

# BAS16 series

## High-speed switching diodes

Rev. 05 — 25 August 2008

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			Configuration	Package configuration
	NXP	JEITA	JEDEC		
BAS16	SOT23	-	TO-236AB	single	small
BAS16H	SOD123F	-	-	single	small and flat lead
BAS16J	SOD323F	SC-90	-	single	very small and flat lead
BAS16L	SOD882	-	-	single	leadless ultra small
BAS16T	SOT416	SC-75	-	single	ultra small
BAS16VV	SOT666	-	-	triple isolated	ultra small and flat lead
BAS16VY	SOT363	SC-88	-	triple isolated	very small
BAS16W	SOT323	SC-70	-	single	very small
BAS316	SOD323	SC-76	-	single	very small
BAS516	SOD523	SC-79	-	single	ultra small and flat lead

### 1.2 Features

- High switching speed:  $t_{rr} \leq 4$  ns
- Low leakage current
- Repetitive peak reverse voltage:  $V_{RRM} \leq 100$  V
- Low capacitance
- Reverse voltage:  $V_R \leq 100$  V
- Small SMD plastic packages

### 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
<b>Per diode</b>						
$V_R$	reverse voltage		-	-	100	V
$I_R$	reverse current	$V_R = 80\text{ V}$	-	-	0.5	$\mu\text{A}$
$t_{rr}$	reverse recovery time		[1]	-	4	ns

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

**2. Pinning information**

**Table 3. Pinning**

Pin	Description	Simplified outline	Graphic symbol	
<b>BAS16; BAS16T; BAS16W</b>				
1	anode	<p>006aaa144</p>	<p>006aaa764</p>	
2	not connected			
3	cathode			
<b>BAS16H; BAS16J; BAS316; BAS516</b>				
1	cathode	[1]	<p>001aab540</p>	<p>006aab040</p>
2	anode	[1]		
<b>BAS16L</b>				
1	cathode	[1]	<p>Transparent top view</p>	<p>006aab040</p>
2	anode	[1]		
<b>BAS16VV; BAS16VY</b>				
1	anode (diode 1)	<p>001aab555</p>	<p>006aab106</p>	
2	anode (diode 2)			
3	anode (diode 3)			
4	cathode (diode 3)			
5	cathode (diode 2)			
6	cathode (diode 1)			

[1] The marking bar indicates the cathode.

### 3. Ordering information

Table 4. Ordering information

Type number	Package		Version
	Name	Description	
BAS16	-	plastic surface-mounted package; 3 leads	SOT23
BAS16H	-	plastic surface-mounted package; 2 leads	SOD123F
BAS16J	SC-90	plastic surface-mounted package; 2 leads	SOD323F
BAS16L	-	leadless ultra small plastic package; 2 terminals; body 1.0 × 0.6 × 0.5 mm	SOD882
BAS16T	SC-75	plastic surface-mounted package; 3 leads	SOT416
BAS16VV	-	plastic surface-mounted package; 6 leads	SOT666
BAS16VY	SC-88	plastic surface-mounted package; 6 leads	SOT363
BAS16W	SC-70	plastic surface-mounted package; 3 leads	SOT323
BAS316	SC-76	plastic surface-mounted package; 2 leads	SOD323
BAS516	SC-79	plastic surface-mounted package; 2 leads	SOD523

### 4. Marking

Table 5. Marking codes

Type number	Marking code <sup>[1]</sup>
BAS16	A6*
BAS16H	A1
BAS16J	AR
BAS16L	S2
BAS16T	A6
BAS16VV	53
BAS16VY	16*
BAS16W	A6*
BAS316	A6
BAS516	6

- [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				
	BAS16		[1]	-	215 mA
	BAS16H BAS16L		[2]	-	215 mA
	BAS16T		[1]	-	155 mA
	BAS16VV BAS16VY		[1][3]	-	200 mA
	BAS16W		[1]	-	175 mA
	BAS16J BAS316 BAS516		[1]	-	250 mA
$I_{FRM}$	repetitive peak forward current	$t_p \leq 0.5 \mu\text{s}$ ; $\delta \leq 0.25$	-	500	mA
$I_{FSM}$	non-repetitive peak forward current	square wave	[4]		
		$t_p = 1 \mu\text{s}$	-	4	A
		$t_p = 1 \text{ms}$	-	1	A
		$t_p = 1 \text{s}$	-	0.5	A
$P_{tot}$	total power dissipation				
	BAS16	$T_{amb} \leq 25 \text{ }^\circ\text{C}$	[1]	-	250 mW
	BAS16H	$T_{amb} \leq 25 \text{ }^\circ\text{C}$	[2][5] [6] [5][6] [7]	-	380 830 mW
	BAS16J	$T_{amb} \leq 25 \text{ }^\circ\text{C}$	[5][6] [7]	-	550 mW
	BAS16L	$T_{amb} \leq 25 \text{ }^\circ\text{C}$	[2][5] [6]	-	250 mW
	BAS16T	$T_{sp} \leq 90 \text{ }^\circ\text{C}$	[1]	-	170 mW
	BAS16VV	$T_{amb} \leq 25 \text{ }^\circ\text{C}$	[1][3] [5][8]	-	180 mW
	BAS16VY	$T_{sp} \leq 85 \text{ }^\circ\text{C}$	[1][3] [8]	-	250 mW
	BAS16W	$T_{amb} \leq 25 \text{ }^\circ\text{C}$	[1]	-	200 mW
	BAS316	$T_{sp} \leq 90 \text{ }^\circ\text{C}$	[1][6]	-	400 mW
	BAS516	$T_{sp} \leq 90 \text{ }^\circ\text{C}$	[1][5] [6]	-	500 mW

**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>					
$T_j$	junction temperature		-	150	°C
$T_{amb}$	ambient temperature		-65	+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.
- [2] Device mounted on an FR4 PCB with 60  $\mu$ m copper strip line.
- [3] Single diode loaded.
- [4]  $T_j = 25$  °C prior to surge.
- [5] Reflow soldering is the only recommended soldering method.
- [6] Soldering point of cathode tab.
- [7] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.
- [8] Soldering points at pins 4, 5 and 6.

## 6. Thermal characteristics

**Table 7. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air				
	BAS16		[1]	-	-	500 K/W
	BAS16H		[2][3]	-	-	330 K/W
			[3][4]	-	-	150 K/W
	BAS16J		[3][4]	-	-	230 K/W
	BAS16L		[2][3]	-	-	500 K/W
	BAS16VV		[2][3]	-	-	700 K/W
			[5]			
			[3][4]	-	-	410 K/W
			[5]			
	BAS16W		[1]	-	-	625 K/W
$R_{th(j-t)}$	thermal resistance from junction to tie-point					
	BAS16		-	-	330	K/W
	BAS16W		-	-	300	K/W

Table 7. Thermal characteristics ...continued

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R <sub>th(j-sp)</sub>	thermal resistance from junction to solder point					
	BAS16H	[6]	-	-	70	K/W
	BAS16J	[6]	-	-	55	K/W
	BAS16T		-	-	350	K/W
	BAS16VY	[5][7]	-	-	260	K/W
	BAS316	[6]	-	-	150	K/W
	BAS516	[6]	-	-	120	K/W

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

[2] Device mounted on an FR4 PCB with 60 μm copper strip line.

