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
	NXP	JEITA	JEDEC		configuration
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: $t_{rr} \le 4$ ns
- Low leakage current
- Repetitive peak reverse voltage: $V_{RRM} \le 100 \text{ V}$
- Low capacitance
- Reverse voltage: V_R ≤ 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	Тур	Max	Unit
Per diode						
V_R	reverse voltage		-	-	100	V
I _R	reverse current	$V_{R} = 80 \text{ V}$	-	-	0.5	μΑ
t _{rr}	reverse recovery time		<u>[1]</u> -	-	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	Graphic symbol
BAS16; B	AS16T; BAS16W		
1	anode		2
2	not connected	3	3
3	cathode		1 1 2
			006aaa764
		1 2	
		006aaa144	
BAS16H;	BAS16J; BAS316; BAS516		
1	cathode	[1]	
2	anode	1 2	1 2
			006aab040
		001aab540	
BAS16L			
1	cathode	[1]	
2	anode	1 2	1 2
			006aab040
		Transparent top view	
BAS16VV	; BAS16VY		
1	anode (diode 1)		
2	anode (diode 2)	6 5 4	6 5 4
3	anode (diode 3)		
4	cathode (diode 3)		
5	cathode (diode 2)		
6	cathode (diode 1)		1 2 3
	,	001445000	006aab106

^[1] The marking bar indicates the cathode.

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3. Ordering information

Table 4. Ordering information

Type number	Package						
	Name	Description	Version				
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 $1.0 \times 0.6 \times 0.5 \text{ mm}$	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[1]
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
Per diode					
V_{RRM}	repetitive peak reverse voltage		-	100	V
V_R	reverse voltage		-	100	V
l _F	forward current				
	BAS16		<u>[1]</u> _	215	mA
	BAS16H BAS16L		[2] -	215	mA
	BAS16T		<u>[1]</u> _	155	mA
	BAS16VV BAS16VY		[1][3]	200	mA
	BAS16W		<u>[1]</u> -	175	mA
	BAS16J BAS316 BAS516		<u>[1]</u> -	250	mA
I _{FRM}	repetitive peak forward current	$t_p \leq 0.5~\mu s; \\ \delta \leq 0.25$	-	500	mA
I _{FSM}	non-repetitive peak forward	square wave	[4]		
	current	t _p = 1 μs	-	4	Α
		$t_p = 1 \text{ ms}$	-	1	Α
		$t_p = 1 s$	-	0.5	Α
P _{tot}	total power dissipation				
	BAS16	$T_{amb} \le 25 ^{\circ}C$	<u>[1]</u> -	250	mW
	BAS16H	T _{amb} ≤ 25 °C	[2][5] <u> </u>	380	mW
			[5][6] <u> </u>	830	mW
	BAS16J	T _{amb} ≤ 25 °C	[5][6] _ [7]	550	mW
	BAS16L	T _{amb} ≤ 25 °C	[2][5] _ [6]	250	mW
	BAS16T	$T_{sp} \le 90 ^{\circ}C$	<u>[1]</u> _	170	mW
	BAS16VV	T _{amb} ≤ 25 °C	[1][3] [5][8]	180	mW
	BAS16VY	T _{sp} ≤ 85 °C	[1][3] _ [8]	250	mW
	BAS16W	$T_{amb} \le 25 ^{\circ}C$	<u>[1]</u> -	200	mW
	BAS316	$T_{sp} \le 90 ^{\circ}C$	[1][6]	400	mW
	BAS516	$T_{sp} \le 90 ^{\circ}C$	[1][5] <u> </u>	500	mW

 Table 6.
 Limiting values ...continued

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

Symbol	Parameter	Conditions	Min	Max	Unit
Per device					
Tj	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] $T_i = 25$ °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 cm².
- [8] Soldering points at pins 4, 5 and 6.

6. Thermal characteristics

Table 7. Thermal characteristics

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
$R_{th(j\text{-}a)}$	thermal resistance from junction to ambient	in free air				
	BAS16		<u>[1]</u> _	-	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] - [5]	-	700	K/W
			[3][4] <u> </u>	-	410	K/W
	BAS16W		<u>[1]</u> _	-	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	Тур	Max	Unit
$R_{th(j-sp)}$	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 cm².
- [5] Single diode loaded.
- [6] Soldering point of cathode tab.
- [7] Soldering points at pins 4, 5 and 6.

