



**THE DATASHEET OF  
BAS21VD,135**





# 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

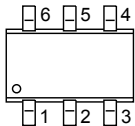
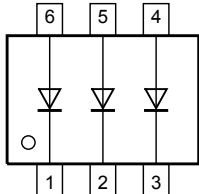
Table 1. Quick reference data

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)	 <p>TSOP6 (SOT457)</p>	 <p>006aab241</p>
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; $t_p \leq 300 \mu\text{s}$ ; $\delta \leq 0.02$	[1]	200	mA
$I_{FRM}$	repetitive peak forward current	$t_p \leq 1 \text{ ms}$ ; $\delta \leq 25 \%$	-	1	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10 \mu\text{s}$ ; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$ ; square wave	-	16	A
		$t_p = 100 \mu\text{s}$ ; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$ ; square wave	-	8	A
		$t_p = 10 \text{ ms}$ ; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$ ; 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.

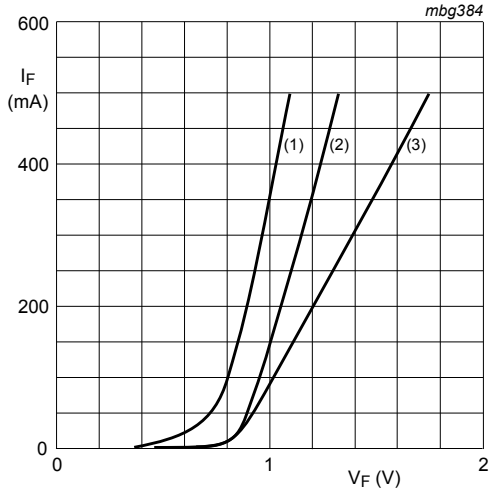
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm<sup>2</sup>.

[3] Soldering point of cathode tab.

## 10. Characteristics

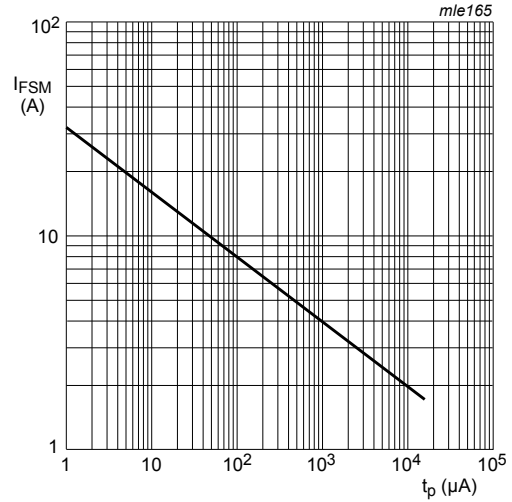
Table 7. Characteristics

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



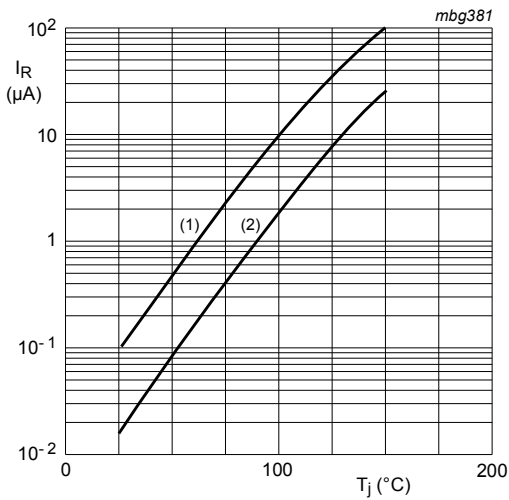
- (1)  $T_j = 150\text{ °C}$ ; typical values
- (2)  $T_j = 25\text{ °C}$ ; typical values
- (3)  $T_j = 25\text{ °C}$ ; maximum values

