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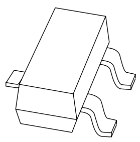


PBRP113ZT

PNP 800 mA, 40 V BISS RET; R1 = 1 kΩ, R2 = 10 kΩ

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: PBRN113ZT.

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
- ±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	kΩ
R2/R1	bias resistor ratio			9	10	11	

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated, mounting pad for collector 1 cm^2.

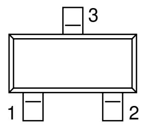
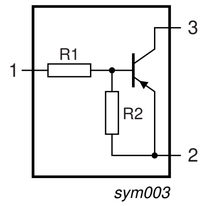
[2] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.

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

founded by Philips

2. Pinning information

Table 2. Pinning

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

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PBRP113ZT	-	plastic surface-mounted package; 3 leads	SOT23

4. Marking

Table 4. Marking codes

Type number	Marking code[1]
PBRP113ZT	*7M

[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		-	–5	V
V_I	input voltage					
	positive			-	+5	V
	negative			-	–10	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*

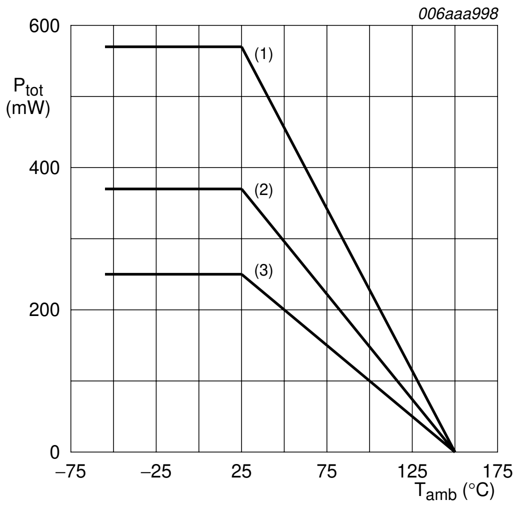
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °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 cm^2.

[2] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.

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



(1) Ceramic PCB, Al_2O_3 standard footprint

(2) FR4 PCB, mounting pad for collector 1 cm^2

(3) FR4 PCB, standard footprint

Fig 1. Power derating curves for SOT23 (TO-236AB)

6. Thermal characteristics

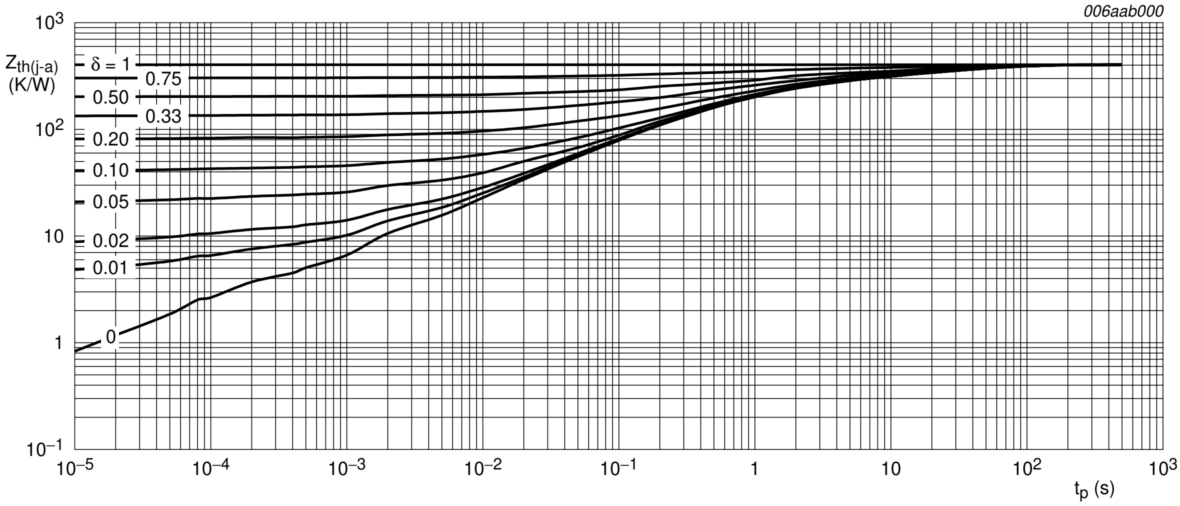
Table 6. Thermal characteristics

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.

