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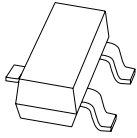
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Kind regards,

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# PMBTA44

400 V, 0.3 A NPN high-voltage low  $V_{CEsat}$  (BISS) transistor

Rev. 01 — 22 February 2008

Product data sheet

## 1. Product profile

### 1.1 General description

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

### 1.2 Features

- Low current (max. 300 mA)
- High voltage (max. 400 V)
- AEC-Q101 qualified

### 1.3 Applications

- LED driver for LED chain module
- LCD backlighting
- High Intensity Discharge (HID) front lighting
- Automotive motor management
- Hook switch for wired telecom
- Switch mode power supply

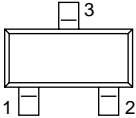
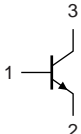
### 1.4 Quick reference data

Table 1. Quick reference data

| Symbol    | Parameter                 | Conditions                                 | Min | Typ | Max | Unit |
|-----------|---------------------------|--|-----|-----|-----|------|
| $V_{CEO}$ | collector-emitter voltage | open base                                  | -   | -   | 400 | V    |
| $I_C$     | collector current         |  | -   | -   | 300 | mA   |
| $h_{FE}$  | DC current gain           | $V_{CE} = 10\text{ V}; I_C = 10\text{ mA}$ | 50  | -   | 200 |      |

## 2. Pinning information

**Table 2. Pinning**

| Pin | Description | Simplified outline  | Symbol  |
|-----|-------------|---|---|
| 1   | base        |  |  |
| 2   | emitter     |   |   |
| 3   | collector   |   |   |

*sym021*

## 3. Ordering information

**Table 3. Ordering information**

| Type number | Package |  |         |
|-------------|---------|--|---------|
|             | Name    | Description                              | Version |
| PMBTA44     | -       | plastic surface-mounted package; 3 leads | SOT23   |

## 4. Marking

**Table 4. Marking codes**

| Type number | Marking code <sup>[1]</sup> |
|-------------|-----------------------------|
| PMBTA44     | W3*                         |

