

# BAV23 series

## Dual high-voltage switching diodes

Rev. 07 — 19 March 2010

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 | Package  |          | Configuration       |
|-------------|----------|----------|---------------------|
|             | Nexperia | JEDEC    |                     |
| BAV23A      | SOT23    | TO-236AB | dual common anode   |
| BAV23C      | SOT23    | TO-236AB | dual common cathode |
| BAV23S      | SOT23    | TO-236AB | dual series         |
| BAV23       | SOT143B  | -        | dual isolated       |

### 1.2 Features and benefits

- 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

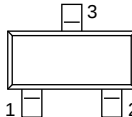
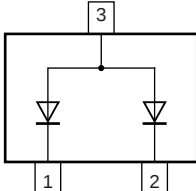
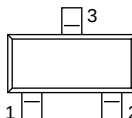
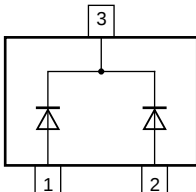
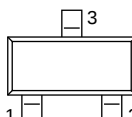
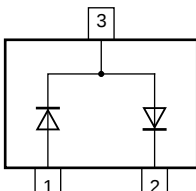
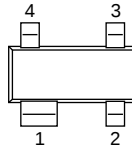
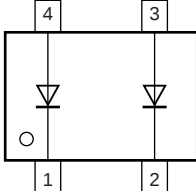
Table 2. Quick reference data

| Symbol    | Parameter             | Conditions    | Min                   | Typ | Max | Unit |
|-----------|-----------------------|---------------|-----------------------|-----|-----|------|
| Per diode |                       |               |                       |     |     |      |
| $I_R$     | reverse current       | $V_R = 200$ V | -                     | -   | 100 | nA   |
| $V_R$     | reverse voltage       |               | -                     | -   | 200 | V    |
| $t_{rr}$  | reverse recovery time |               | <a href="#">[1]</a> - | -   | 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                                                                                     |
|--------|---------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| BAV23A |                                       |                                                                                       |                                                                                                    |
| 1      | cathode (diode 1)                     |    | <br>006aab099   |
| 2      | cathode (diode 2)                     |                                                                                       |                                                                                                    |
| 3      | common anode                          |                                                                                       |                                                                                                    |
| BAV23C |                                       |                                                                                       |                                                                                                    |
| 1      | anode (diode 1)                       |    | <br>006aab034  |
| 2      | anode (diode 2)                       |                                                                                       |                                                                                                    |
| 3      | common cathode                        |                                                                                       |                                                                                                    |
| BAV23S |                                       |                                                                                       |                                                                                                    |
| 1      | anode (diode 1)                       |  | <br>006aaa763 |
| 2      | cathode (diode 2)                     |                                                                                       |                                                                                                    |
| 3      | cathode (diode 1),<br>anode (diode 2) |                                                                                       |                                                                                                    |
| BAV23  |                                       |                                                                                       |                                                                                                    |
| 1      | cathode (diode 1)                     |  | <br>006aab100 |
| 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      | -       | plastic surface-mounted package; 3 leads | SOT23   |
| BAV23C      |         |                                          |         |
| BAV23S      |         |                                          |         |
| BAV23       | -       | plastic surface-mounted package; 4 leads | SOT143B |

### 4. Marking

Table 5. Marking codes

| Type number | Marking code <sup>[1]</sup> |
|-------------|-----------------------------|
| BAV23A      | *V0                         |
| BAV23C      | *V9                         |
| BAV23S      | *V5                         |
| BAV23       | *L3                         |

[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                     | <sup>[1]</sup>    | -              | 225 | mA   |
|                  |                                     | <sup>[2]</sup>    | -              | 125 | mA   |
| $I_{FRM}$        | repetitive peak forward current     |                   | -              | 625 | mA   |
| $I_{FSM}$        | non-repetitive peak forward current | square wave       | <sup>[3]</sup> |     |      |
|                  |                                     | $t_p = 1 \mu s$   | -              | 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> |                         |                                    |       |      |      |
| $P_{\text{tot}}$  | total power dissipation | $T_{\text{amb}} \leq 25\text{ °C}$ | [4] - | 250  | mW   |
| $T_{\text{j}}$    | junction temperature    |                                    | -     | 150  | °C   |
| $T_{\text{amb}}$  | ambient temperature     |                                    | -65   | +150 | °C   |
| $T_{\text{stg}}$  | storage temperature     |                                    | -65   | +150 | °C   |

[1] Single diode loaded.

