# BAV70 series

## High-speed switching diodes

Rev. 8 — 18 March 2015 Product data sheet

## 1. Product profile

### 1.1 General description

High-speed switching diodes, encapsulated in small Surface-Mounted Device (SMD) plastic packages.

**Table 1. Product overview**

| Type number | Package | | | Package configuration | Configuration |
|---|---|---|---|---|---|
| | Nexperia | JEITA | JEDEC | | |
| BAV70 | SOT23 | - | TO-236AB | small | dual common cathode |
| BAV70M | SOT883 | SC-101 | - | leadless ultra small | dual common cathode |
| BAV70S | SOT363 | SC-88 | - | very small | quadruple common cathode/common cathode |
| BAV70T | SOT416 | SC-75 | - | ultra small | dual common cathode |
| BAV70W | SOT323 | SC-70 | - | very small | dual common cathode |

### 1.2 Features and benefits

- High switching speed: $t_{rr} \leq 4$ ns
- Low leakage current
- Small SMD plastic packages
- Low capacitance: $C_d \leq 1.5$ pF
- Reverse voltage: $V_R \leq 100$ V
- AEC-Q101 qualified

### 1.3 Applications

- High-speed switching
- General-purpose switching

### 1.4 Quick reference data

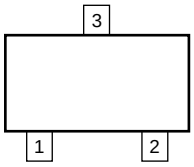
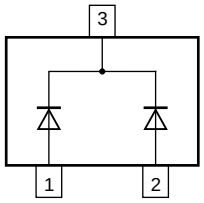
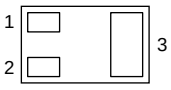
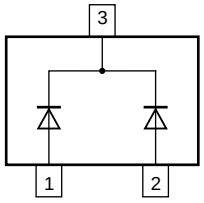
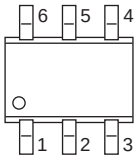
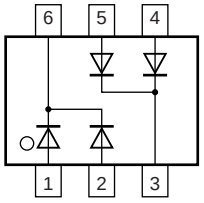
**Table 2. Quick reference data**

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Per diode** | | | | | | |
| $I_R$ | reverse current | $V_R$ = 80 V | - | - | 0.5 | µA |
| $V_R$ | reverse voltage | | - | - | 100 | V |
| $t_{rr}$ | reverse recovery time | [1] | - | - | 4 | ns |

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

## 2. Pinning information

**Table 3. Pinning**

| Pin | Description | Simplified outline | Symbol |
|---|---|---|---|
| **BAV70; BAV70T; BAV70W** | | | |
| 1 | anode (diode 1) |  006aaa144 |  006aab034 |
| 2 | anode (diode 2) | | |
| 3 | common cathode | | |
| **BAV70M** | | | |
| 1 | anode (diode 1) |  Transparent top view |  006aab034 |
| 2 | anode (diode 2) | | |
| 3 | common cathode | | |
| **BAV70S** | | | |
| 1 | anode (diode 1) |  |  006aab104 |
| 2 | anode (diode 2) | | |
| 3 | common cathode (diode 3 and diode 4) | | |
| 4 | anode (diode 3) | | |
| 5 | anode (diode 4) | | |
| 6 | common cathode (diode 1 and diode 2) | | |

## 3. Ordering information

**Table 4. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| BAV70 | - | plastic surface-mounted package; 3 leads | SOT23 |
| BAV70M | SC-101 | leadless ultra small plastic package; 3 solder lands; body 1.0 × 0.6 × 0.5 mm | SOT883 |
| BAV70S | SC-88 | plastic surface-mounted package; 6 leads | SOT363 |
| BAV70T | SC-75 | plastic surface-mounted package; 3 leads | SOT416 |
| BAV70W | SC-70 | plastic surface-mounted package; 3 leads | SOT323 |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## 4. Marking

**Table 5. Marking codes**

| Type number | Marking code[1] |
|---|---|
| BAV70 | A4* |
| BAV70M | S4 |
| BAV70S | A4* |
| BAV70T | A4 |
| BAV70W | A4* |

