



# BAS321J

## High-voltage switching diode

23 March 2018

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
- AEC-Q101 qualified

## 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                 |   | -   | -   | 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; $\delta \leq 0.02$ ;<br>$T_j = 25$ °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; $R_L = 100$ $\Omega$ ;<br>$I_{R(meas)} = 3$ 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     | <br>SC-90 (SOD323F) | <br>aaa-028035 |
| 2   | A      | Anode       |  |   |

## 6. Ordering information

Table 3. Ordering information

| Type number | Package |   |         |
|-------------|---------|---|---------|
|             | Name    | Description   | Version |
| BAS321J     | SC-90   | plastic, surface-mounted package; 2 leads; 1.7 mm x 1.25 mm x 0.7 mm body | SOD323F |

## 7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| BAS321J     | 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 | $t_p = 50 \mu s$ ; $T_{j(init)} = 25 \text{ }^\circ\text{C}$ ; square wave      |     | -   | 13  | A                |
|           |                                     | $t_p = 100 \mu s$ ; $T_{j(init)} = 25 \text{ }^\circ\text{C}$ ; square wave     |     | -   | 9   | A                |
|           |                                     | $t_p = 10 \text{ ms}$ ; $T_{j(init)} = 25 \text{ }^\circ\text{C}$ ; square wave |     | -   | 3   | A                |
| $I_{FRM}$ | repetitive peak forward current     | $t_p \leq 0.5 \text{ ms}$ ; $\delta \leq 0.25$                                  |     | -   | 625 | mA               |
| $P_{tot}$ | total power dissipation             | $T_{amb} \leq 25 \text{ }^\circ\text{C}$  | [1] | -   | 420 | mW               |
|           |                                     |   | [2] | -   | 660 | mW               |
| $T_j$     | junction temperature                |   |     | -   | 150 | $^\circ\text{C}$ |
| $T_{amb}$ | ambient temperature                 |   |     | -55 | 150 | $^\circ\text{C}$ |
| $T_{stg}$ | 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  $1 \text{ cm}^2$ .

## 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  $1 \text{ cm}^2$ .

[3] Soldering point of cathode tab.

