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Kind regards,

Team Nexperia

BAS16 series

High-speed switching diodes

Rev. 6 — 24 September 2014

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 and benefits

- High switching speed: $t_{rr} \le 4$ ns
- Low leakage current
- Repetitive peak reverse voltage: V_{RRM} ≤ 100 V
- AEC-Q101 qualified

- 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

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

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
Per diode						
V_R	reverse voltage		-	-	100	V
I _R	reverse current	V _R = 80 V	-	-	0.5	μΑ
t _{rr}	reverse recovery time	$I_F = 10 \text{ mA}; I_R = 10 \text{ mA};$ $R_L = 100 \Omega; I_{R(meas)} = 1 \text{ mA}$	-	-	4	ns

2. Pinning information

Table 3. Pinning

Pin	Description		Simplified outline	Graphic symbol
BAS16; BAS1	6T; BAS16W			
1	anode			
2	not connected		3	3
3	cathode		1 2	1 1 2 2 006aaa764
			006aaa144	
BAS16H; BAS	S16J; BAS316; BAS516			
1	cathode	[1]		
2	anode		001aab540	1 2 006aab040
BAS16L				
1	cathode	<u>[1]</u>		
2	anode		Transparent top view	1 2 006aab040
BAS16VV; BA	AS16VY			
1	anode (diode 1)			
2	anode (diode 2)		6 5 4	6 5 4
3	anode (diode 3)			$ \downarrow \downarrow \downarrow \downarrow $
4	cathode (diode 3)			
5	cathode (diode 2)			
6	cathode (diode 1)		001aab555	006aab106

^[1] The marking bar indicates the cathode.

3. Ordering information

Table 4. Ordering information

Type number	Package						
	Name	Version					
BAS16	TO-236AB	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	DFN1006-2	leadless ultra small plastic package; 2 terminals; body 1.0 \times 0.6 \times 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 ^[1]
BAS16	A6*
BAS16H	A1
BAS16J	AR
BAS16L	S2
BAS16T	A6
BAS16VV	53
BAS16VY	16*
BAS16W	A6*
BAS316	A6
BAS516	6

^{[1] * =} placeholder for manufacturing site code

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

Table 6. Limiting values ...continued
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
l _F	forward current					
	BAS16		[1]	-	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		[1]	-	250	mA
I _{FRM}	repetitive peak forward current	$t_p \leq 0.5 \text{ ms}; \\ \delta \leq 0.25$		-	500	mA
I _{FSM}	non-repetitive peak forward current	square wave; T _{j(init)} = 25 °C				
		$t_p = 1 \mu s$		-	4	Α
		$t_p = 1 \text{ ms}$		-	1	Α
		t _p = 1 s		-	0.5	Α
P _{tot}	total power dissipation					
	BAS16	T _{amb} ≤ 25 °C	[1]	-	250	mW
	BAS16H	T _{amb} ≤ 25 °C	[2]	-	380	mW
			[5]	-	830	mW
	BAS16J	T _{amb} ≤ 25 °C	[5]	-	550	mW
	BAS16L	T _{amb} ≤ 25 °C	[2]	-	250	mW
	BAS16T	T _{sp} ≤ 90 °C	[1][4]	-	170	mW
	BAS16VV	T _{amb} ≤ 25 °C	[1][3]	-	180	mW
	BAS16VY	T _{sp} ≤ 85 °C	[1][3][6]	-	250	mW
	BAS16W	T _{amb} ≤ 25 °C	[1]	-	200	mW
	BAS316	T _{sp} ≤ 90 °C	[1][4]	-	400	mW
	BAS516	T _{sp} ≤ 90 °C	[1][4]	-	500	mW
Per device	1	1	-	1	1	1
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 μm copper strip line.

^[3] Single diode loaded.

^[4] Soldering point of cathode tab.

^[5] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

^[6] 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-a)}	thermal resistance from junction to ambient	in free air					
	BAS16		<u>[1]</u>	-	-	500	K/W
	BAS16H		[2]	-	-	330	K/W
			[3]	-	-	150	K/W
	BAS16J		[3]	-	-	230	K/W
	BAS16L		[2]	-	-	500	K/W
	BAS16VV		[2][4]	-	-	700	K/W
			[3][4]	-	-	410	K/W
	BAS16W		<u>[1]</u>	-	-	625	K/W
R _{th(j-sp)}	thermal resistance from junction to solder point						
	BAS16			-	-	330	K/W
	BAS16H		<u>[5]</u>	-	-	70	K/W
	BAS16J		<u>[5]</u>	-	-	55	K/W
	BAS16T			-	-	350	K/W
	BAS16VY		[4][6]	-	-	260	K/W
	BAS16W			-	-	300	K/W
	BAS316		<u>[5]</u>	-	-	150	K/W
	BAS516		[5]	-	-	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] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².
- [4] Single diode loaded.
- [5] Soldering point of cathode tab.
- [6] Soldering points at pins 4, 5 and 6.