[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 |
|---|---|---|---|---|---|
| **Per diode** | | | | | |
| $V_{RRM}$ | repetitive peak reverse voltage | | - | 100 | V |
| $V_R$ | reverse voltage | | - | 100 | V |
| $I_F$ | forward current | | | | |
| | BAV70 | $T_{amb} \leq 25$ °C | - | 215 | mA |
| | BAV70M | $T_s = 90$ °C | - | 150 | mA |
| | BAV70S | $T_s = 60$ °C | - | 250 | mA |
| | BAV70T | $T_s = 90$ °C | - | 150 | mA |
| | BAV70W | $T_{amb} \leq 25$ °C | - | 175 | mA |
| $I_{FRM}$ | repetitive peak forward current | | | | |
| | BAV70 | | - | 450 | mA |
| | BAV70M | | - | 500 | mA |
| | BAV70S | | - | 450 | mA |
| | BAV70T | | - | 500 | mA |
| | BAV70W | | - | 500 | mA |
| $I_{FSM}$ | non-repetitive peak forward current | square wave [1] | | | |
| | | $t_p = 1$ µs | - | 4 | A |
| | | $t_p = 1$ ms | - | 1 | A |
| | | $t_p = 1$ s | - | 0.5 | A |


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

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

| Symbol | Parameter | Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| $P_{tot}$ | total power dissipation | [2] | | | |
| | BAV70 | $T_{amb} \leq 25$ °C | - | 250 | mW |
| | BAV70M | $T_{amb} \leq 25$ °C [3] | - | 250 | mW |
| | BAV70S | $T_s = 60$ °C | - | 350 | mW |
| | BAV70T | $T_s = 90$ °C | - | 170 | mW |
| | BAV70W | $T_{amb} \leq 25$ °C | - | 200 | mW |
| **Per device** | | | | | |
| $I_F$ | forward current | | | | |
| | BAV70 | $T_{amb} \leq 25$ °C | - | 125 | mA |
| | BAV70M | $T_s = 90$ °C | - | 75 | mA |
| | BAV70S | $T_s = 60$ °C | - | 100 | mA |
| | BAV70T | $T_s = 90$ °C | - | 75 | mA |
| | BAV70W | $T_{amb} \leq 25$ °C | - | 100 | mA |
| $T_j$ | junction temperature | | - | 150 | °C |
| $T_{amb}$ | ambient temperature | | −65 | +150 | °C |
| $T_{stg}$ | storage temperature | | −65 | +150 | °C |

[1] $T_j = 25$ °C prior to surge.

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

[3] Reflow soldering is the only recommended soldering method.

## 6. Thermal characteristics

**Table 7. Thermal characteristics**

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Per diode** | | | | | | |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air [1] | | | | |
| | BAV70 | | - | - | 500 | K/W |
| | BAV70M | [2] | - | - | 500 | K/W |
| | BAV70W | | - | - | 625 | K/W |
| $R_{th(j-t)}$ | thermal resistance from junction to tie-point | | | | | |
| | BAV70 | | - | - | 360 | K/W |
| | BAV70W | | - | - | 300 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | | | | |
| | BAV70S | | - | - | 255 | K/W |
| | BAV70T | | - | - | 350 | K/W |

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

[2] Reflow soldering is the only recommended soldering method.


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# 7. Characteristics

**Table 8. Characteristics**

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Per diode** | | | | | | |
| $V_F$ | forward voltage | [1] | | | | |
| | | $I_F$ = 1 mA | - | - | 715 | mV |
| | | $I_F$ = 10 mA | - | - | 855 | mV |
| | | $I_F$ = 50 mA | - | - | 1 | V |
| | | $I_F$ = 150 mA | - | - | 1.25 | V |
| $I_R$ | reverse current | $V_R$ = 25 V | - | - | 30 | nA |
| | | $V_R$ = 80 V | - | - | 0.5 | µA |
| | | $V_R$ = 25 V; $T_j$ = 150 °C | - | - | 30 | µA |
| | | $V_R$ = 80 V; $T_j$ = 150 °C | - | - | 100 | µA |
| $C_d$ | diode capacitance | $V_R$ = 0 V; f = 1 MHz | - | - | 1.5 | pF |
| $t_{rr}$ | reverse recovery time | [2] | - | - | 4 | ns |
| $V_{FR}$ | forward recovery voltage | [3] | - | - | 1.75 | V |

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

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

[3] When switched from $I_F$ = 10 mA; $t_r$ = 20 ns.


