

PBHV8118T

180 V, 1 A NPN high-voltage low V_{CEsat} (BISS) transistor

Rev. 01 — 7 May 2010

Product data sheet

1. Product profile

1.1 General description

NPN high-voltage low V_{CEsat} Breakthrough In Small Signal (BISS) transistor in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

1.2 Features and benefits

- High voltage
- Low collector-emitter saturation voltage V_{CEsat}
- High collector current capability I_C and I_{CM}
- High collector current gain (h_{FE}) at high I_C
- AEC-Q101 qualified
- Small SMD plastic package

1.3 Applications

- LED driver for LED chain module
- LCD backlighting
- Automotive power management
- Hook switch for wired telecom
- Switch Mode Power Supply (SMPS)

1.4 Quick reference data

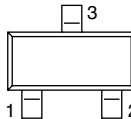
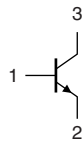
Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CEO}	collector-emitter voltage	open base	-	-	180	V
I_C	collector current		-	-	1	A
h_{FE}	DC current gain	$V_{CE} = 10\text{ V};$ $I_C = 50\text{ mA}$	[1] 100	250	-	

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



2. Pinning information

Table 2. Pinning			
Pin	Description	Simplified outline	Graphic symbol
1	base		
2	emitter		
3	collector		
sym021			

3. Ordering information

Table 3. Ordering information			
Type number	Package		
	Name	Description	Version
PBHV8118T	-	plastic surface-mounted package; 3 leads	SOT23

4. Marking

Table 4. Marking codes	
Type number	Marking code ^[1]
PBHV8118T	LZ*

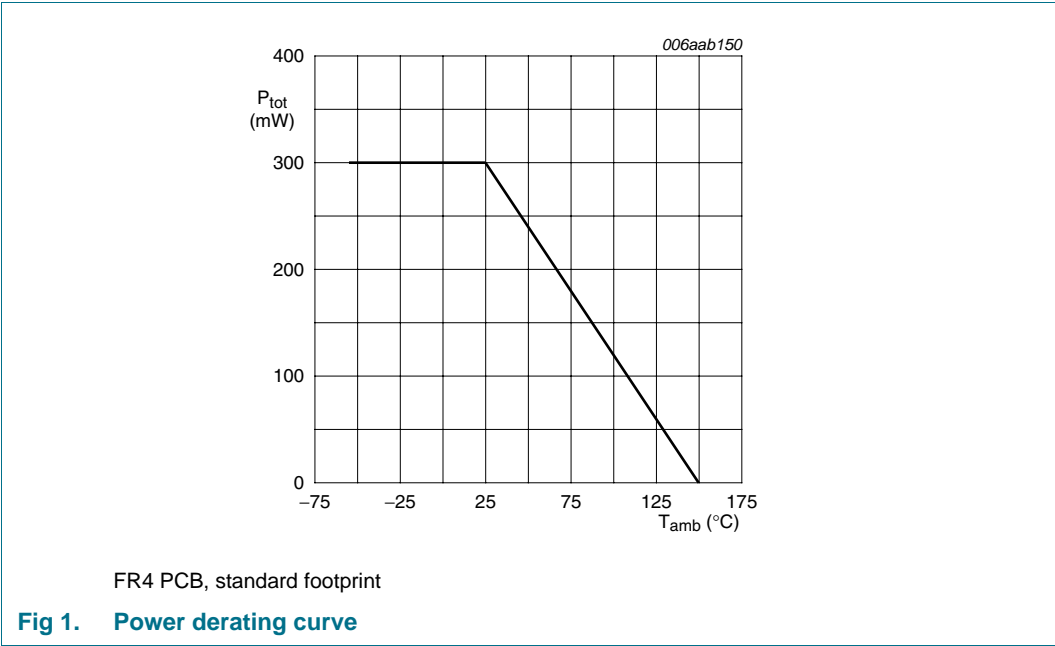
[1] * = -: made in Hong Kong
 * = p: made in Hong Kong
 * = t: made in Malaysia
 * = W: made in China

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	-	400	V
V_{CEO}	collector-emitter voltage	open base	-	180	V
V_{EBO}	emitter-base voltage	open collector	-	6	V
I_C	collector current		-	1	A
I_{CM}	peak collector current	single pulse; $t_p \leq 1$ ms	-	2	A
I_{BM}	peak base current	single pulse; $t_p \leq 1$ ms	-	400	mA
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1] -	300	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 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