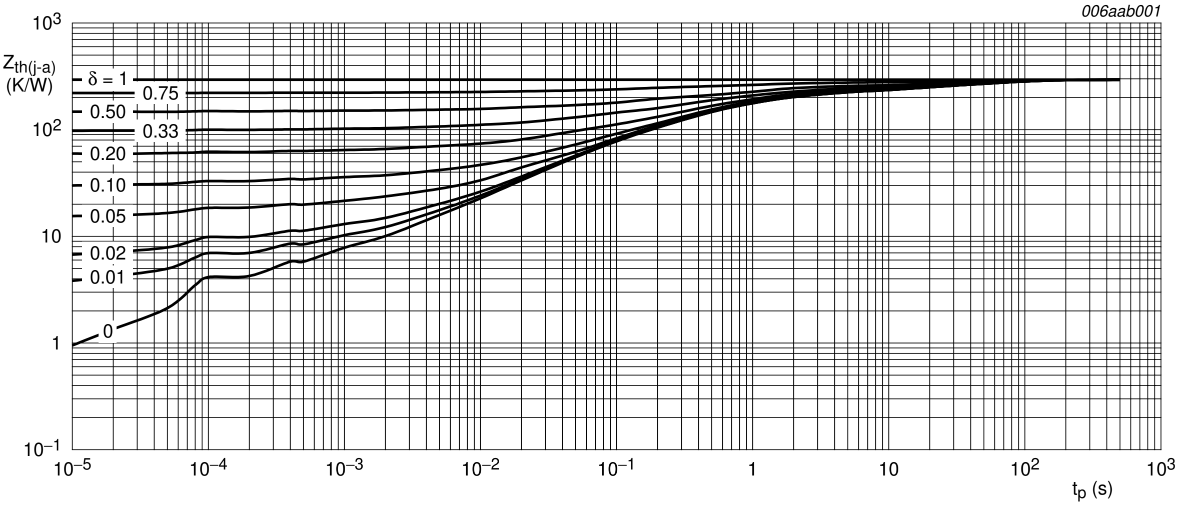
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for collector 1 cm^2.

[3] Device mounted on a ceramic PCB, Al_2O_3, standard footprint.



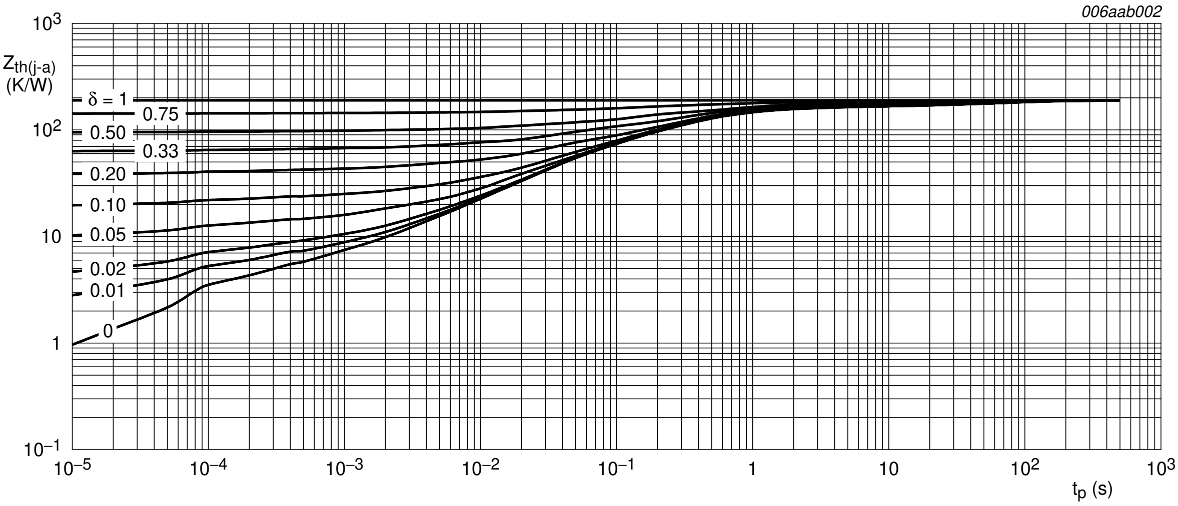
FR4 PCB, standard footprint

Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration for SOT23 (TO-236AB); typical values