[2] Double diode loaded.

[3]  $T_{\text{j}} = 25\text{ °C}$  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>     |                                                  |             |       |     |     |      |
| $R_{\text{th(j-a)}}$  | thermal resistance from junction to ambient      | in free air | [1] - | -   | 500 | K/W  |
| $R_{\text{th(j-sp)}}$ | thermal resistance from junction to solder point |             | -     | -   | 360 | K/W  |

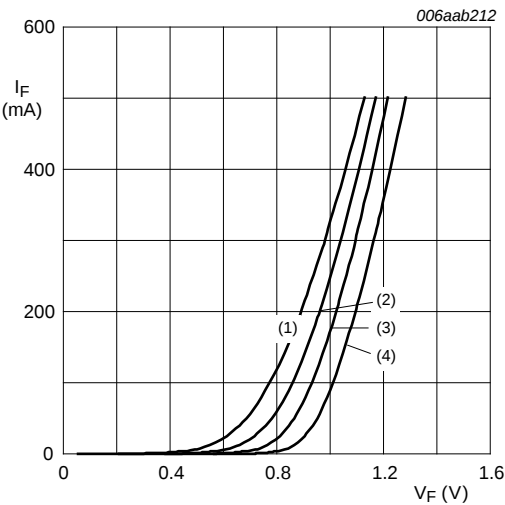
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

## 7. Characteristics

**Table 8. Characteristics** $T_{\text{amb}} = 25\text{ °C}$  unless otherwise specified.

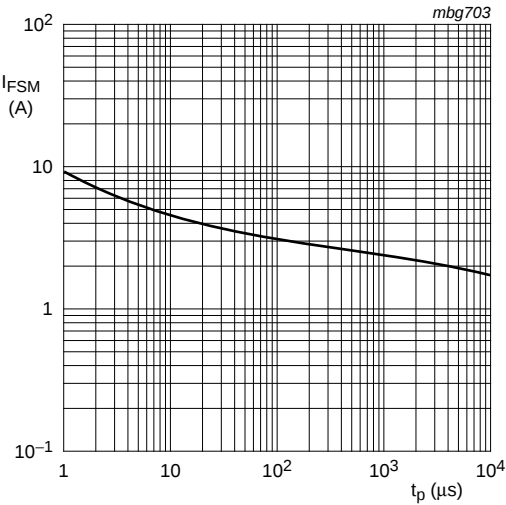
| Symbol           | Parameter             | Conditions                                                  | Min   | Typ | Max  | Unit |
|------------------|-----------------------|-------------------------------------------------------------|-------|-----|------|------|
| <b>Per diode</b> |                       |                                                             |       |     |      |      |
| $V_{\text{F}}$   | forward voltage       | $I_{\text{F}} = 100\text{ mA}$                              | -     | -   | 1.0  | V    |
|                  |                       | $I_{\text{F}} = 200\text{ mA}$                              | -     | -   | 1.25 | V    |
| $I_{\text{R}}$   | reverse current       | $V_{\text{R}} = 200\text{ V}$                               | -     | -   | 100  | nA   |
|                  |                       | $V_{\text{R}} = 200\text{ V}; T_{\text{j}} = 150\text{ °C}$ | -     | -   | 100  | μA   |
| $C_{\text{d}}$   | diode capacitance     | $f = 1\text{ MHz}; V_{\text{R}} = 0\text{ V}$               | -     | -   | 2    | pF   |
| $t_{\text{rr}}$  | reverse recovery time |                                                             | [1] - | -   | 50   | ns   |

[1] When switched from  $I_{\text{F}} = 10\text{ mA}$  to  $I_{\text{R}} = 10\text{ mA}$ ;  $R_{\text{L}} = 100\text{ Ω}$ ; measured at  $I_{\text{R}} = 1\text{ mA}$ .