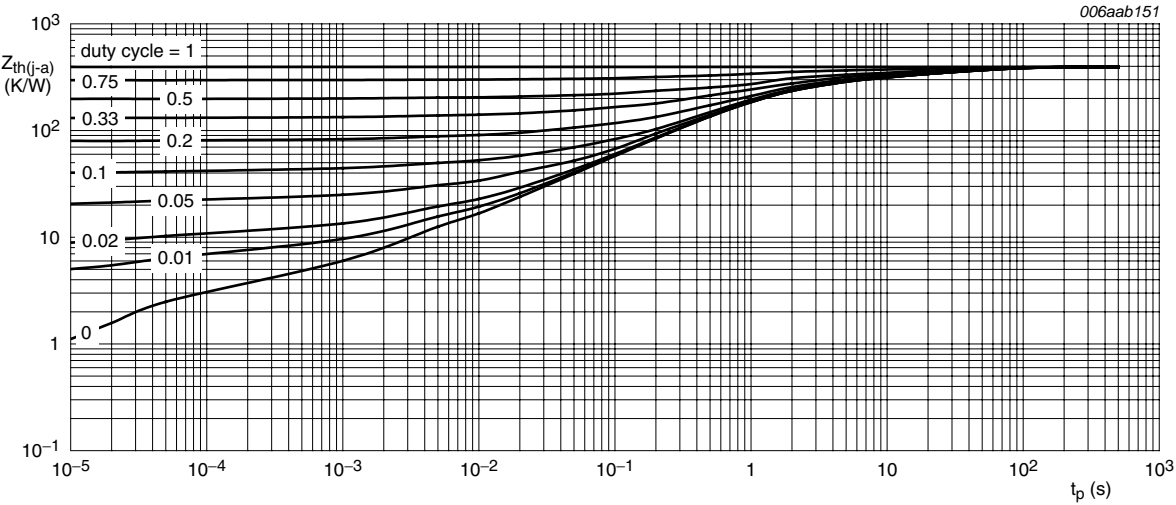


6. Thermal characteristics

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]	-	417	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	-	70	K/W

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



FR4 PCB, standard footprint

Fig 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

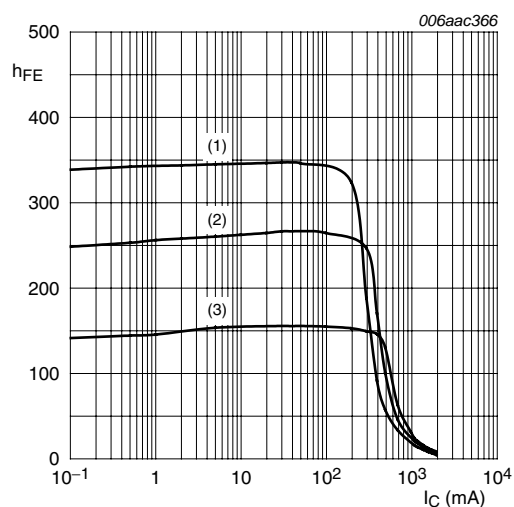
7. Characteristics

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	$V_{CB} = 144\text{ V}; I_E = 0\text{ A}$	-	-	100	nA
		$V_{CB} = 144\text{ V}; I_E = 0\text{ A}; T_j = 150\text{ }^{\circ}\text{C}$	-	-	10	μA
I_{CES}	collector-emitter cut-off current	$V_{CE} = 144\text{ V}; V_{BE} = 0\text{ V}$	-	-	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	$V_{CE} = 10\text{ V}$	[1]			
		$I_C = 50\text{ mA}$	100	250	-	
		$I_C = 100\text{ mA}$	100	250	-	
		$I_C = 0.5\text{ A}$	50	100	-	
V_{CEsat}	collector-emitter saturation voltage	$I_C = 100\text{ mA}; I_B = 10\text{ mA}$	[1]	-	40	60 mV
		$I_C = 100\text{ mA}; I_B = 20\text{ mA}$	[1]	-	33	50 mV
V_{BEsat}	base-emitter saturation voltage	$I_C = 0.5\text{ A}; I_B = 100\text{ mA}$	[1]	-	1	1.2 V
t_d	delay time	$V_{CC} = 6\text{ V}; I_C = 0.5\text{ A}; I_{Bon} = 0.1\text{ A}; I_{Boff} = -0.1\text{ A}$	-	7	-	ns
t_r	rise time		-	565	-	ns
t_{on}	turn-on time		-	572	-	ns
t_s	storage time		-	1320	-	ns
t_f	fall time		-	740	-	ns
t_{off}	turn-off time		-	2060	-	ns
f_T	transition frequency	$V_{CE} = 10\text{ V}; I_C = 10\text{ mA}; f = 100\text{ MHz}$	-	30	-	MHz
C_c	collector capacitance	$V_{CB} = 20\text{ V}; I_E = i_e = 0\text{ A}; f = 1\text{ MHz}$	-	5.7	-	pF
C_e	emitter capacitance	$V_{EB} = 0.5\text{ V}; I_C = i_c = 0\text{ A}; f = 1\text{ MHz}$	-	150	-	pF