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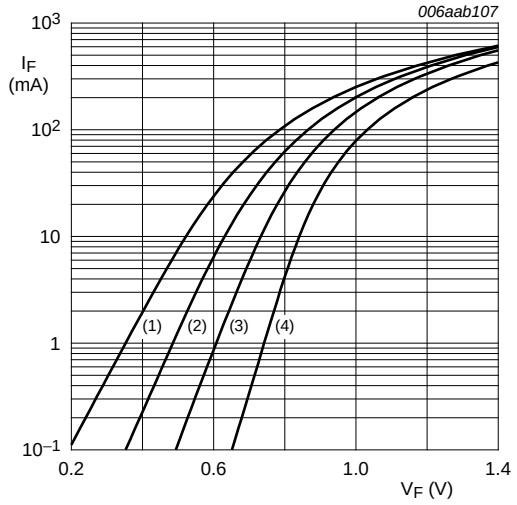
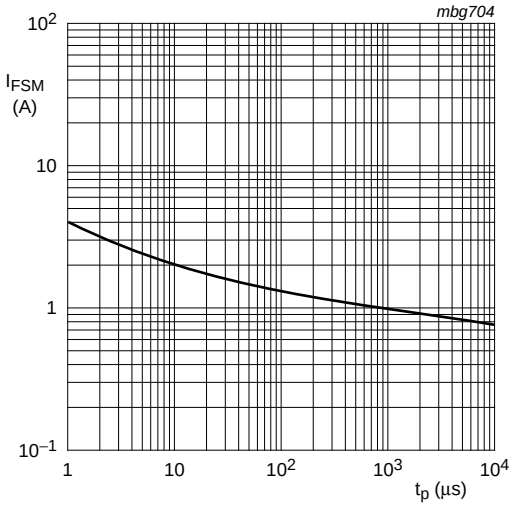


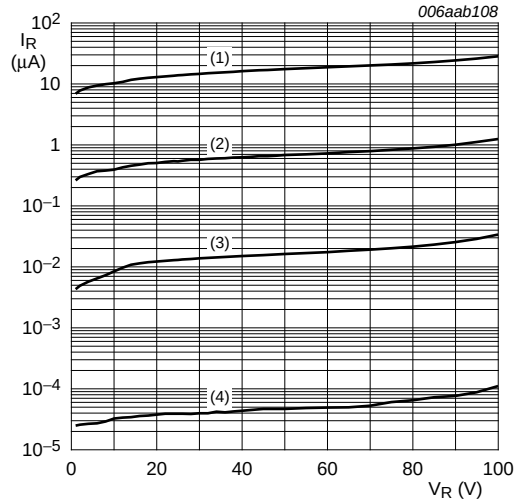

(1) $T_{amb}$ = 150 °C
(2) $T_{amb}$ = 85 °C
(3) $T_{amb}$ = 25 °C
(4) $T_{amb}$ = −40 °C

