



# THE DATASHEET OF BAT54-QR





# BAS321J-Q

## High-voltage switching diode

27 June 2023

Product data sheet

### 1. General description

High-voltage switching diode in a very small SOD323F (SC-90) flat lead Surface-Mounted Device (SMD) plastic package.

### 2. Features and benefits

- High switching speed:  $t_{rr} \leq 50$  ns
- Low leakage current:  $I_R \leq 100$  nA
- High reverse voltage  $V_R \leq 200$  V
- Low capacitance:  $C_d \leq 2$  pF
- Very small SMD plastic package
- Qualified according to AEC-Q101 and recommended for use in automotive applications

### 3. Applications

- High-speed switching
- General-purpose switching
- Voltage clamping
- Reverse polarity protection

### 4. Quick reference data

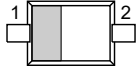

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$I_F$	forward current		[1]	-	-	250	mA
$V_R$	reverse voltage			-	-	200	V
$V_{RRM}$	repetitive peak reverse voltage			-	-	250	V
$V_F$	forward voltage	$I_F = 200$ mA; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; $T_j = 25$ °C		-	-	1.25	V
$I_R$	reverse current	$V_R = 200$ V; pulsed; $T_j = 25$ °C		-	-	100	nA
$t_{rr}$	reverse recovery time	$I_F = 30$ mA; $I_R = 30$ mA; $R_L = 100$ $\Omega$ ; $I_{R(meas)} = 3$ mA; $T_j = 25$ °C		-	-	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	K	Cathode	 SC-90 (SOD323F)	 aaa-028035
2	A	Anode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
<a href="#">BAS321J-Q</a>	SC-90	plastic, surface-mounted package; 2 leads; 1.7 mm x 1.25 mm x 0.7 mm body	<a href="#">SOD323F</a>

## 7. Marking

Table 4. Marking codes

Type number	Marking code
BAS321J-Q	ED

## 8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC60134).

Symbol	Parameter	Conditions		Min	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage			-	250	V
$V_R$	reverse voltage			-	200	V
$I_F$	forward current		[1]	-	250	mA
$I_{FSM}$	non-repetitive peak forward current	$t_p = 50 \mu\text{s}$ ; square wave; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$		-	13	A
		$t_p = 100 \mu\text{s}$ ; square wave; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$		-	9	A
		$t_p = 10 \text{ ms}$ ; square wave; $T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$		-	3	A
$I_{FRM}$	repetitive peak forward current	$t_p \leq 0.5 \text{ ms}$ ; $\delta \leq 0.25$		-	625	mA
$P_{\text{tot}}$	total power dissipation	$T_{\text{amb}} \leq 25 \text{ }^\circ\text{C}$	[1]	-	420	mW
			[2]	-	660	mW
$T_j$	junction temperature			-	150	$^\circ\text{C}$
$T_{\text{amb}}$	ambient temperature			-55	150	$^\circ\text{C}$
$T_{\text{stg}}$	storage temperature			-65	150	$^\circ\text{C}$

[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
$R_{th(j-a)}$	thermal resistance from junction to ambient	[1]	-	-	300	K/W
		[2]	-	-	190	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point	[3]	-	-	40	K/W

- [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>.
- [3] Soldering point of cathode tab.

