



# BAS21VD

## High-voltage switching diodes

1 August 2013

Product data sheet

## 1. General description

Triple high-voltage switching diodes, encapsulated in a SOT457 (SC-74/TSOP6) small Surface-Mounted Device (SMD) plastic package.

## 2. Features and benefits

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

## 3. Applications

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

## 4. Quick reference data

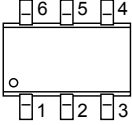
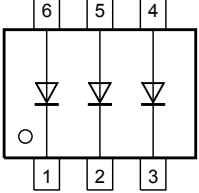
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
<b>Per diode</b>							
$I_F$	forward current	pulsed; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$	[1]	-	-	200	mA
$V_R$	reverse voltage			-	-	200	V
<b>Per diode</b>							
$I_R$	reverse current	$V_R = 200$ V; $T_{amb} = 25$ °C; pulsed; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$		-	25	100	nA
$t_{rr}$	reverse recovery time	$I_F = 30$ mA; $I_R = 30$ mA; $I_{R(meas)} = 3$ mA; $R_L = 100$ $\Omega$ ; $T_{amb} = 25$ °C		-	16	50	ns

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

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K1	cathode (diode 1)	 TSOP6 (SOT457)	 006aab241
2	K2	cathode (diode 2)		
3	K3	cathode (diode 3)		
4	A3	anode (diode 3)		
5	A2	anode (diode 2)		
6	A1	anode (diode 1)		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAS21VD	TSOP6	plastic surface-mounted package (TSOP6); 6 leads	SOT457

## 7. Marking

Table 4. Marking codes

Type number	Marking code
BAS21VD	B5

## 8. Limiting values

Table 5. 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			-	250	V
$V_R$	reverse voltage			-	200	V
$I_F$	forward current	pulsed; $t_p \leq 300 \mu s$ ; $\delta \leq 0.02$	[1]	-	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	$t_p = 10 \mu s$ ; $T_{j(init)} = 25^\circ C$ ; square wave		-	16	A
		$t_p = 100 \mu s$ ; $T_{j(init)} = 25^\circ C$ ; square wave		-	8	A
		$t_p = 10 ms$ ; $T_{j(init)} = 25^\circ C$ ; square wave		-	2	A

Symbol	Parameter	Conditions		Min	Max	Unit
<b>Per device; one diode loaded</b>						
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	[1]	-	250	mW
			[2]	-	295	mW
T <sub>stg</sub>	storage temperature			-65	150	°C
T <sub>j</sub>	junction temperature			-	150	°C
T <sub>amb</sub>	ambient 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, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.

## 9. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
<b>Per device; one diode loaded</b>							
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air	[1]	-	-	500	K/W
			[2]	-	-	425	K/W
R <sub>th(j-sp)</sub>	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.

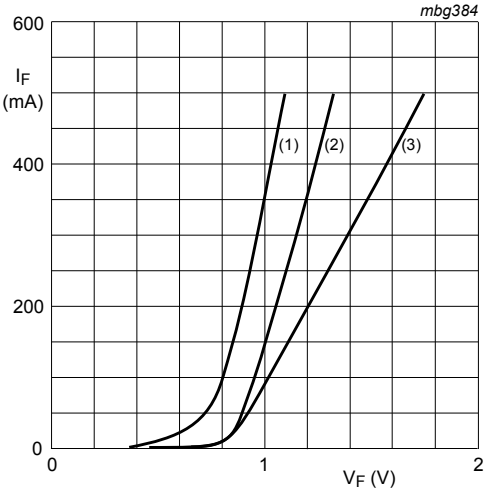
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.

[3] Soldering point of cathode tab.