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

[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.

[5] Single diode loaded.

[6] Soldering point of cathode tab.

[7] Soldering points at pins 4, 5 and 6.

## 7. Characteristics

Table 8. Characteristics

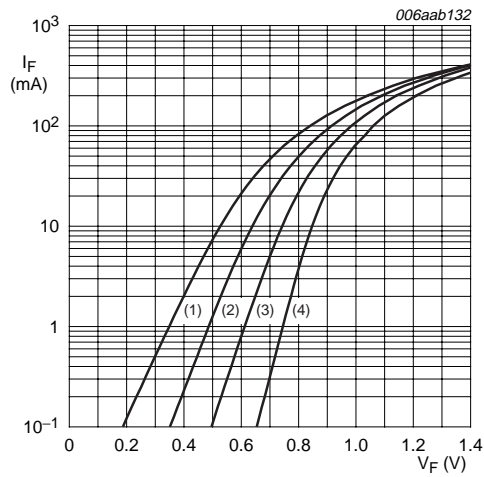
$T_{amb} = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per diode</b>						
V <sub>F</sub>	forward voltage		[1]			
		I <sub>F</sub> = 1 mA	-	-	715	mV
		I <sub>F</sub> = 10 mA	-	-	855	mV
		I <sub>F</sub> = 50 mA	-	-	1	V
		I <sub>F</sub> = 150 mA	-	-	1.25	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 25 V	-	-	30	nA
		V <sub>R</sub> = 80 V	-	-	0.5	μA
		V <sub>R</sub> = 25 V; T <sub>j</sub> = 150 °C	-	-	30	μA
		V <sub>R</sub> = 80 V; T <sub>j</sub> = 150 °C	-	-	50	μA
C <sub>d</sub>	diode capacitance	f = 1 MHz; V <sub>R</sub> = 0 V				
		BAS16; BAS16H; BAS16J; BAS16L; BAS16T; BAS16VV; BAS16VY; BAS16W; BAS316	-	-	1.5	pF
		BAS516	-	-	1	pF
t <sub>rr</sub>	reverse recovery time		[2]	-	4	ns
V <sub>FR</sub>	forward recovery voltage		[3]	-	1.75	V

[1] Pulse test: t<sub>p</sub> ≤ 300 μs; δ ≤ 0.02.

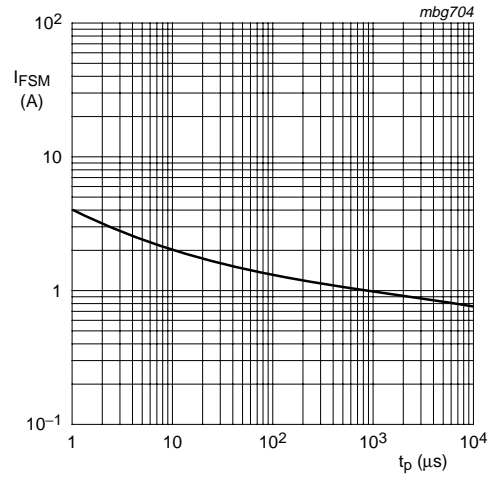
[2] When switched from I<sub>F</sub> = 10 mA to I<sub>R</sub> = 10 mA; R<sub>L</sub> = 100 Ω; measured at I<sub>R</sub> = 1 mA.

[3] When switched from I<sub>F</sub> = 10 mA; t<sub>r</sub> = 20 ns.



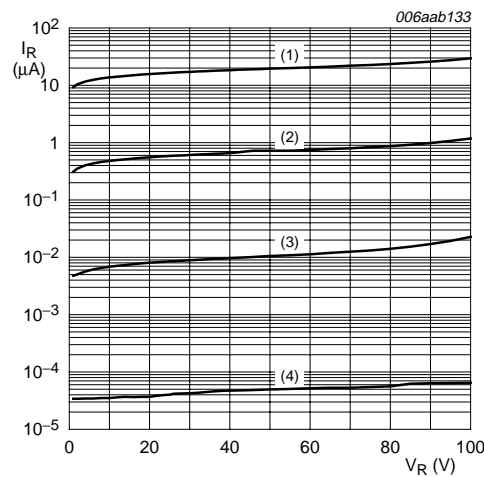
- (1)  $T_{amb} = 150^\circ\text{C}$
- (2)  $T_{amb} = 85^\circ\text{C}$
- (3)  $T_{amb} = 25^\circ\text{C}$
- (4)  $T_{amb} = -40^\circ\text{C}$

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



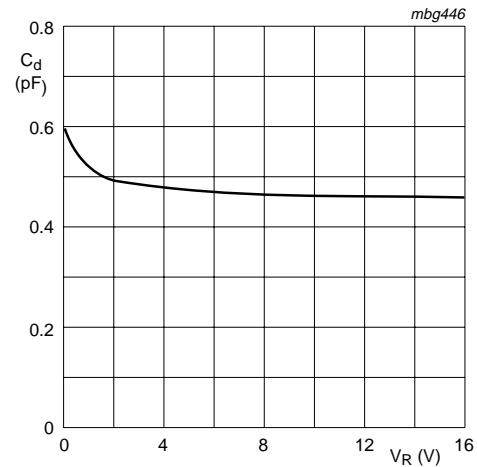
Based on square wave currents.  
 $T_j = 25^\circ\text{C}$ ; prior to surge

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



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

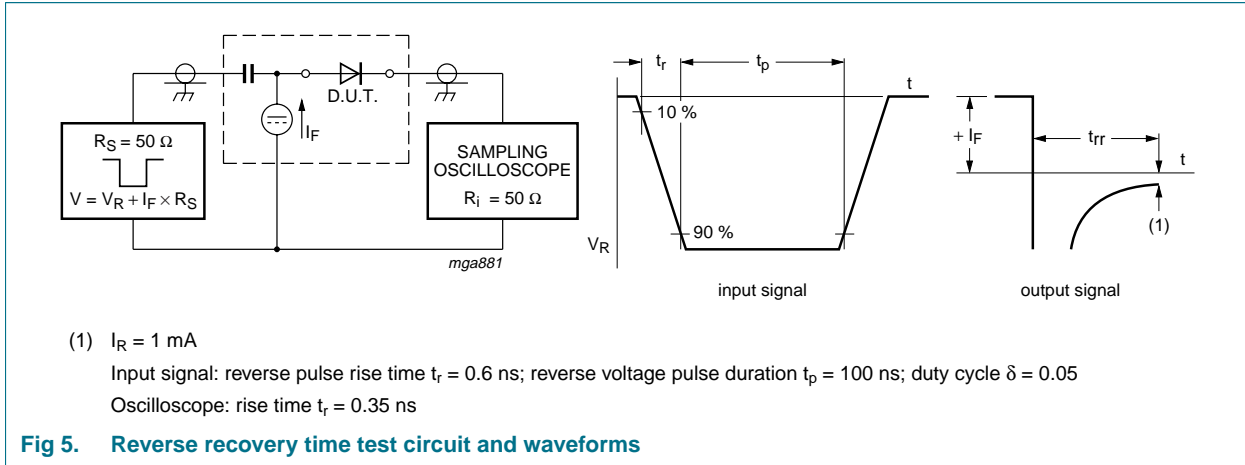
**Fig 3. Reverse current as a function of reverse voltage; typical values**



