

# 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
	NXP	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

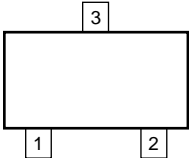
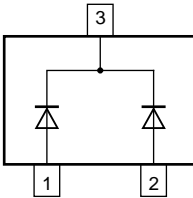
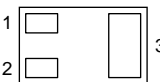
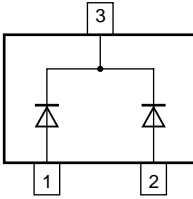
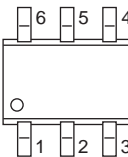
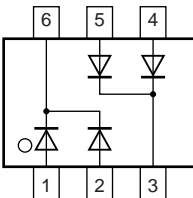
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
$I_R$	reverse current	$V_R = 80$ V	-	-	0.5	$\mu$ A
$V_R$	reverse voltage		-	-	100	V
$t_{rr}$	reverse recovery time	[1]	-	-	4	ns

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

## 4. Marking

Table 5. Marking codes

Type number	Marking code <sup>[1]</sup>
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
<b>Per diode</b>					
$V_{RRM}$	repetitive peak reverse voltage		-	100	V
$V_R$	reverse voltage		-	100	V
$I_F$	forward current				
	BAV70	$T_{amb} \leq 25\text{ °C}$	-	215	mA
	BAV70M	$T_s = 90\text{ °C}$	-	150	mA
	BAV70S	$T_s = 60\text{ °C}$	-	250	mA
	BAV70T	$T_s = 90\text{ °C}$	-	150	mA
	BAV70W	$T_{amb} \leq 25\text{ °C}$	-	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 <sup>[1]</sup>			
		$t_p = 1\text{ }\mu\text{s}$	-	4	A
		$t_p = 1\text{ ms}$	-	1	A
		$t_p = 1\text{ s}$	-	0.5	A

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

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

Symbol	Parameter	Conditions	Min	Max	Unit
P <sub>tot</sub>	total power dissipation	[2]			
	BAV70	T <sub>amb</sub> ≤ 25 °C	-	250	mW
	BAV70M	T <sub>amb</sub> ≤ 25 °C [3]	-	250	mW
	BAV70S	T <sub>s</sub> = 60 °C	-	350	mW
	BAV70T	T <sub>s</sub> = 90 °C	-	170	mW
	BAV70W	T <sub>amb</sub> ≤ 25 °C	-	200	mW
<b>Per device</b>					
I <sub>F</sub>	forward current				
	BAV70	T <sub>amb</sub> ≤ 25 °C	-	125	mA
	BAV70M	T <sub>s</sub> = 90 °C	-	75	mA
	BAV70S	T <sub>s</sub> = 60 °C	-	100	mA
	BAV70T	T <sub>s</sub> = 90 °C	-	75	mA
	BAV70W	T <sub>amb</sub> ≤ 25 °C	-	100	mA
T <sub>j</sub>	junction temperature		-	150	°C
T <sub>amb</sub>	ambient temperature		-65	+150	°C
T <sub>stg</sub>	storage temperature		-65	+150	°C

[1] T<sub>j</sub> = 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
<b>Per diode</b>						
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air [1]				
	BAV70		-	-	500	K/W
	BAV70M	[2]	-	-	500	K/W
	BAV70W		-	-	625	K/W
R <sub>th(j-t)</sub>	thermal resistance from junction to tie-point					
	BAV70		-	-	360	K/W
	BAV70W		-	-	300	K/W
R <sub>th(j-sp)</sub>	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.