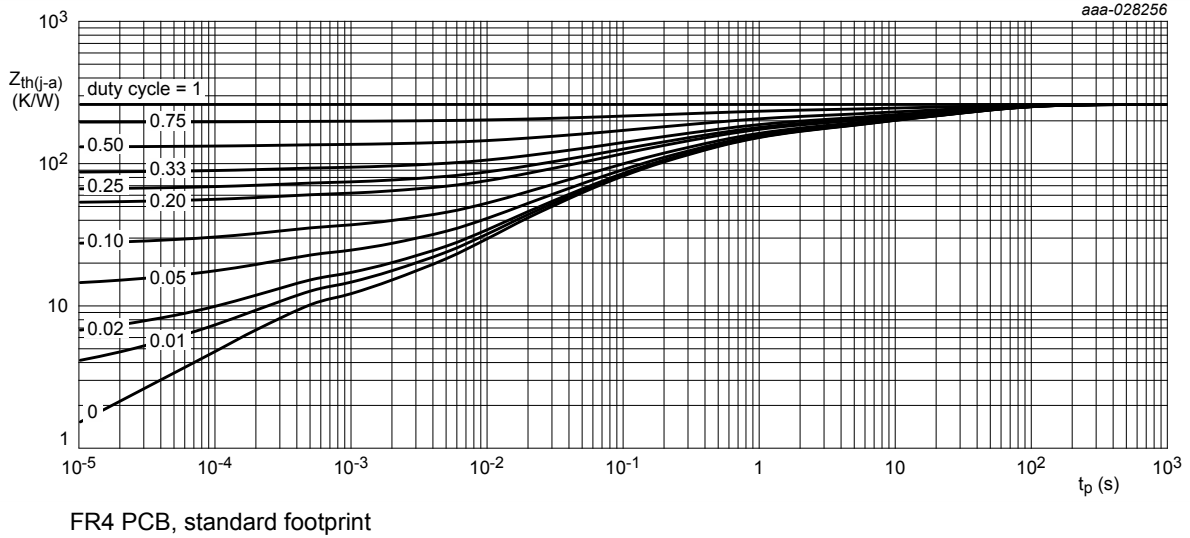


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

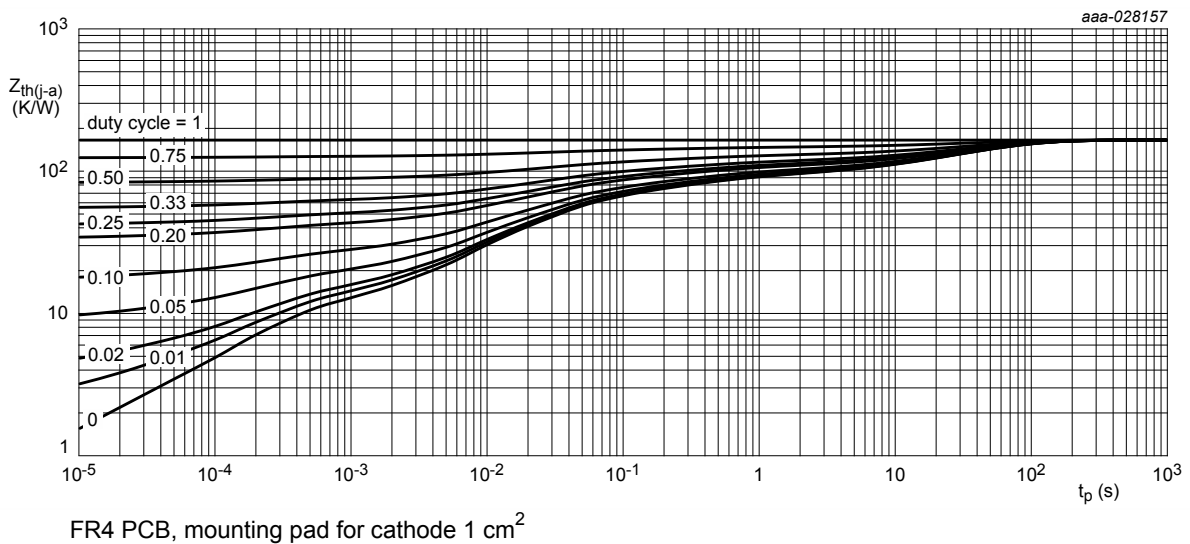
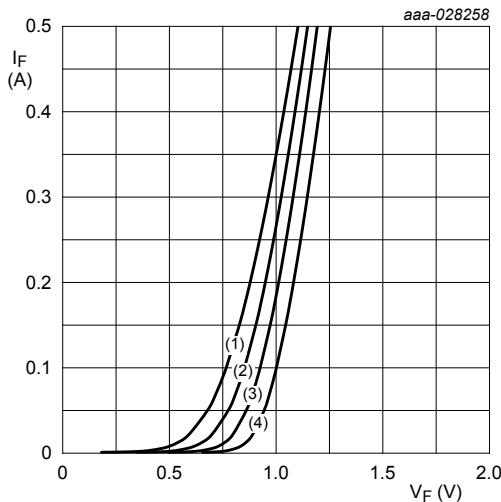