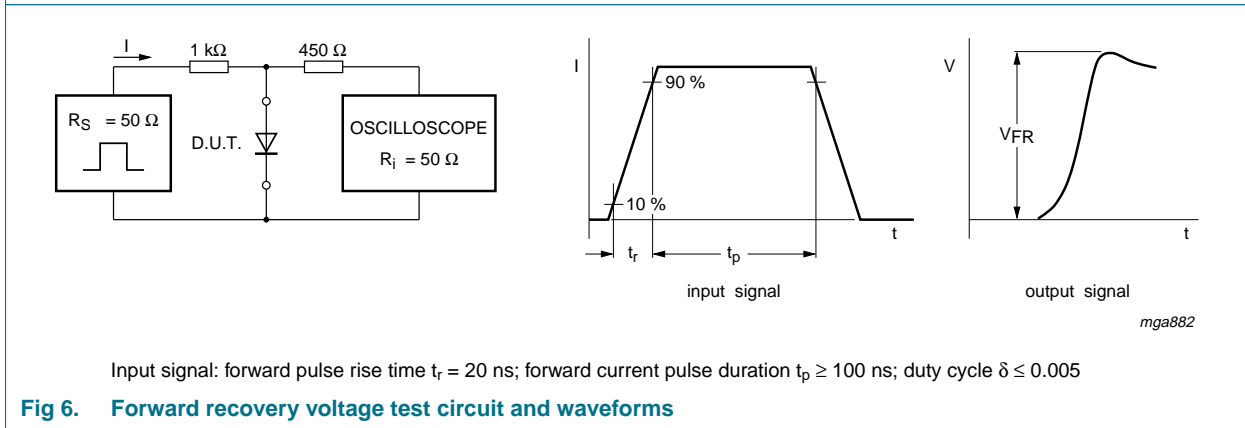
$f = 1\text{ MHz}$ ;  $T_{amb} = 25^\circ\text{C}$