## 7. Characteristics

**Table 8. Characteristics**

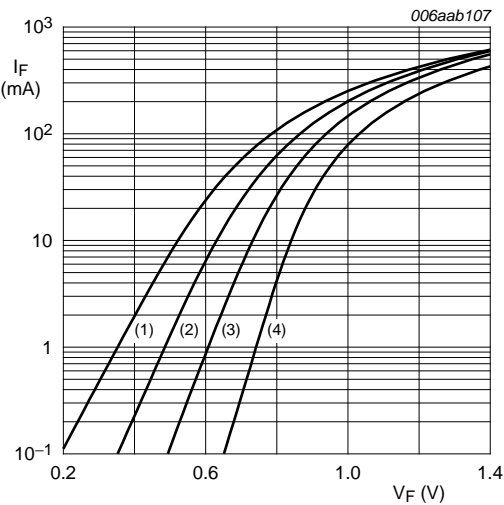
$T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

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

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

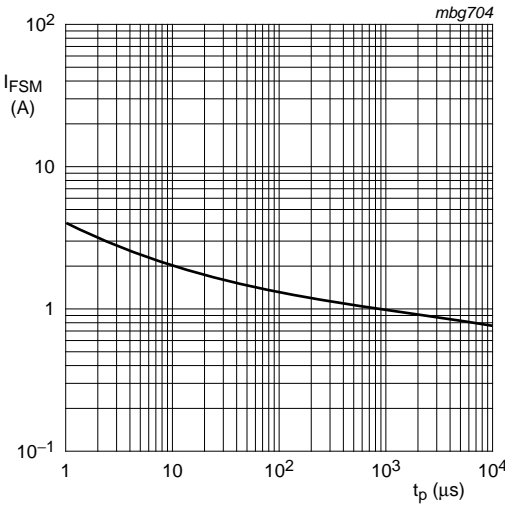
[2] When switched from  $I_F = 10\text{ mA}$  to  $I_R = 10\text{ mA}$ ;  $R_L = 100\text{ }\Omega$ ; measured at  $I_R = 1\text{ mA}$ .

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



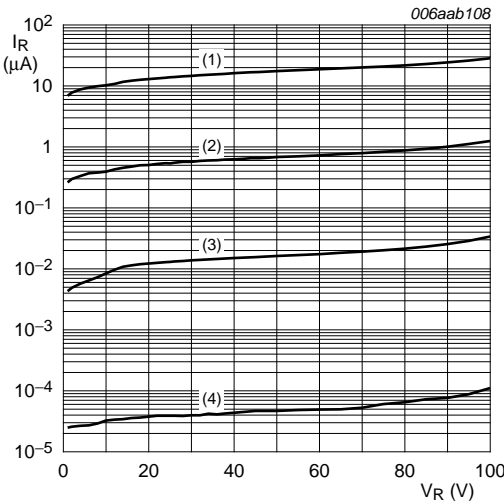
- (1)  $T_{amb} = 150\text{ }^{\circ}\text{C}$
- (2)  $T_{amb} = 85\text{ }^{\circ}\text{C}$
- (3)  $T_{amb} = 25\text{ }^{\circ}\text{C}$
- (4)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

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



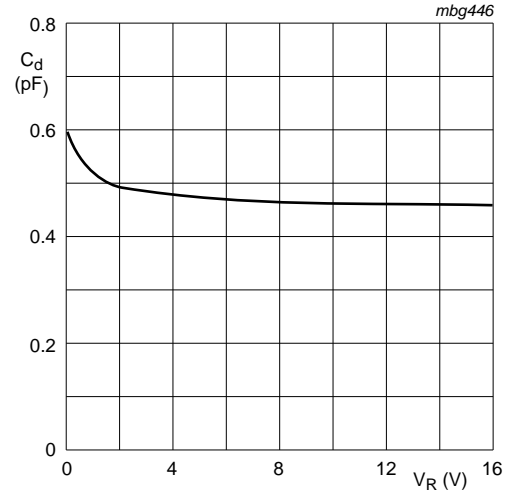
Based on square wave currents.  
 $T_j = 25\text{ }^{\circ}\text{C}$ ; prior to surge

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)  $T_{amb} = -40\text{ }^{\circ}\text{C}$