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



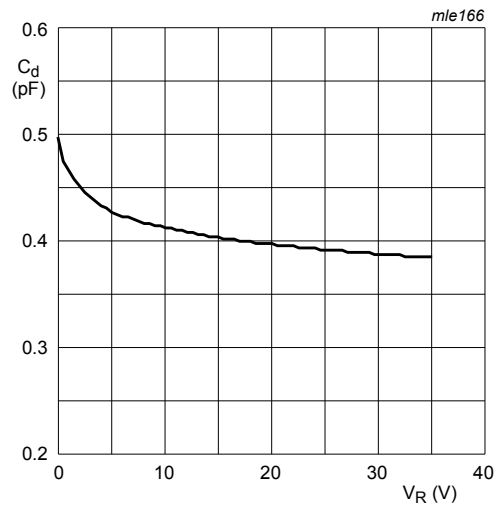
Based on square wave currents.  
 $T_{j(\text{init})} = 25\text{ °C}$

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



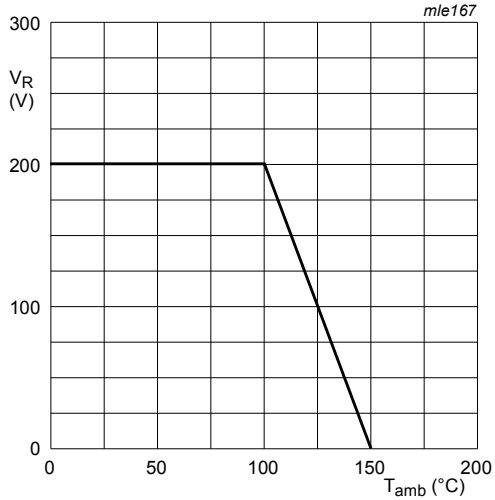
- (1)  $V_R = V_{R\text{max}}$ ; maximum values
- (2)  $V_R = V_{R\text{max}}$ ; typical values

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



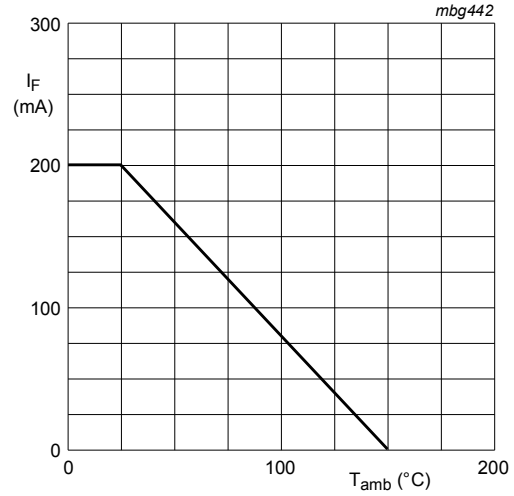
$f = 1\text{ MHz}$ ;  $T_j = 25\text{ °C}$

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



FR4 PCB, standard footprint

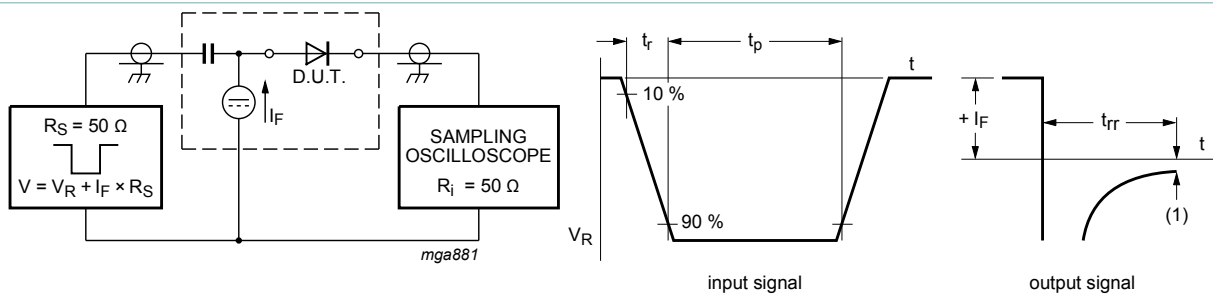
**Fig. 5. Reverse voltage as a function of ambient temperature; derating curve**