## 10. Characteristics

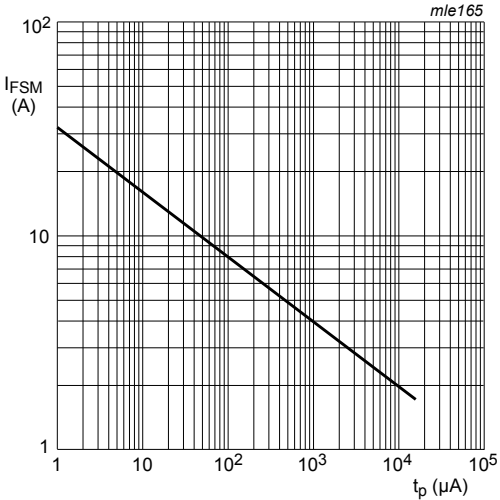
**Table 7. Characteristics**

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
<b>Per diode</b>							
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 100 mA; T <sub>amb</sub> = 25 °C		-	-	1	V
		I <sub>F</sub> = 200 mA; T <sub>amb</sub> = 25 °C		-	-	1.25	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 200 V; pulsed; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02 ; T <sub>amb</sub> = 25 °C		-	25	100	nA
		V <sub>R</sub> = 200 V; T <sub>j</sub> = 150 °C		-	-	100	μA
C <sub>d</sub>	diode capacitance	f = 1 MHz; V <sub>R</sub> = 0 V; T <sub>amb</sub> = 25 °C		-	0.6	5	pF
t <sub>rr</sub>	reverse recovery time	I <sub>F</sub> = 30 mA; I <sub>R</sub> = 30 mA; T <sub>amb</sub> = 25 °C; R <sub>L</sub> = 100 Ω; I <sub>R(meas)</sub> = 3 mA		-	16	50	ns



- (1)  $T_j = 150\text{ }^{\circ}\text{C}$ ; typical values
- (2)  $T_j = 25\text{ }^{\circ}\text{C}$ ; typical values
- (3)  $T_j = 25\text{ }^{\circ}\text{C}$ ; maximum values

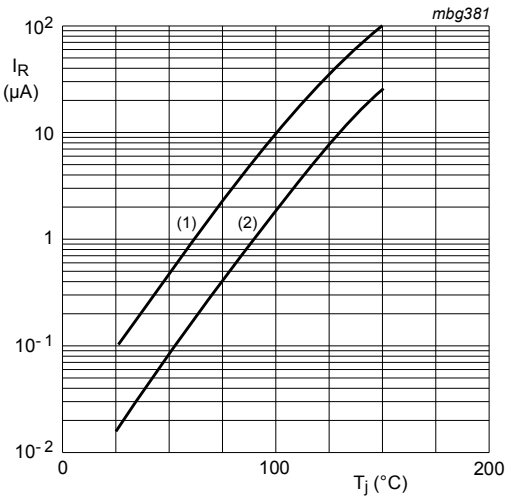
Fig. 1. Forward current as a function of forward voltage



Based on square wave currents.

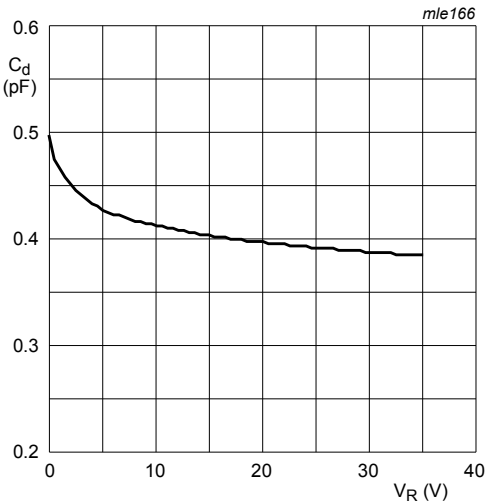
$T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$