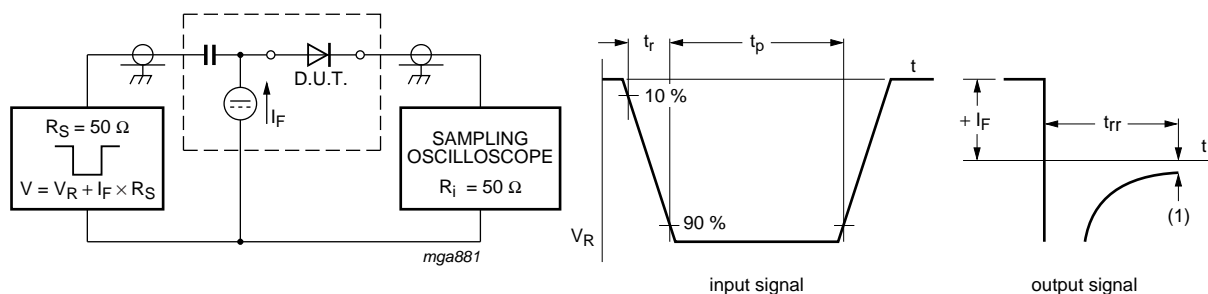
Fig 3. Reverse current as a function of reverse voltage; typical values



