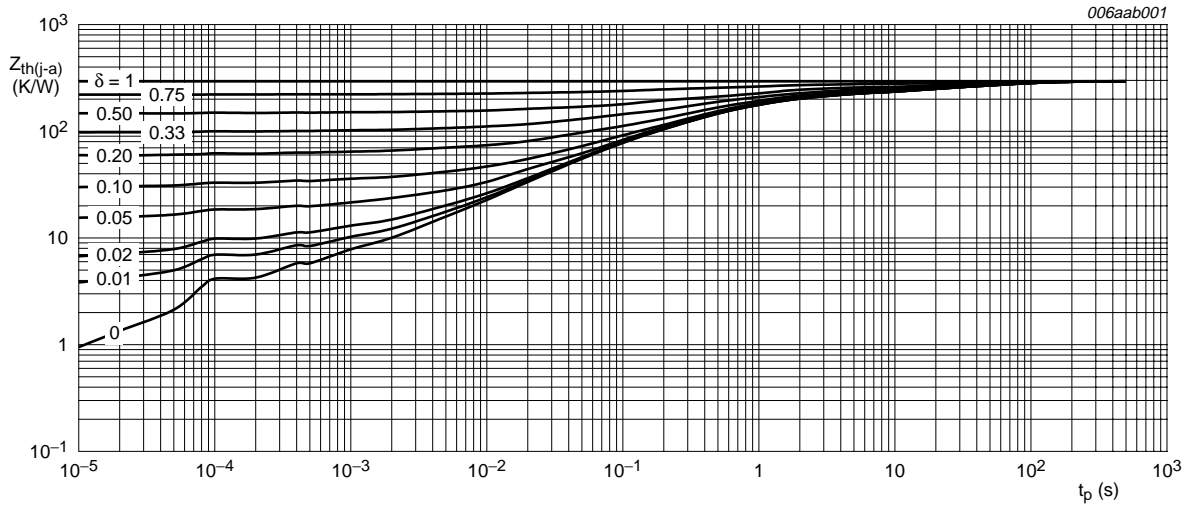
6. Thermal characteristics

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	

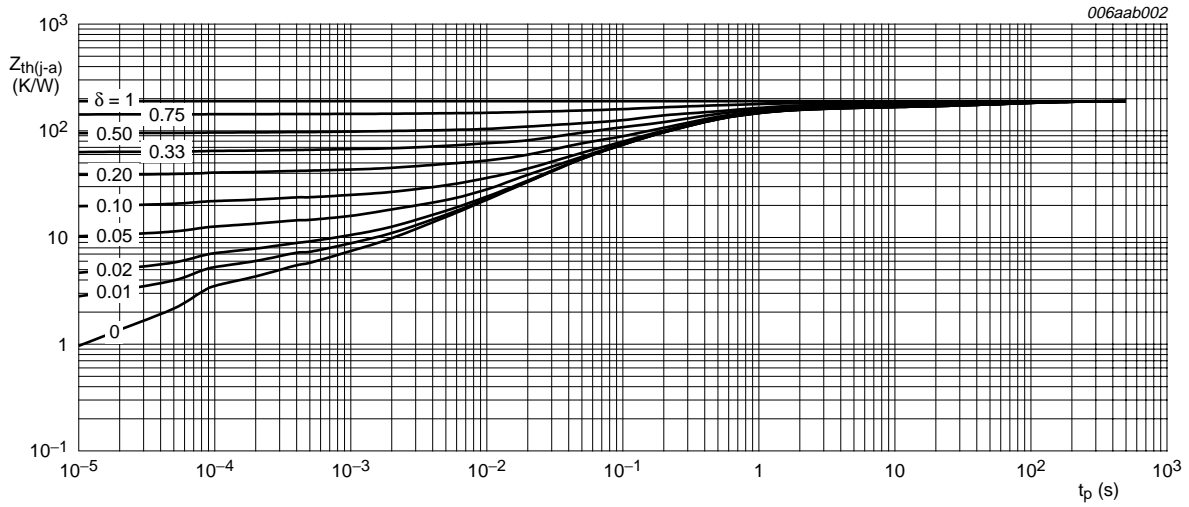
- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm².
- [3] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.