7. Characteristics

Table 8. Characteristics

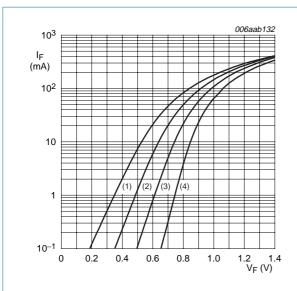
 T_{amb} = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
Per diode						
V_{F}	forward voltage		<u>[1]</u>			
		I _F = 1 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 V	-	-	30	nA
		V _R = 80 V	-	-	0.5	μΑ
		$V_R = 25 \text{ V}; T_j = 150 ^{\circ}\text{C}$	-	-	30	μΑ
		$V_R = 80 \text{ V}; T_j = 150 ^{\circ}\text{C}$	-	-	50	μΑ
C_d	diode capacitance	$f = 1 MHz; V_R = 0 V$				
	BAS16; BAS16H; BAS16J; BAS16L; BAS16T; BAS16VV; BAS16VY; BAS16W; BAS316		-	-	1.5	pF
	BAS516		-	-	1	pF
t _{rr}	reverse recovery time		[2] _	-	4	ns
V_{FR}	forward recovery voltage		[3]	-	1.75	V

^[1] Pulse test: $t_p \le 300 \ \mu s$; $\delta \le 0.02$.

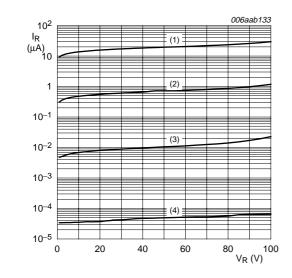
^[2] When switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω ; measured at I_R = 1 mA.

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



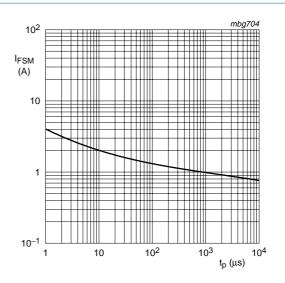
- (1) $T_{amb} = 150 \, ^{\circ}C$
- (2) $T_{amb} = 85 \, ^{\circ}C$
- (3) $T_{amb} = 25 \, ^{\circ}C$
- (4) $T_{amb} = -40 \, ^{\circ}C$

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



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

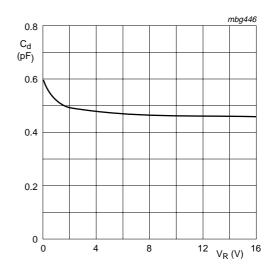
Fig 3. Reverse current as a function of reverse voltage; typical values



Based on square wave currents.

 $T_i = 25$ °C; prior to surge

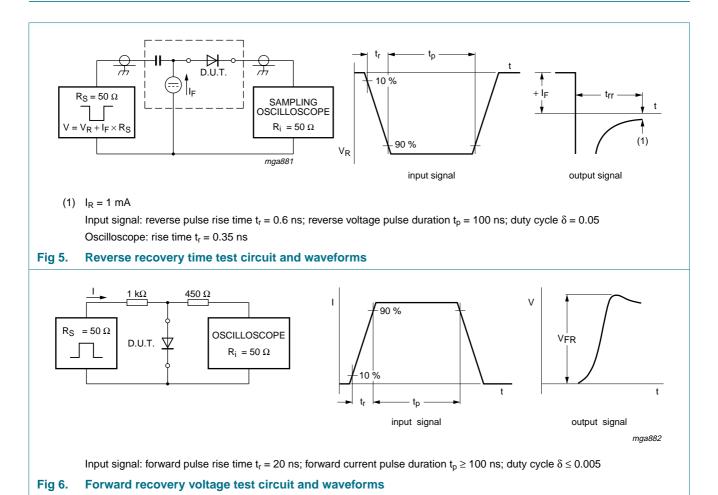
Fig 2. Non-repetitive peak forward current as a function of pulse duration; maximum values



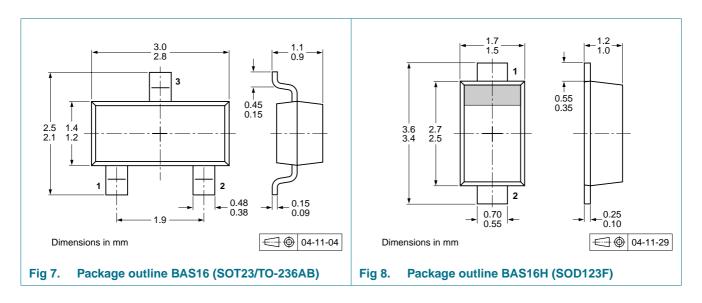
 $f = 1 \text{ MHz}; T_{amb} = 25 ^{\circ}\text{C}$