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

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

## 8. Test information

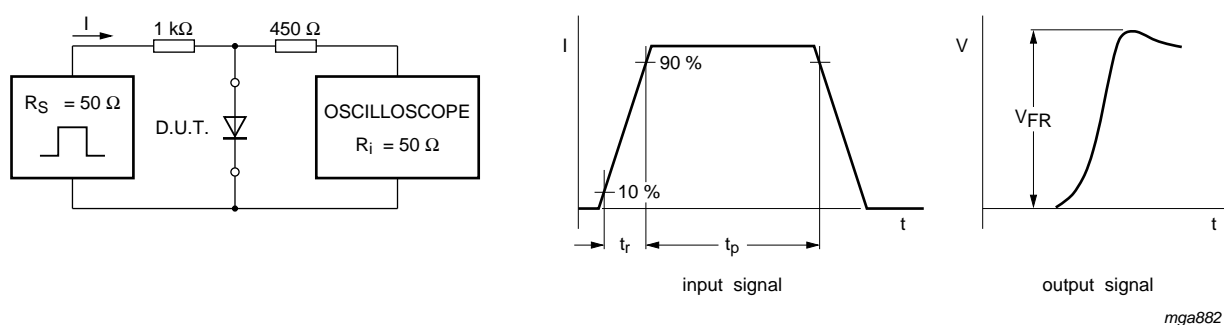


(1)  $I_R = 1 \text{ mA}$

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

Oscilloscope: rise time  $t_r = 0.35 \text{ ns}$

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



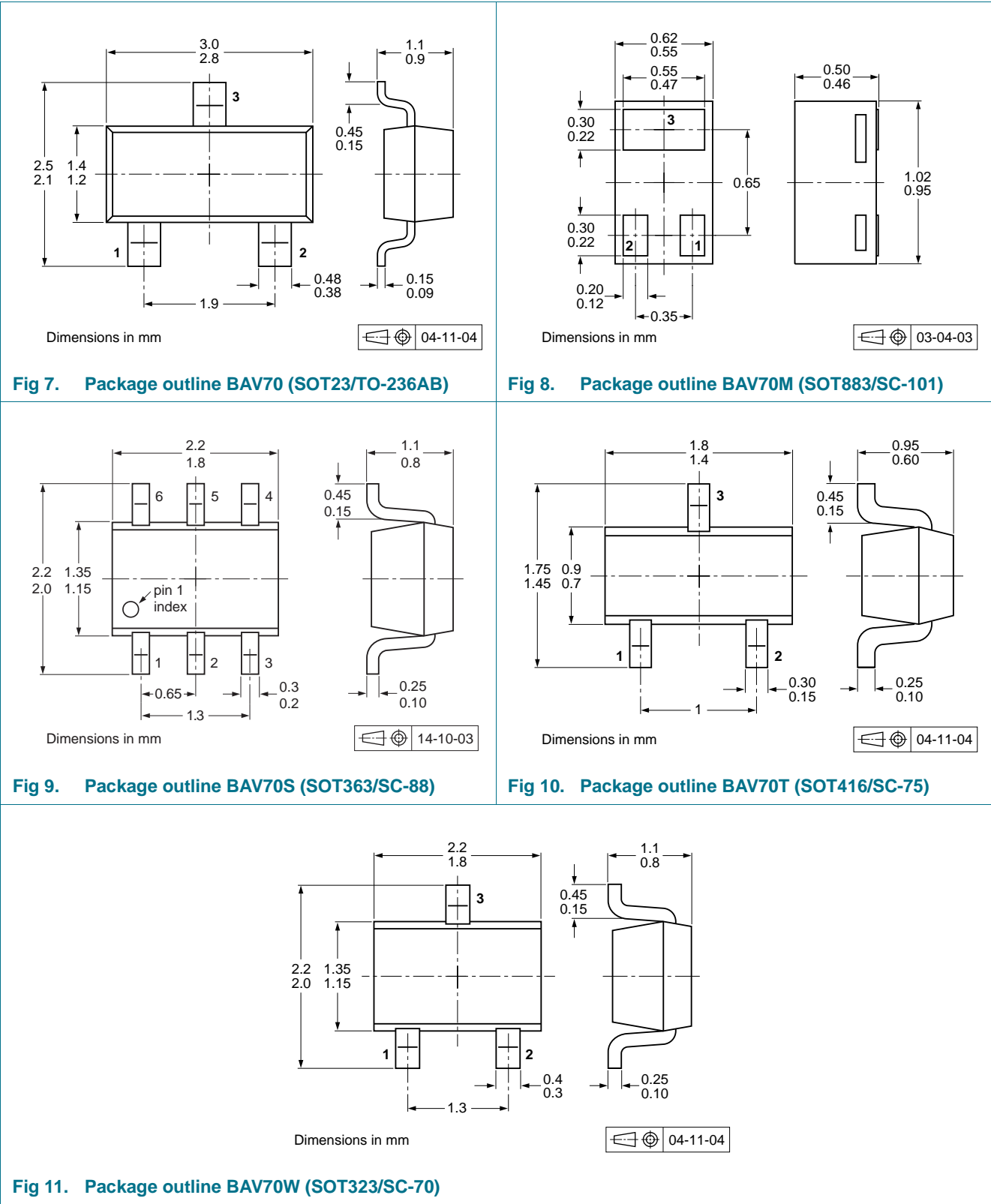
Input signal: forward pulse rise time  $t_r = 20 \text{ ns}$ ; forward current pulse duration  $t_p \geq 100 \text{ ns}$ ; duty cycle  $\delta \leq 0.005$