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

**8. Test information**

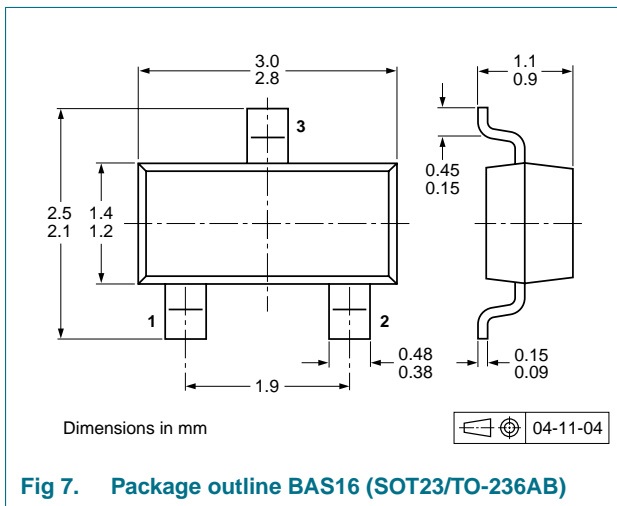


**Fig 5. Reverse recovery time test circuit and waveforms**

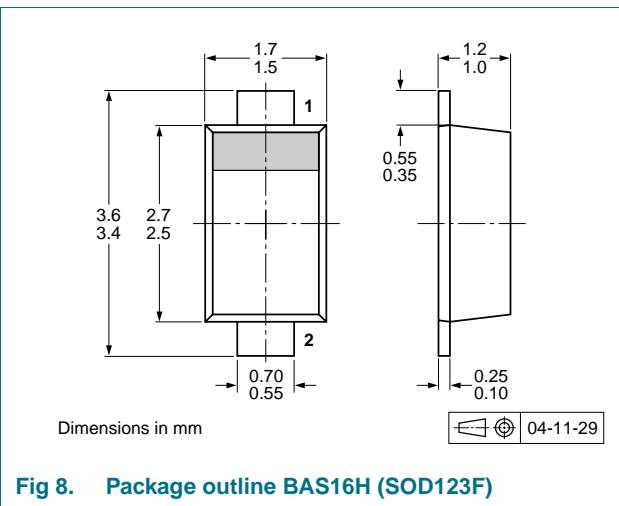


**Fig 6. Forward recovery voltage test circuit and waveforms**

**9. Package outline**

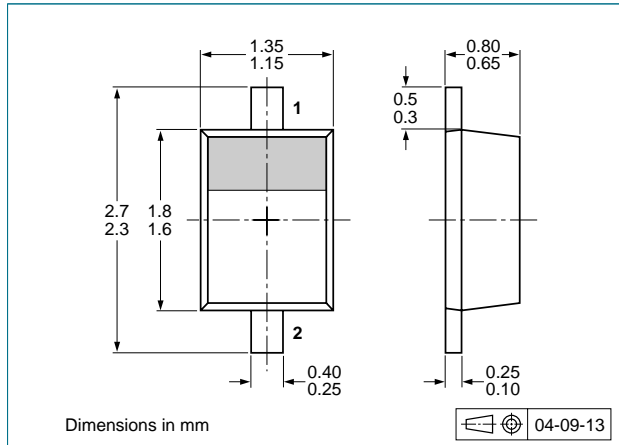


**Fig 7. Package outline BAS16 (SOT23/TO-236AB)**

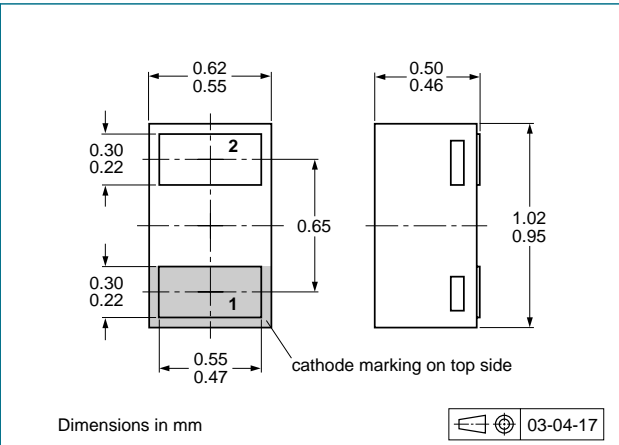


**Fig 8. Package outline BAS16H (SOD123F)**

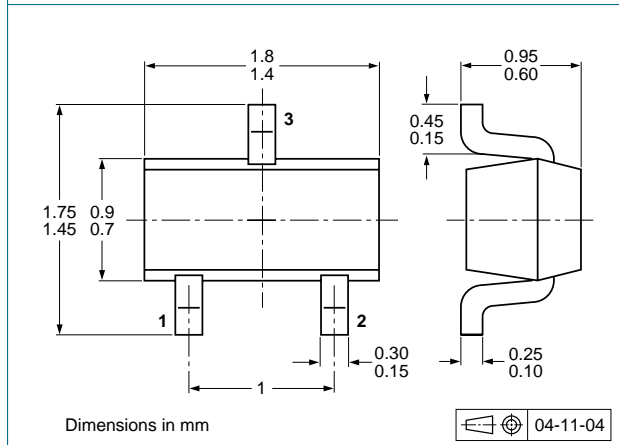




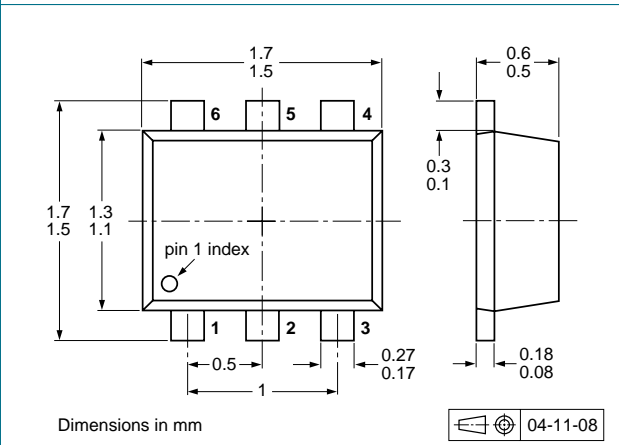
**Fig 9. Package outline BAS16J (SOD323F/SC-90)**



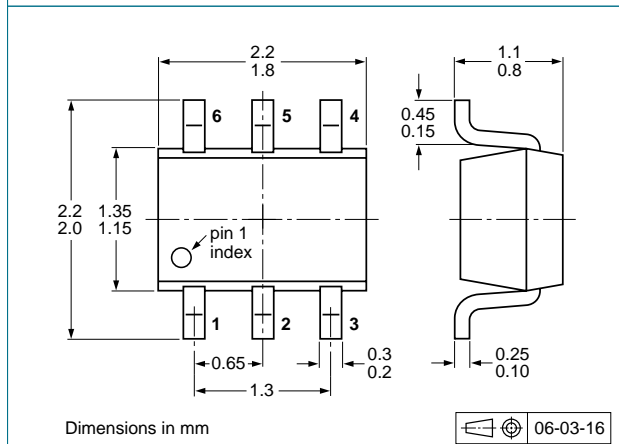
**Fig 10. Package outline BAS16L (SOD882)**



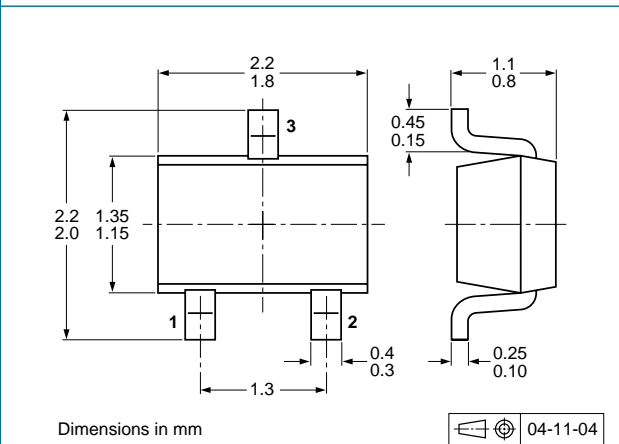
**Fig 11. Package outline BAS16T (SOT416/SC-75)**



**Fig 12. Package outline BAS16VV (SOT666)**



**Fig 13. Package outline BAS16VY (SOT363)**



**Fig 14. Package outline BAS16W (SOT323/SC-70)**

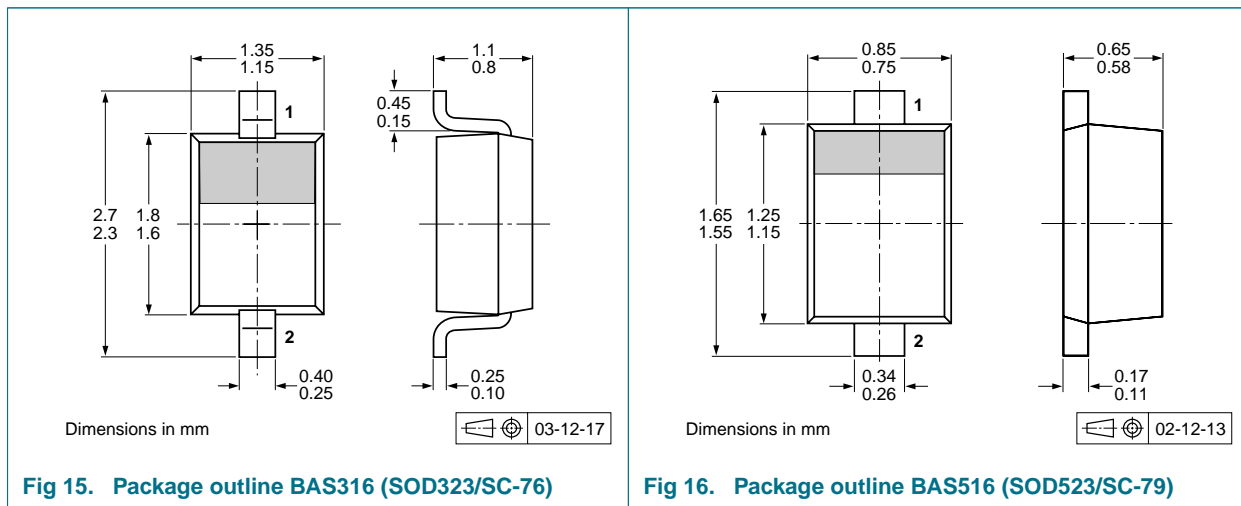


Fig 15. Package outline BAS316 (SOD323/SC-76)

Fig 16. Package outline BAS516 (SOD523/SC-79)

