BAS21VD

High-voltage switching diodes

Rev. 2 — 29 June 2011 Product data sheet

1. Product profile

1.1 General description

Triple high-voltage switching diodes, encapsulated in a SOT457 (SC-74) small Surface-Mounted Device (SMD) plastic package.

1.2 Features and benefits

- High switching speed: $t_{rr} \leq 50$ ns
- Reverse voltage: $V_R \leq 200$ V
- Repetitive peak reverse voltage: $V_{RRM} \leq 250$ V
- Small SMD plastic package
- Low capacitance: $C_d \leq 5$ pF
- AEC-Q101 qualified
- Repetitive peak forward current: $I_{FRM} \leq 1$ A

1.3 Applications

- High-voltage switching in surface-mounted circuits
- Automotive
- Communication

1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per diode							
I_F	forward current		[1][2]	-	-	200	mA
I_R	reverse current	V_R = 200 V	[1]	-	25	100	nA
V_R	reverse voltage			-	-	200	V
t_{rr}	reverse recovery time		[3]	-	16	50	ns

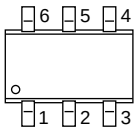
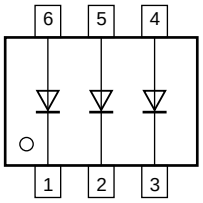
[1] Pulse test: $t_p \leq 300$ μs; $\delta \leq 0.02$.

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

[3] When switched from I_F = 30 mA to I_R = 30 mA; R_L = 100 Ω; measured at I_R = 3 mA.

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	cathode (diode 1)		
2	cathode (diode 2)		
3	cathode (diode 3)		
4	anode (diode 3)		
5	anode (diode 2)		
6	anode (diode 1)		

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3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAS21VD	SC-74	plastic surface-mounted package; 6 leads	SOT457

4. Marking

Table 4. Marking codes

Type number	Marking code
BAS21VD	B5

5. Limiting values

Table 5. 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			-	250	V
V_R	reverse voltage			-	200	V
I_F	forward current		[1][3]	-	200	mA
I_{FRM}	repetitive peak forward current	$t_p \leq 1$ ms; $\delta \leq 25$ %		-	1	A
I_{FSM}	non-repetitive peak forward current	square wave	[2]			
		$t_p = 10$ μs		-	16	A
		$t_p = 100$ μs		-	8	A
		$t_p = 10$ ms		-	2	A

Table 5. Limiting values *...continued*

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

Symbol	Parameter	Conditions		Min	Max	Unit
Per device; one diode loaded						
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[3]	-	250	mW
			[4]	-	295	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			−65	+150	°C
T_{stg}	storage temperature			−65	+150	°C

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

[2] $T_j = 25$ °C prior to surge.

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

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

6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per device; one diode loaded							
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	500	K/W
			[2]	-	-	425	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[3]	-	-	140	K/W

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

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2.

[3] Soldering point of cathode tab.

7. Characteristics

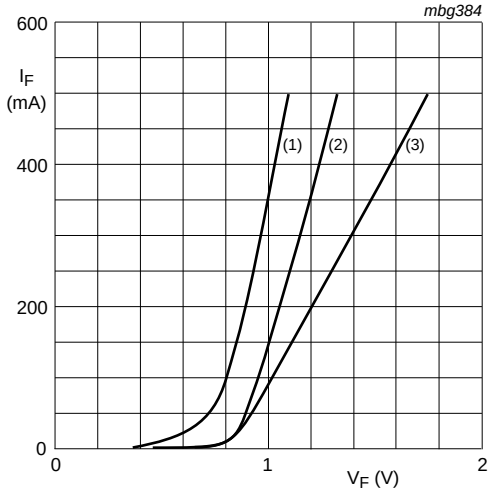
Table 7. Characteristics

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

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Per diode							
V_F	forward voltage	$I_F = 100$ mA		-	-	1	V
		$I_F = 200$ mA		-	-	1.25	mV
I_R	reverse current	$V_R = 200$ V	[1]	-	25	100	nA
		$V_R = 200$ V; $T_j = 150$ °C		-	-	100	μA
C_d	diode capacitance	$f = 1$ MHz; $V_R = 0$ V		-	0.6	5	pF
t_{rr}	reverse recovery time		[2]	-	16	50	ns

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

[2] When switched from $I_F = 30$ mA to $I_R = 30$ mA; $R_L = 100\ \Omega$; measured at $I_R = 3$ mA.