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



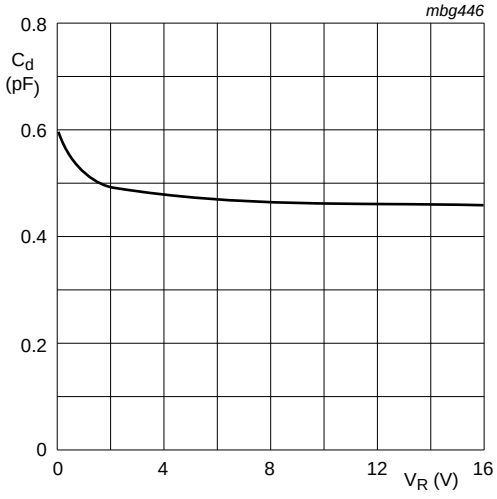

Based on square wave currents.
$T_j$ = 25 °C; prior to surge

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




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

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




f = 1 MHz; $T_{amb}$ = 25 °C

**Fig 4. Diode capacitance as a function of reverse voltage; typical values**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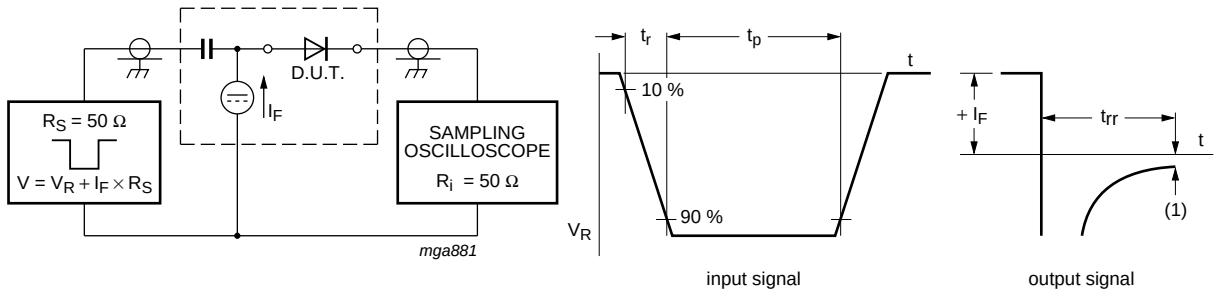
# 8. Test information

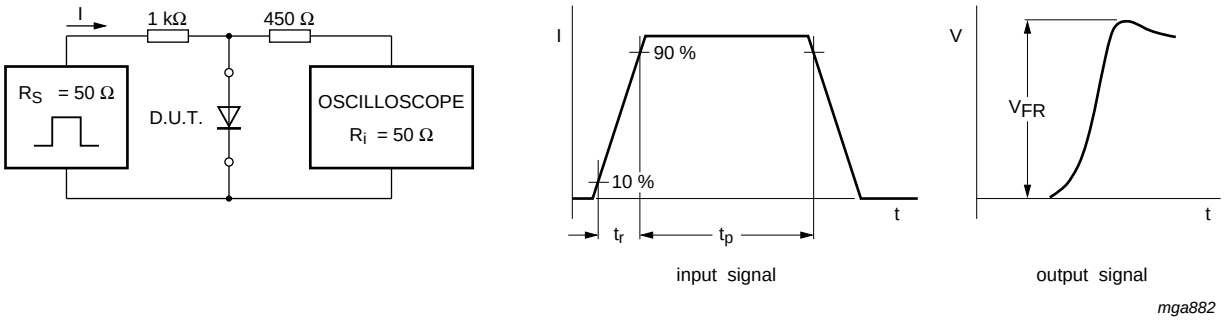



(1) $I_R$ = 1 mA

Input signal: reverse pulse rise time $t_r$ = 0.6 ns; reverse voltage pulse duration $t_p$ = 100 ns; duty cycle $\delta$ = 0.05

Oscilloscope: rise time $t_r$ = 0.35 ns

**Fig 5. Reverse recovery time test circuit and waveforms**




Input signal: forward pulse rise time $t_r$ = 20 ns; forward current pulse duration $t_p \geq$ 100 ns; duty cycle $\delta \leq$ 0.005

**Fig 6. Forward recovery voltage test circuit and waveforms**

## 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.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## 9. Package outline

