

# BAV23 series

## Dual high-voltage switching diodes

Rev. 06 — 3 March 2008

Product data sheet

## 1. Product profile

### 1.1 General description

Dual high-voltage switching diodes, encapsulated in small Surface-Mounted Device (SMD) plastic packages.

Table 1. Product overview

| Type number <sup>[1]</sup> | Package |          | Configuration       |
|----------------------------|---------|----------|---------------------|
|                            | NXP     | JEDEC    |                     |
| BAV23A/DG                  | SOT23   | TO-236AB | dual common anode   |
| BAV23C/DG                  | SOT23   | TO-236AB | dual common cathode |
| BAV23S                     | SOT23   | TO-236AB | dual series         |
| BAV23S/DG                  |         |          |                     |
| BAV23                      | SOT143B | -        | dual isolated       |
| BAV23/DG                   |         |          |                     |

[1] /DG: halogen free

### 1.2 Features

- High switching speed:  $t_{rr} \leq 50$  ns
- Low leakage current
- Repetitive peak reverse voltage:  $V_{RRM} \leq 250$  V
- Low capacitance:  $C_d \leq 2$  pF
- Small SMD plastic package

### 1.3 Applications

- High-speed switching at high voltage
- High-voltage general-purpose switching

### 1.4 Quick reference data

Table 2. Quick reference data

| Symbol           | Parameter             | Conditions    | Min              | Typ | Max | Unit |
|------------------|-----------------------|---------------|------------------|-----|-----|------|
| <b>Per diode</b> |                       |               |                  |     |     |      |
| $I_R$            | reverse current       | $V_R = 200$ V | -                | -   | 100 | nA   |
| $V_R$            | reverse voltage       |               | -                | -   | 200 | V    |
| $t_{rr}$         | reverse recovery time |               | <sup>[1]</sup> - | -   | 50  | ns   |

[1] When switched from  $I_F = 10$  mA to  $I_R = 10$  mA;  $R_L = 100$   $\Omega$ ; measured at  $I_R = 1$  mA.

**2. Pinning information**

**Table 3. Pinning**

| Pin                      | Description                           | Simplified outline | Graphic symbol   |
|--------------------------|---------------------------------------|--------------------|------------------|
| <b>BAV23A/DG</b>         |                                       |                    |                  |
| 1                        | cathode (diode 1)                     |                    | <p>006aab099</p> |
| 2                        | cathode (diode 2)                     |                    |                  |
| 3                        | common anode                          |                    |                  |
| <b>BAV23C/DG</b>         |                                       |                    |                  |
| 1                        | anode (diode 1)                       |                    | <p>006aab034</p> |
| 2                        | anode (diode 2)                       |                    |                  |
| 3                        | common cathode                        |                    |                  |
| <b>BAV23S; BAV23S/DG</b> |                                       |                    |                  |
| 1                        | anode (diode 1)                       |                    | <p>006aaa763</p> |
| 2                        | cathode (diode 2)                     |                    |                  |
| 3                        | cathode (diode 1),<br>anode (diode 2) |                    |                  |
| <b>BAV23; BAV23/DG</b>   |                                       |                    |                  |
| 1                        | cathode (diode 1)                     |                    | <p>006aab100</p> |
| 2                        | cathode (diode 2)                     |                    |                  |
| 3                        | anode (diode 2)                       |                    |                  |
| 4                        | anode (diode 1)                       |                    |                  |

### 3. Ordering information

Table 4. Ordering information

| Type number | Package |  |         |
|-------------|---------|--|---------|
|             | Name    | Description                              | Version |
| BAV23A/DG   | -       | plastic surface-mounted package; 3 leads | SOT23   |
| BAV23C/DG   |         |  |         |
| BAV23S      |         |  |         |
| BAV23S/DG   |         |  |         |
| BAV23       | -       | plastic surface-mounted package; 4 leads | SOT143B |
| BAV23/DG    |         |  |         |