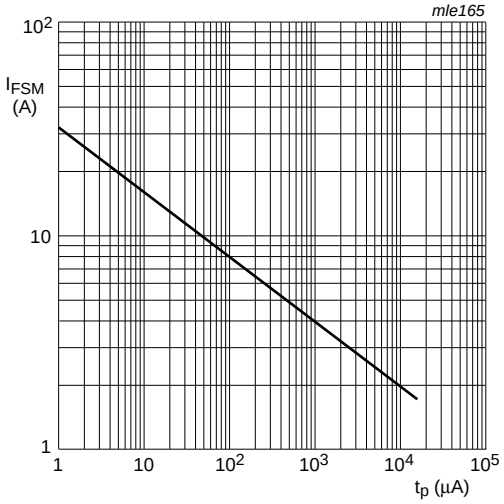


(1) T_j = 150 °C; typical values

(2) T_j = 25 °C; typical values

(3) T_j = 25 °C; maximum values

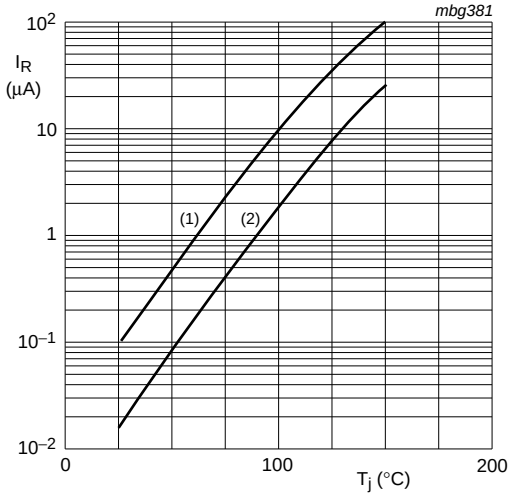
Fig 1. Forward current as a function of forward voltage



Based on square wave currents.

T_j = 25 °C; prior to surge

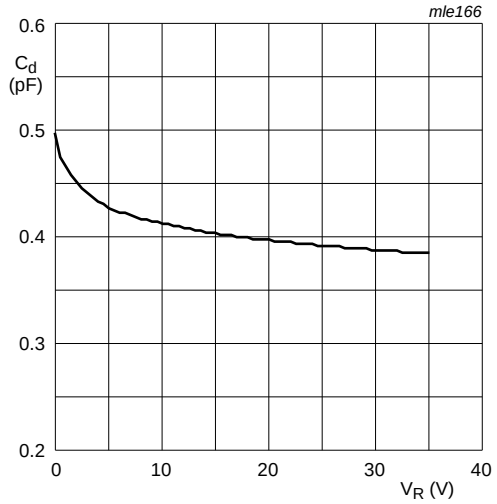
Fig 2. Non-repetitive peak forward current as a function of pulse duration; maximum values