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

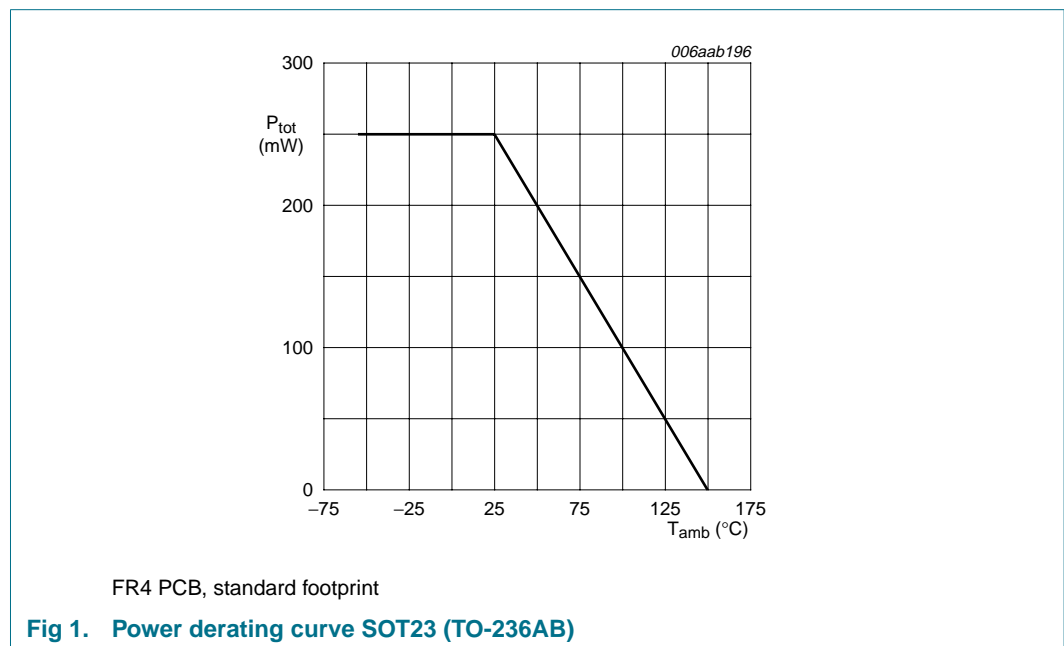
## 5. Limiting values

**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                     | -   | 500  | V    |
| $V_{CEO}$ | collector-emitter voltage | open base                        | -   | 400  | V    |
| $V_{EBO}$ | emitter-base voltage      | open collector                   | -   | 6    | V    |
| $I_C$     | collector current         |                                  | -   | 300  | mA   |
| $I_{CM}$  | peak collector current    | single pulse;<br>$t_p \leq 1$ ms | -   | 300  | mA   |
| $I_{BM}$  | peak base current         | single pulse;<br>$t_p \leq 1$ ms | -   | 100  | mA   |
| $P_{tot}$ | total power dissipation   | $T_{amb} \leq 25$ °C             | [1] | 250  | 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.