### 4. Marking

Table 5. Marking codes

| Type number | Marking code <sup>[1]</sup> |
|-------------|-----------------------------|
| BAV23A/DG   | ZY*                         |
| BAV23C/DG   | ZX*                         |
| BAV23S      | *V5                         |
| BAV23S/DG   | YD*                         |
| BAV23       | L30                         |
| BAV23/DG    | *N1                         |

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

### 5. Limiting values

Table 6. Limiting values

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

| Symbol           | Parameter                           | Conditions        | Min | Max | Unit |
|------------------|-------------------------------------|-------------------|-----|-----|------|
| <b>Per diode</b> |                                     |                   |     |     |      |
| $V_{RRM}$        | repetitive peak reverse voltage     |                   | -   | 250 | V    |
| $V_R$            | reverse voltage                     |                   | -   | 200 | V    |
| $I_F$            | forward current                     | [1]               | -   | 225 | mA   |
|                  |                                     | [2]               | -   | 125 | mA   |
| $I_{FRM}$        | repetitive peak forward current     |                   | -   | 625 | mA   |
| $I_{FSM}$        | non-repetitive peak forward current | square wave       | [3] |     |      |
|                  |                                     | $t_p = 1 \mu s$   | -   | 9   | A    |
|                  |                                     | $t_p = 100 \mu s$ | -   | 3   | A    |
|                  |                                     | $t_p = 10 ms$     | -   | 1.7 | A    |

**Table 6. Limiting values ...continued**

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

| Symbol            | Parameter               | Conditions                  | Min   | Max  | Unit |
|-------------------|-------------------------|-----------------------------|-------|------|------|
| <b>Per device</b> |                         |                             |       |      |      |
| $P_{tot}$         | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [4] - | 250  | mW   |
| $T_j$             | junction temperature    |                             | -     | 150  | °C   |
| $T_{amb}$         | ambient temperature     |                             | -65   | +150 | °C   |
| $T_{stg}$         | storage temperature     |                             | -65   | +150 | °C   |

[1] Single diode loaded.

[2] Double diode loaded.

[3]  $T_j = 25\text{ °C}$  prior to surge.

[4] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

## 6. Thermal characteristics

**Table 7. Thermal characteristics**

| Symbol            | Parameter  | Conditions  | Min   | Typ | Max | Unit |
|-------------------|--|-------------|-------|-----|-----|------|
| <b>Per device</b> |  |             |       |     |     |      |
| $R_{th(j-a)}$     | thermal resistance from junction to ambient      | in free air | [1] - | -   | 500 | K/W  |
| $R_{th(j-sp)}$    | thermal resistance from junction to solder point |             | -     | -   | 360 | K/W  |