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

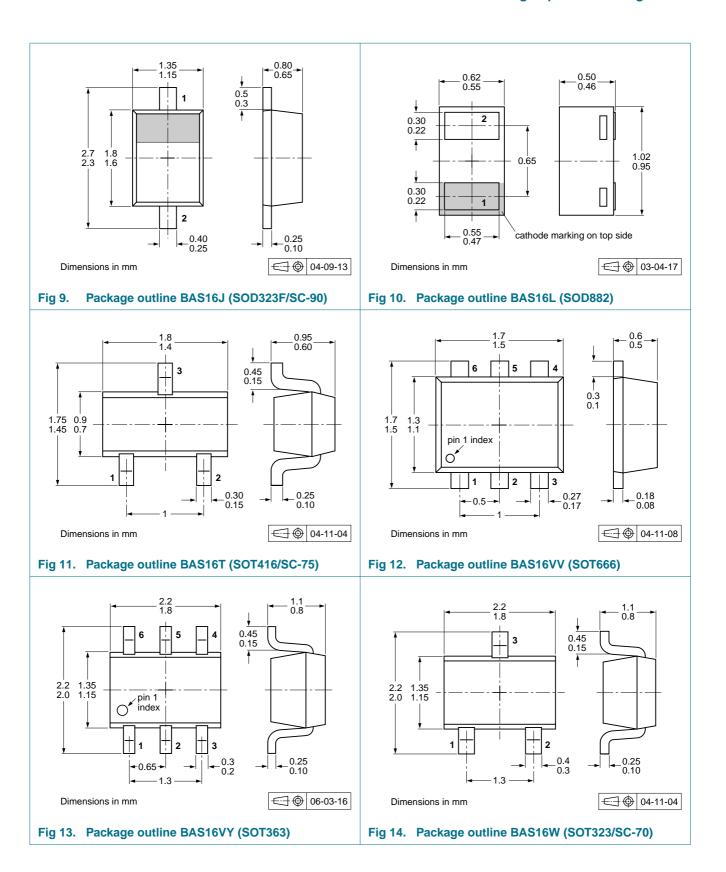
8. Test information



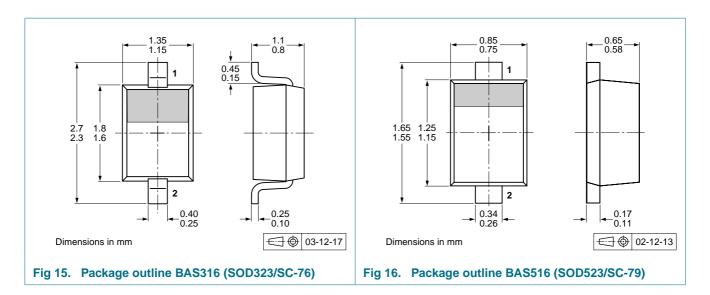
9. Package outline



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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]

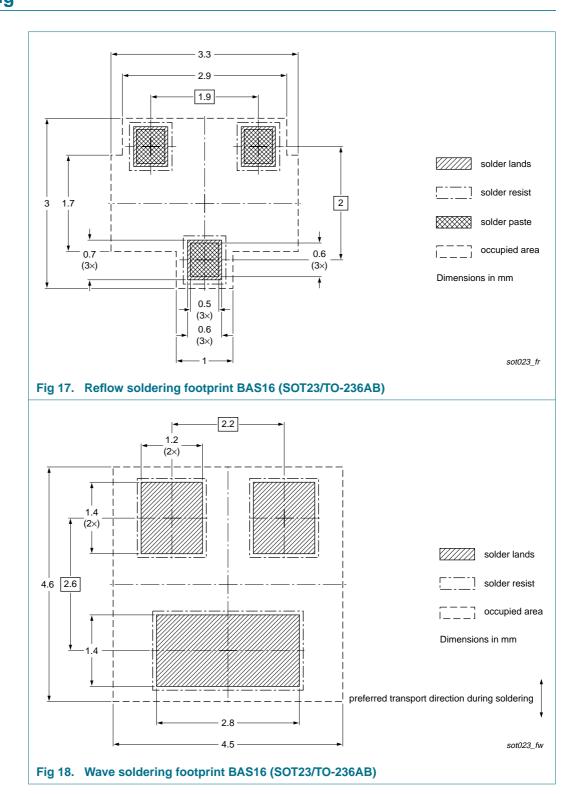
Type number	Package	Description		Packing quantity				
				3000	4000	8000	10000	
BAS16	SOT23	4 mm pitch, 8 mm tape and reel		-215	-	-	-235	
BAS16H	SOD123F	4 mm pitch, 8 mm tape and reel		-115	-	-	-135	
BAS16J	SOD323F	4 mm pitch, 8 mm tape and reel		-115	-	-	-135	
BAS16L	SOD882	2 mm pitch, 8 mm tape and 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	[2]	-115	-	-	-135	
		4 mm pitch, 8 mm tape and reel; T2	[3]	-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.