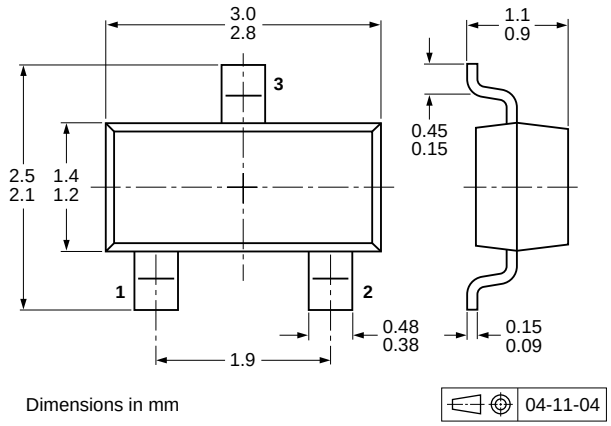


**Fig 7. Package outline BAV70 (SOT23/TO-236AB)**

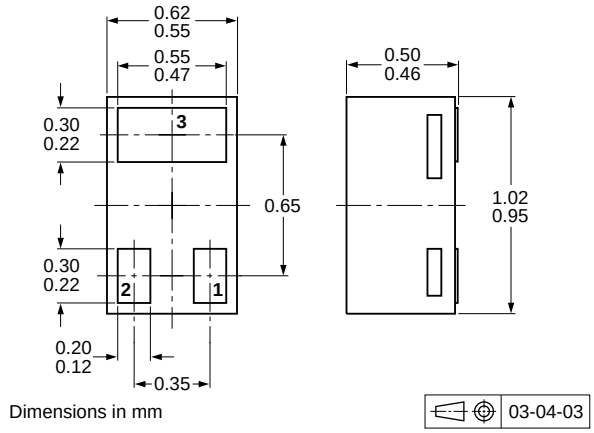


**Fig 8. Package outline BAV70M (SOT883/SC-101)**

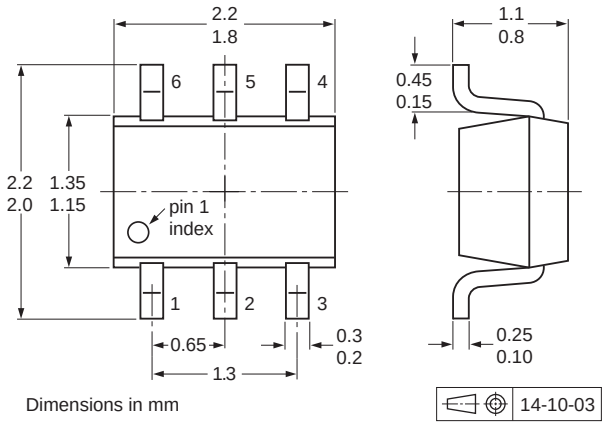


**Fig 9. Package outline BAV70S (SOT363/SC-88)**

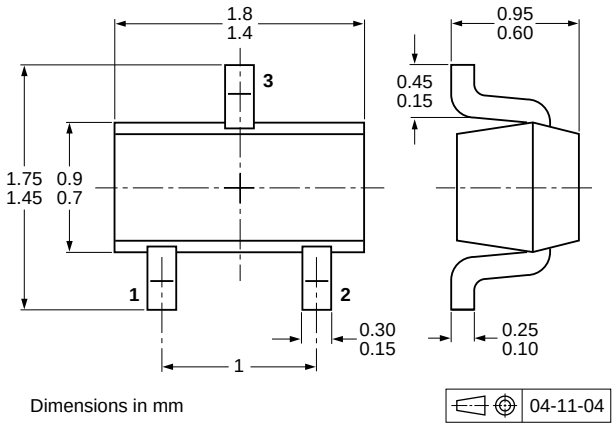


**Fig 10. Package outline BAV70T (SOT416/SC-75)**

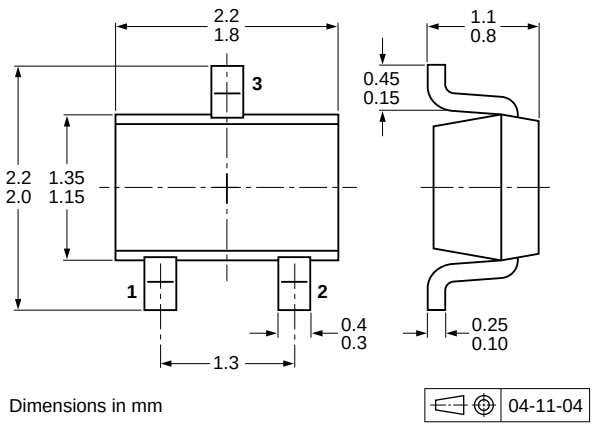


**Fig 11. Package outline BAV70W (SOT323/SC-70)**


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## 10. Packing information

**Table 9. Packing methods**

*The indicated -xxx are the last three digits of the 12NC ordering code.*[1]

| Type number | Package | Description | Packing quantity | |
|---|---|---|---|---|
| | | | 3000 | 10000 |
| BAV70 | SOT23 | 4 mm pitch, 8 mm tape and reel | -215 | -235 |
| BAV70M | SOT883 | 2 mm pitch, 8 mm tape and reel | - | -315 |
| BAV70S | SOT363 | 4 mm pitch, 8 mm tape and reel; T1 [2] | -115 | -135 |
| | | 4 mm pitch, 8 mm tape and reel; T2 [3] | -125 | -165 |
| BAV70T | SOT416 | 4 mm pitch, 8 mm tape and reel | -115 | -135 |
| BAV70W | SOT323 | 4 mm pitch, 8 mm tape and reel | -115 | -135 |