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

## 10. Characteristics

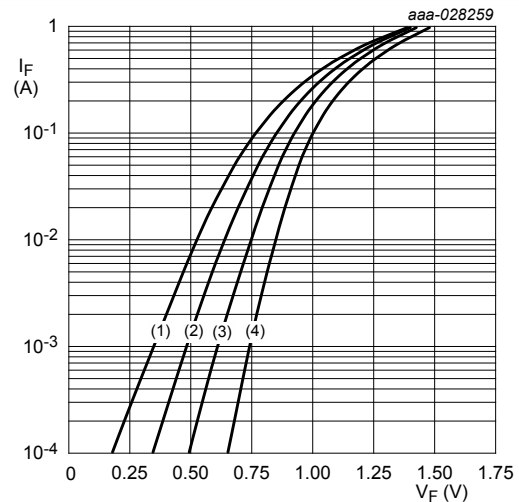
Table 7. Characteristics

| Symbol   | Parameter             | Conditions  | Min | Typ | Max  | Unit          |
|----------|-----------------------|---|-----|-----|------|---------------|
| $V_F$    | forward voltage       | $I_F = 100 \text{ mA}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02;$<br>$T_j = 25 \text{ } ^\circ\text{C}$                              | -   | -   | 1    | V             |
|          |                       | $I_F = 200 \text{ mA}; t_p \leq 300 \text{ } \mu\text{s}; \delta \leq 0.02;$<br>$T_j = 25 \text{ } ^\circ\text{C}$                              | -   | -   | 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 | $I_F = 30 \text{ mA}; I_R = 30 \text{ mA}; R_L = 100 \text{ } \Omega;$<br>$I_{R(\text{meas})} = 3 \text{ mA}; T_j = 25 \text{ } ^\circ\text{C}$ | -   | -   | 50   | ns            |



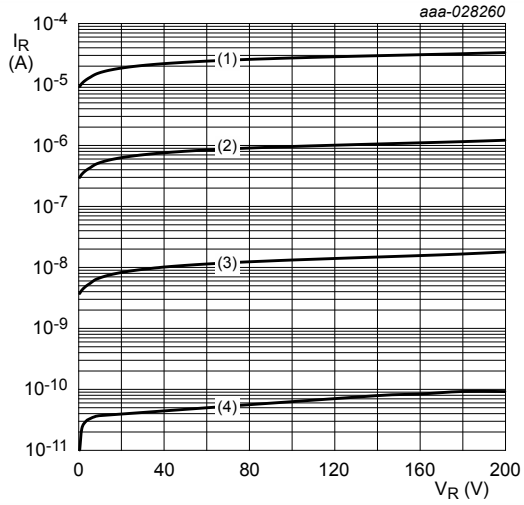
- (1)  $T_{\text{amb}} = 150 \text{ } ^\circ\text{C}$
- (2)  $T_{\text{amb}} = 85 \text{ } ^\circ\text{C}$
- (3)  $T_{\text{amb}} = 25 \text{ } ^\circ\text{C}$
- (4)  $T_{\text{amb}} = -40 \text{ } ^\circ\text{C}$

Fig. 3. Forward current as a function of forward voltage; typical values; (linear scale)



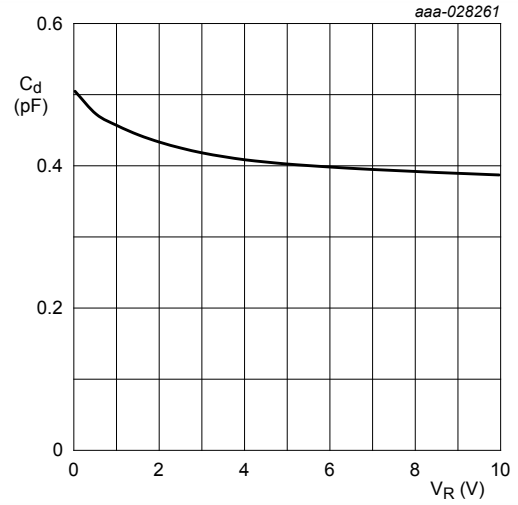
- (1)  $T_j = 150 \text{ } ^\circ\text{C}$
- (2)  $T_j = 85 \text{ } ^\circ\text{C}$
- (3)  $T_j = 25 \text{ } ^\circ\text{C}$
- (4)  $T_j = -40 \text{ } ^\circ\text{C}$