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

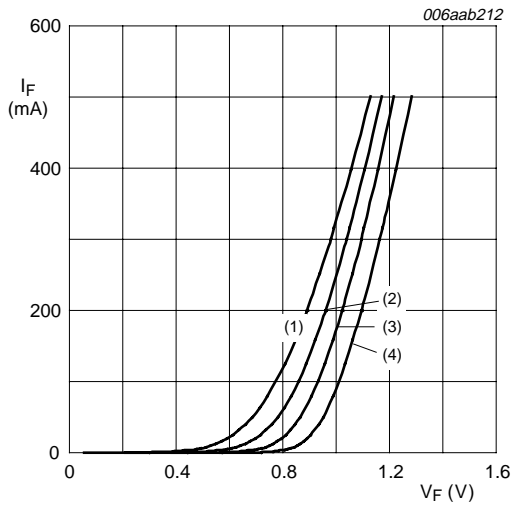
## 7. Characteristics

**Table 8. Characteristics**

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

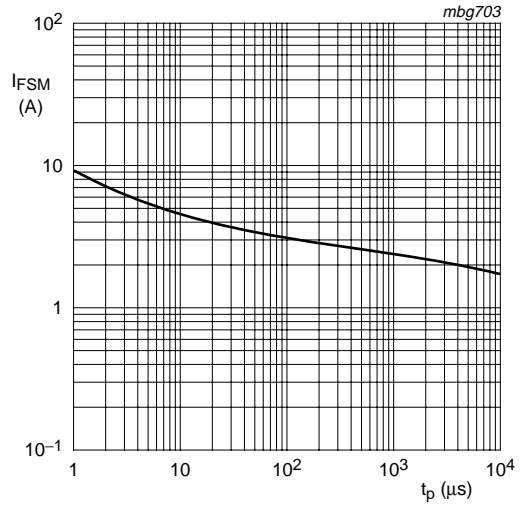
| Symbol           | Parameter             | Conditions                                | Min   | Typ | Max  | Unit |
|------------------|-----------------------|---|-------|-----|------|------|
| <b>Per diode</b> |                       |   |       |     |      |      |
| $V_F$            | forward voltage       | $I_F = 100\text{ mA}$                     | -     | -   | 1.0  | V    |
|                  |                       | $I_F = 200\text{ mA}$                     | -     | -   | 1.25 | V    |
| $I_R$            | reverse current       | $V_R = 200\text{ V}$                      | -     | -   | 100  | nA   |
|                  |                       | $V_R = 200\text{ V}; T_j = 150\text{ °C}$ | -     | -   | 100  | μA   |
| $C_d$            | diode capacitance     | $f = 1\text{ MHz}; V_R = 0\text{ V}$      | -     | -   | 2    | pF   |
| $t_{rr}$         | reverse recovery time |   | [1] - | -   | 50   | ns   |

[1] When switched from  $I_F = 10\text{ mA}$  to  $I_R = 10\text{ mA}$ ;  $R_L = 100\text{ }\Omega$ ; measured at  $I_R = 1\text{ mA}$ .



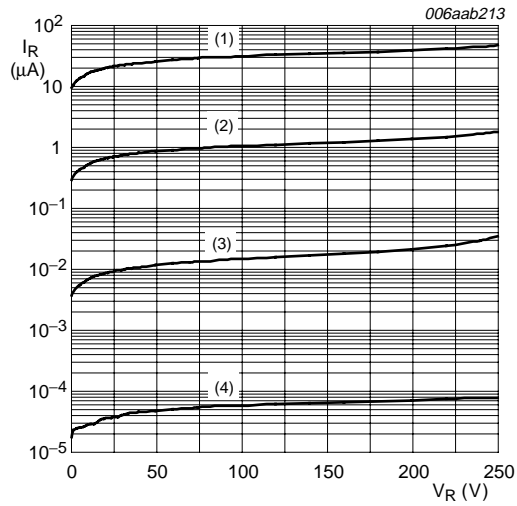
- (1)  $T_{amb} = 150\text{ °C}$
- (2)  $T_{amb} = 85\text{ °C}$
- (3)  $T_{amb} = 25\text{ °C}$
- (4)  $T_{amb} = -40\text{ °C}$

**Fig 1. Forward current as a function of forward voltage; typical values**



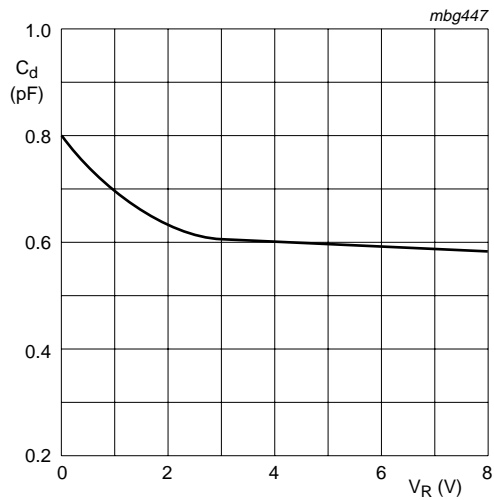
Based on square wave currents.  
 $T_j = 25\text{ °C}$ ; prior to surge