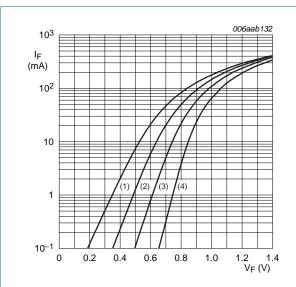
7. Characteristics

Table 8. Characteristics

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

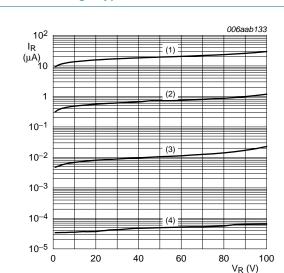
Symbol	Parameter	Conditions		Min	Тур	Max	Unit
Per diode)		'				
V _F	forward voltage		[1]				
		I _F = 1 mA		-	-	715	mV
		I _F = 10 mA		-	-	855	mV
		I _F = 50 mA		-	-	1	V
		I _F = 150 mA		-	-	1.25	V
I _R	reverse current	V _R = 25 V		-	-	30	nA
		V _R = 80 V		-	-	0.5	μΑ
		V _R = 25 V; T _j = 150 °C		-	-	30	μΑ
		V _R = 80 V; T _j = 150 °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	$\begin{split} I_F &= 10 \text{ mA; } I_R = 10 \text{ mA;} \\ R_L &= 100 \Omega; \\ I_{R(meas)} &= 1 \text{ mA} \end{split}$		-	-	4	ns
V_{FR}	forward recovery voltage	$I_F = 10 \text{ mA}; t_r = 20 \text{ ns}$		-	-	1.75	V

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



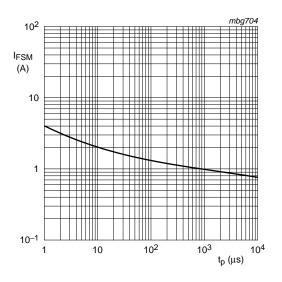
- (1) $T_{amb} = 150 \, ^{\circ}C$
- (2) $T_{amb} = 85 \, ^{\circ}C$
- (3) $T_{amb} = 25 \, ^{\circ}C$
- (4) $T_{amb} = -40 \, ^{\circ}C$

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



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

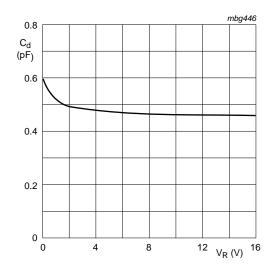
Fig 3. Reverse current as a function of reverse voltage; typical values



Based on square wave currents.

$$T_{j(init)} = 25 \, ^{\circ}C$$

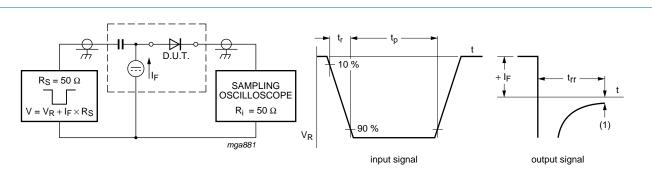
Fig 2. Non-repetitive peak forward current as a function of pulse duration; maximum values



f = 1 MHz; T_{amb} = 25 °C

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

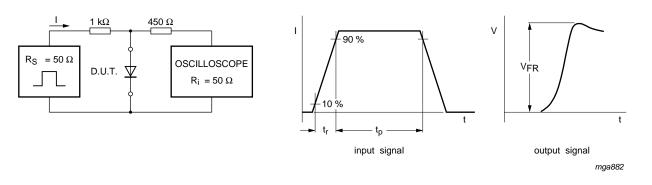
8. Test information



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

Input signal: reverse pulse rise time t_r = 0.6 ns; reverse voltage pulse duration t_p = 100 ns; duty cycle δ = 0.05 Oscilloscope: rise time t_r = 0.35 ns