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



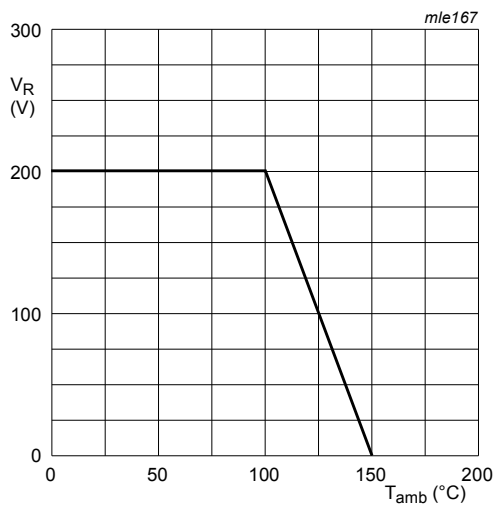
- (1)  $V_R = V_{R\text{max}}$ ; maximum values
- (2)  $V_R = V_{R\text{max}}$ ; typical values

Fig. 3. Reverse current as a function of junction temperature



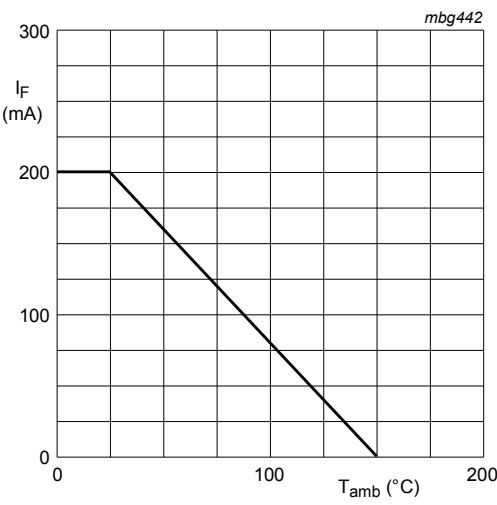
$f = 1\text{ MHz}$ ;  $T_j = 25\text{ }^{\circ}\text{C}$

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

11. Test information

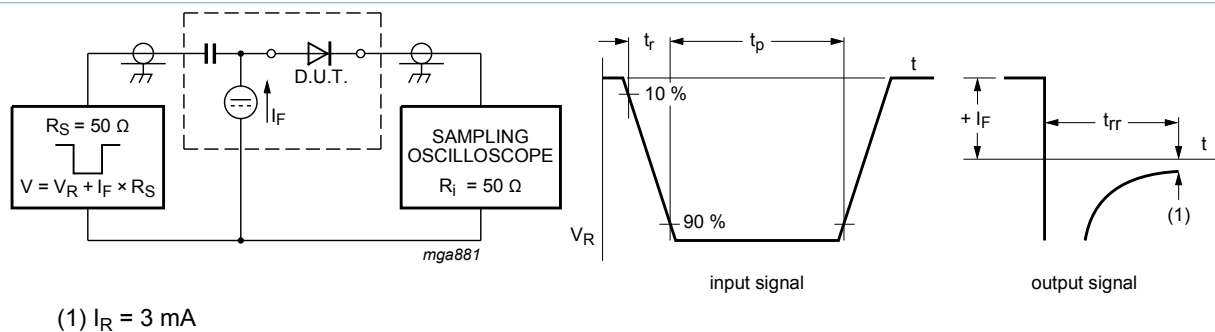
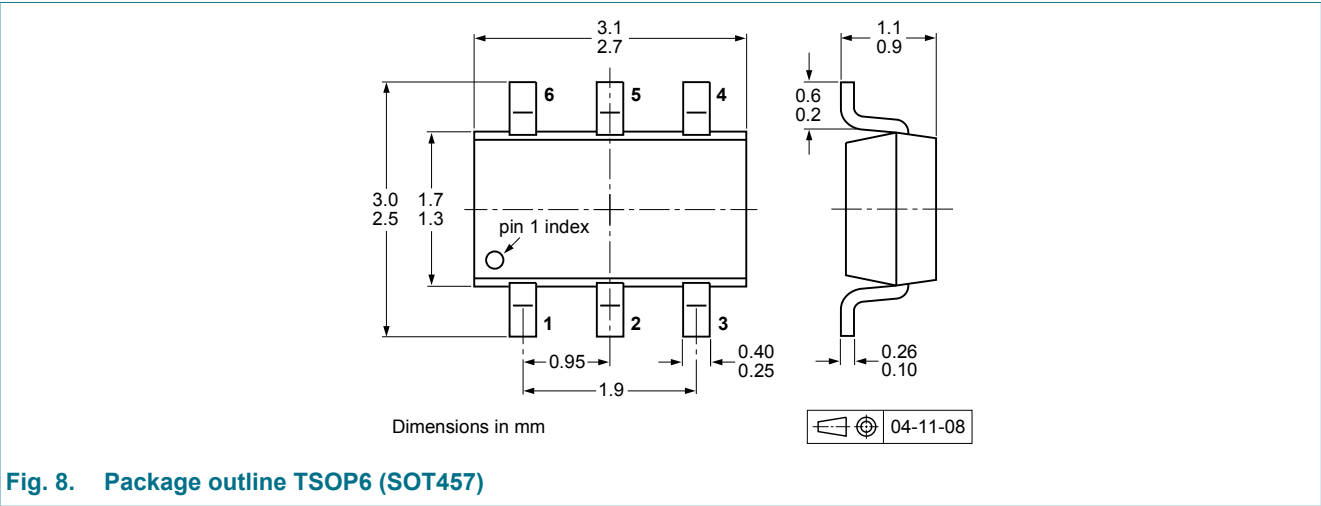