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

 $V_{CE} = 10 \text{ V}$

- (1) $T_{\text{amb}} = 100\text{ }^{\circ}\text{C}$
- (2) $T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$
- (3) $T_{\text{amb}} = -55\text{ }^{\circ}\text{C}$

Fig 3. DC current gain as a function of collector current; typical values

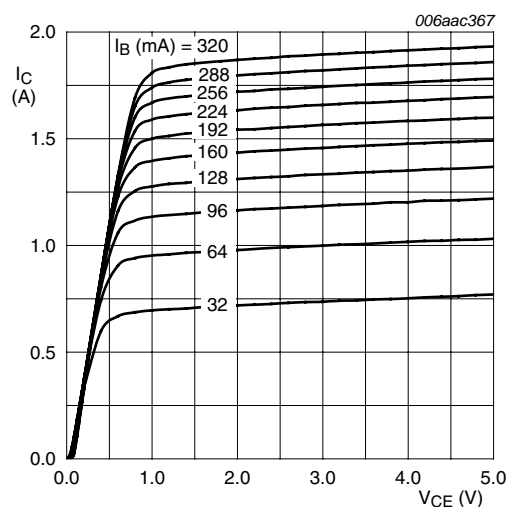
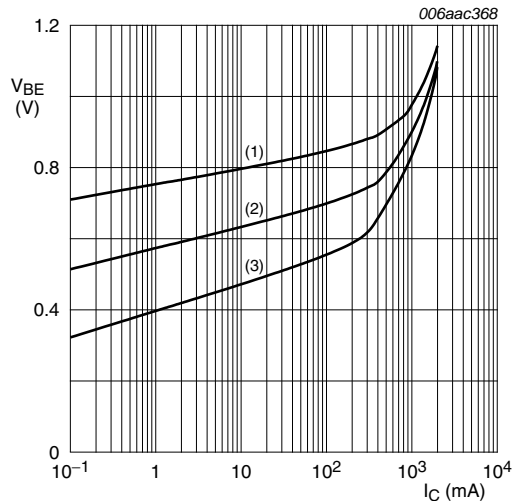
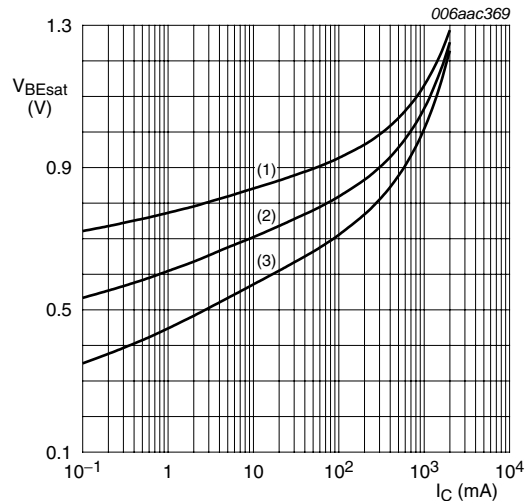

$$T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$$

Fig 4. Collector current as a function of collector-emitter voltage; typical values


$$V_{CE} = 10 \text{ V}$$

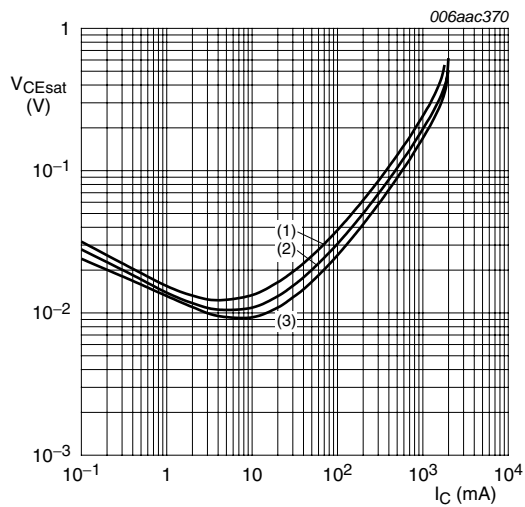
- (1) $T_{\text{amb}} = -55\text{ }^{\circ}\text{C}$
- (2) $T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$
- (3) $T_{\text{amb}} = 100\text{ }^{\circ}\text{C}$

