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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		[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; $t_p \leq 300$ µs; $\delta \leq 0.02$; 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 Ω; $I_{R(meas)}$ = 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.

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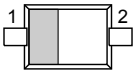
5. Pinning information

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
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 µs; $T_{j(init)}$ = 25 °C; square wave		-	13	A
		t_p = 100 µs; $T_{j(init)}$ = 25 °C; square wave		-	9	A
		t_p = 10 ms; $T_{j(init)}$ = 25 °C; square wave		-	3	A
I_{FRM}	repetitive peak forward current	$t_p \leq$ 0.5 ms; $\delta \leq$ 0.25		-	625	mA
P_{tot}	total power dissipation	$T_{amb} \leq$ 25 °C	[1]	-	420	mW
			[2]	-	660	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-55	150	°C
T_{stg}	storage temperature			-65	150	°C

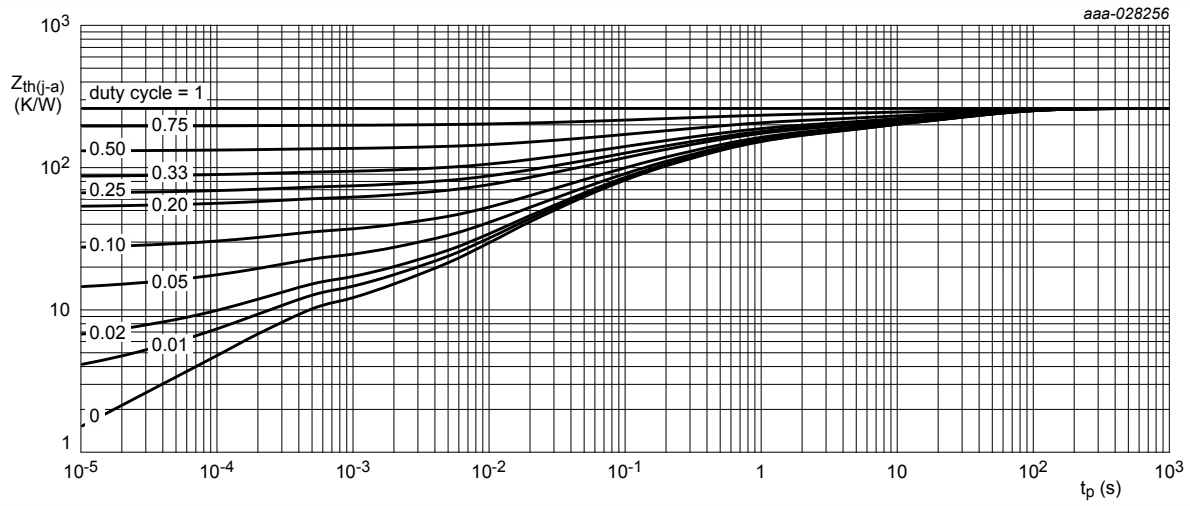
[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2.

9. Thermal characteristics

Table 6. Thermal characteristics

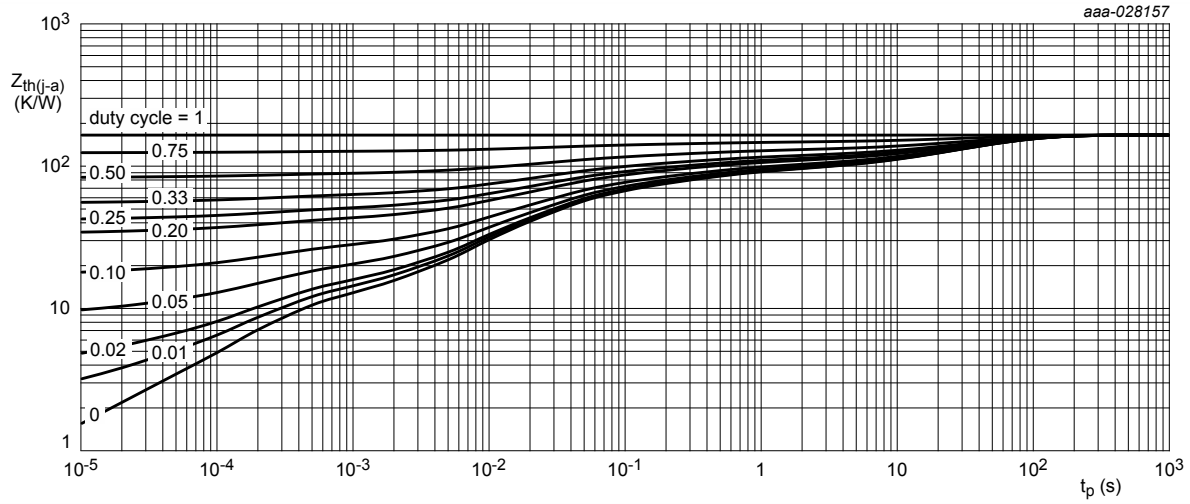
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient		[1]	-	-	300	K/W
			[2]	-	-	190	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[3]	-	-	40	K/W

[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 cm^2.
[3] Soldering point of cathode tab.