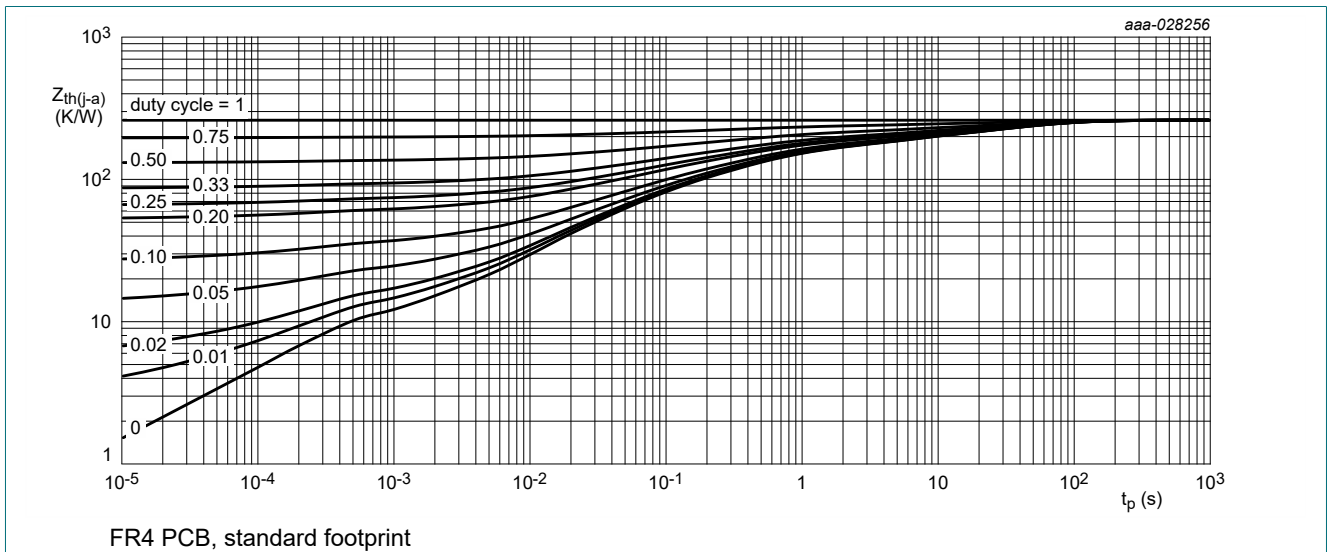


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

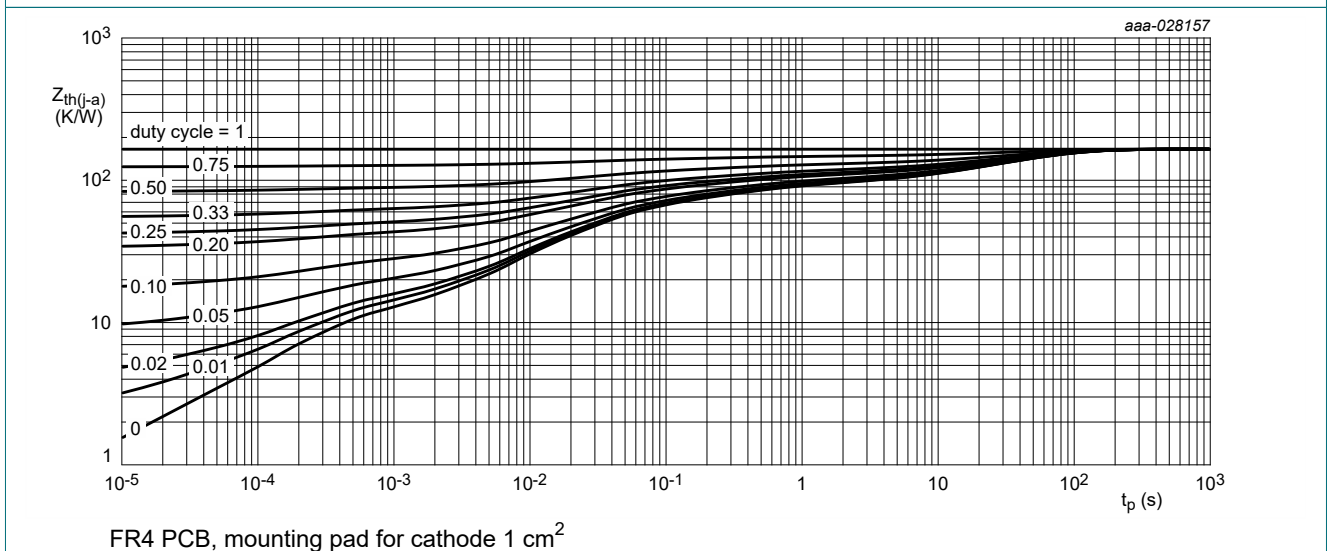
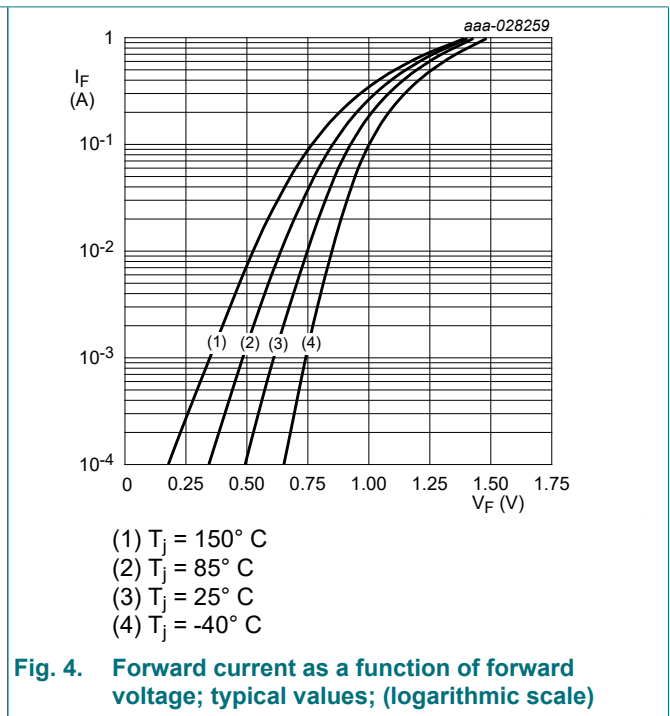
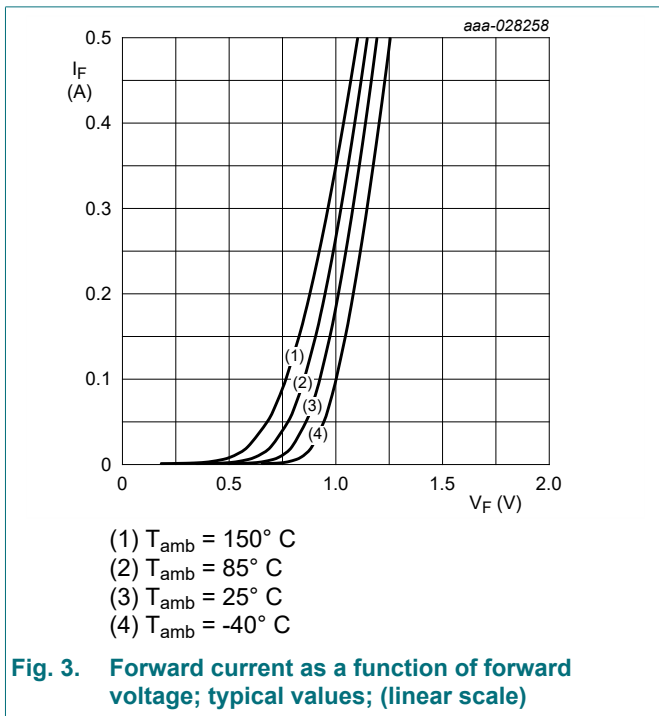