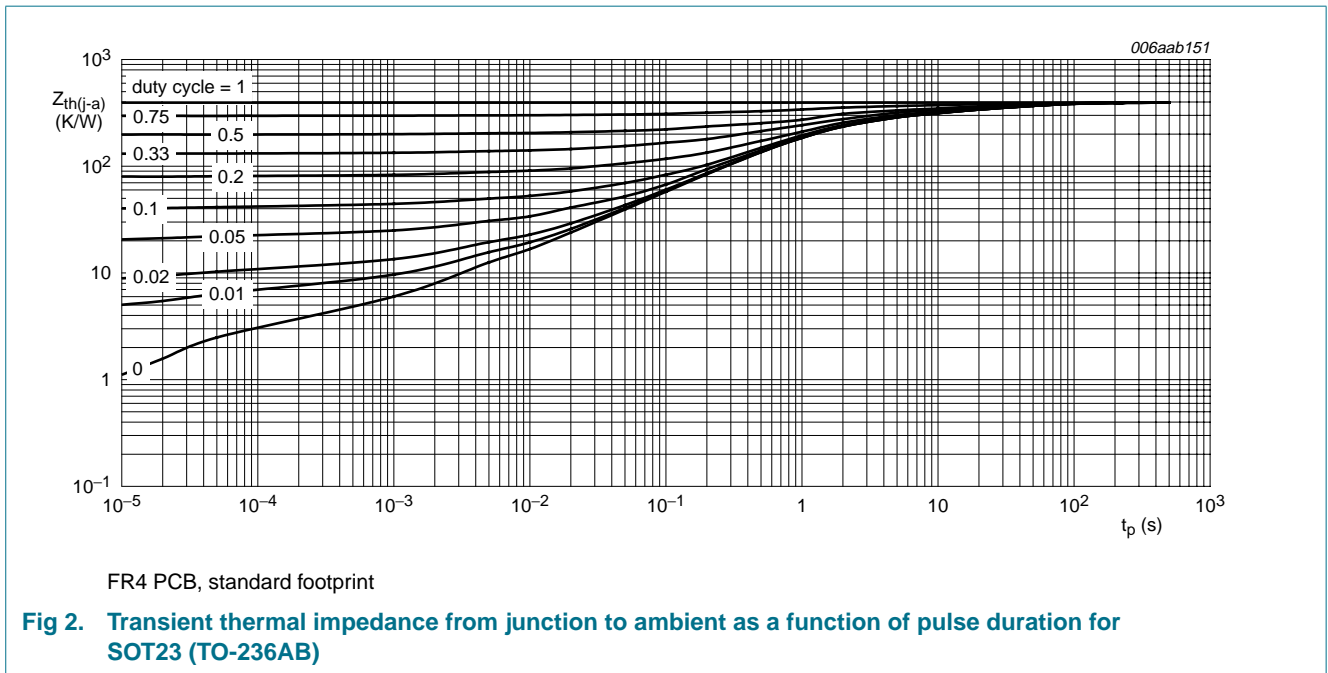


## 6. Thermal characteristics

**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] | -   | -   | 500  | K/W |

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



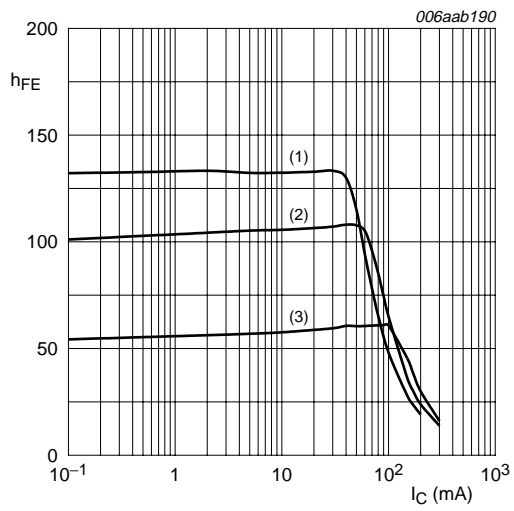
## 7. Characteristics

**Table 7. Characteristics**

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

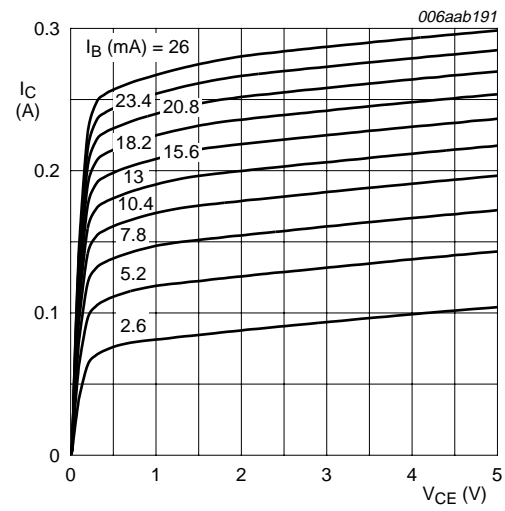
| Symbol      | Parameter                            | Conditions   | Min    | Typ | Max | Unit          |
|-------------|--------------------------------------|--|--------|-----|-----|---------------|
| $I_{CBO}$   | collector-base cut-off current       | $V_{CB} = 320\text{ V}; I_E = 0\text{ A}$                          | -      | -   | 100 | nA            |
|             |                                      | $V_{CB} = 320\text{ V}; I_E = 0\text{ A}; T_j = 150^\circ\text{C}$ | -      | -   | 10  | $\mu\text{A}$ |
| $I_{EBO}$   | emitter-base cut-off current         | $V_{EB} = 4\text{ V}; I_C = 0\text{ A}$                            | -      | -   | 100 | nA            |
| $h_{FE}$    | DC current gain                      | $V_{CE} = 10\text{ V}$   |        |     |     |               |
|             |                                      | $I_C = 10\text{ mA}$   | 50     | -   | 200 |               |
|             |                                      | $I_C = 50\text{ mA}$   | [1] 45 | -   | -   |               |
|             |                                      | $I_C = 100\text{ mA}$  | [1] 40 | -   | -   |               |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C = 1\text{ mA}; I_B = 0.1\text{ mA}$                           | -      | -   | 400 | mV            |
|             |                                      | $I_C = 10\text{ mA}; I_B = 1\text{ mA}$                            | -      | -   | 500 | mV            |
|             |                                      | $I_C = 50\text{ mA}; I_B = 5\text{ mA}$                            | [1] -  | -   | 750 | mV            |
| $V_{BEsat}$ | base-emitter saturation voltage      | $I_C = 10\text{ mA}; I_B = 1\text{ mA}$                            | [1] -  | -   | 850 | mV            |
| $f_T$       | transition frequency                 | $V_{CE} = 10\text{ V}; I_E = 10\text{ mA}; f = 100\text{ MHz}$     | 20     | -   | -   | MHz           |
| $C_c$       | collector capacitance                | $V_{CB} = 20\text{ V}; I_E = I_E = 0\text{ A}; f = 1\text{ MHz}$   | -      | -   | 7   | pF            |
| $C_e$       | emitter capacitance                  | $V_{EB} = 0.5\text{ V}; I_C = I_C = 0\text{ A}; f = 1\text{ MHz}$  | -      | -   | 180 | pF            |