FR4 PCB, standard footprint

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



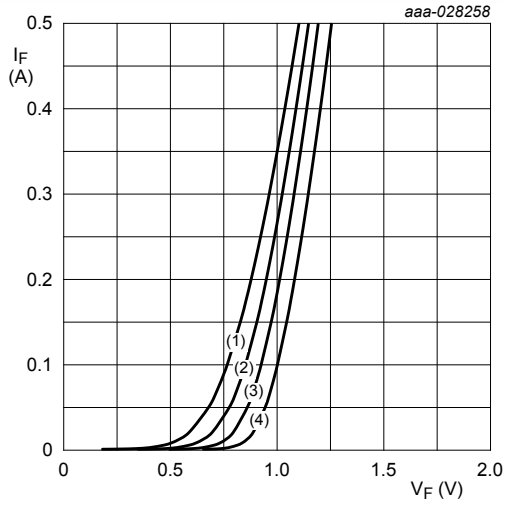
FR4 PCB, mounting pad for cathode 1 cm^2

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

10. Characteristics

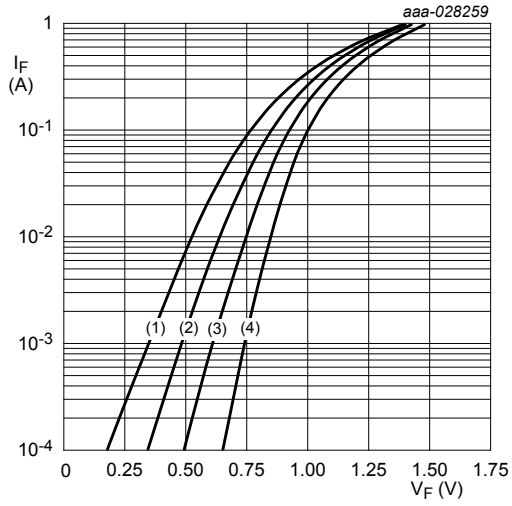
Table 7. Characteristics

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



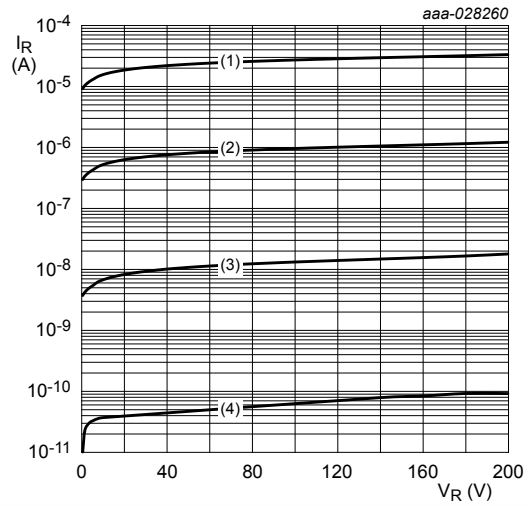
(1) T_{amb} = 150° C
(2) T_{amb} = 85° C
(3) T_{amb} = 25° C
(4) T_{amb} = -40° C

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



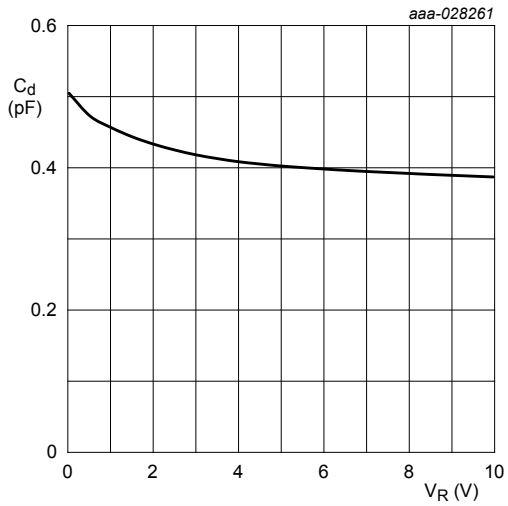
(1) T_j = 150° C
(2) T_j = 85° C
(3) T_j = 25° C
(4) T_j = -40° C

