BAL99

High-speed switching diode

23 May 2025 **Product data sheet**

1. General description

High-speed switching diode encapsulated in a very small SOT23 Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Small plastic SMD package
- High switching speed: max. 4 ns
- Continuous reverse voltage: max. 70 V
- Repetitive peak reverse voltage: max. 70 V
- Repetitive peak forward current: max. 500 mA
- AEC-Q101 qualified

3. Applications

- High-speed switching in e.g. surface mounted circuits.

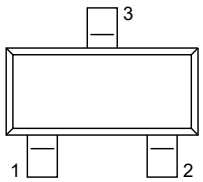
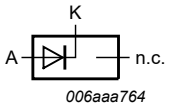
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	-	70	V
V_R	reverse voltage			-	-	70	V
V_F	forward voltage	I_F = 1 mA; T_j = 25 °C		-	-	715	mV
		I_F = 10 mA; T_j = 25 °C		-	-	855	mV
I_R	reverse current	V_R = 25 V; T_j = 25 °C		-	-	30	nA
		V_R = 70 V; T_j = 25 °C		-	-	1	µA

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	not connected		
2	K	cathode		
3	A	anode		

SOT23

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAL99	SOT23	plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body	SOT23

7. Marking

Table 4. Marking codes

Type number	Marking code[1]
BAL99	JF%

[1] % = placeholder for manufacturing site code

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	70	V
V_R	reverse voltage			-	70	V
I_F	forward current		[1]	-	215	mA
I_{FSM}	non-repetitive peak forward current	t_p = 1 µs; square wave; $T_{j(init)}$ = 25 °C		-	4	A
		t_p = 1 ms; square wave; $T_{j(init)}$ = 25 °C		-	1	A
		t_p = 1000 ms; square wave; $T_{j(init)}$ = 25 °C		-	0.5	A
I_{FRM}	repetitive peak forward current			-	500	mA
P_{tot}	total power dissipation	T_{amb} = 25 °C	[1]	-	250	mW
T_j	junction temperature			-	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.

9. Thermal characteristics

Table 6. Thermal characteristics

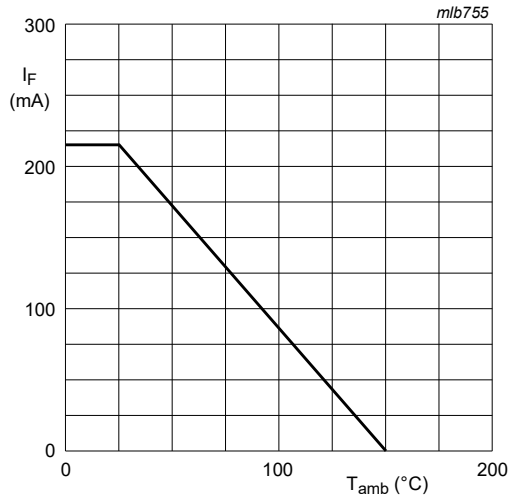
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	500	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point			-	-	360	K/W

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

10. Characteristics

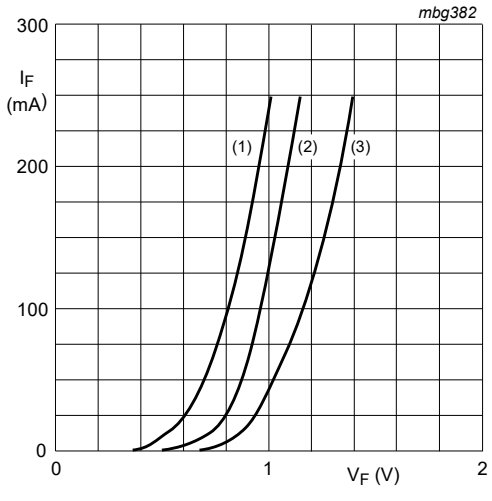
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_F	forward voltage	I_F = 1 mA; T_j = 25 °C		-	-	715	mV
		I_F = 10 mA; T_j = 25 °C		-	-	855	mV
		I_F = 50 mA; T_j = 25 °C		-	-	1	V
		I_F = 150 mA; T_j = 25 °C		-	-	1.25	V
I_R	reverse current	V_R = 25 V; T_j = 25 °C		-	-	30	nA
		V_R = 70 V; T_j = 25 °C		-	-	1	µA
		V_R = 25 V; T_j = 150 °C		-	-	30	µA
		V_R = 70 V; T_j = 150 °C		-	-	50	µA
C_d	diode capacitance	V_R = 0 V; f = 1 MHz; T_j = 25 °C		-	-	1.5	pF
t_{rr}	reverse recovery time	I_F = 10 mA; I_R = 10 mA; R_L = 100 Ω; $I_{R(meas)}$ = 1 mA; T_j = 25 °C		-	-	4	ns
V_{FRM}	peak forward recovery voltage	I_F = 10 mA; t_r = 20 ns; T_j = 25 °C		-	-	1.75	V