**Fig 2. Non-repetitive peak forward current as a function of pulse duration; maximum values**



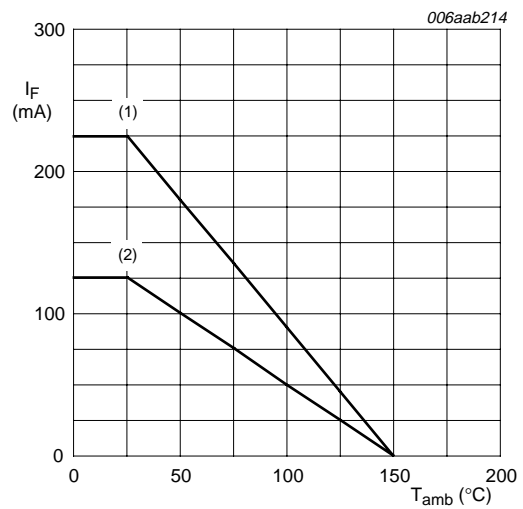
- (1)  $T_{amb} = 150\text{ °C}$
- (2)  $T_{amb} = 85\text{ °C}$
- (3)  $T_{amb} = 25\text{ °C}$
- (4)  $T_{amb} = -40\text{ °C}$

**Fig 3. Reverse current as a function of reverse voltage; typical values**



f = 1 MHz; T<sub>amb</sub> = 25 °C

**Fig 4. Diode capacitance as a function of reverse voltage; typical values**

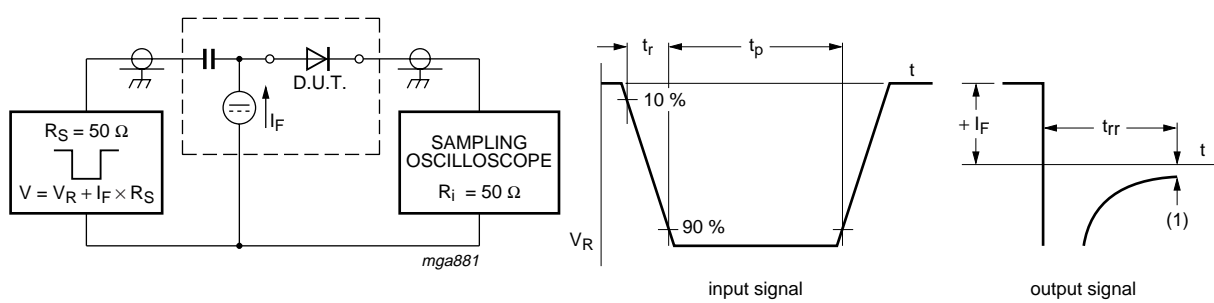


FR4 PCB, standard footprint

- (1) Single diode loaded.
- (2) Double diode loaded.