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



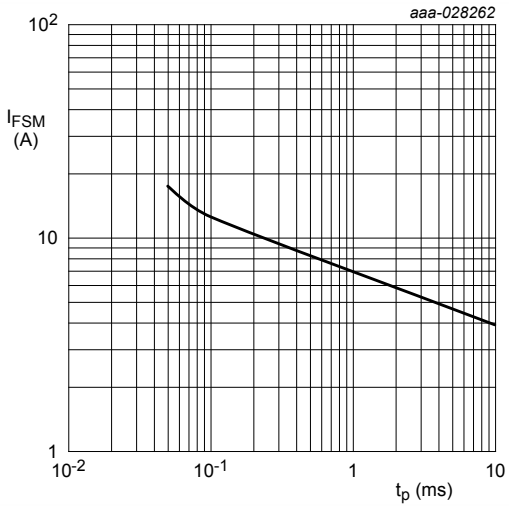
(1) T_{amb} = 150° C
(2) T_{amb} = 85° C
(3) T_{amb} = 25° C
(4) T_{amb} = -40° C

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



f = 1 MHz
T_j = 25 °C.

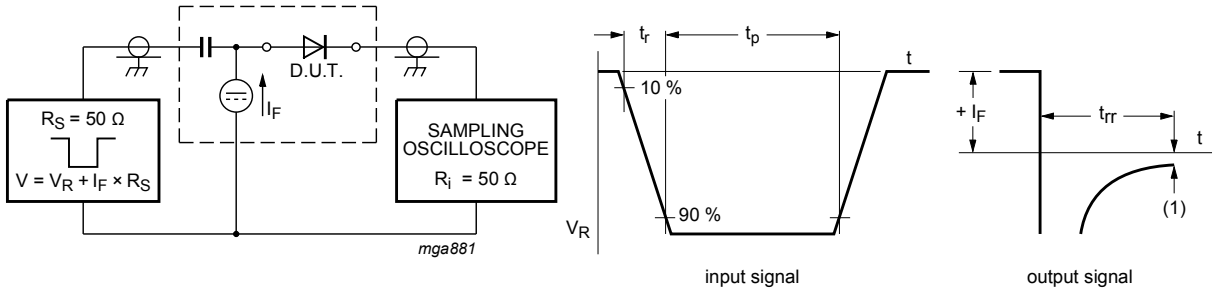
Fig. 6. Diode capacitance as a function of reverse voltage; typical values.



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

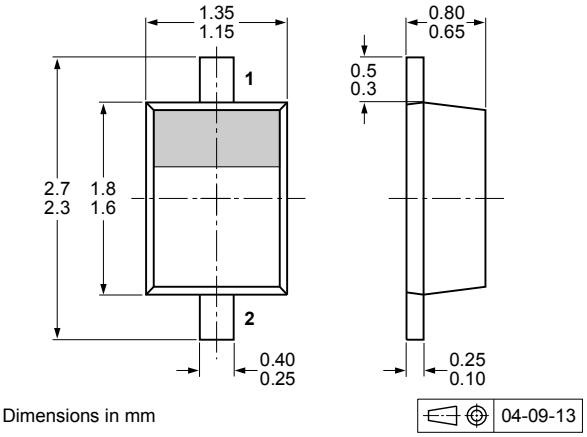


Fig. 9. Package outline SC-90 (SOD323F)

13. Soldering

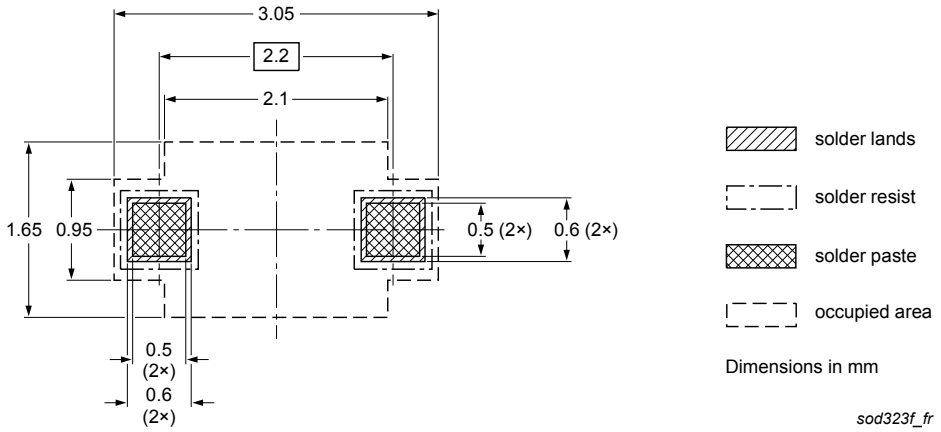


Fig. 10. Reflow soldering footprint for SC-90 (SOD323F)

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAS321J 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.

[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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16. Contents

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Date of release: 23 March 2018