FR4 PCB, mounting pad for collector 1 cm^2

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



Ceramic PCB, Al_2O_3 standard footprint

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

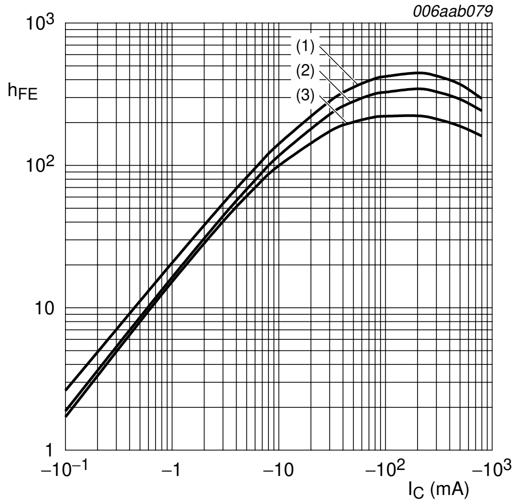
7. Characteristics

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	μA
I_{EBO}	emitter-base cut-off current	V_{EB} = −5 V; I_C = 0 A		-	-	−0.8	mA
h_{FE}	DC current gain	V_{CE} = −5 V; I_C = −50 mA		190	270	-	
		V_{CE} = −5 V; I_C = −300 mA	[1]	230	320	-	
		V_{CE} = −5 V; I_C = −600 mA	[1]	190	270	-	
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 μA		−0.3	−0.5	−1	V
$V_{I(on)}$	on-state input voltage	V_{CE} = −0.3 V; I_C = −20 mA		−0.4	−0.7	−1.4	V
R1	bias resistor 1 (input)			0.7	1	1.3	kΩ
R2/R1	bias resistor ratio			9	10	11	
C_c	collector capacitance	V_{CB} = −10 V; I_E = i_e = 0 A; f = 1 MHz		-	11	-	pF