FR4 PCB, standard footprint

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

## 11. Test information



(1) I<sub>R</sub> = 3 mA

**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

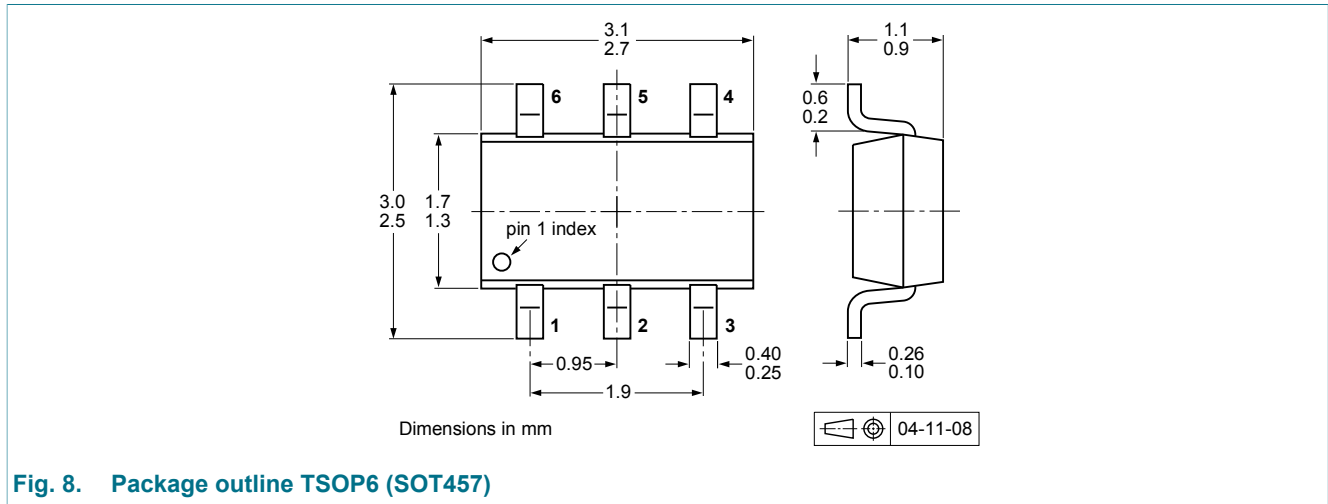


Fig. 8. Package outline TSOP6 (SOT457)