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

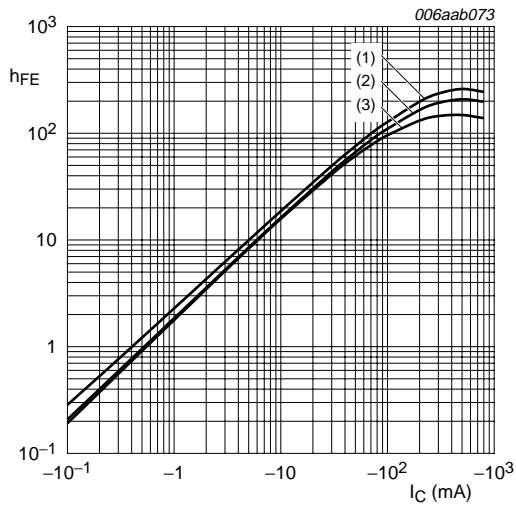
Fig 4. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT23 (TO-236AB); typical values

7. Characteristics

Table 7. Characteristics
T_{amb} = 25 °C unless otherwise specified.

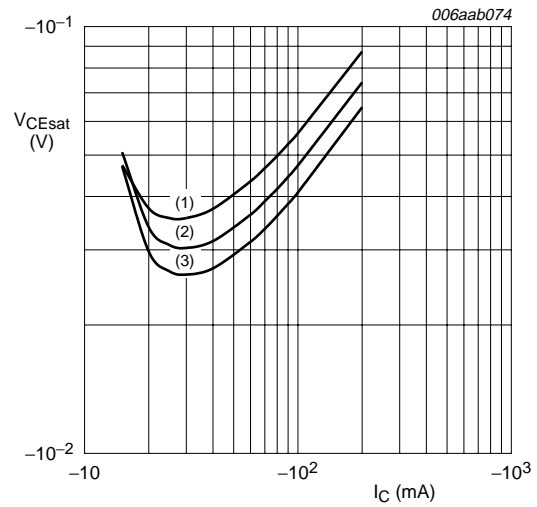
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I _{CBO}	collector-base cut-off current	V _{CB} = -30 V; I _E = 0 A	-	-	-100	nA
I _{CEO}	collector-emitter cut-off current	V _{CE} = -30 V; I _B = 0 A	-	-	-0.5	μ A
I _{EBO}	emitter-base cut-off current	V _{EB} = -5 V; I _C = 0 A	-	-	-4	mA
h _{FE}	DC current gain	V _{CE} = -5 V; I _C = -50 mA	40	65	-	
		V _{CE} = -5 V; I _C = -300 mA	[1] 130	190	-	
		V _{CE} = -5 V; I _C = -600 mA	[1] 140	210	-	
V _{CEsat}	collector-emitter saturation voltage	I _C = -50 mA; I _B = -2.5 mA	-	-35	-45	mV
		I _C = -200 mA; I _B = -10 mA	-	-70	-100	mV
		I _C = -500 mA; I _B = -10 mA	[1] -	-200	-300	mV
		I _C = -600 mA; I _B = -6 mA	[1] -	-450	-750	mV
V _{I(off)}	off-state input voltage	V _{CE} = -5 V; I _C = -100 μ A	-0.6	-1	-1.5	V
V _{I(on)}	on-state input voltage	V _{CE} = -0.3 V; I _C = -20 mA	-1	-1.3	-1.8	V
R1	bias resistor 1 (input)		0.7	1	1.3	k Ω
R2/R1	bias resistor ratio		0.9	1	1.1	
C _c	collector capacitance	V _{CB} = -10 V; I _E = i _e = 0 A; f = 1 MHz	-	11	-	pF

[1] Pulse test: t_p \leq 300 μ s; $\delta \leq$ 0.02.



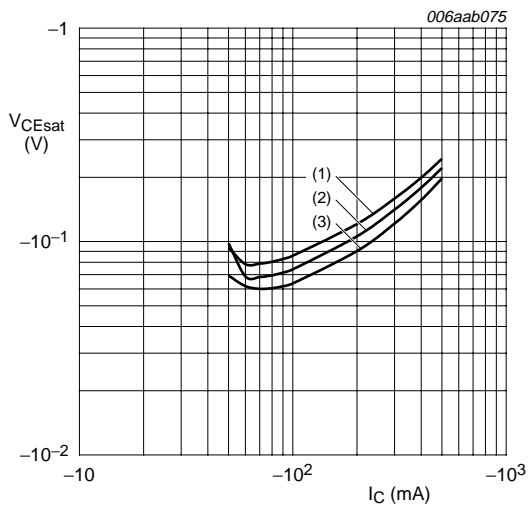
$V_{CE} = -5\text{ V}$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