**Fig 5. Forward current as a function of ambient temperature; derating curve**

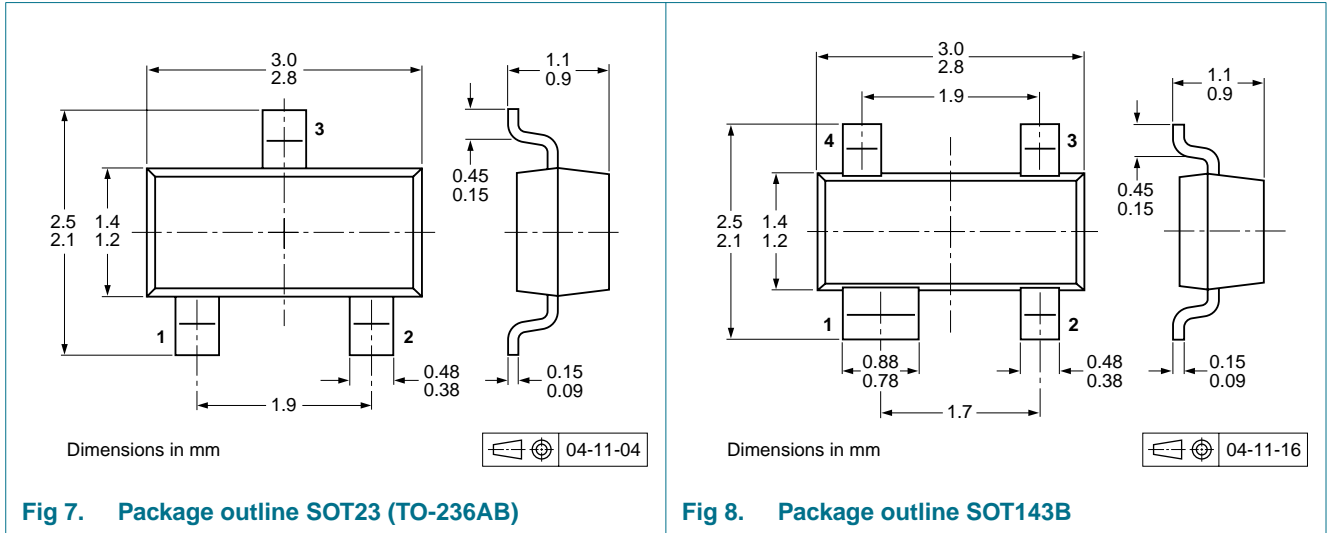
## 8. Test information



(1) I<sub>R</sub> = 3 mA

**Fig 6. Reverse recovery time test circuit and waveforms**

**9. Package outline**



**Fig 7. Package outline SOT23 (TO-236AB)**

**Fig 8. Package outline SOT143B**

**10. Packing information**

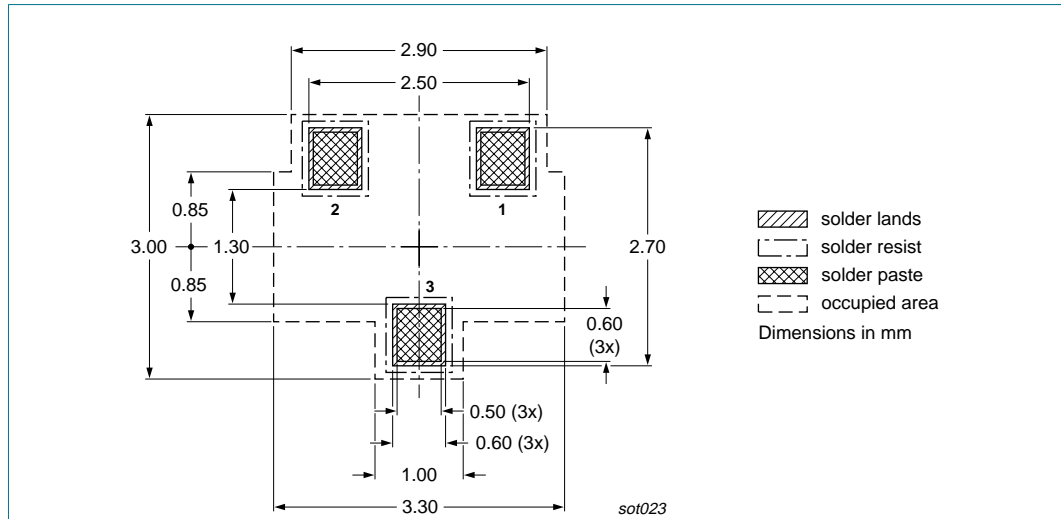
**Table 9. Packing methods**

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

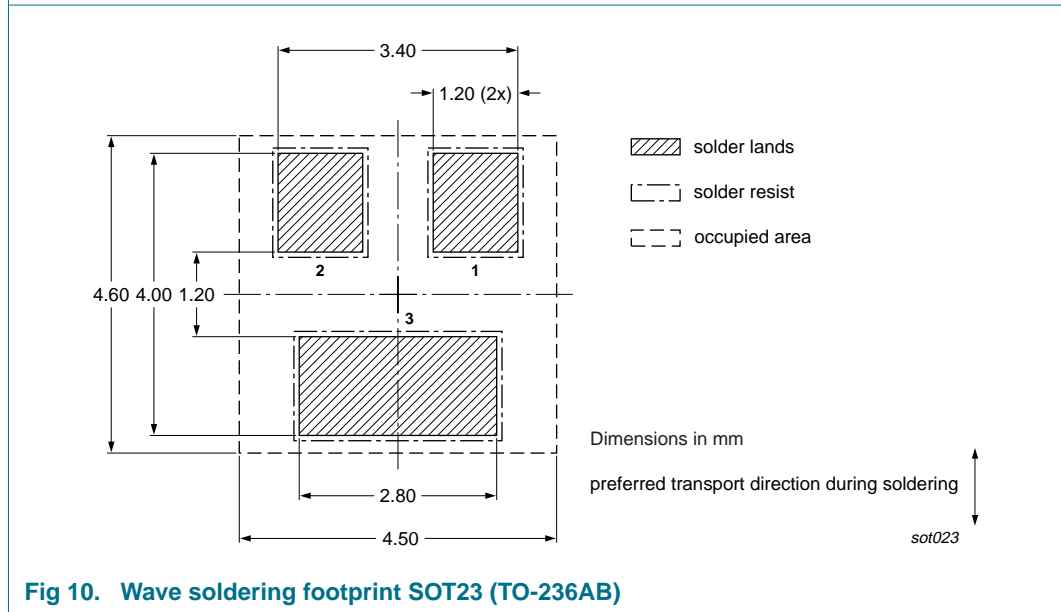
| Type number | Package | Description                    | Packing quantity |       |
|-------------|---------|--------------------------------|------------------|-------|
|             |         |                                | 3000             | 10000 |
| BAV23A/DG   | SOT23   | 4 mm pitch, 8 mm tape and reel | -215             | -235  |
| BAV23C/DG   |         |                                |                  |       |
| BAV23S      |         |                                |                  |       |
| BAV23S/DG   |         |                                |                  |       |
| BAV23       | SOT143B | 4 mm pitch, 8 mm tape and reel | -215             | -235  |
| BAV23/DG    |         |                                |                  |       |