## 10. Packing information

**Table 9. Packing methods**

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

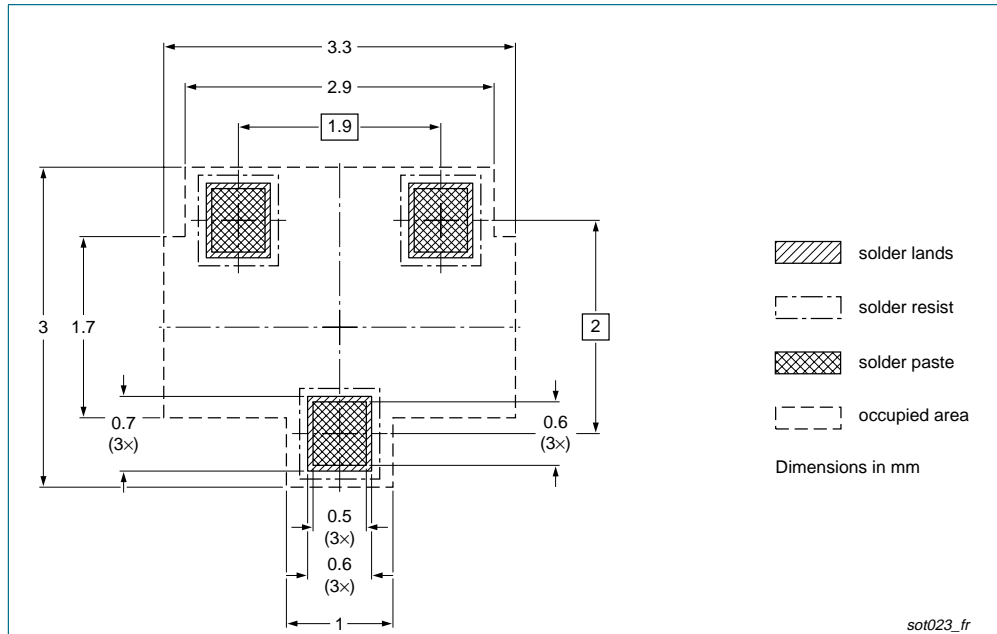
Type number	Package	Description	Packing quantity			
			3000	4000	8000	10000
BAS16	SOT23	4 mm pitch, 8 mm tape and reel	-215	-	-	-235
BAS16H	SOD123F	4 mm pitch, 8 mm tape and reel	-115	-	-	-135
BAS16J	SOD323F	4 mm pitch, 8 mm tape and reel	-115	-	-	-135
BAS16L	SOD882	2 mm pitch, 8 mm tape and reel	-	-	-	-315
BAS16T	SOT416	4 mm pitch, 8 mm tape and reel	-115	-	-	-135
BAS16VV	SOT666	2 mm pitch, 8 mm tape and reel	-	-	-315	-
		4 mm pitch, 8 mm tape and reel	-	-115	-	-
BAS16VY	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
BAS16W	SOT323	4 mm pitch, 8 mm tape and reel	-115	-	-	-135
BAS316	SOD323	4 mm pitch, 8 mm tape and reel	-115	-	-	-135
BAS516	SOD523	2 mm pitch, 8 mm tape and reel	-	-	-315	-
		4 mm pitch, 8 mm tape and reel	-115	-	-	-135

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

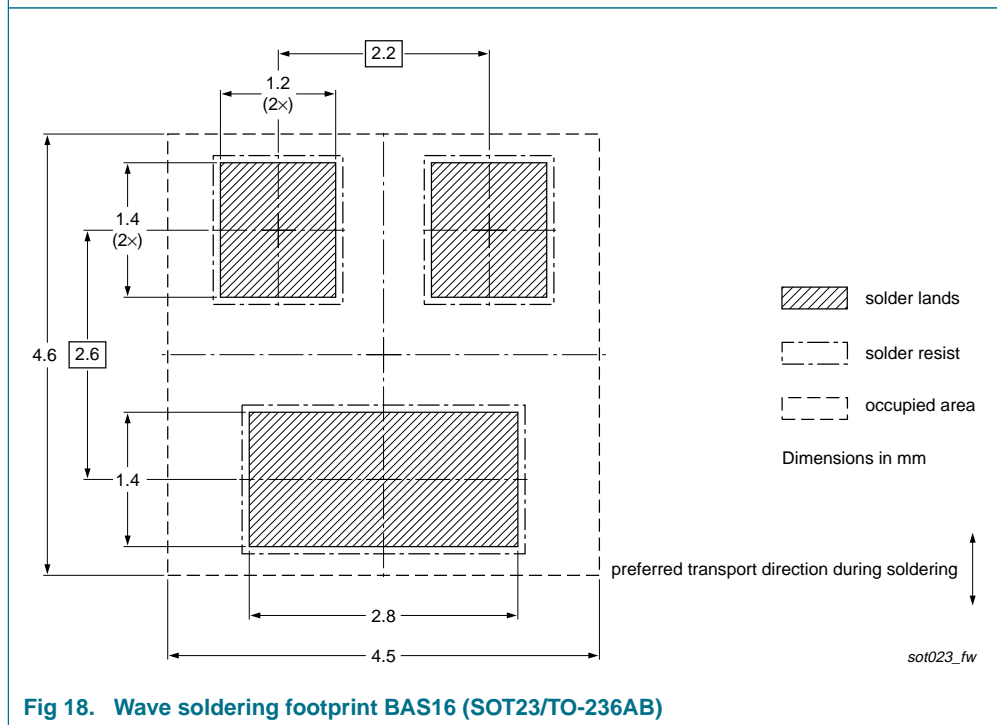
[2] T1: normal taping

[3] T2: reverse taping

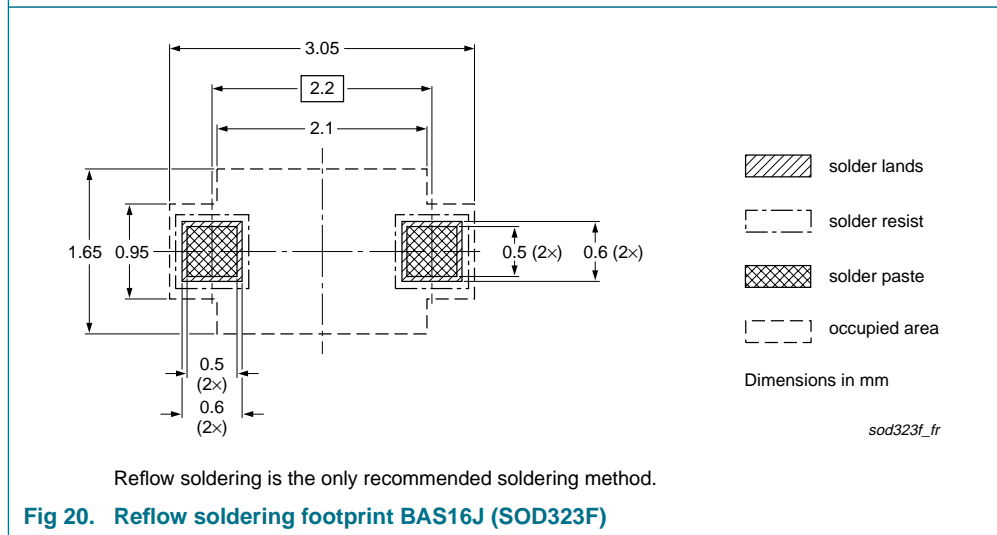
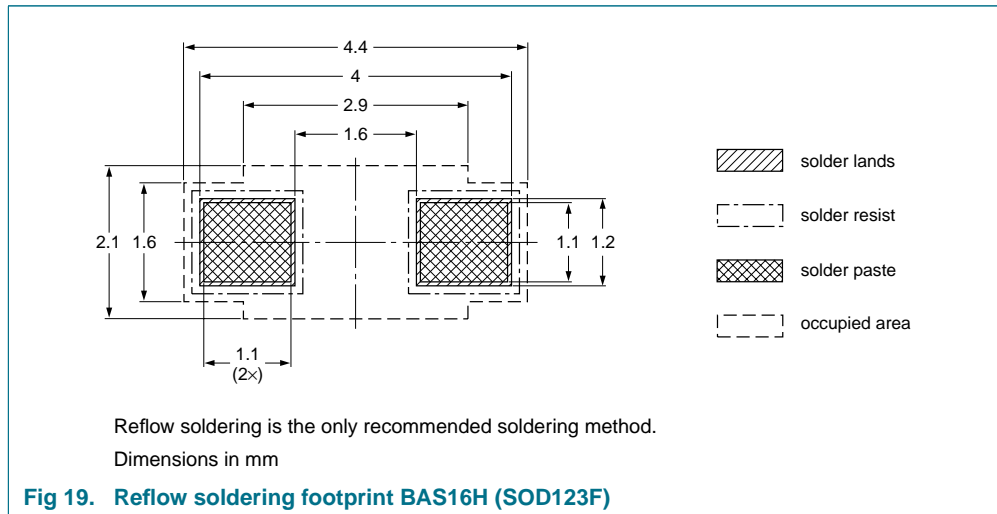
**11. Soldering**