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

[2] T1: normal taping

[3] T2: reverse taping

## 11. Soldering

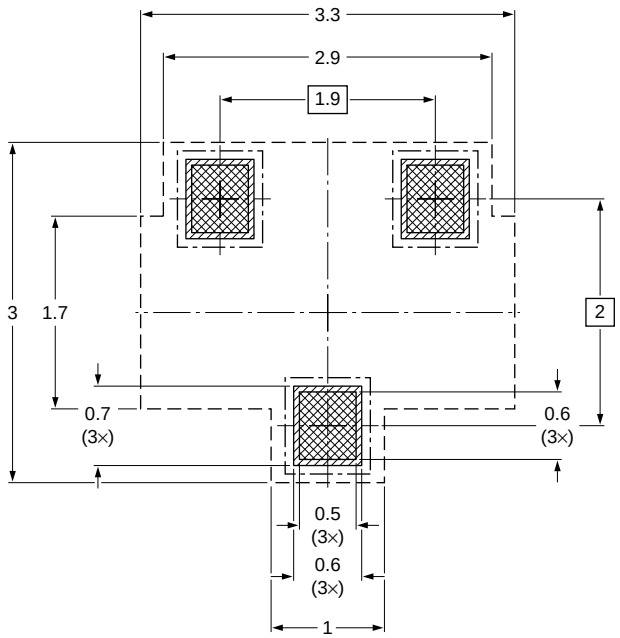


**Fig 12. Reflow soldering footprint BAV70 (SOT23/TO-236AB)**


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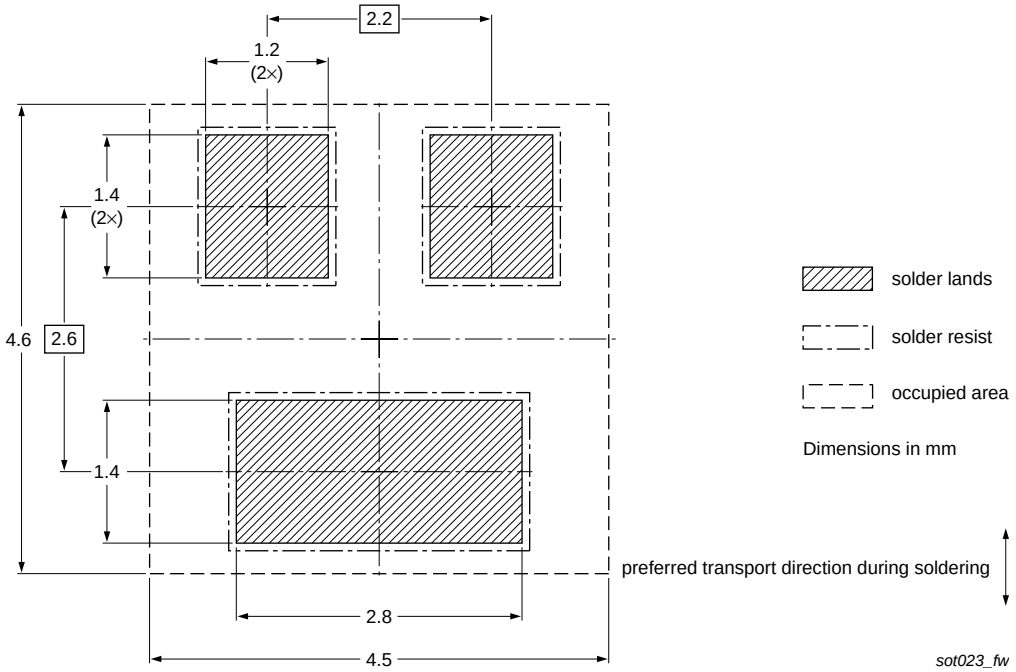
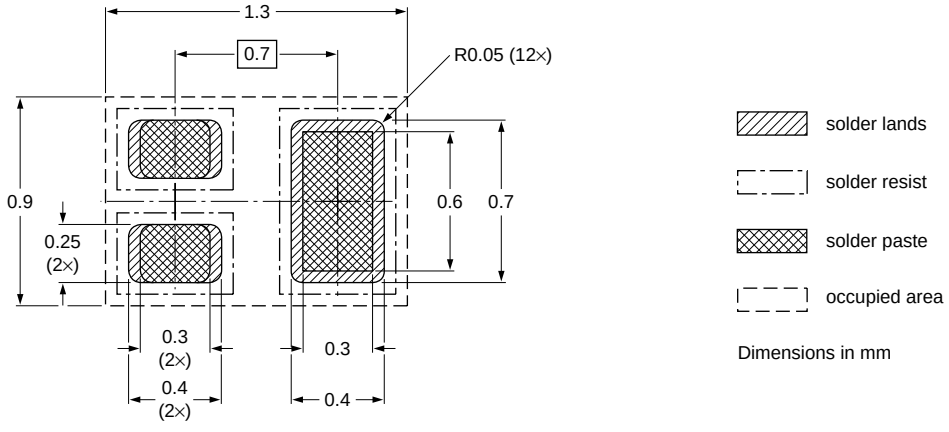