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


$$I_C/I_B = 5$$

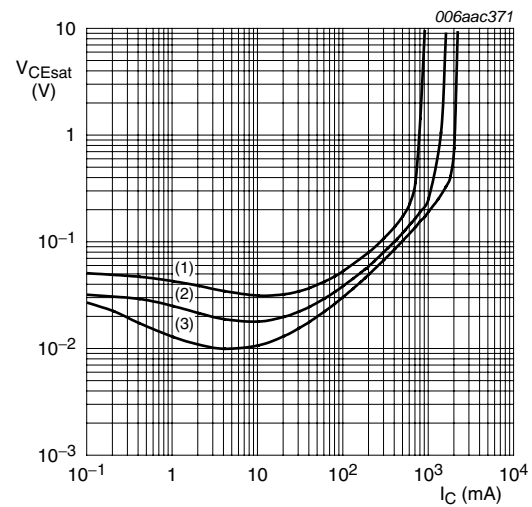
- (1) $T_{\text{amb}} = -55\text{ }^{\circ}\text{C}$
- (2) $T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$
- (3) $T_{\text{amb}} = 100\text{ }^{\circ}\text{C}$

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



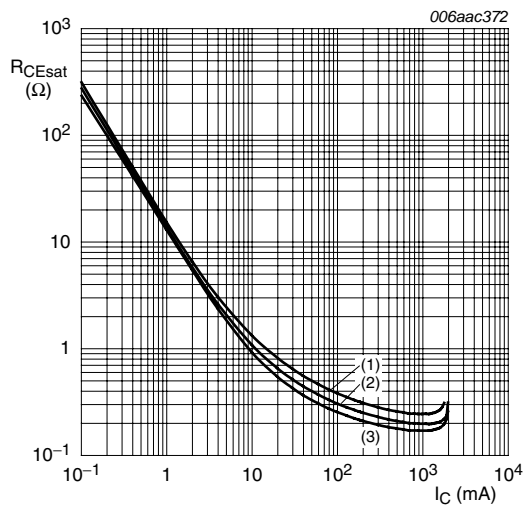
- $I_C/I_B = 5$
- (1) $T_{amb} = 100\text{ °C}$
 - (2) $T_{amb} = 25\text{ °C}$
 - (3) $T_{amb} = -55\text{ °C}$

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



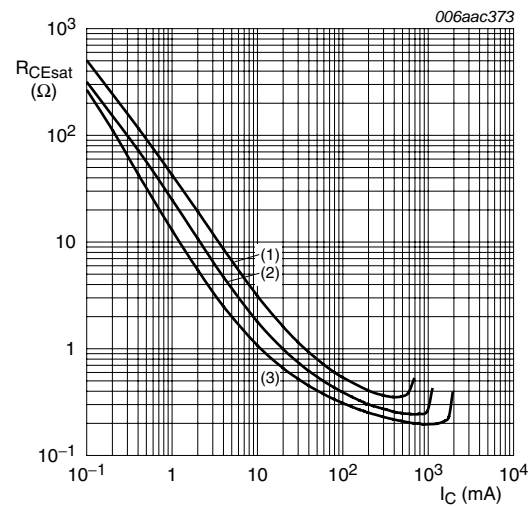
- $T_{amb} = 25\text{ °C}$
- (1) $I_C/I_B = 20$
 - (2) $I_C/I_B = 10$
 - (3) $I_C/I_B = 5$

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



- $I_C/I_B = 5$
- (1) $T_{amb} = 100\text{ °C}$
 - (2) $T_{amb} = 25\text{ °C}$
 - (3) $T_{amb} = -55\text{ °C}$