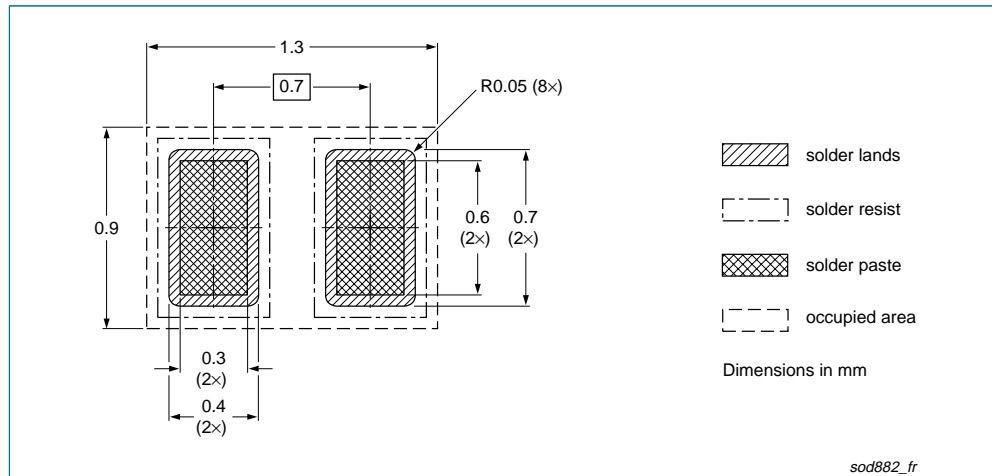


**Fig 17. Reflow soldering footprint BAS16 (SOT23/TO-236AB)**



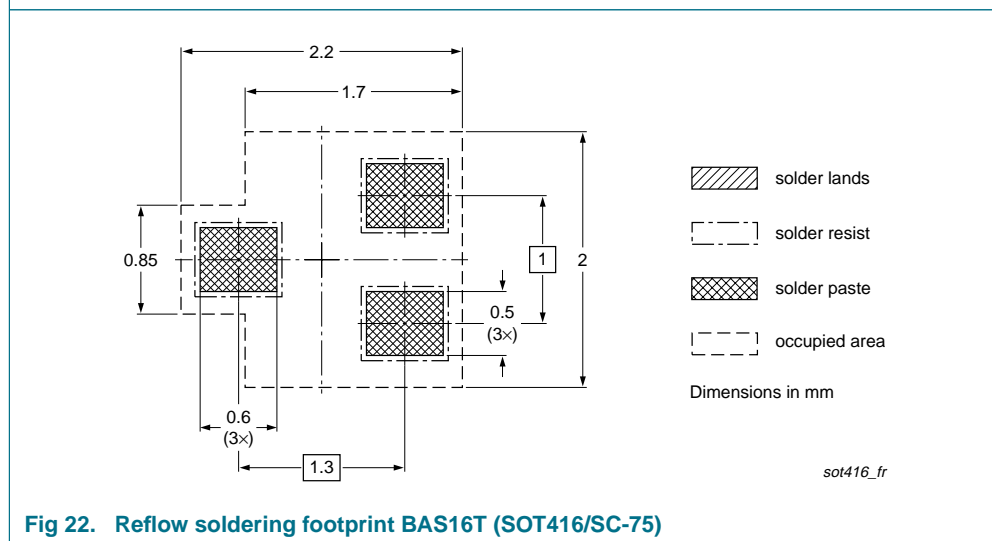
**Fig 18. Wave soldering footprint BAS16 (SOT23/TO-236AB)**



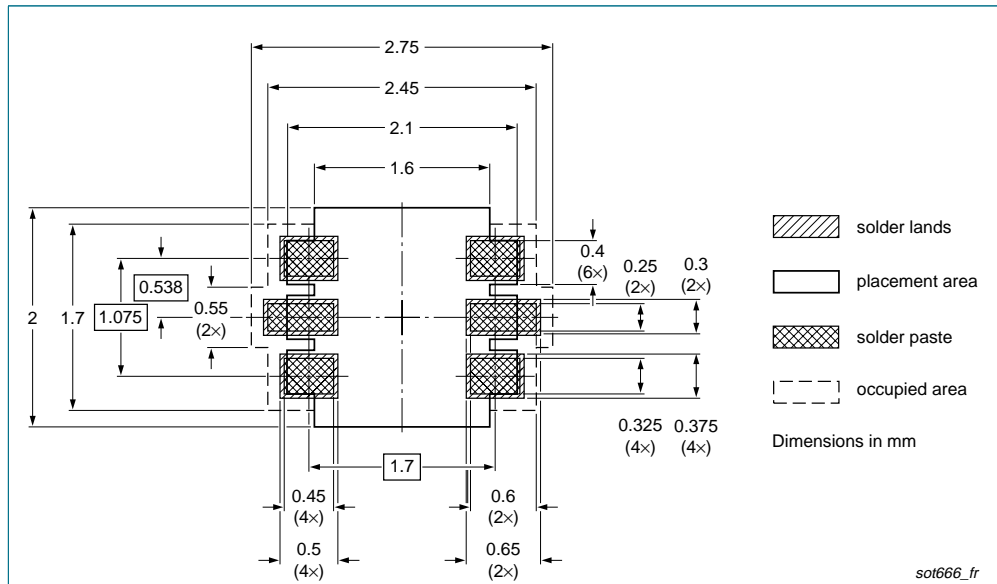


Reflow soldering is the only recommended soldering method.