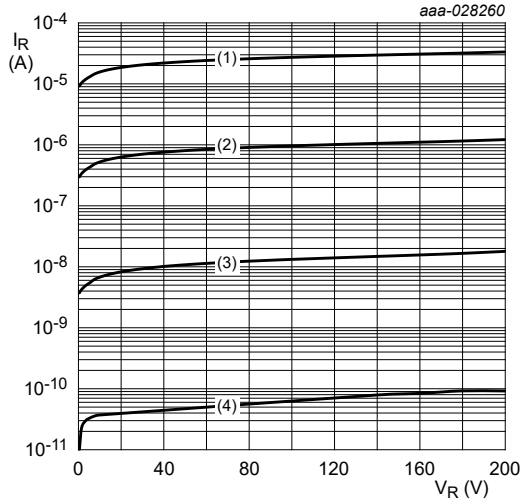
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

Table 7. Characteristics

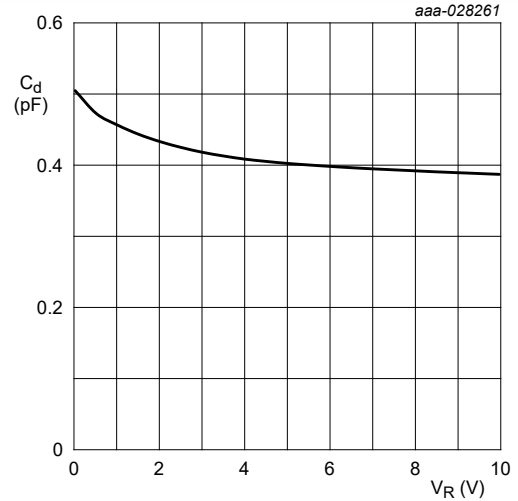
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_F$	forward voltage	$I_F = 100 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ }^\circ\text{C}$	-	-	1	V
		$I_F = 200 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ }^\circ\text{C}$	-	-	1.25	V
$I_R$	reverse current	$V_R = 200 \text{ V}; \text{pulsed}; T_j = 25 \text{ }^\circ\text{C}$	-	-	100	nA
		$V_R = 200 \text{ V}; \text{pulsed}; T_j = 150 \text{ }^\circ\text{C}$	-	-	100	$\mu\text{A}$
$C_d$	diode capacitance	$V_R = 0 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}$	-	-	2	pF
$t_{rr}$	reverse recovery time	$I_F = 30 \text{ mA}; I_R = 30 \text{ mA}; R_L = 100 \Omega;$ $I_{R(\text{meas})} = 3 \text{ mA}; T_j = 25 \text{ }^\circ\text{C}$	-	-	50	ns