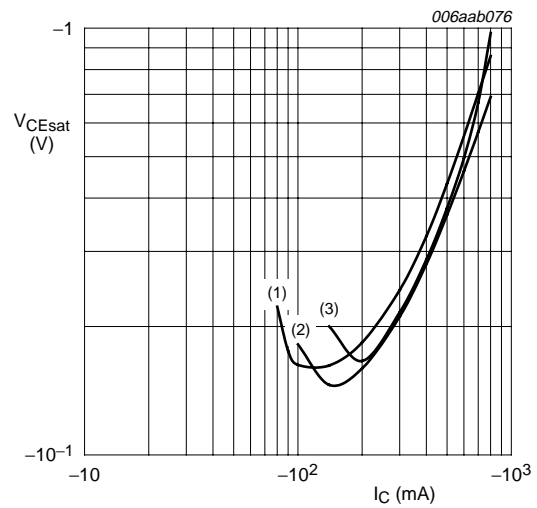
$I_C/I_B = 20$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



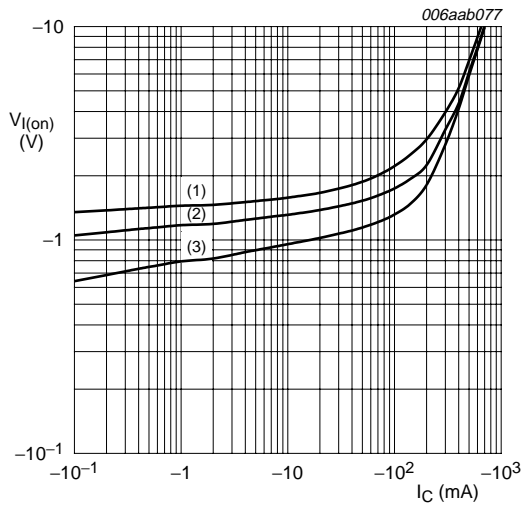
$I_C/I_B = 50$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



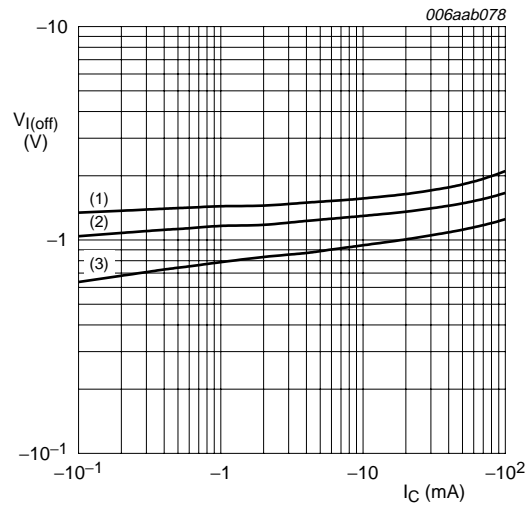
$I_C/I_B = 100$
 (1) $T_{amb} = 100\text{ }^{\circ}\text{C}$
 (2) $T_{amb} = 25\text{ }^{\circ}\text{C}$
 (3) $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



$V_{CE} = -0.3 \text{ V}$
 (1) $T_{amb} = -40 \text{ }^\circ\text{C}$
 (2) $T_{amb} = 25 \text{ }^\circ\text{C}$
 (3) $T_{amb} = 100 \text{ }^\circ\text{C}$

Fig 9. On-state input voltage as a function of collector current; typical values



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

Fig 10. Off-state input voltage as a function of collector current; typical values

8. Package outline

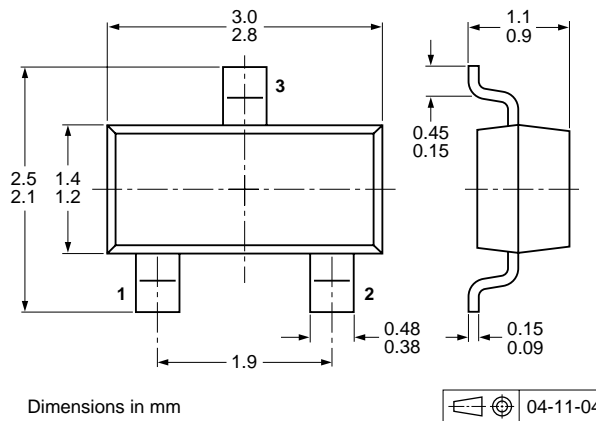


Fig 11. Package outline SOT23 (TO-236AB)