**Fig 21. Reflow soldering footprint BAS16L (SOD882)**

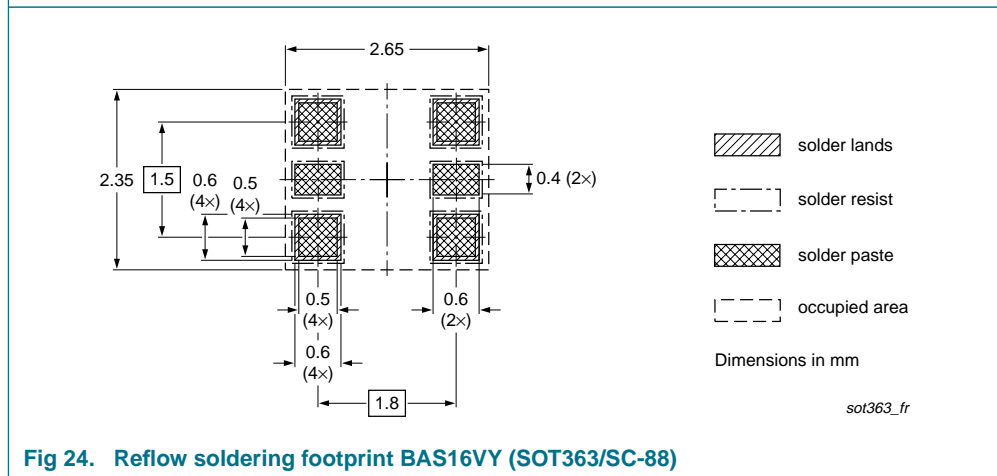


**Fig 22. Reflow soldering footprint BAS16T (SOT416/SC-75)**

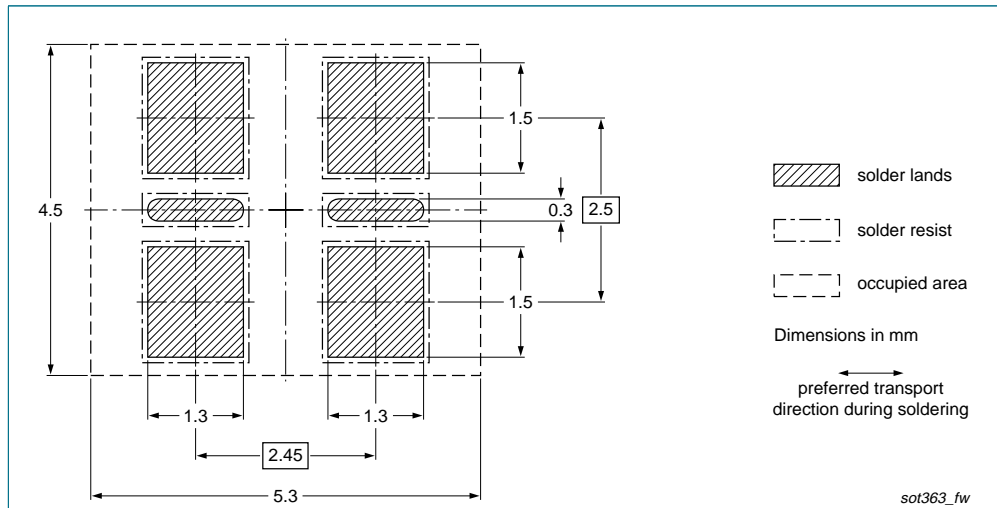


Reflow soldering is the only recommended soldering method.

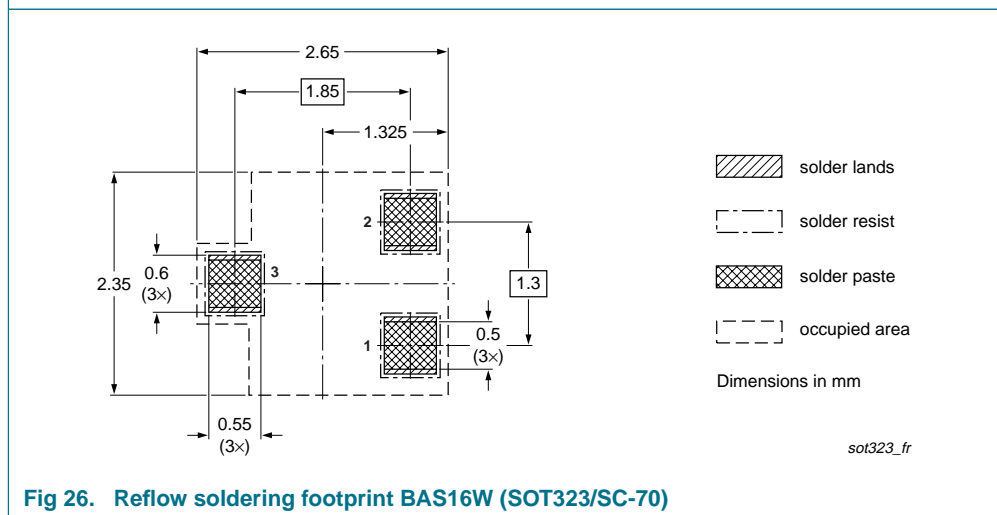
**Fig 23. Reflow soldering footprint BAS16VV (SOT666)**



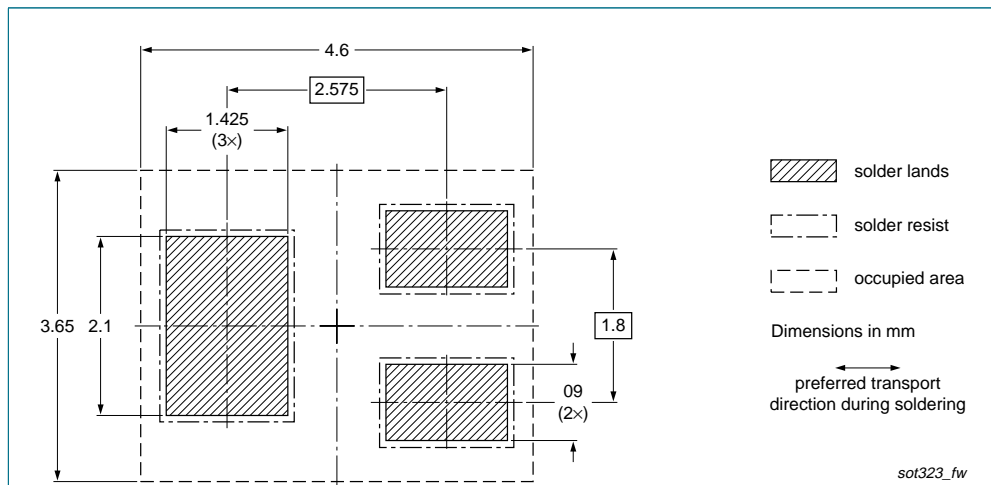
**Fig 24. Reflow soldering footprint BAS16VY (SOT363/SC-88)**