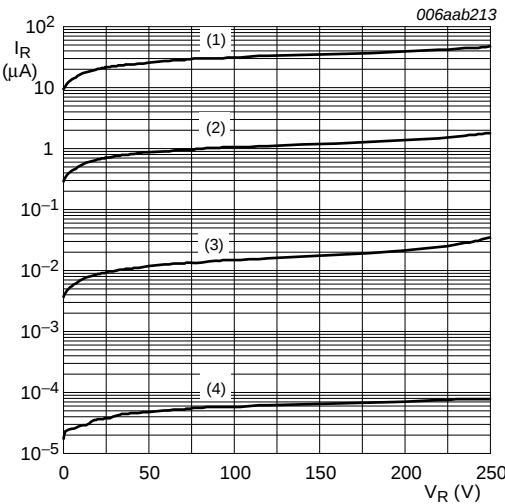
- (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}$
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}$
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



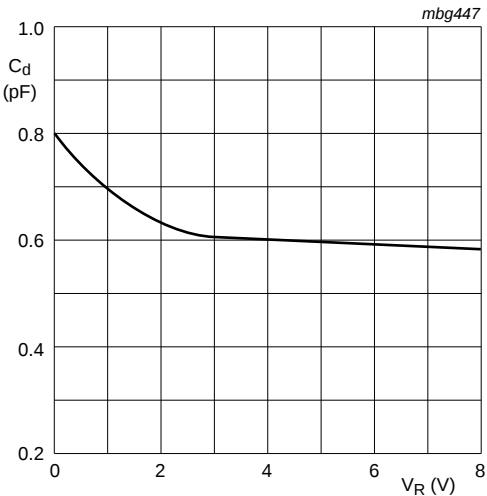
Based on square wave currents.  
 $T_J = 25\text{ }^{\circ}\text{C}$ ; prior to surge

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



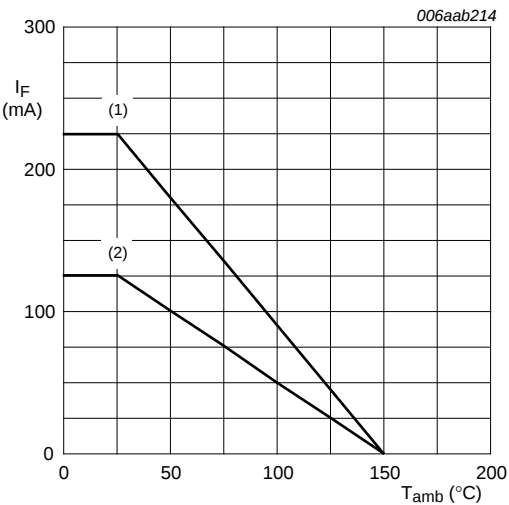
- (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}$
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}$
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