(1) $V_R = V_{Rmax}$; maximum values

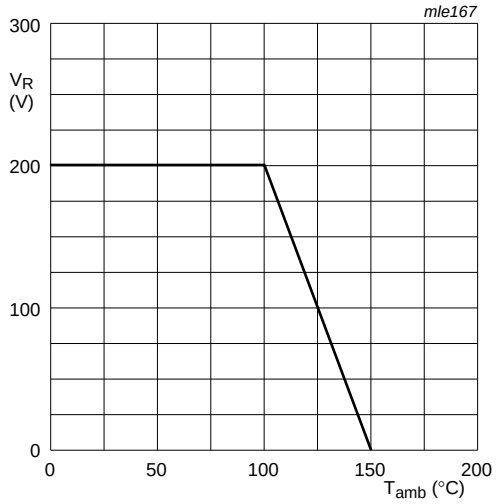
(2) $V_R = V_{Rmax}$; typical values

Fig 3. Reverse current as a function of junction temperature



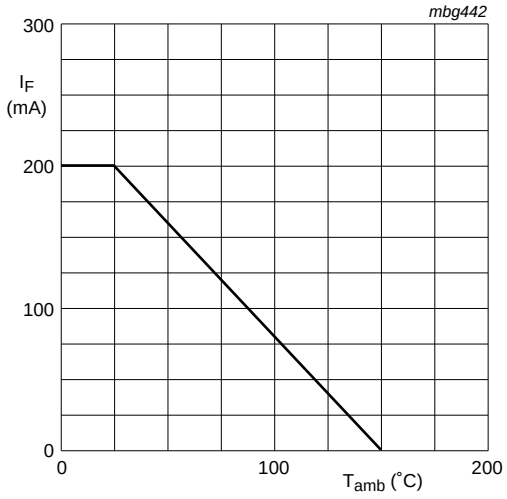
f = 1 MHz; T_j = 25 °C

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



FR4 PCB, standard footprint

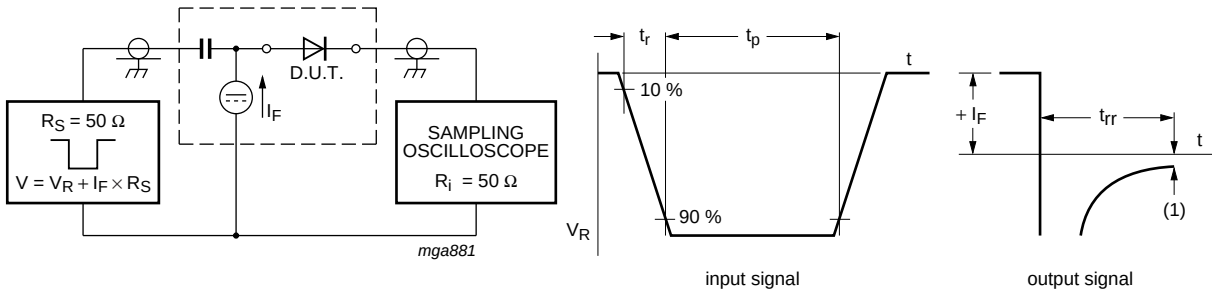
Fig 5. Reverse voltage as a function of ambient temperature; derating curve



FR4 PCB, standard footprint

Fig 6. Forward current as a function of ambient temperature; derating curve

8. Test information



(1) I_R = 3 mA

Fig 7. Reverse recovery time 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

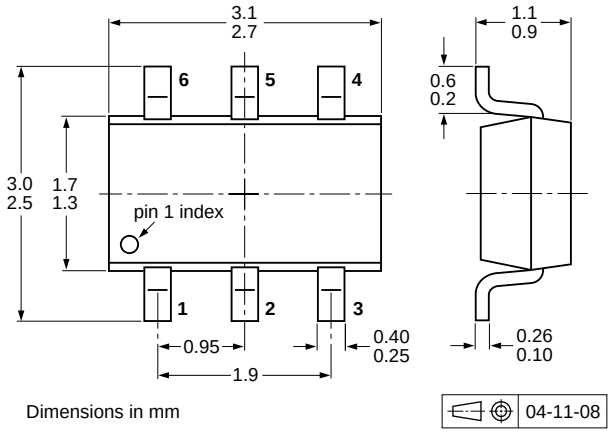


Fig 8. Package outline SOT457 (SC-74)

10. Packing information

Table 8. Packing methods

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

Type number	Package	Description		Packing quantity	
				3000	10000
BAS21VD	SOT457	4 mm pitch, 8 mm tape and reel; T1	[2]	-115	-135
		4 mm pitch, 8 mm tape and reel; T2	[3]	-125	-165