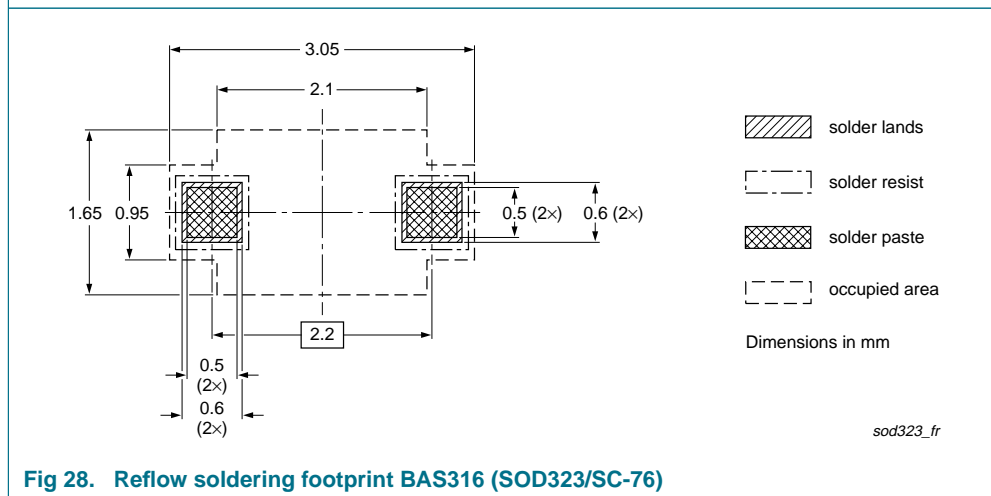
**Fig 25. Wave soldering footprint BAS16VY (SOT363/SC-88)**



**Fig 26. Reflow soldering footprint BAS16W (SOT323/SC-70)**

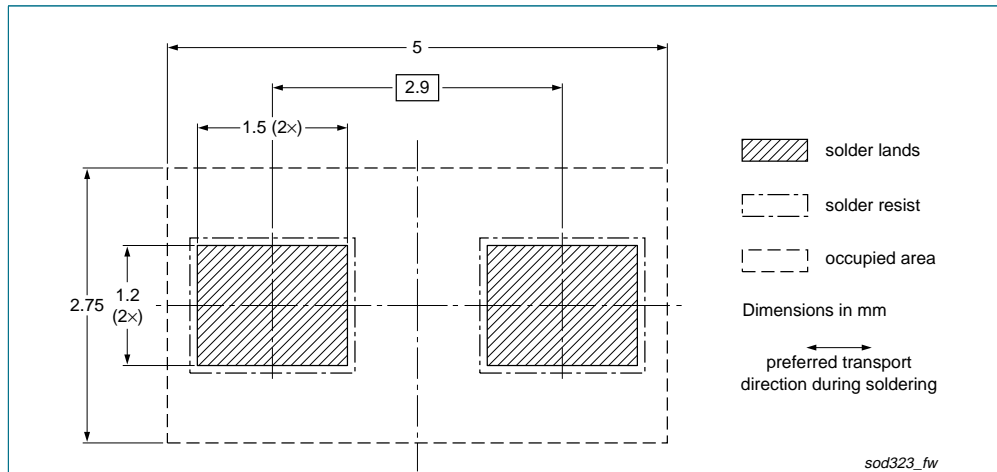


**Fig 27. Wave soldering footprint BAS16W (SOT323/SC-70)**

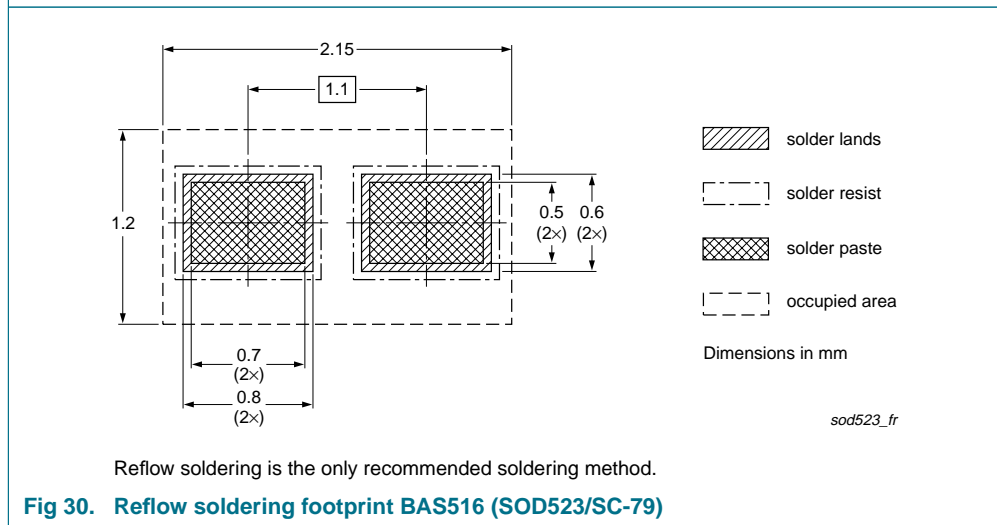


**Fig 28. Reflow soldering footprint BAS316 (SOD323/SC-76)**





**Fig 29. Wave soldering footprint BAS16 (SOD323/SC-76)**



**Fig 30. Reflow soldering footprint BAS516 (SOD523/SC-79)**

## 12. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BAS16_SER_5	20080825	Product data sheet	-	BAS16_4 BAS16H_1 BAS16J_1 BAS16L_1 BAS16T_1 BAS16VV_BAS16VY_3 BAS16W_4 BAS316_4 BAS516_1
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><a href="#">Table 5 "Marking codes"</a>: marking code amended for BAS16W</li> <li><a href="#">Table 6 "Limiting values"</a>: for BAS16, BAS16T, BAS16W and BAS516 change of <math>V_{RRM}</math> maximum value from 85 V to 100 V</li> <li><a href="#">Table 6 "Limiting values"</a>: for BAS16, BAS16L, BAS16T, BAS16W and BAS516 change of <math>V_R</math> maximum value from 75 V to 100 V</li> <li><a href="#">Table 8 "Characteristics"</a>: change of <math>I_R</math> condition <math>V_R</math> from 75 V to 80 V for <math>T_j = 25\text{ °C}</math></li> <li><a href="#">Table 8 "Characteristics"</a>: change of <math>I_R</math> maximum value from 1.0 <math>\mu\text{A}</math> to 0.5 <math>\mu\text{A}</math> for <math>V_R = 80\text{ V}</math> and <math>T_j = 25\text{ °C}</math></li> <li><a href="#">Table 8 "Characteristics"</a>: change of <math>I_R</math> condition <math>V_R</math> from 75 V to 80 V for <math>T_j = 150\text{ °C}</math></li> <li><a href="#">Section 13 "Legal information"</a>: updated</li> </ul>
BAS16_4	20011010	Product specification	-	BAS16_3
BAS16H_1	20050415	Product data sheet	-	-
BAS16J_1	20070308	Product data sheet	-	-
BAS16L_1	20030623	Product specification	-	-
BAS16T_1	19980120	Product specification	-	-
BAS16VV_BAS16VY_3	20070420	Product data sheet	-	BAS16VV_BAS16VY_2
BAS16W_4	19990506	Product specification	-	BAS16W_3
BAS316_4	20040204	Product specification	-	BAS316_3
BAS516_1	19980831	Product specification	-	-

## 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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