Fig. 7. Reverse recovery time test circuit and waveforms

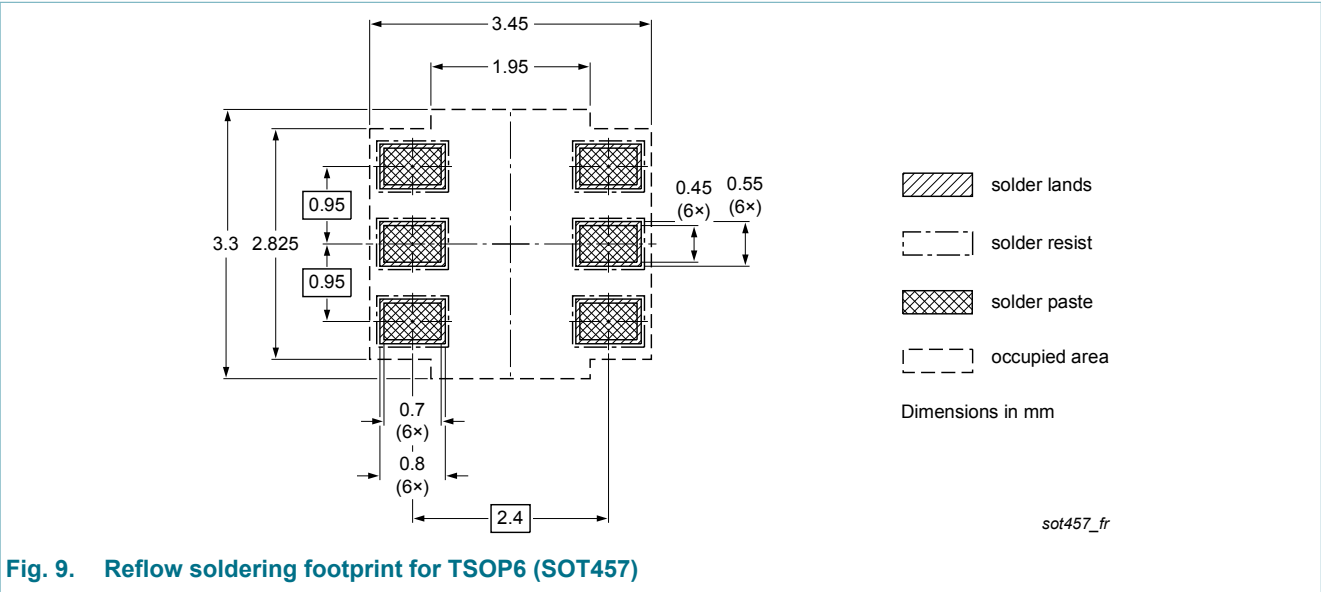
11.1 Quality information

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.