**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.

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>

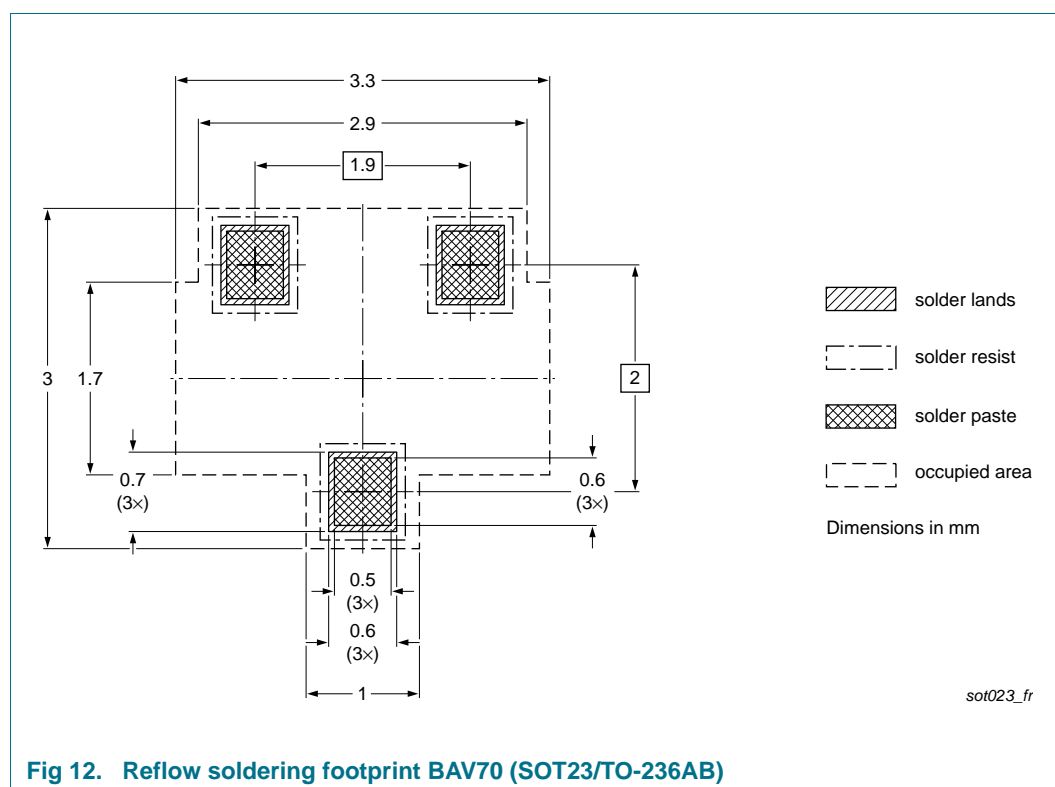
Type number	Package	Description	Packing quantity	
			3000	10000
BAV70	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235
BAV70M	SOT883	2 mm pitch, 8 mm tape and reel	-	-315
BAV70S	SOT363	4 mm pitch, 8 mm tape and reel; T1 <sup>[2]</sup>	-115	-135
		4 mm pitch, 8 mm tape and reel; T2 <sup>[3]</sup>	-125	-165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