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



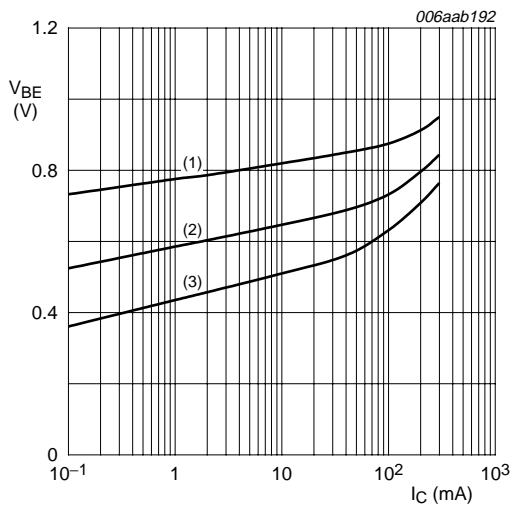
$V_{CE} = 10\text{ V}$   
 (1)  $T_{amb} = 100^\circ C$   
 (2)  $T_{amb} = 25^\circ C$   
 (3)  $T_{amb} = -55^\circ C$

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



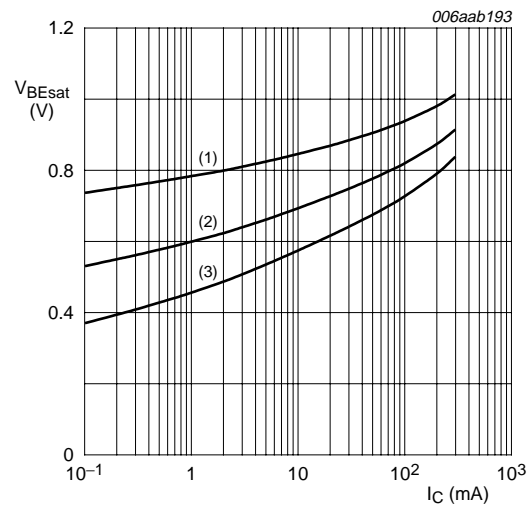
$T_{amb} = 25^\circ C$

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



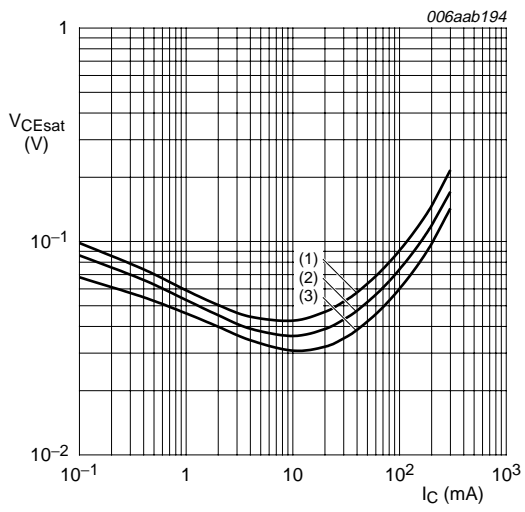
$V_{CE} = 10\text{ V}$   
 (1)  $T_{amb} = -55^\circ C$   
 (2)  $T_{amb} = 25^\circ C$   
 (3)  $T_{amb} = 100^\circ C$