12. Package outline



13. Soldering



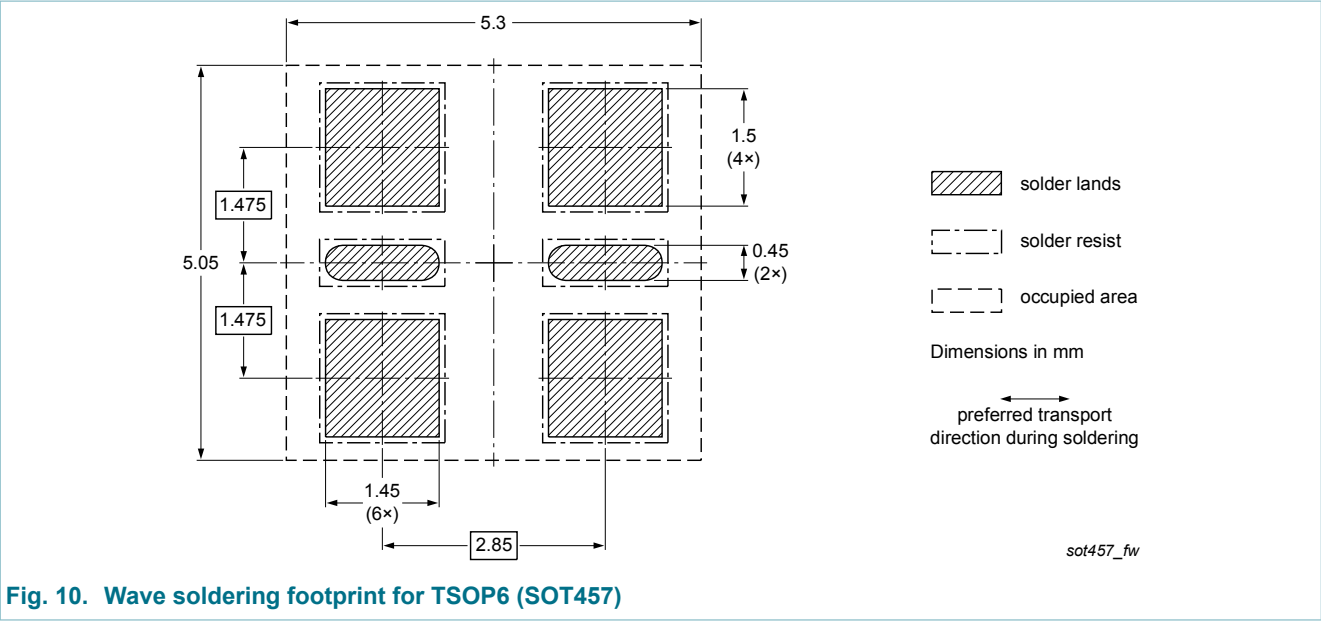


Fig. 10. Wave soldering footprint for TSOP6 (SOT457)

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAS21VD v.3	20130801	Product data sheet	-	BAS21VD v.2
Modifications:	<ul style="list-style-type: none"><li>Table 7. Characteristics: parameter unit of <math>V_F</math> corrected</li><li>Packing information: removed</li><li>Legal information: updated</li></ul>			
BAS21VD v.2	20110629	Product data sheet	-	BAS21VD v.1
BAS21VD v.1	20030703	Product data sheet	-	-

## 15. Legal information

### 15.1 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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