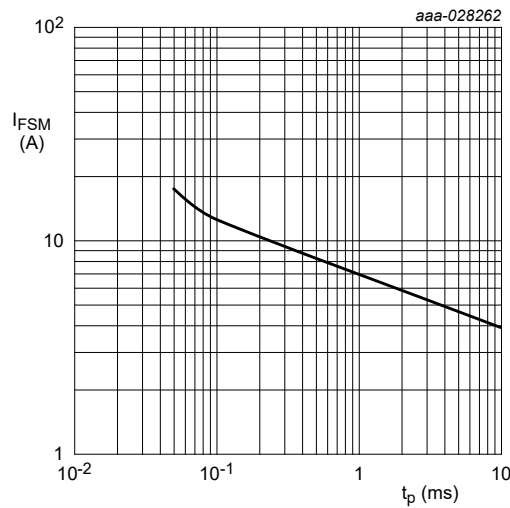
- (1)  $T_{amb} = 150^{\circ}C$
- (2)  $T_{amb} = 85^{\circ}C$
- (3)  $T_{amb} = 25^{\circ}C$
- (4)  $T_{amb} = -40^{\circ}C$

**Fig. 5. Reverse current as a function of reverse voltage; typical values**



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

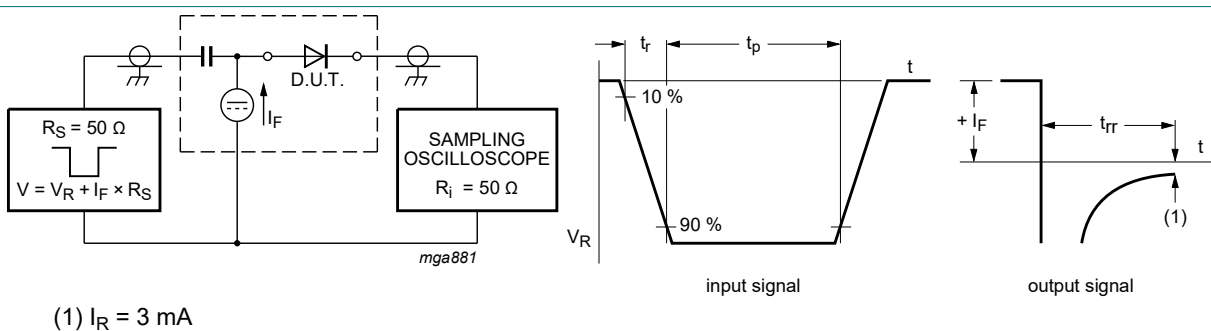
**Fig. 6. Diode capacitance as a function of reverse voltage; typical values.**