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



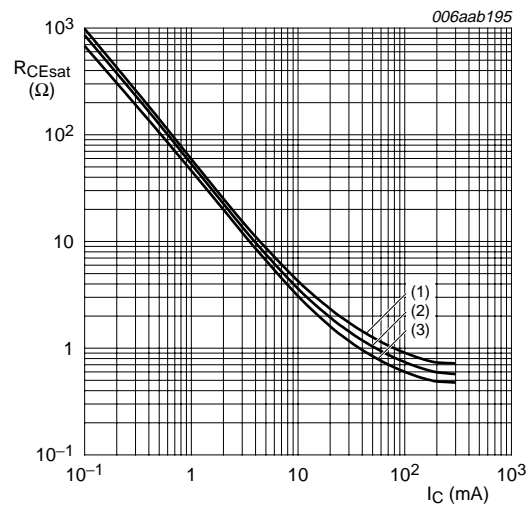
$I_C/I_B = 5$   
 (1)  $T_{amb} = -55^\circ C$   
 (2)  $T_{amb} = 25^\circ C$   
 (3)  $T_{amb} = 100^\circ C$

**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**



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

**Fig 8. 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

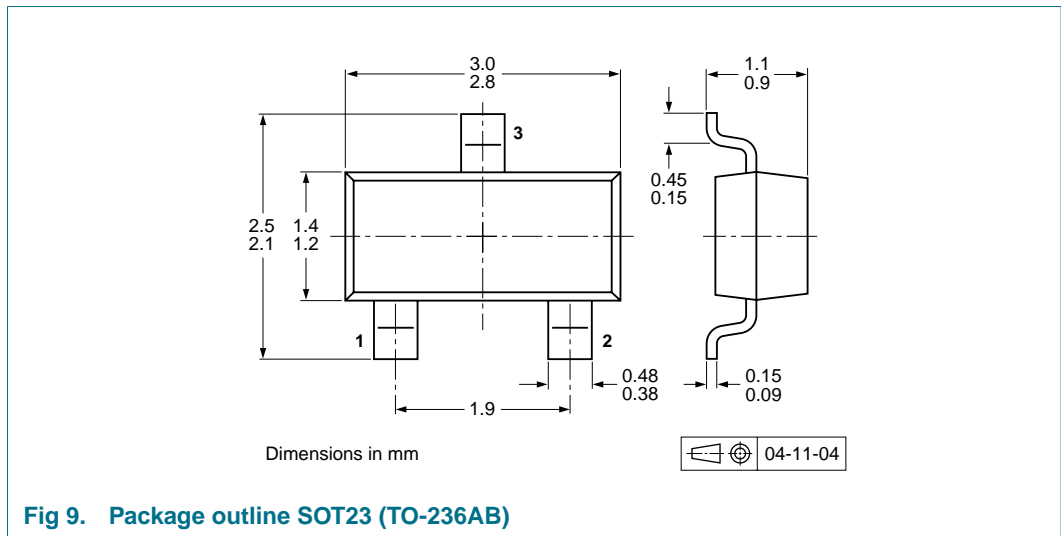


Fig 9. Package outline SOT23 (TO-236AB)

## 10. Packing information

**Table 8. Packing methods**

The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

| Type number | Package | Description                    | Packing quantity |       |
|-------------|---------|--------------------------------|------------------|-------|
|             |         |                                | 3000             | 10000 |
| PMBTA44     | 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