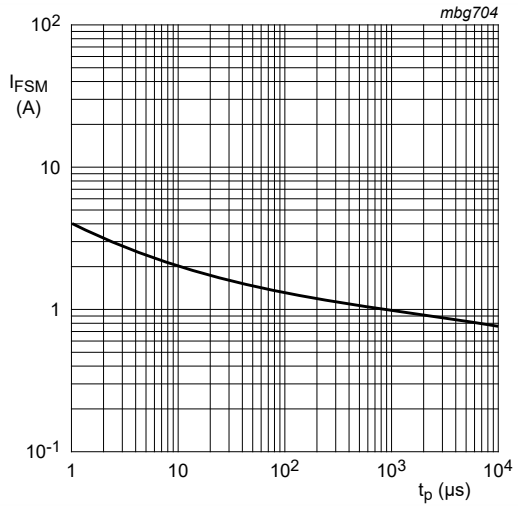
Device mounted on an FR4 printed-circuit board.

Fig. 1. Maximum permissible continuous forward current as a function of ambient temperature.



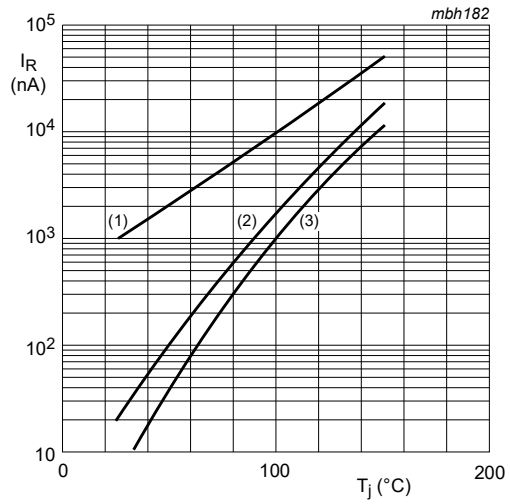
(1) T_j = 150 °C; typical values
(2) T_j = 25 °C; typical values
(3) T_j = 25 °C; maximum values

Fig. 2. Forward current as a function of forward voltage



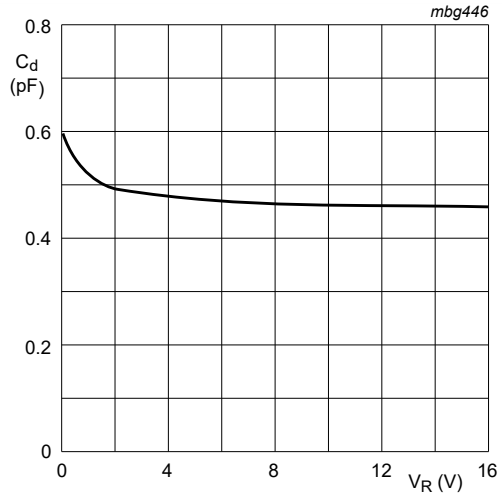
Based on square wave currents; Tj = 25 °C prior to surge.

Fig. 3. Maximum permissible non-repetitive peak forward current as a function of pulse duration.



(1) VR = 70 V; maximum values
(2) VR = 70 V; typical values.
(3) VR = 25 V; typical values.