## 13. Soldering

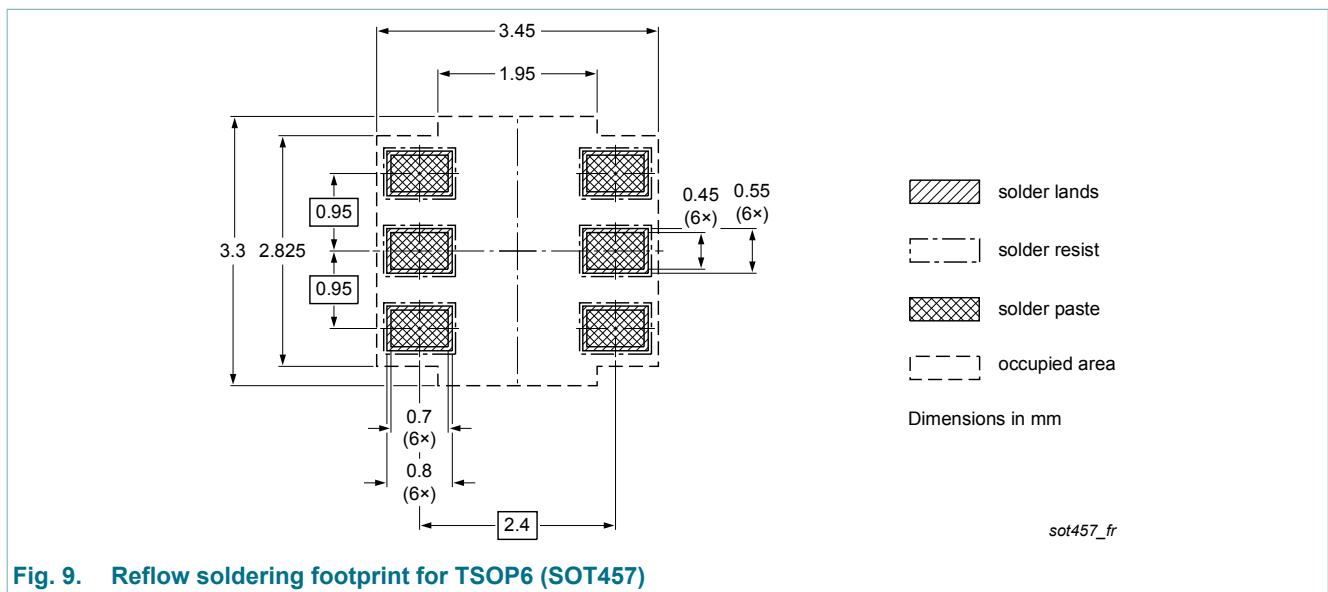


Fig. 9. Reflow soldering footprint for TSOP6 (SOT457)

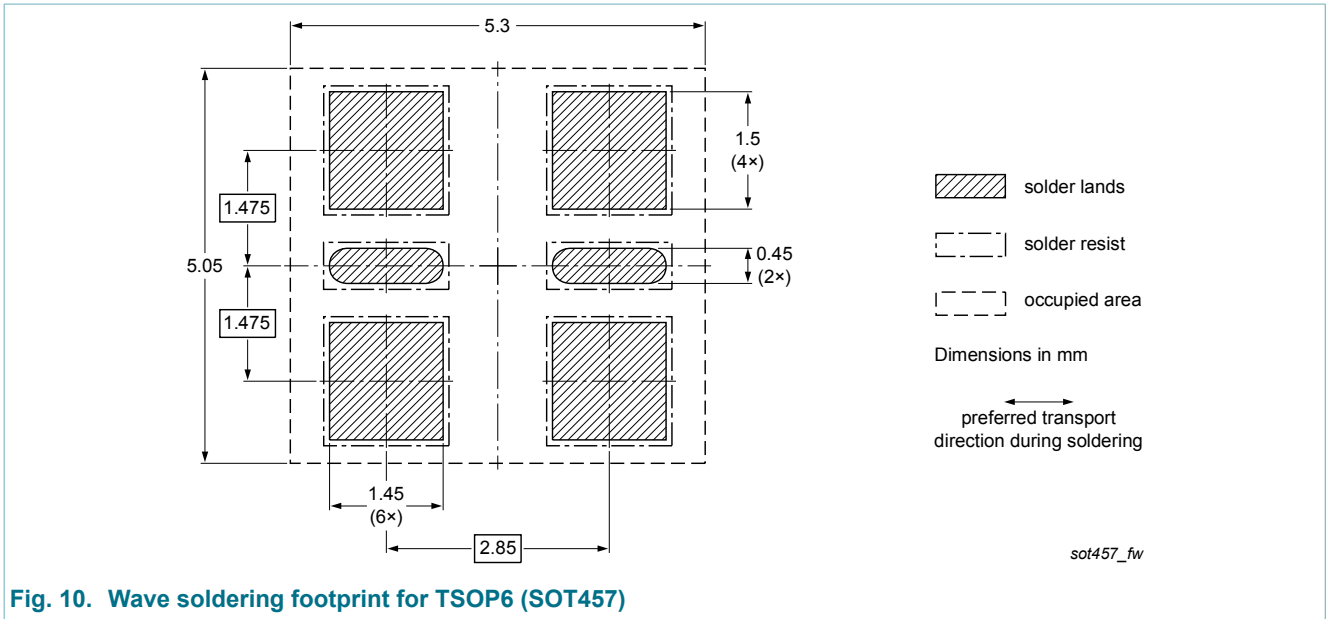


Fig. 10. Wave soldering footprint for TSOP6 (SOT457)

## 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.

- [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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