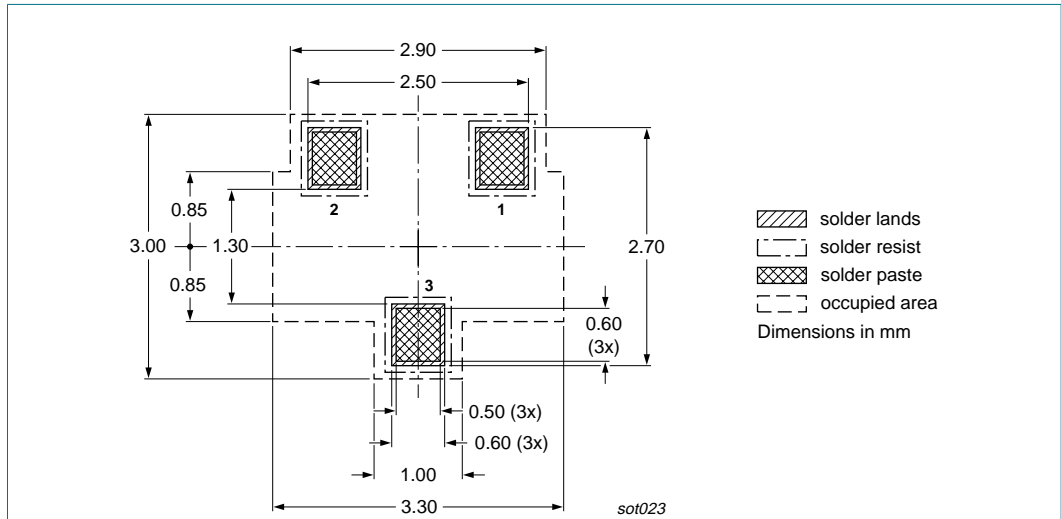


Fig 10. Reflow soldering footprint SOT23 (TO-236AB)

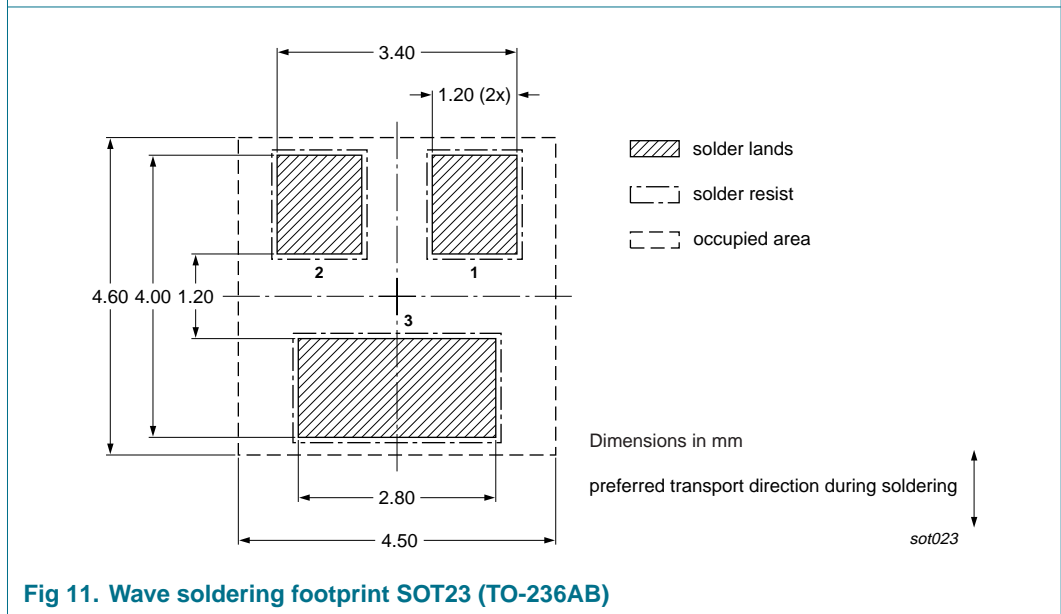


Fig 11. Wave soldering footprint SOT23 (TO-236AB)

## 12. Revision history

Table 9. Revision history

| Document ID | Release date | Data sheet status  | Change notice | Supersedes |
|-------------|--------------|--------------------|---------------|------------|
| PMBTA44_1   | 20080222     | Product data sheet | -             | -          |

## 13. Legal information

### 13.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | 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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