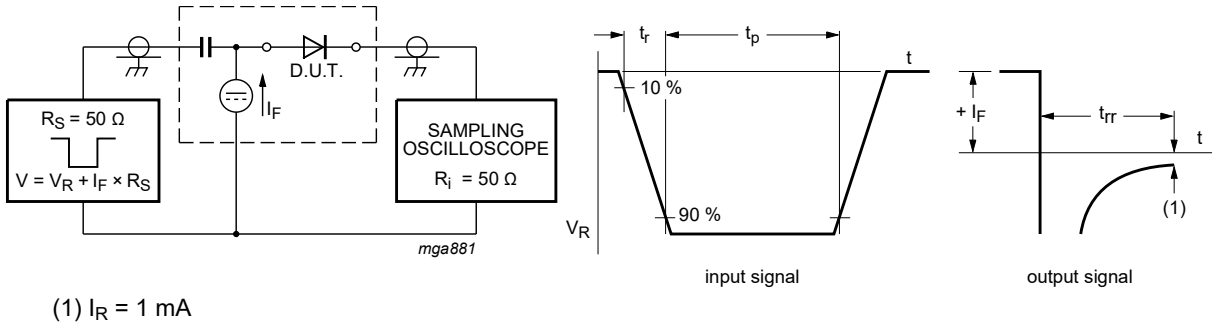
Fig. 4. Reverse current as a function of junction temperature.