Fig 5. Reverse recovery time test circuit and waveforms



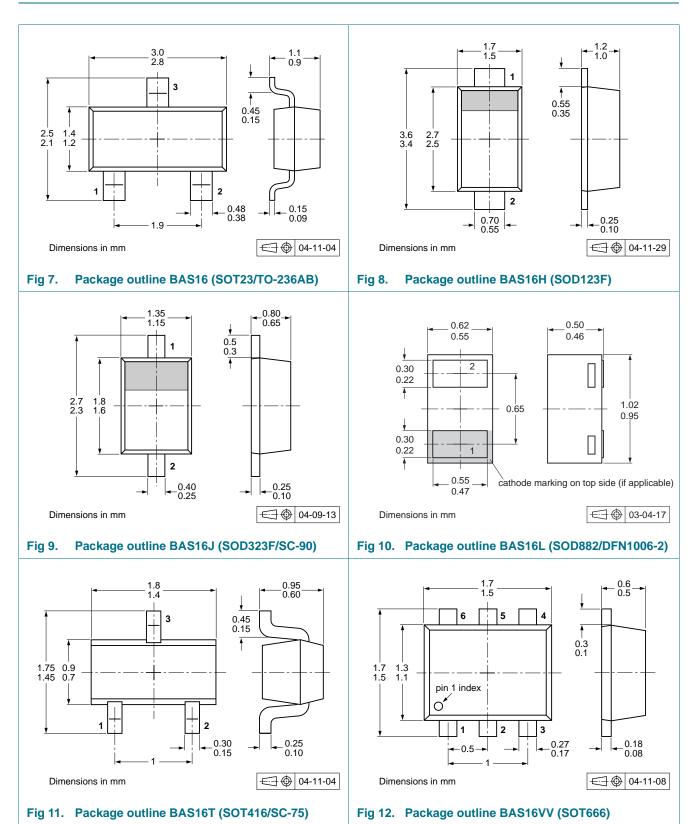
Input signal: forward pulse rise time $t_r = 20$ ns; forward current pulse duration $t_p \ge 100$ ns; duty cycle $\delta \le 0.005$

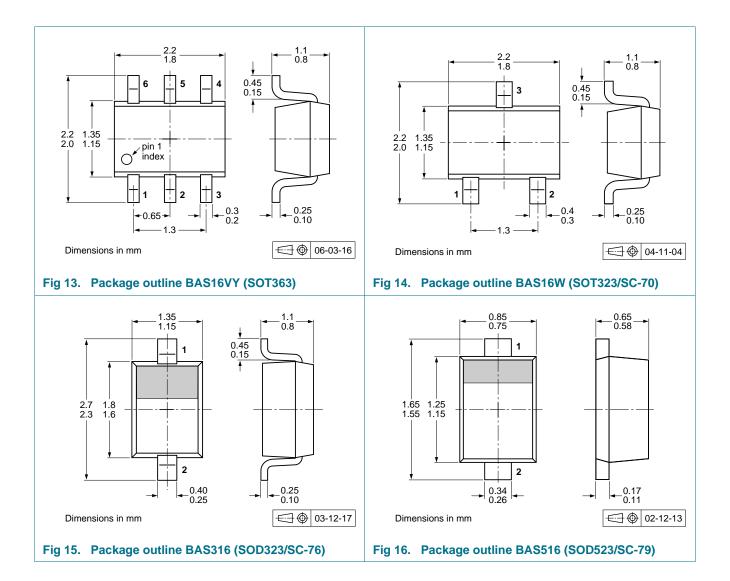
Fig 6. Forward recovery voltage test circuit and waveforms

8.1 Quality information

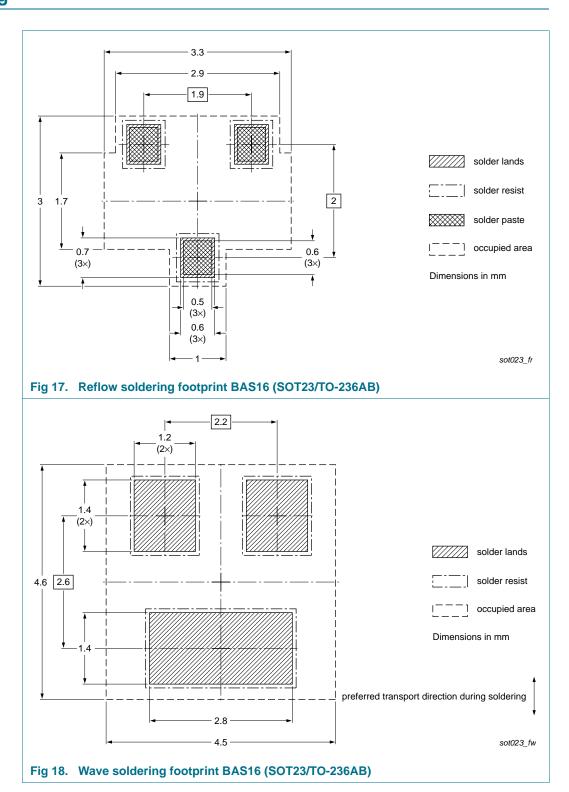
This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard *Q101 - Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