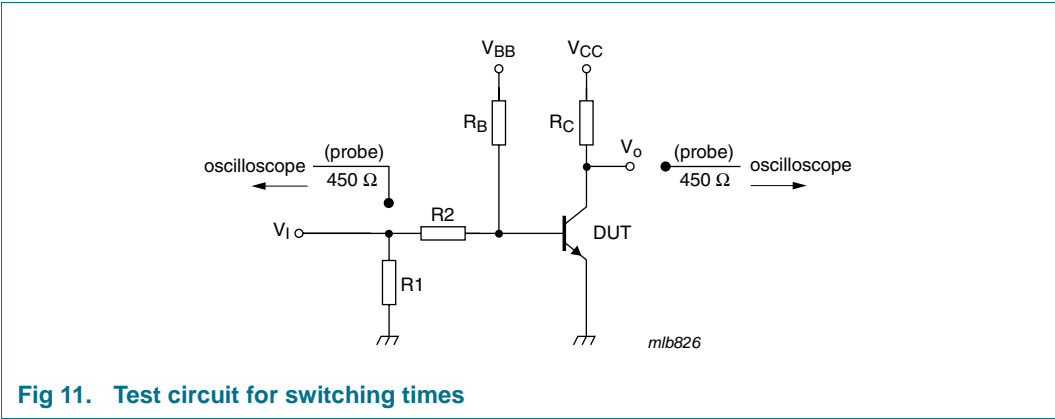
Fig 9. Collector-emitter saturation resistance as a function of collector current; typical values



- $T_{amb} = 25\text{ °C}$
- (1) $I_C/I_B = 20$
 - (2) $I_C/I_B = 10$
 - (3) $I_C/I_B = 5$

Fig 10. Collector-emitter saturation resistance as a function of collector current; typical values

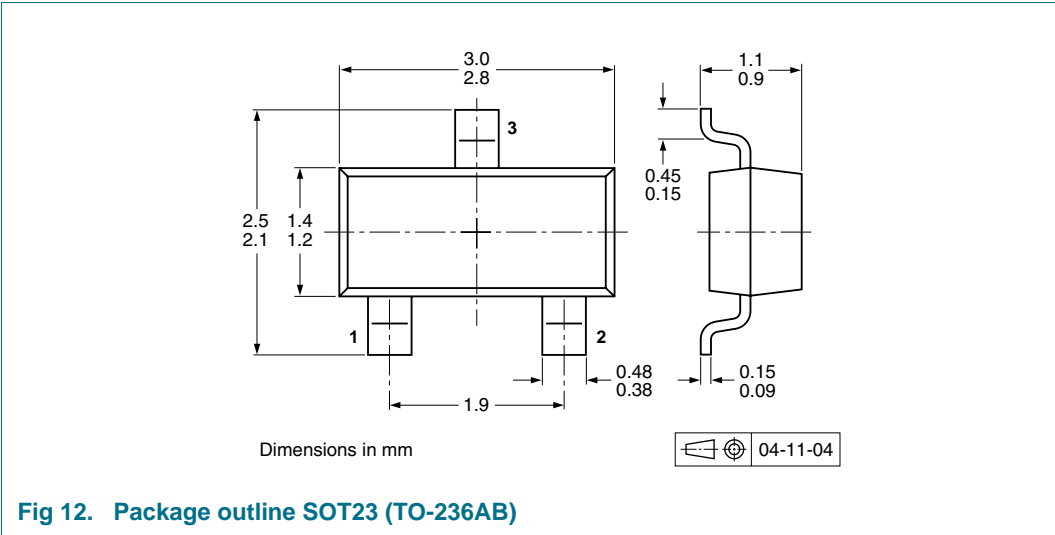
8. Test information



8.1 Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors, and is suitable for use in automotive applications.

9. Package outline



10. 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
PBHV8118T	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235

[1] For further information and the availability of packing methods, see Section 14.