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
PBRP113ET	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

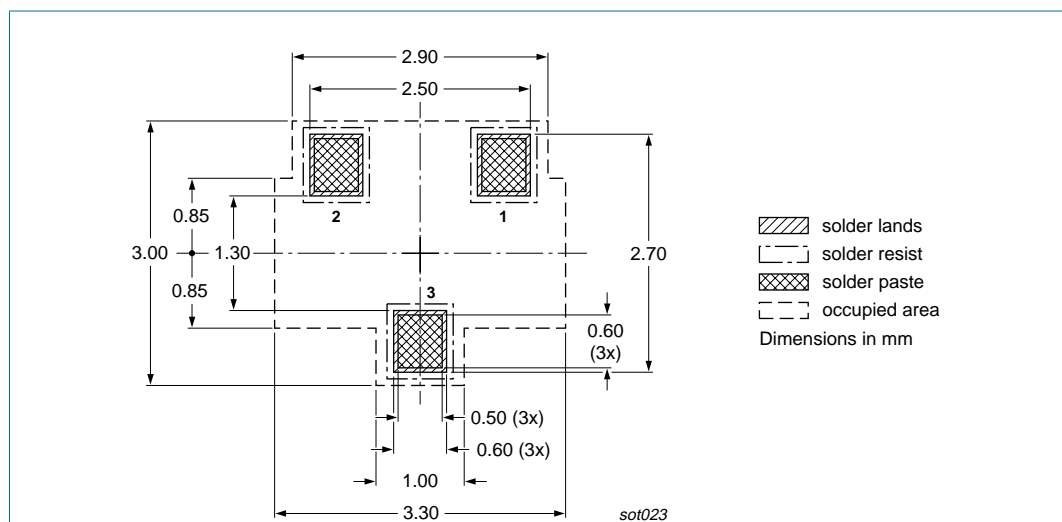


Fig 12. Reflow soldering footprint SOT23 (TO-236AB)

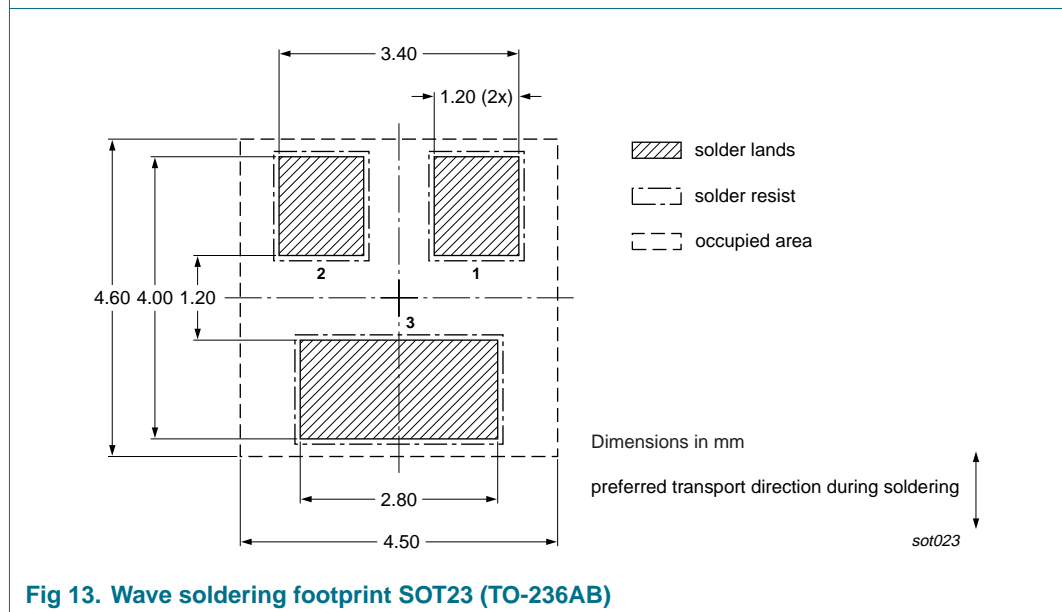


Fig 13. Wave soldering footprint SOT23 (TO-236AB)

11. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBRP113ET_1	20071217	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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