$f = 1 \text{ MHz}$ ;  $T_{\text{amb}} = 25 \text{ }^{\circ}\text{C}$

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

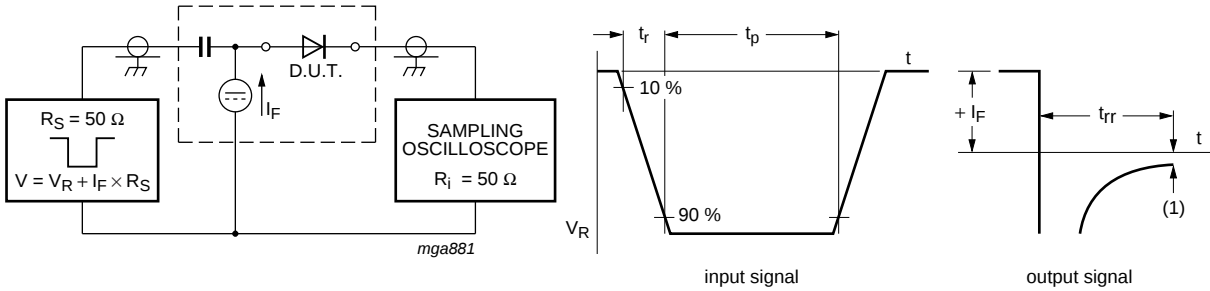


FR4 PCB, standard footprint

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

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

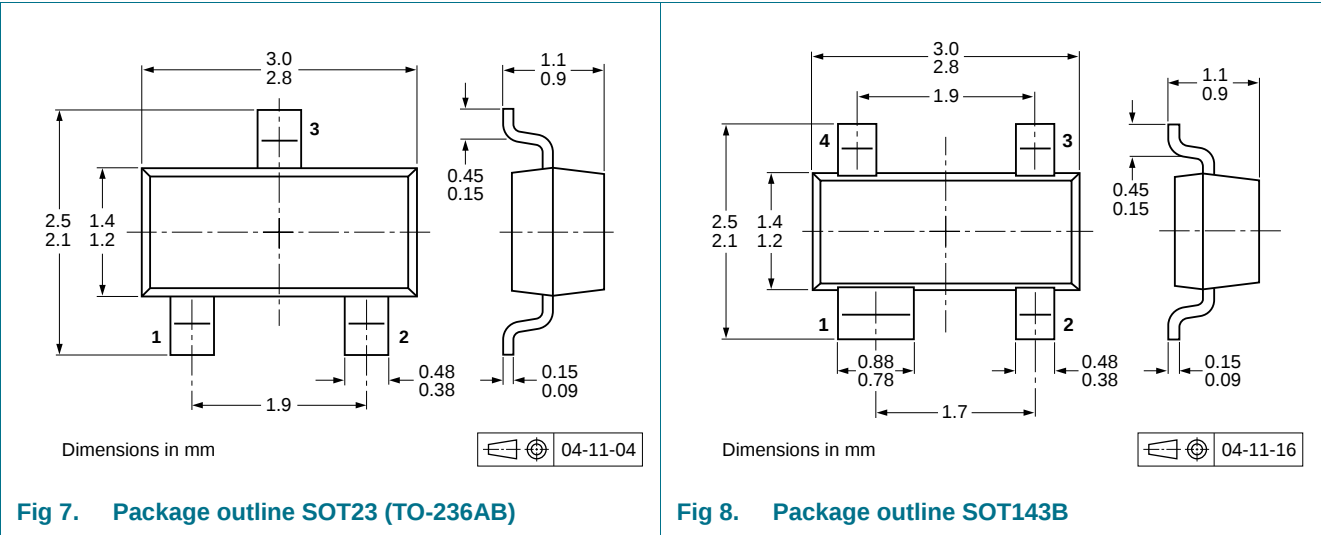
8. Test information



(1)  $I_R = 1 \text{ mA}$

Fig 6. Reverse recovery time test circuit and waveforms

9. Package outline



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      | SOT23   | 4 mm pitch, 8 mm tape and reel | -215             | -235  |
| BAV23C      |         |                                |                  |       |
| BAV23S      |         |                                |                  |       |
| BAV23       | SOT143B | 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

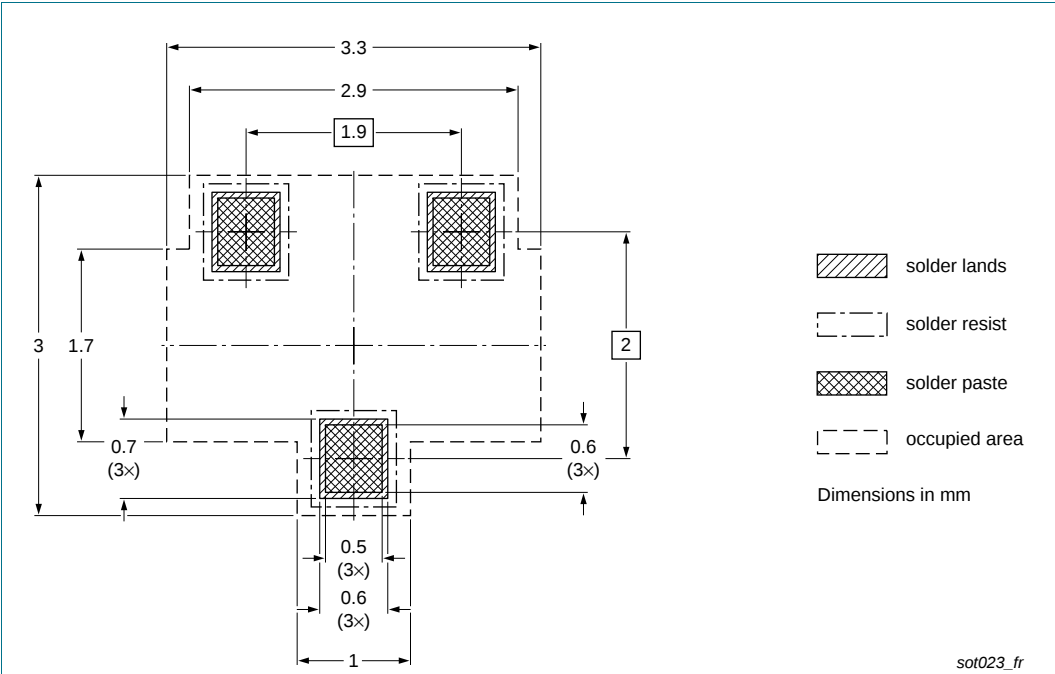


Fig 9. Reflow soldering footprint SOT23 (TO-236AB)