Fig. 4. Forward current as a function of forward voltage; typical values; (logarithmic scale)



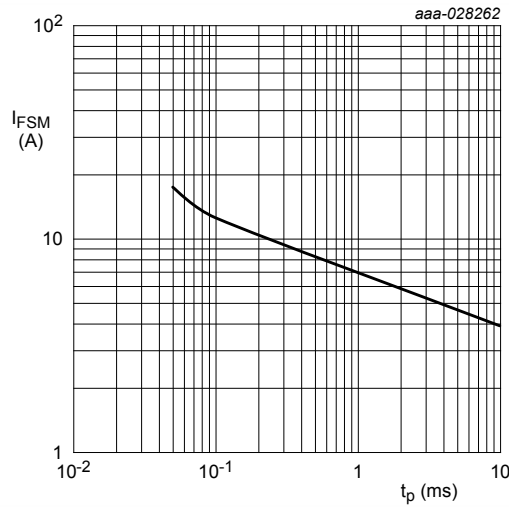
- (1)  $T_{amb} = 150^\circ\text{C}$
- (2)  $T_{amb} = 85^\circ\text{C}$
- (3)  $T_{amb} = 25^\circ\text{C}$
- (4)  $T_{amb} = -40^\circ\text{C}$

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



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

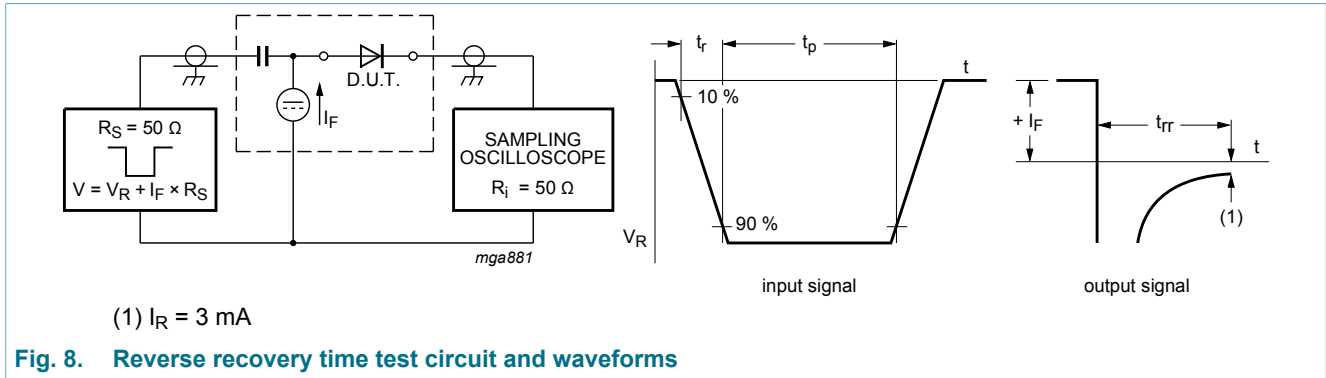
**Fig. 6. Diode capacitance as a function of reverse voltage; typical values.**