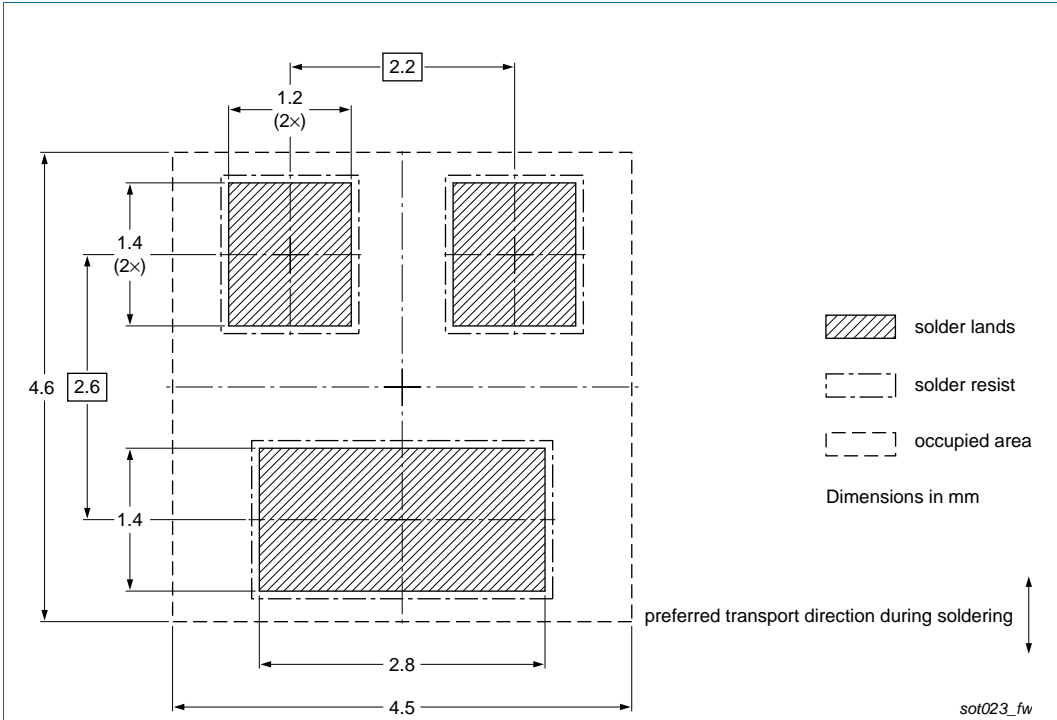
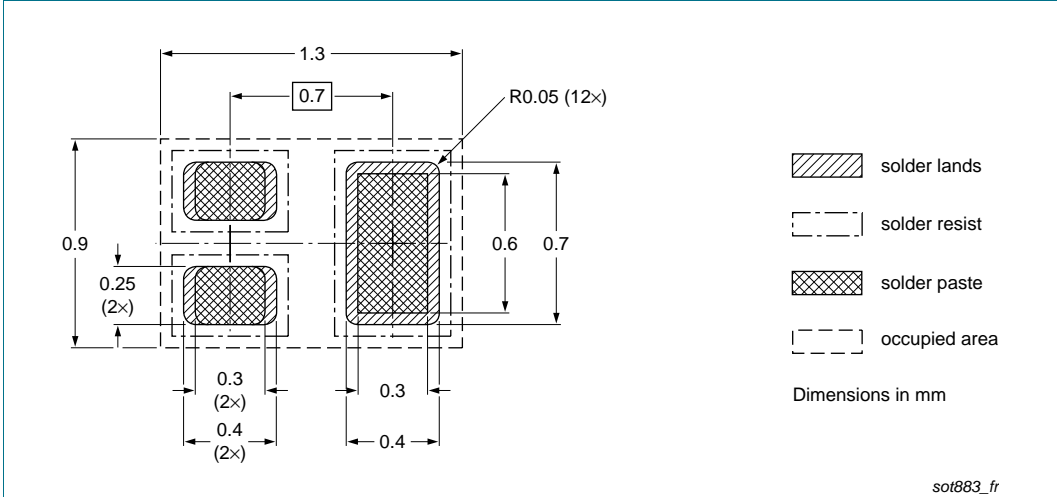


Fig 13. Wave soldering footprint BAV70 (SOT23/TO-236AB)



Reflow soldering is the only recommended soldering method.

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

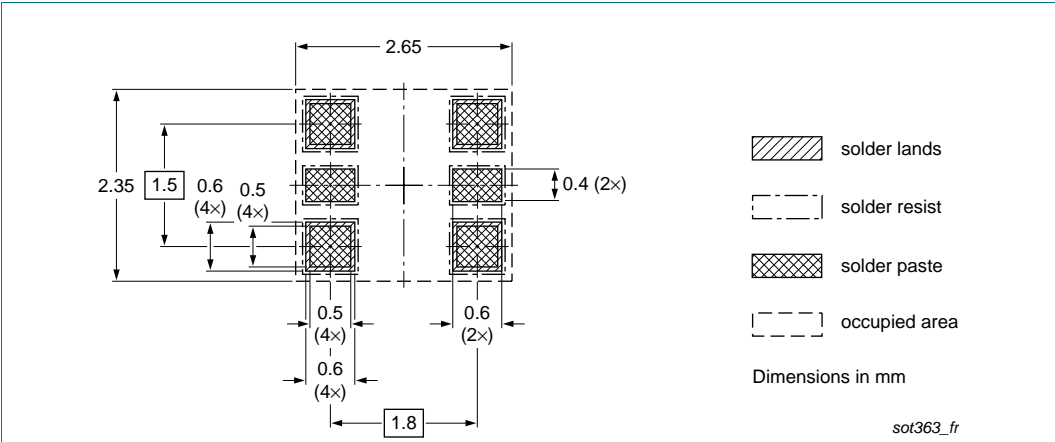


Fig 15. Reflow soldering footprint BAV70S (SOT363/SC-88)