f = 1 MHz; T_j = 25 °C

Fig. 5. Diode capacitance as a function of reverse voltage; typical values

11. Test information



(1) I_R = 1 mA

Fig. 6. Reverse recovery time test circuit and waveforms

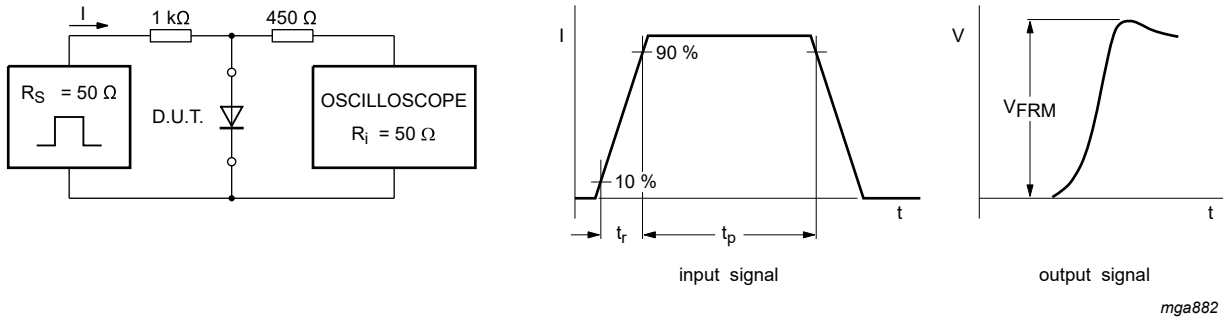


Fig. 7. Forward recovery voltage test circuit and waveforms

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

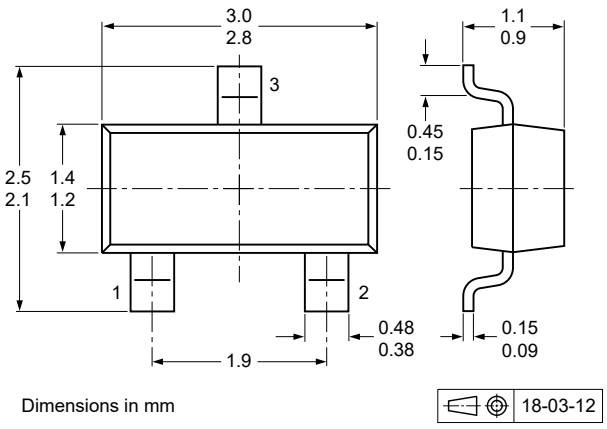


Fig. 8. Package outline SOT23

13. Soldering

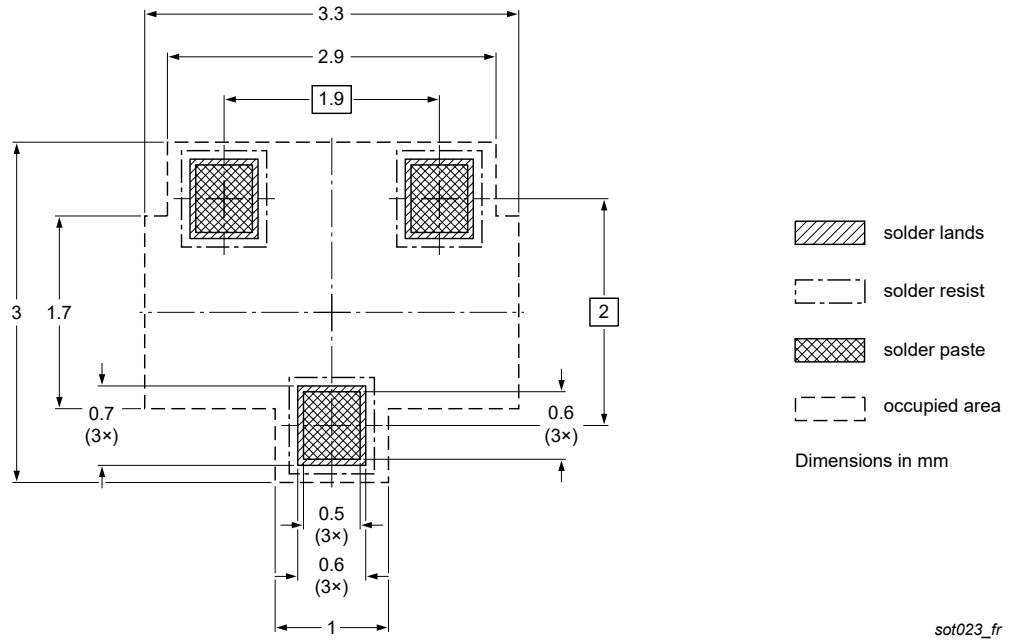


Fig. 9. Reflow soldering footprint for SOT23

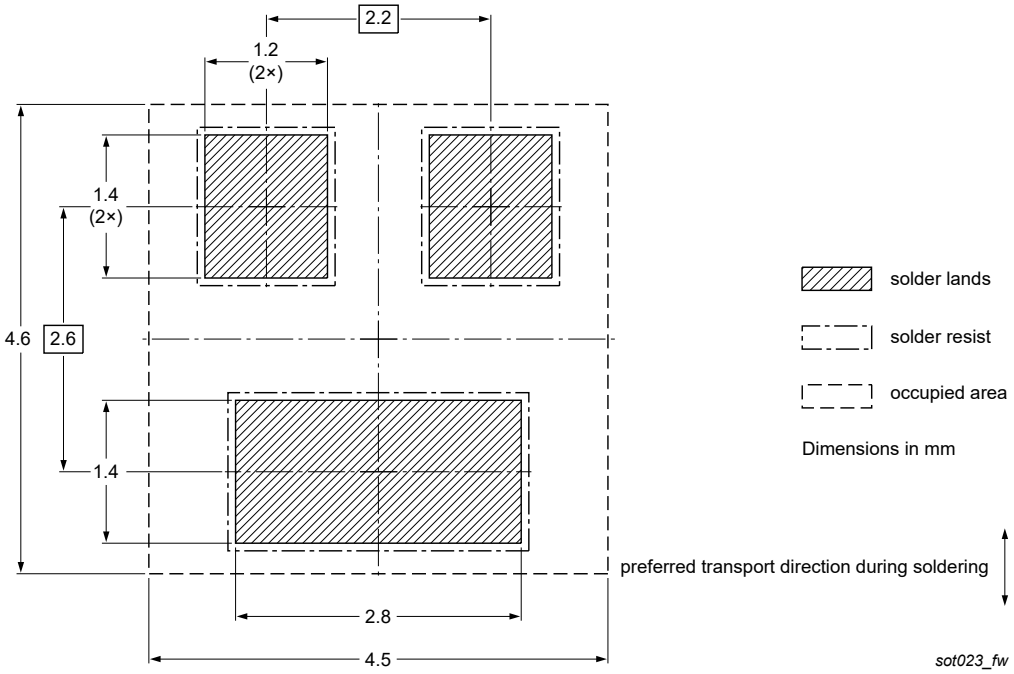


Fig. 10. Wave soldering footprint for SOT23

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAL99 v.2	20250523	Product data sheet	-	BAL99 v.1
Modification:	• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. • Legal texts have been adapted to the new company name where appropriate.			
BAL99 v.1	20031217	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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