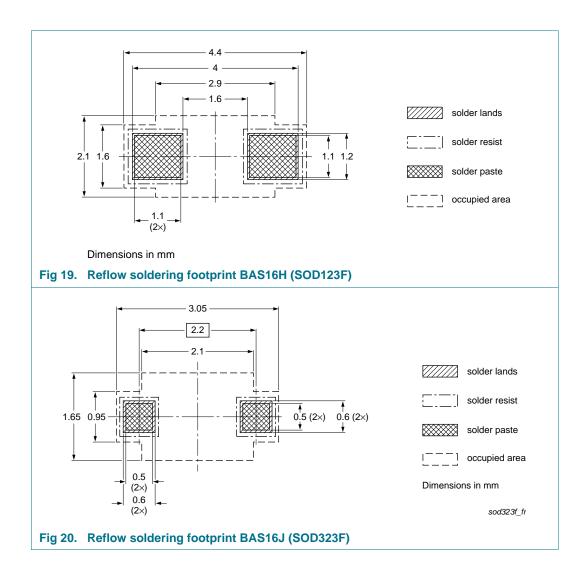
9. Package outline

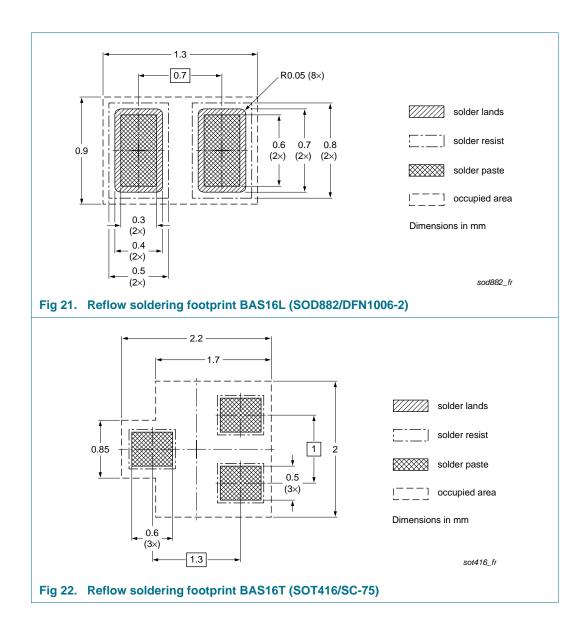


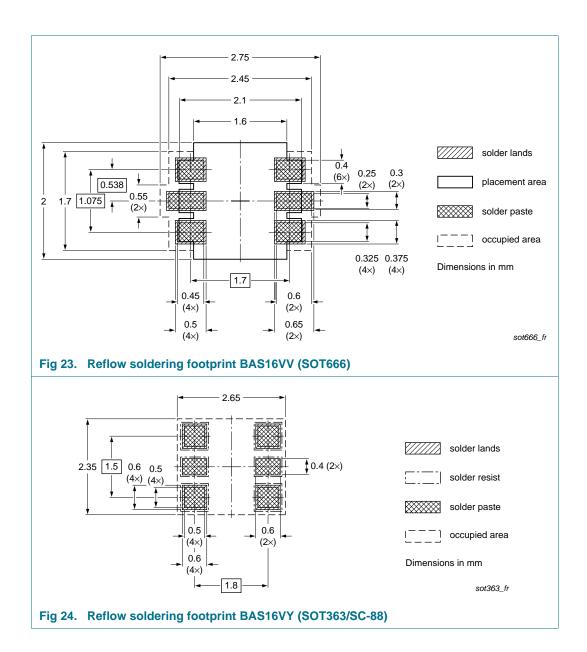


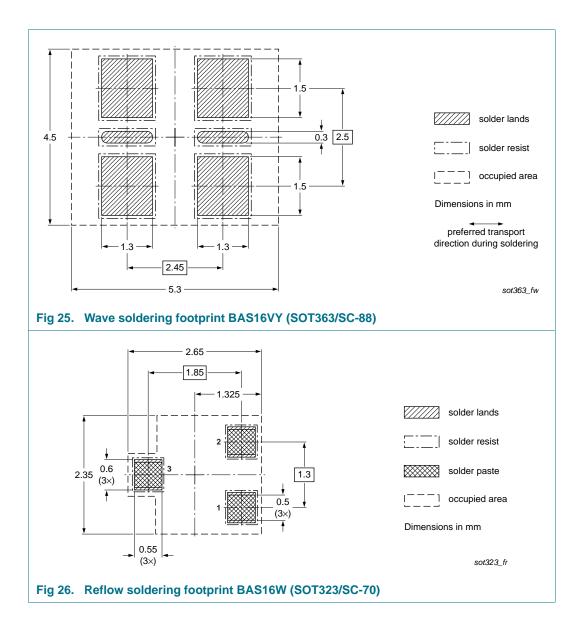
10. Soldering

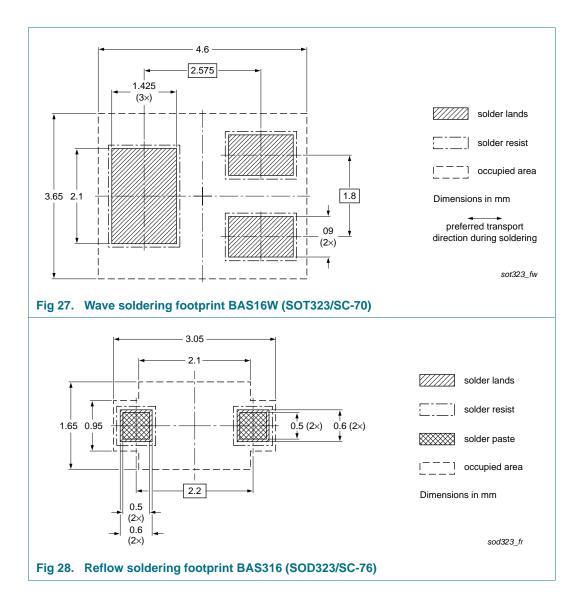


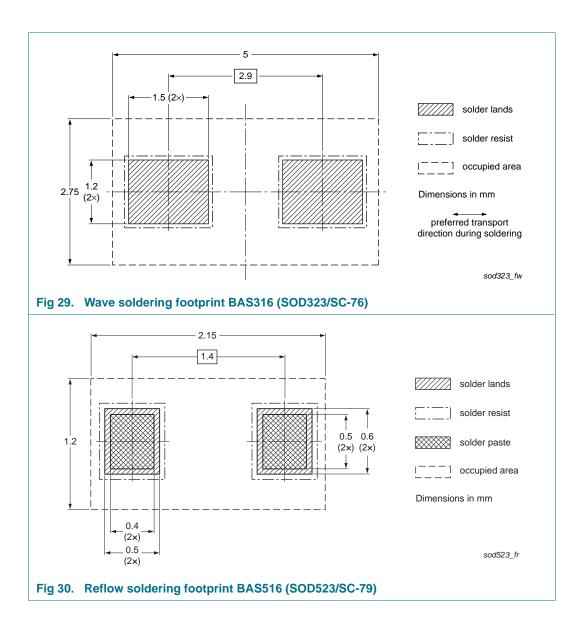












11. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BAS16_SER_6	20140924	Product data sheet	-	BAS16_SER_5
Modifications:	Section 1.2 "	Features and benefits": update	d	
	Section 4 "Magnetic states and a section states are sectin states are section states are section states are section states	arking": updated		
		ting values": updated		
	-	st information": updated		
	Section 12 "L	<u>egal information"</u> : updated		
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
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	-	-

12. Legal information

12.1 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.

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- [2] The term 'short data sheet' is explained in section "Definitions"
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BAS16_SER

BAS16 series

High-speed switching diodes

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BAS16 series

High-speed switching diodes

14. Contents

1	Product profile
1.1	General description
1.2	Features and benefits
1.3	Applications
1.4	Quick reference data 2
2	Pinning information 2
3	Ordering information 3
4	Marking 3
5	Limiting values
6	Thermal characteristics 5
7	Characteristics 6
8	Test information 8
8.1	Quality information 8
9	Package outline 9
10	Soldering 11
11	Revision history 18
12	Legal information
12.1	Data sheet status
12.2	Definitions
12.3	Disclaimers
12.4	Trademarks
13	Contact information 20
14	Contents

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