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



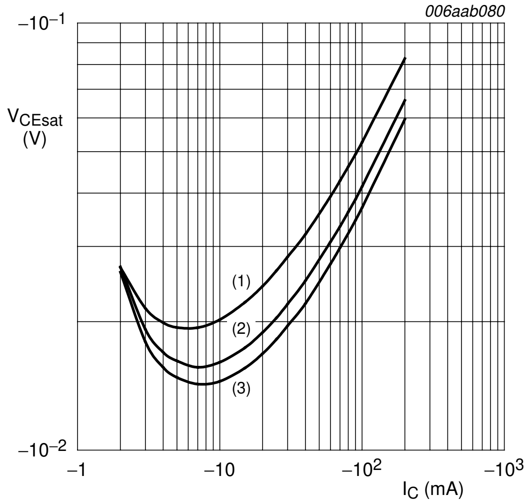
$V_{CE} = -5$ V

(1) $T_{amb} = 100$ °C

(2) $T_{amb} = 25$ °C

(3) $T_{amb} = -40$ °C

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



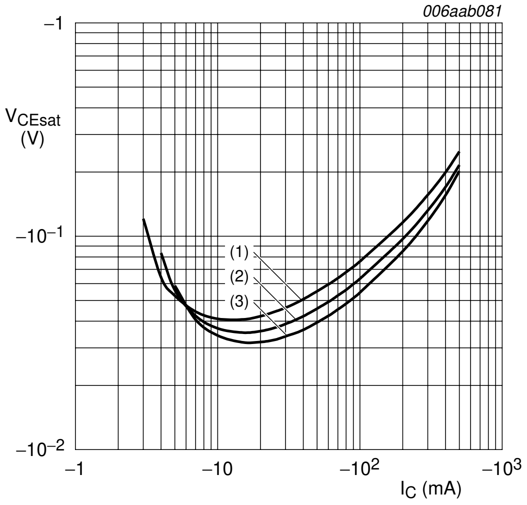
$I_C/I_B = 20$

(1) $T_{amb} = 100$ °C

(2) $T_{amb} = 25$ °C

(3) $T_{amb} = -40$ °C

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



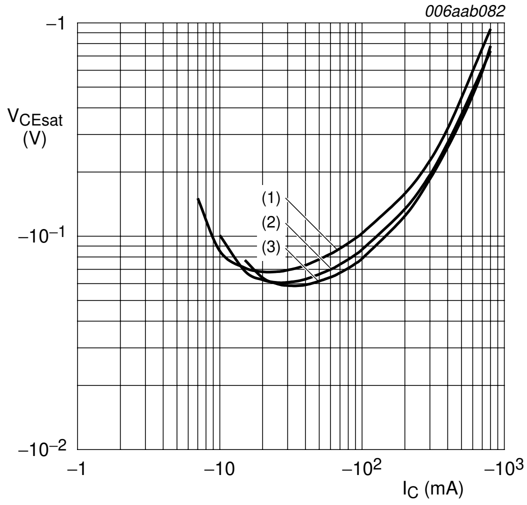
$I_C/I_B = 50$

(1) $T_{amb} = 100$ °C

(2) $T_{amb} = 25$ °C

(3) $T_{amb} = -40$ °C

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



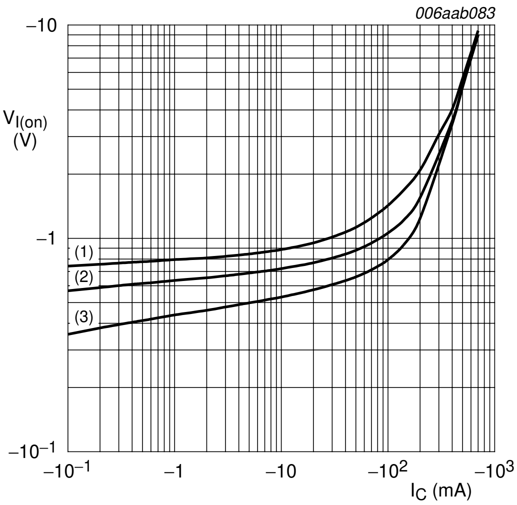
$I_C/I_B = 100$

(1) $T_{amb} = 100$ °C

(2) $T_{amb} = 25$ °C

(3) $T_{amb} = -40$ °C

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



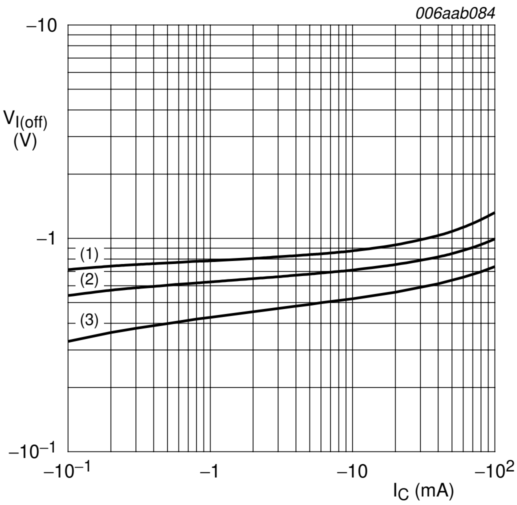