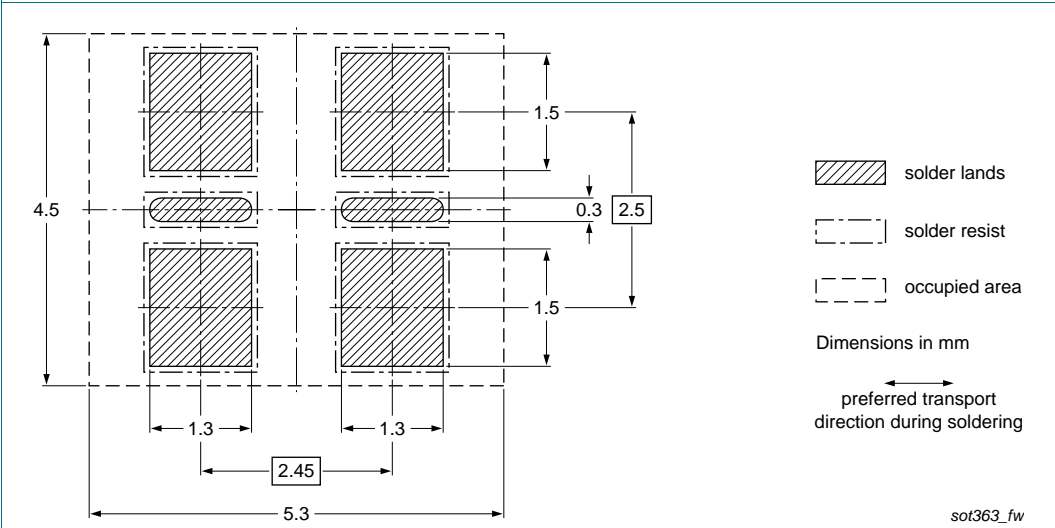


Fig 16. Wave soldering footprint BAV70S (SOT363/SC-88)

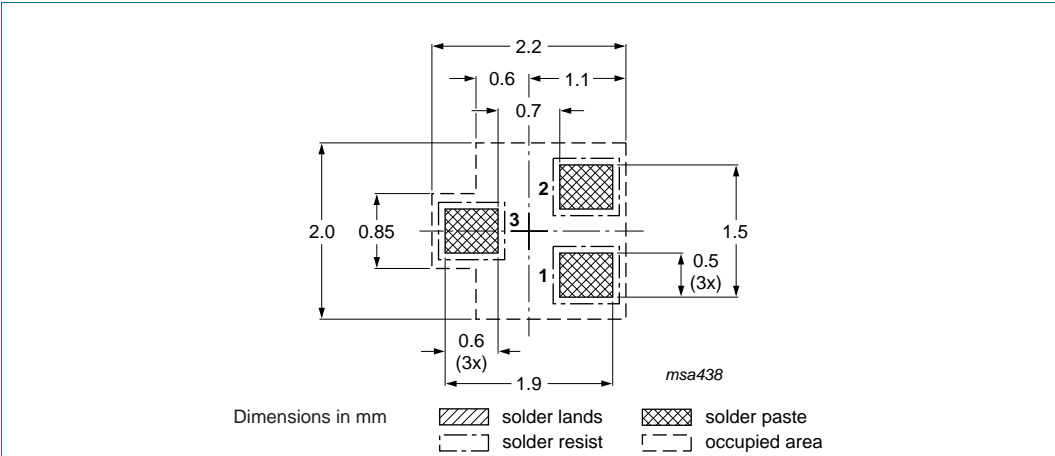


Fig 17. Reflow soldering footprint BAV70T (SOT416/SC-75)