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

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

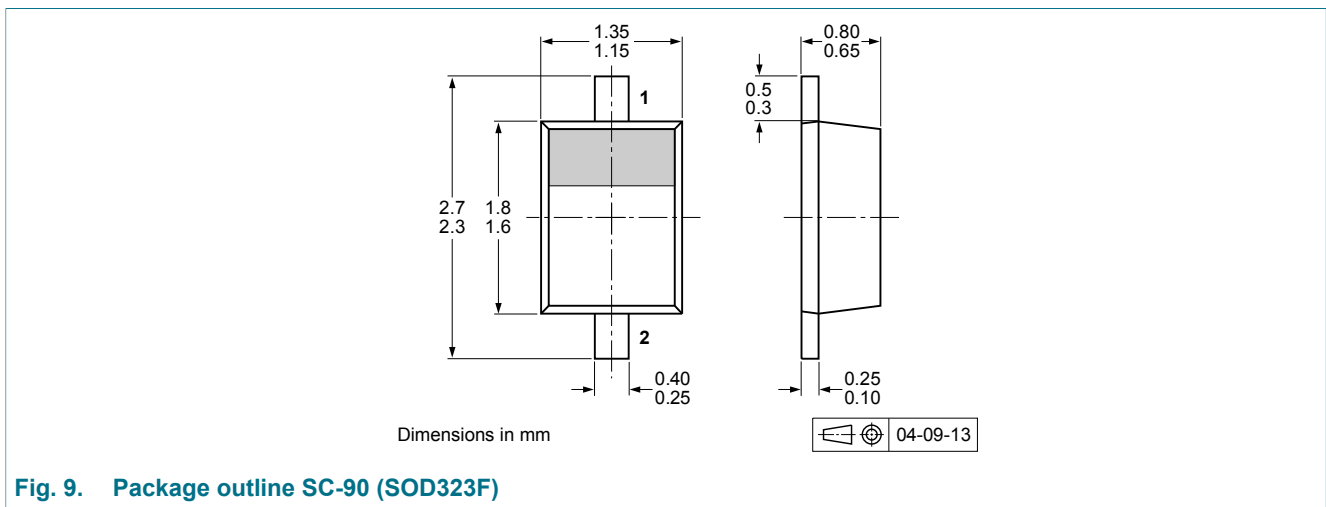
### 11. Test information



#### 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

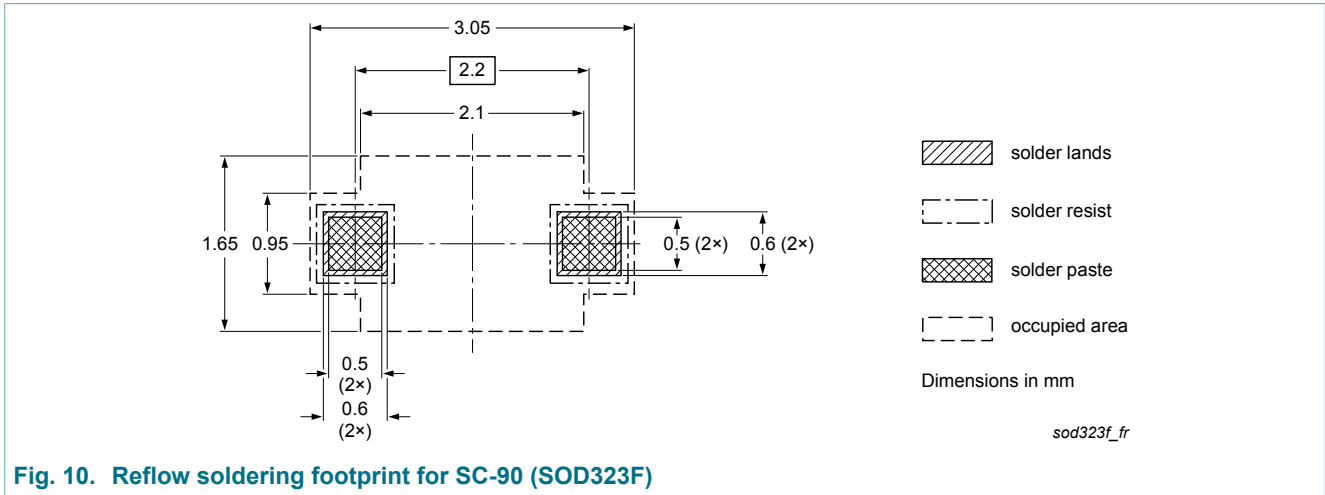


Fig. 10. Reflow soldering footprint for SC-90 (SOD323F)



## 14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status  | Change notice | Supersedes |
|---------------|--------------|--------------------|---------------|------------|
| BAS321J v.1   | 20180323     | 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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