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

[2] T1: normal taping

[3] T2: reverse taping

11. Soldering

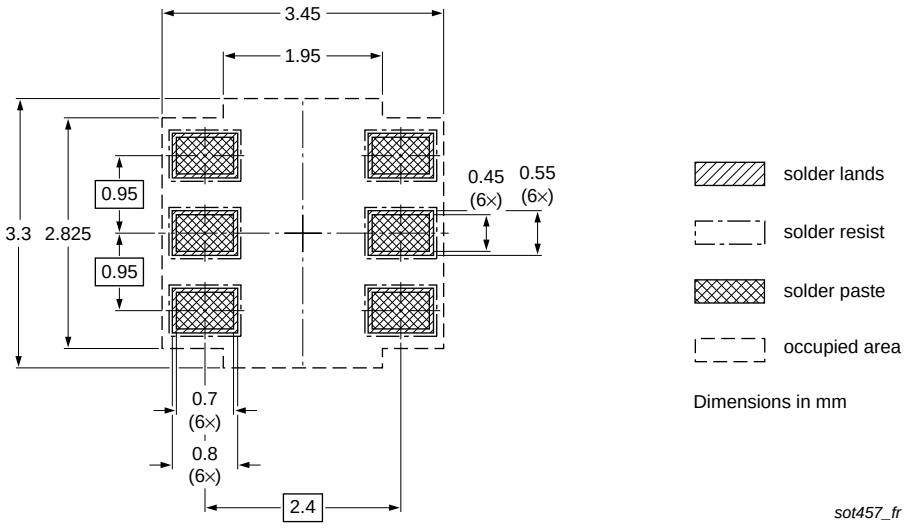


Fig 9. Reflow soldering footprint SOT457 (SC-74)

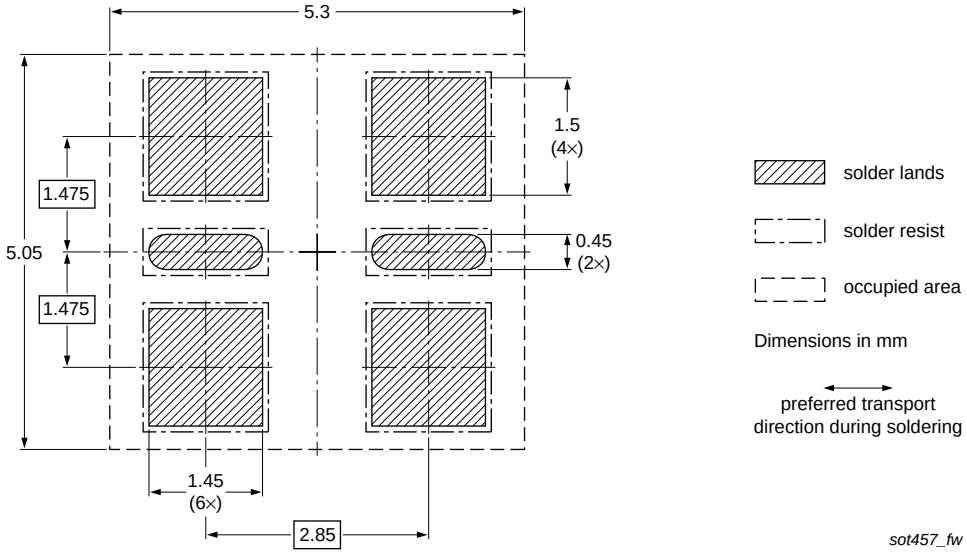


Fig 10. Wave soldering footprint SOT457 (SC-74)

12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BAS21VD v.2	20110629	Product data sheet	-	BAS21VD v.1
Modifications:	• The format of this document has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Section 1.4 “Quick reference data”: added. • Table 5: added T_{amb}; updated P_{tot}. • Table 6: updated. • Figure 1: updated. • Section 8.1 “Quality information”: added. • Figure 8: replaced by minimized package outline drawing. • Section 10 “Packing information”: added. • Section 11 “Soldering”: added. • Section 13 “Legal information”: updated.			
BAS21VD v.1	20030703	Product data sheet	-	-

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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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15. Contents

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