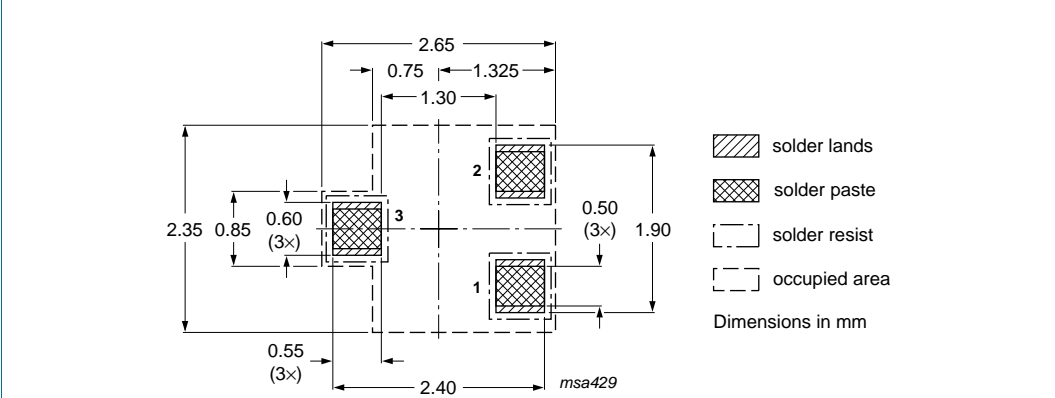


Fig 18. Reflow soldering footprint BAV70W (SOT323/SC-70)

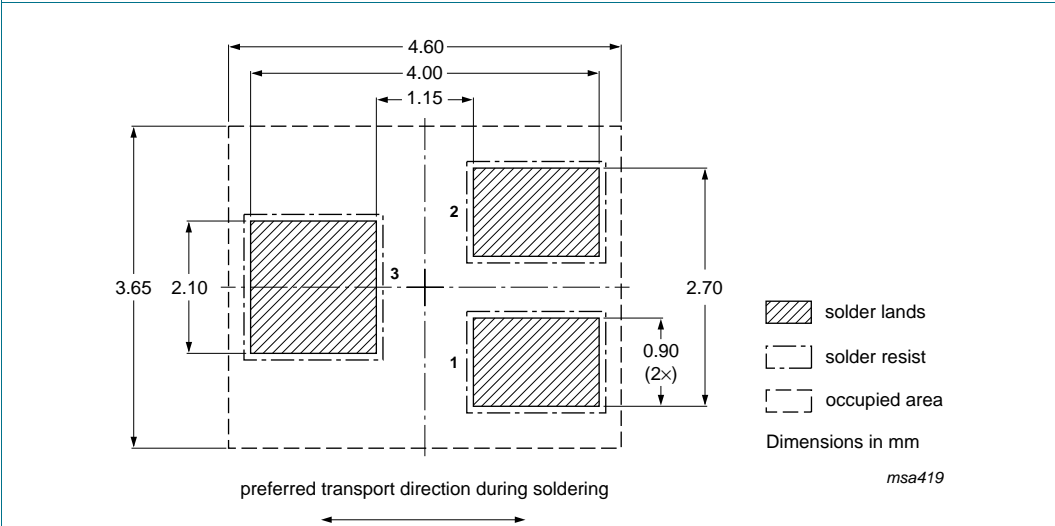


Fig 19. Wave soldering footprint BAV70W (SOT323/SC-70)

## 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:	<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></ul>			
BAV70_SER_7	20071127	Product data sheet	-	BAV70_6 BAV70S_2 BAV70T_3 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

## 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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# AMEYA360

## Components Supply Platform

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