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

**11. Soldering**

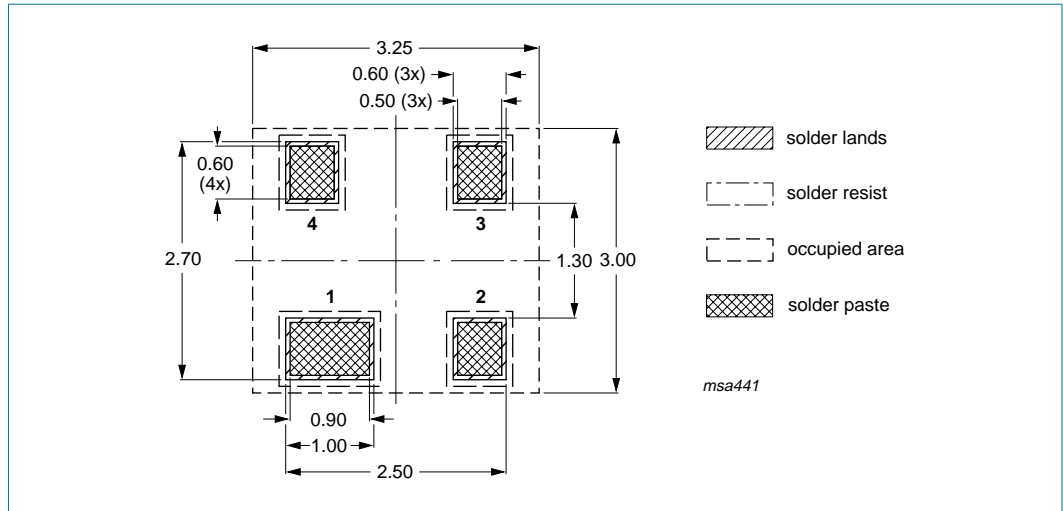


**Fig 9. Reflow soldering footprint SOT23 (TO-236AB)**



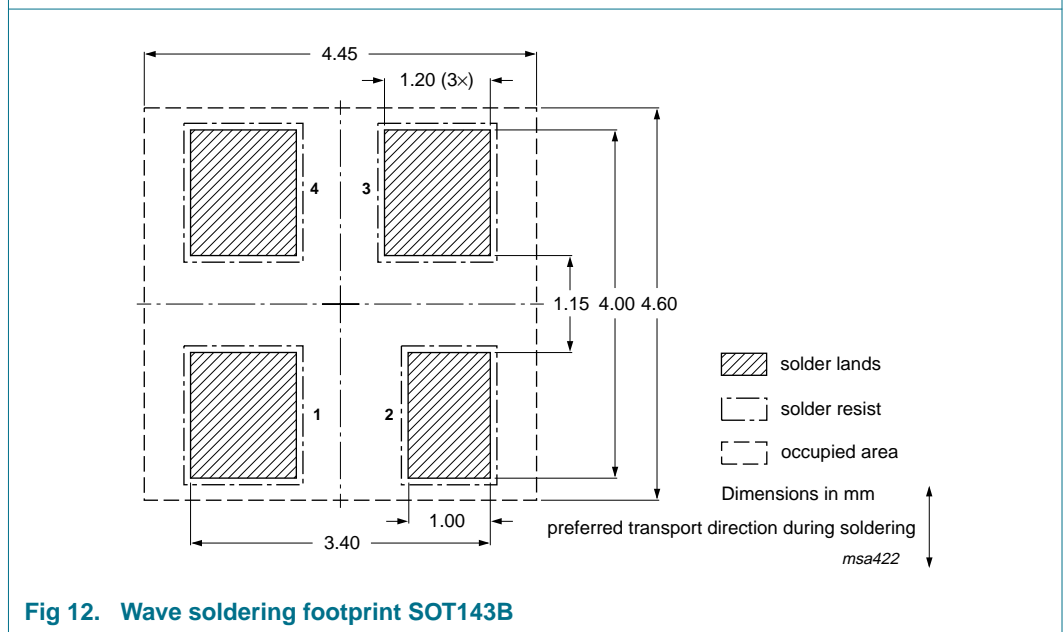
**Fig 10. Wave soldering footprint SOT23 (TO-236AB)**





Dimensions in mm

**Fig 11. Reflow soldering footprint SOT143B**



**Fig 12. Wave soldering footprint SOT143B**

## 12. Revision history

**Table 10. Revision history**

| Document ID    | Release date | Data sheet status   | Change notice | Supersedes          |
|----------------|--------------|---|---------------|---------------------|
| BAV23_SER_6    | 20080303     | Product data sheet  | -             | BAV23S_5<br>BAV23_2 |
| Modifications: |              | <ul style="list-style-type: none"> <li>• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>• Legal texts have been adapted to the new company name where appropriate.</li> <li>• Type numbers BAV23A/DG, BAV23C/DG, BAV23S/DG and BAV23/DG added</li> <li>• <a href="#">Table 1 “Product overview”</a>: added</li> <li>• <a href="#">Table 2 “Quick reference data”</a>: added</li> <li>• <a href="#">Table 5 “Marking codes”</a>: amended</li> <li>• <a href="#">Table 8</a>: for BAV23 and BAV23S maximum value for <math>C_d</math> diode capacitance amended to 2 pF</li> <li>• <a href="#">Figure 7</a> and <a href="#">8</a>: superseded by minimized package outline drawings</li> <li>• <a href="#">Section 10 “Packing information”</a>: added</li> <li>• <a href="#">Section 11 “Soldering”</a>: added</li> <li>• <a href="#">Section 13 “Legal information”</a>: updated</li> </ul> |               |                     |
| BAV23S_5       | 20011012     | Product specification   | -             | BAV23S_4            |
| BAV23_2        | 19960917     | Product specification   | -             | BAV23_1             |

## 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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