Based on square wave currents  
 $T_{j(init)} = 25^{\circ}C$  prior to surge

**Fig. 7. Non-repetitive peak forward current as a function of pulse duration; maximum value**

## 11. Test information



(1)  $I_R = 3\text{ mA}$

**Fig. 8. Reverse recovery time test circuit and waveforms**

**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**

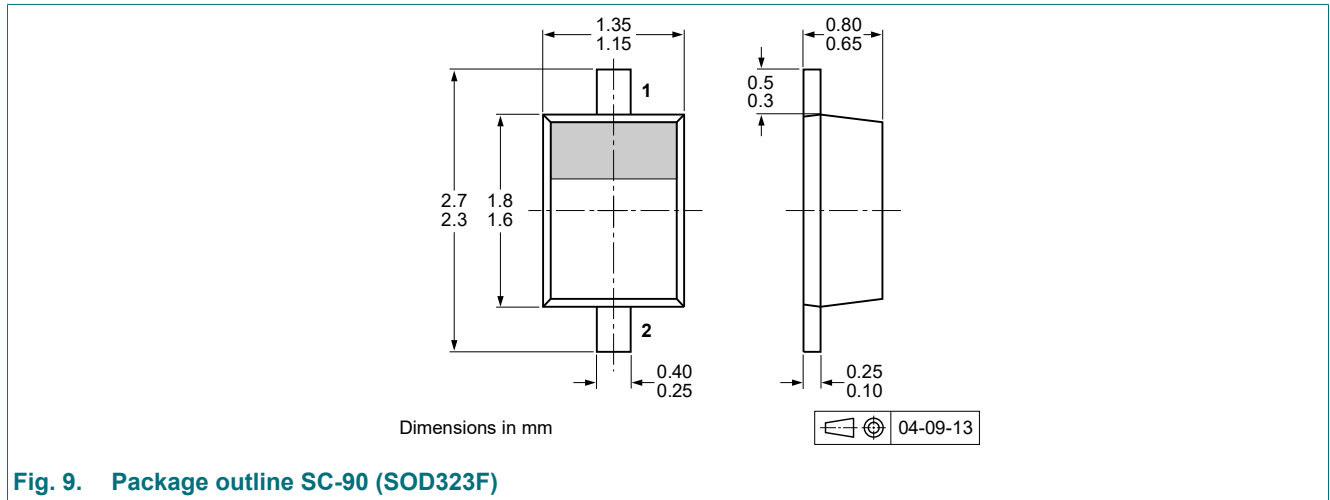


Fig. 9. Package outline SC-90 (SOD323F)

**13. Soldering**

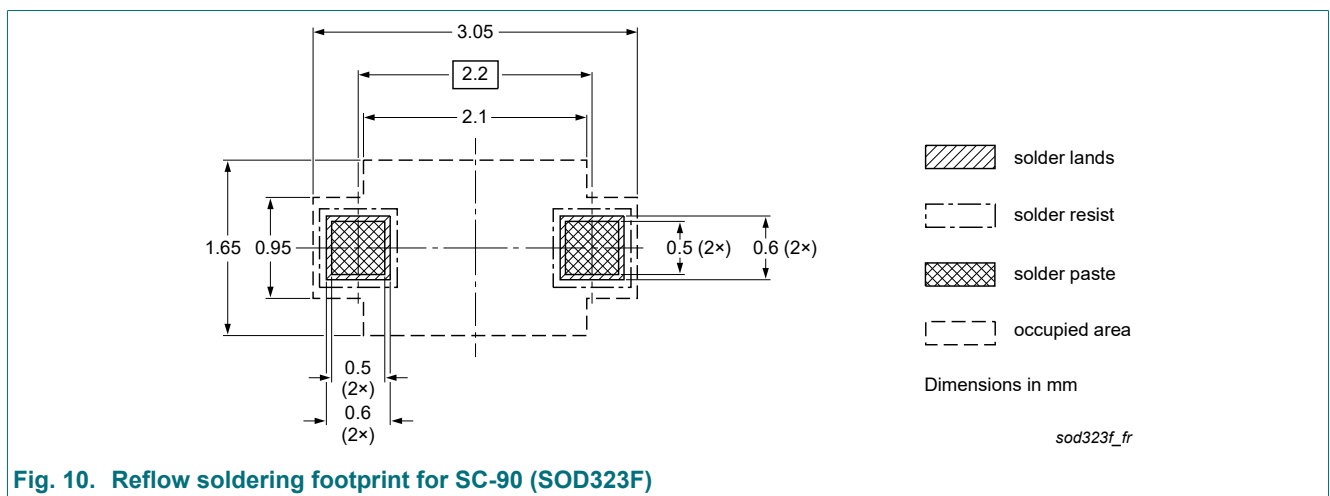


Fig. 10. Reflow soldering footprint for SC-90 (SOD323F)

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAS321J-Q v.1	20230623	Product data sheet	-	-

## 15. Legal information

### 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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## Contents

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1. General description.....	1
2. Features and benefits.....	1
3. Applications.....	1
4. Quick reference data.....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values.....	2
9. Thermal characteristics.....	3
10. Characteristics.....	4
11. Test information.....	5
12. Package outline.....	6
13. Soldering.....	6
14. Revision history.....	7
15. Legal information.....	8

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