11. Soldering

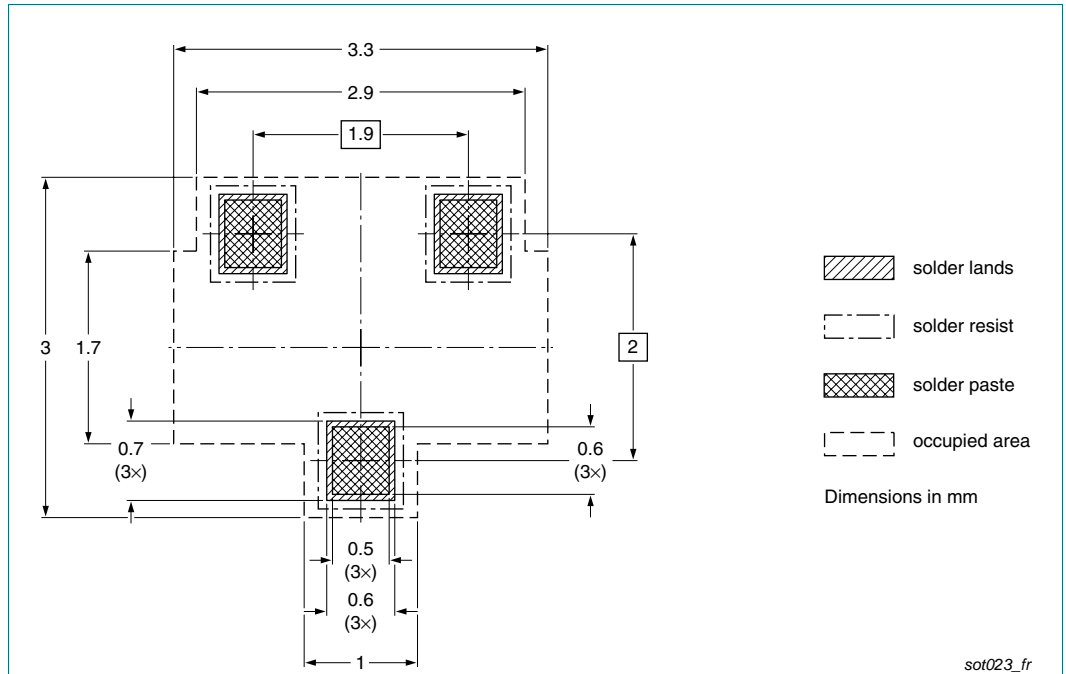


Fig 13. Reflow soldering footprint SOT23 (TO-236AB)

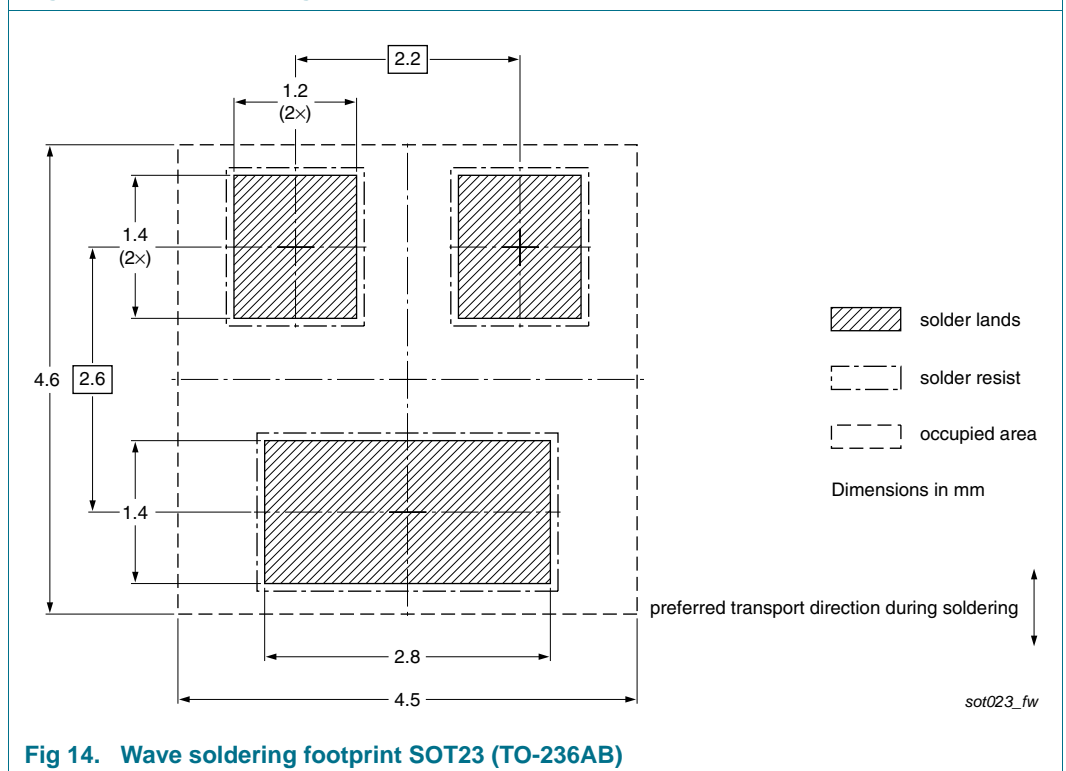


Fig 14. Wave soldering footprint SOT23 (TO-236AB)

12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PBHV8118T v.1	20100507	Product data sheet	-	-

13. Legal information

13.1 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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