**Fig 13. Wave soldering footprint BAV70 (SOT23/TO-236AB)**




Reflow soldering is the only recommended soldering method.

**Fig 14. Reflow soldering footprint BAV70M (SOT883/SC-101)**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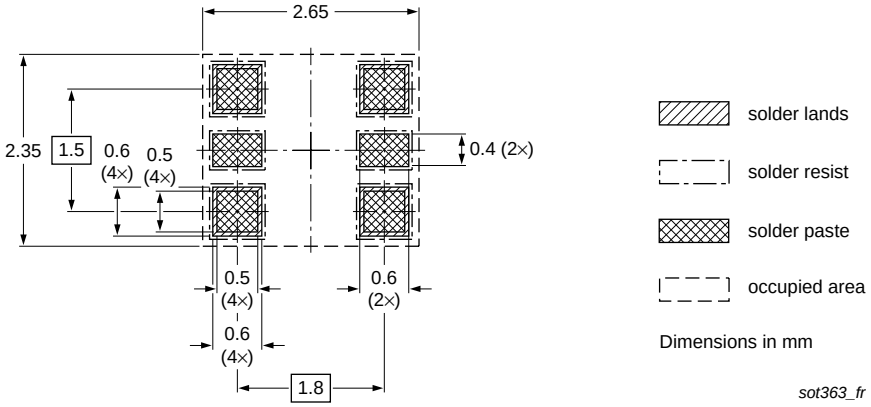