V_{CE} = −0.3 V

(1) T_{amb} = −40 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 100 °C

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



V_{CE} = −5 V

(1) T_{amb} = −40 °C

(2) T_{amb} = 25 °C

(3) T_{amb} = 100 °C

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

8. Package outline

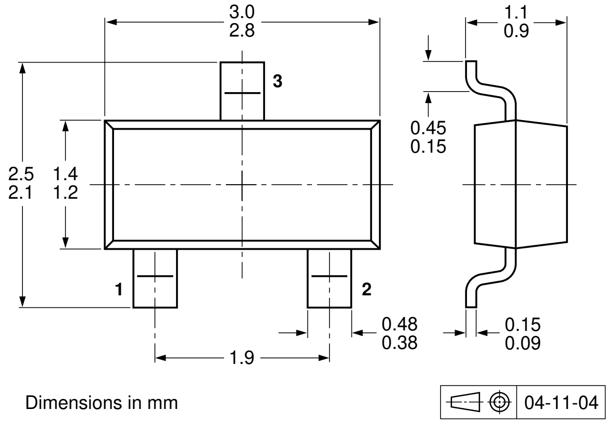


Fig 11. Package outline SOT23 (TO-236AB)

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
PBRP113ZT	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

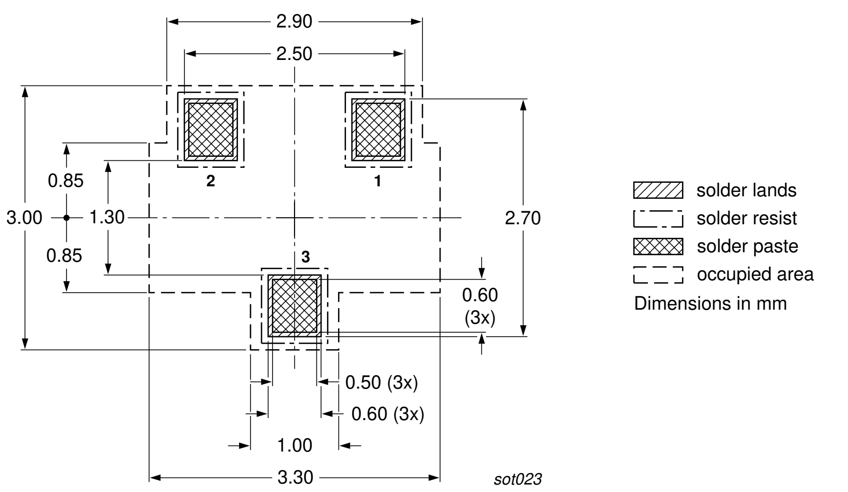


Fig 12. Reflow soldering footprint SOT23 (TO-236AB)

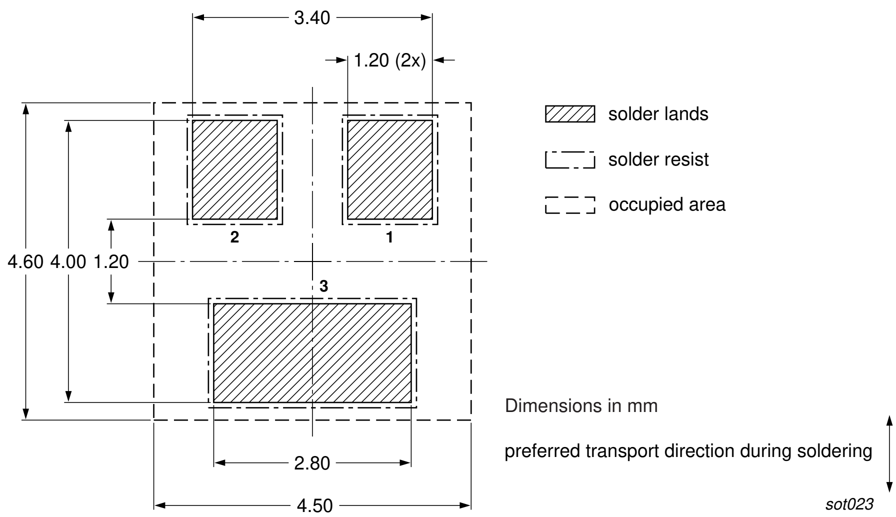


Fig 13. Wave soldering footprint SOT23 (TO-236AB)

11. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBRP113ZT_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: PBRP113ZT_1