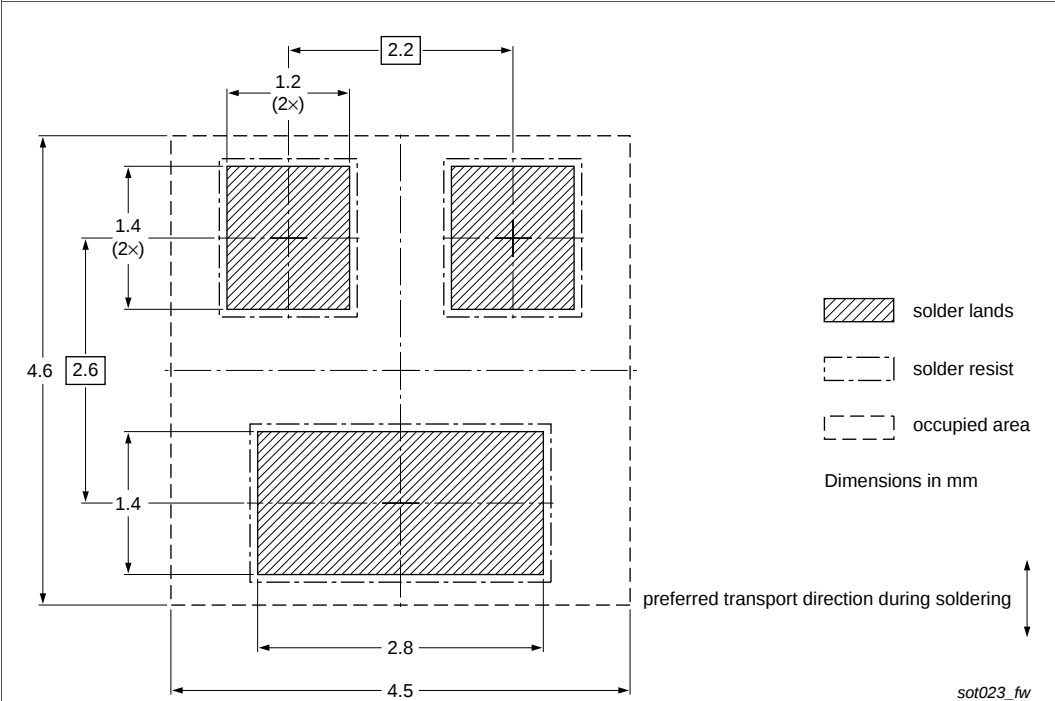


Fig 10. Wave soldering footprint SOT23 (TO-236AB)