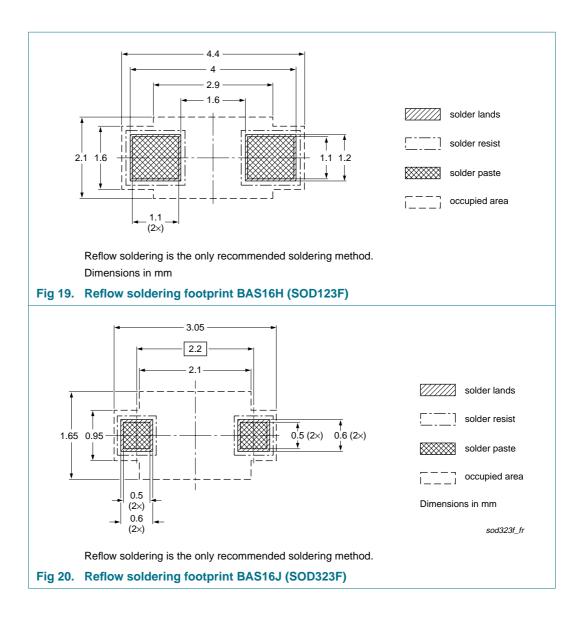
[2] T1: normal taping

[3] T2: reverse taping

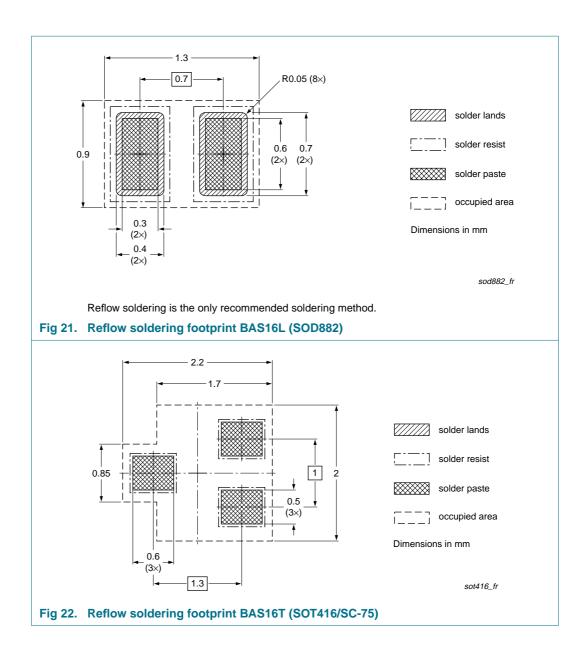
11. Soldering

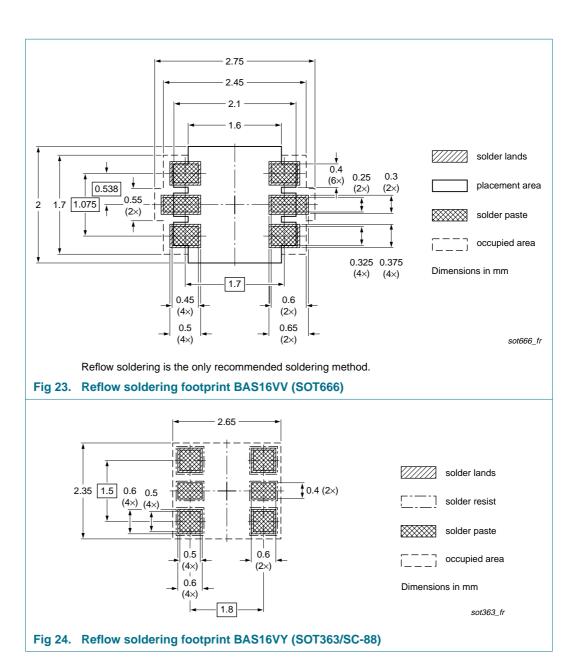


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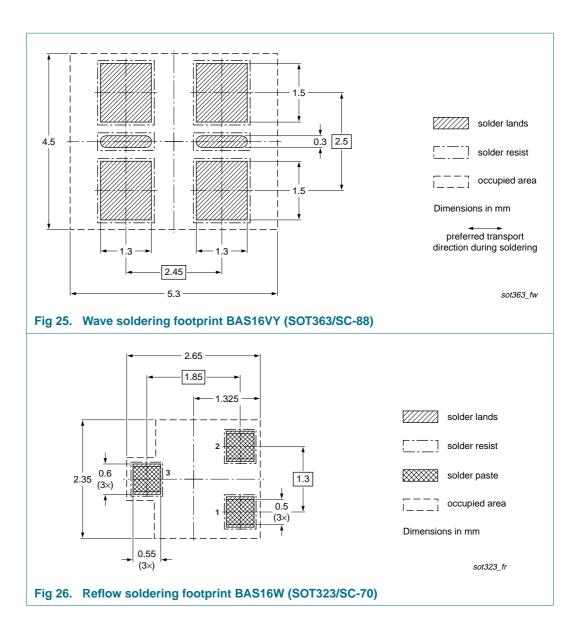


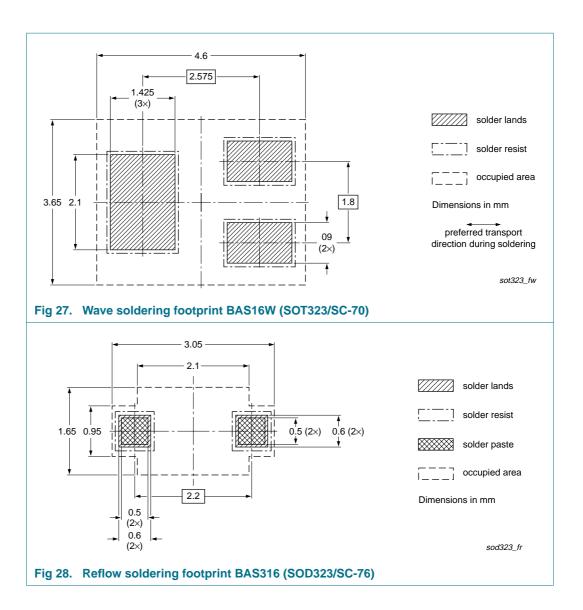
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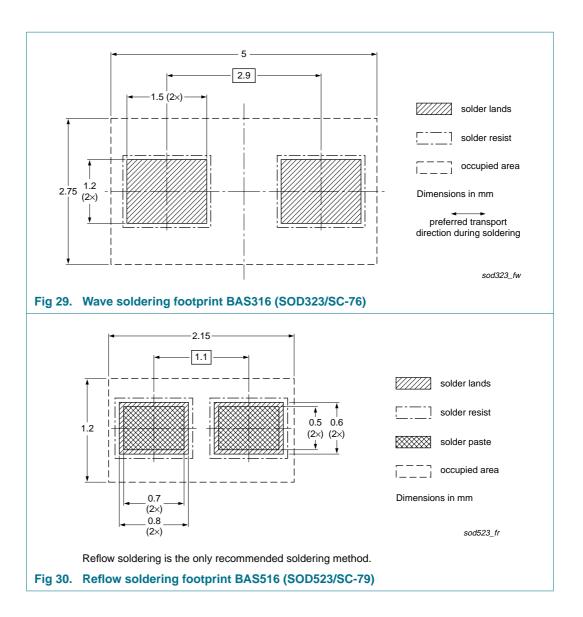




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12. Revision history

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:	guidelines of Legal texts h	of this data sheet has been ref NXP Semiconductors. have been adapted to the ne	w company name whe	•				
		king codes": marking code a		ASS16 change of				
	 <u>Table 6 "Limiting values"</u>: for BAS16, BAS16T, BAS16W and BAS516 change of V_{RRM} maximum value from 85 V to 100 V 							
	• Table 6 "Limiting values": for BAS16, BAS16L, BAS16T, BAS16W and BAS516 change of							
		n value from 75 V to 100 V	Pri: 1/ (75.1/)	. 00.V/. T 05.00				
		racteristics": change of I _R co		,				
	and T _i = 25 °		aximum value from 1.0	0μ A to 0.5 μ A for V _R = 80 V				
	,	racteristics": change of IR co	ondition V _R from 75 V	to 80 V for T _j = 150 °C				
	 Section 13 "I 	Legal information": updated						
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				
DA0040 4								
BAS316_4	20040204	Product specification	-	BAS316_3				

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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.
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- [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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High-speed switching diodes

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