**Fig 15. Reflow soldering footprint BAV70S (SOT363/SC-88)**

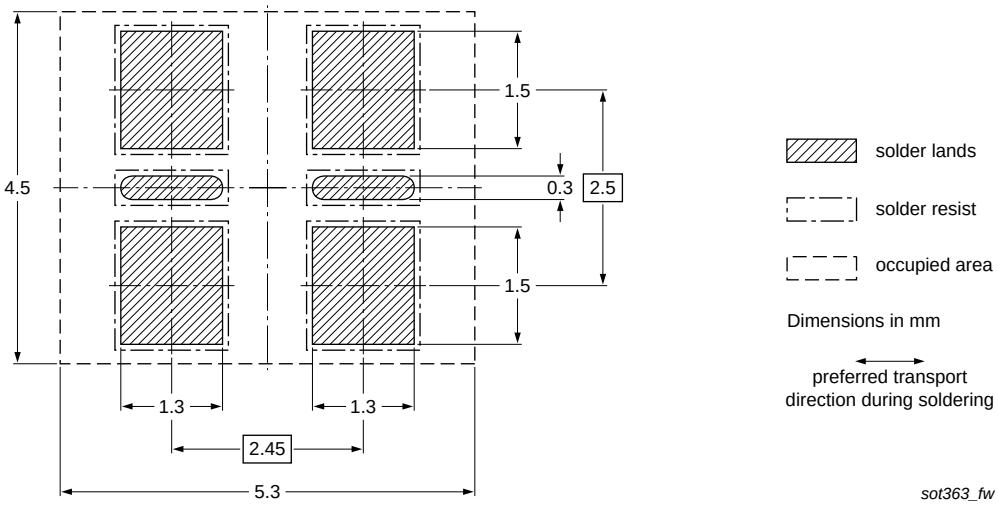


**Fig 16. Wave soldering footprint BAV70S (SOT363/SC-88)**


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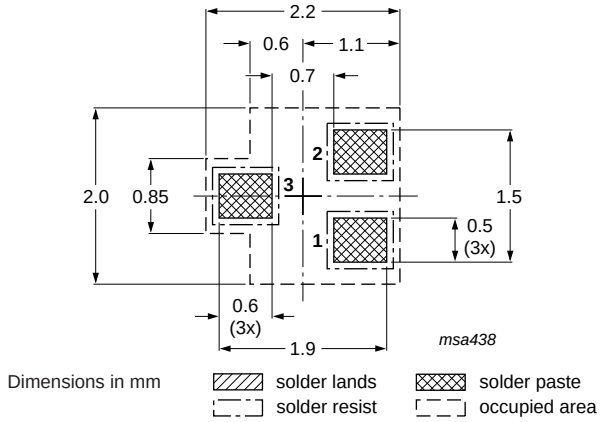


**Fig 17. Reflow soldering footprint BAV70T (SOT416/SC-75)**

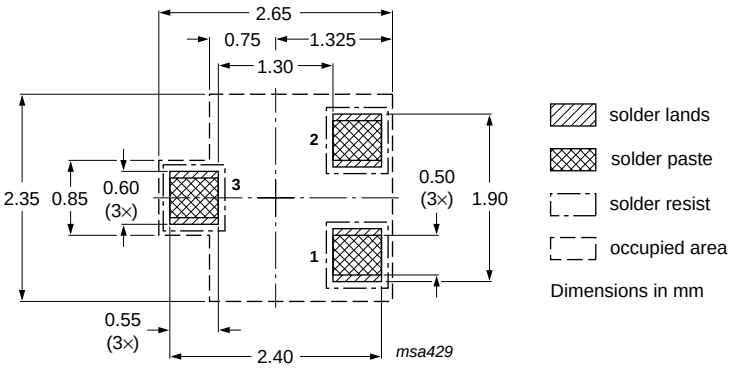


**Fig 18. Reflow soldering footprint BAV70W (SOT323/SC-70)**

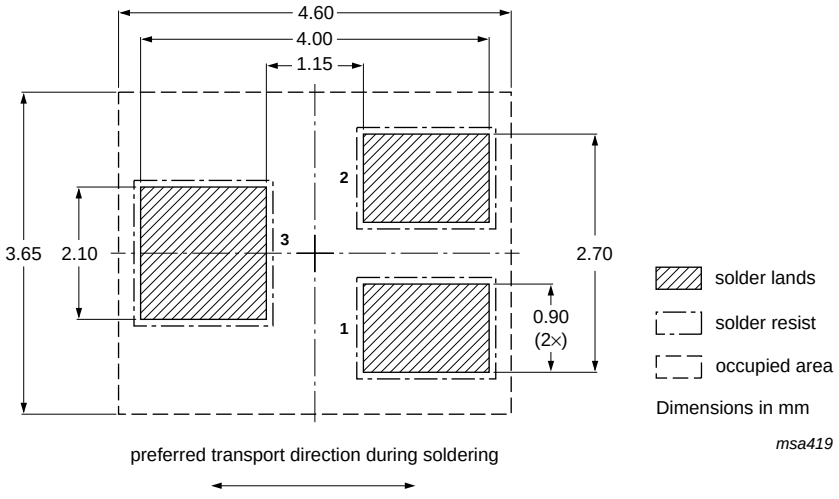


**Fig 19. Wave soldering footprint BAV70W (SOT323/SC-70)**


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## 12. Revision history

**Table 10. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| BAV70_SER v.8 | 20150318 | Product data sheet | - | BAV70_SER_7 |
| Modifications: | • The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.<br>• Legal texts have been adapted to the new company name where appropriate. | | | |
| BAV70_SER_7 | 20071127 | Product data sheet | - | BAV70_6<br>BAV70S_2<br>BAV70T_3<br>BAV70W_6 |
| BAV70_6 | 20020403 | Product specification | - | BAV70_5 |
| BAV70S_2 | 19971021 | Product specification | - | BAV70S_1 |
| BAV70T_3 | 20040204 | Product specification | - | BAV70T_2 |
| BAV70W_6 | 20020405 | Product specification | - | BAV70W_5 |


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# 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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## 14. Contact information

For more information, please visit: **http://www.nexperia.com**

For sales office addresses, please send an email to: **salesaddresses@nexperia.com**


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