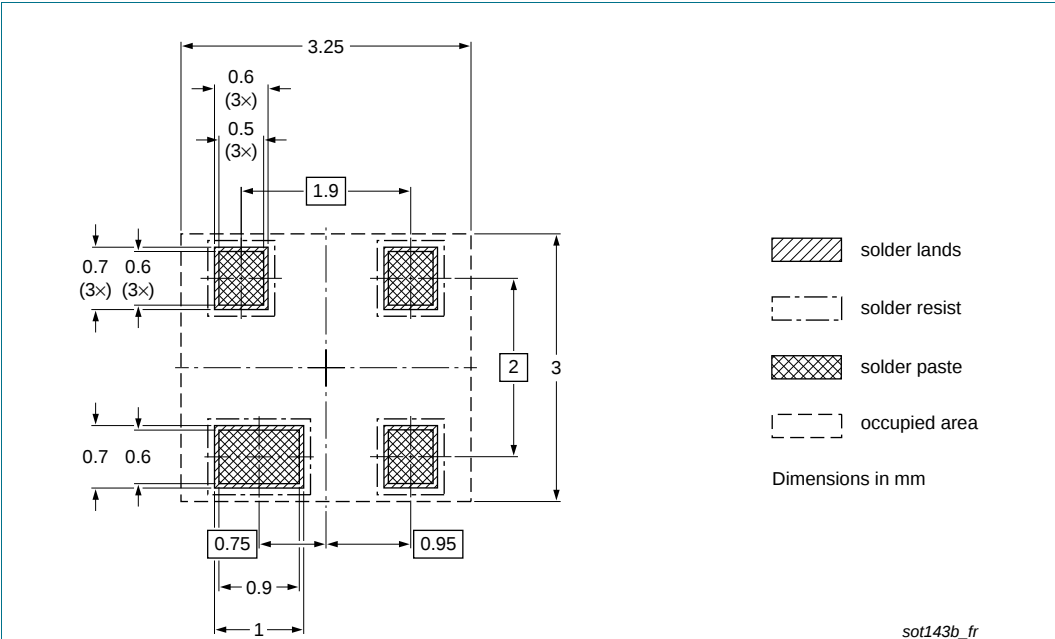


Fig 11. Reflow soldering footprint SOT143B

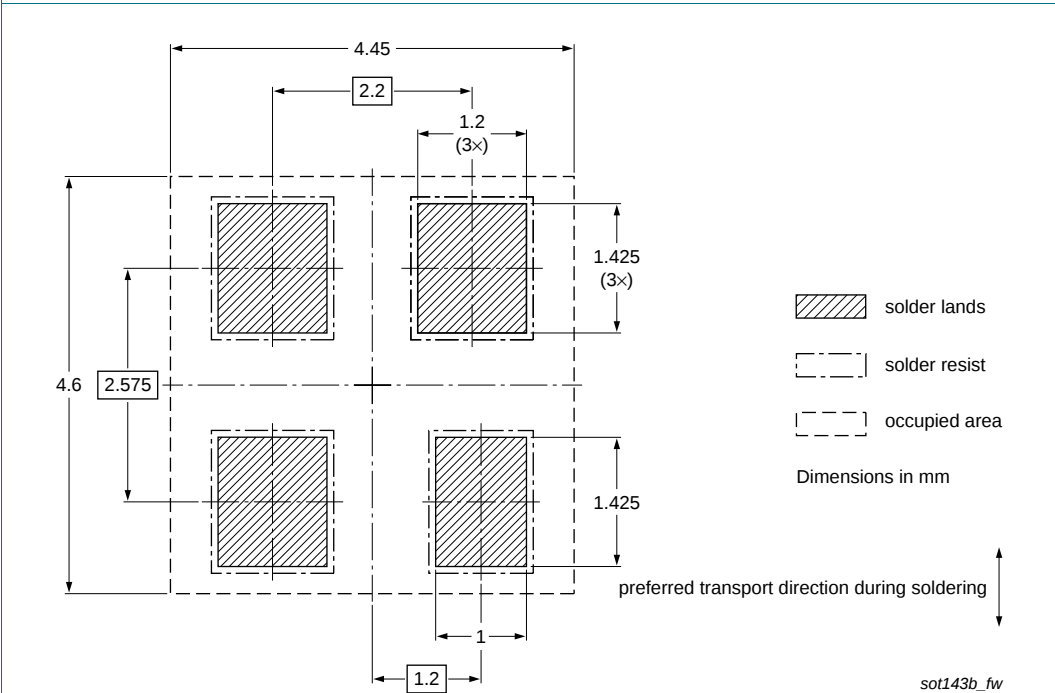


Fig 12. Wave soldering footprint SOT143B

## 12. Revision history

Table 10. Revision history

| Document ID    | Release date                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Data sheet status     | Change notice | Supersedes          |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------|---------------------|
| BAV23_SER_7    | 20100319                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Product data sheet    | -             | BAV23_SER_6         |
| Modifications: | <ul style="list-style-type: none"><li>• Type numbers BAV23A/DG, BAV23C/DG, BAV23S/DG and BAV23/DG deleted</li><li>• Type numbers BAV23A and BAV23C added</li><li>• <a href="#">Table 5 "Marking codes"</a>: updated</li><li>• <a href="#">Figure 6</a>: adaptation of test condition to specified characteristics in <a href="#">Table 8</a></li><li>• <a href="#">Figure 9, 10, 11</a> and <a href="#">12</a>: updated</li><li>• <a href="#">Section 13 "Legal information"</a>: updated</li></ul> |                       |               |                     |
| BAV23_SER_6    | 20080303                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Product data sheet    | -             | BAV23S_5<br>BAV23_2 |
| 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.nexperia.com>.

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## 15. Contents

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- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
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- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



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