BAT46GW

100 V, 250 mA Schottky barrier diode

24 November 2016 — Product data sheet

1. General description

Planar Schottky barrier diode with an integrated guard ring for stress protection, encapsulated in an SOD123 small Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Low forward voltage: $V_F \leq 850$ mV
- Low leakage current: $I_R \leq 4$ µA
- Reverse voltage $V_R \leq 100$ V
- Low capacitance
- Small SMD plastic package
- AEC-Q101 qualified

3. Applications

- High-speed switching
- Line termination
- Voltage clamping
- Reverse polarity protection

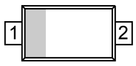
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_R	reverse voltage	T_j = 25 °C		-	-	100	V
V_F	forward voltage	I_F = 250 mA; $t_p \leq$ 300 µs; $\delta \leq$ 0.02 ; T_j = 25 °C		-	710	850	mV
I_R	reverse current	V_R = 75 V; pulsed; T_j = 25 °C		-	1	4	µA

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode[1]	 SOD123	 sym001
2	A	anode		

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAT46GW	SOD123	Plastic surface-mounted package; 2 leads	SOD123

7. Marking

Table 4. Marking codes

Type number	Marking code
BAT46GW	G8

8. Limiting values

Table 5. Limiting values
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V_R	reverse voltage	$T_j = 25$ °C		-	100	V
I_F	forward current			-	250	mA
I_{FSM}	non-repetitive peak forward current	$t_p < 10$ ms; $T_{j(init)} = 25$ °C; square wave		-	2.5	A
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[1]	-	390	mW
			[2]	-	660	mW
T_j	junction temperature			-	150	°C
T_{amb}	ambient temperature			-55	150	°C
T_{stg}	storage temperature			-65	150	°C

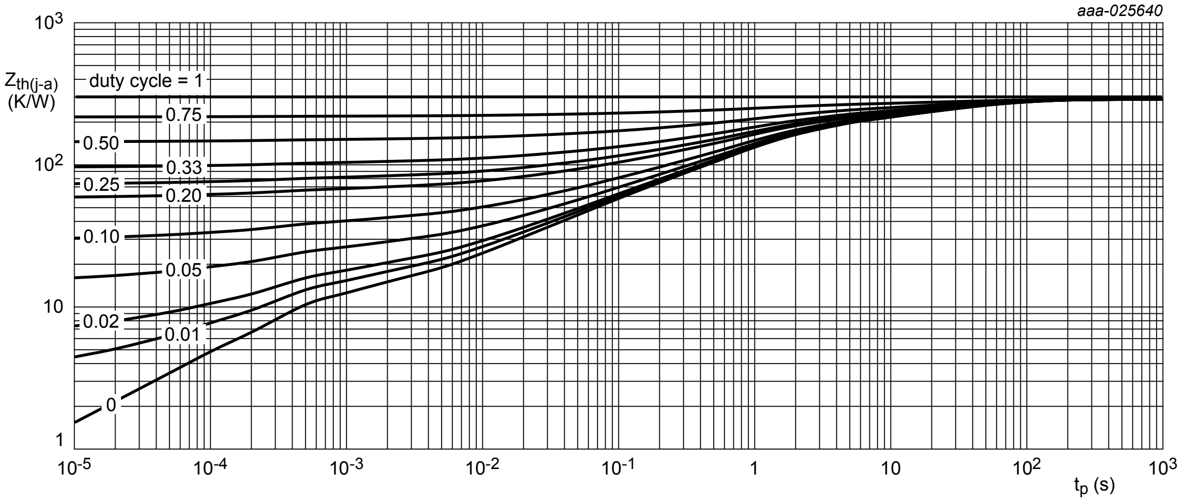
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2.

9. Thermal characteristics

Table 6. Thermal characteristics

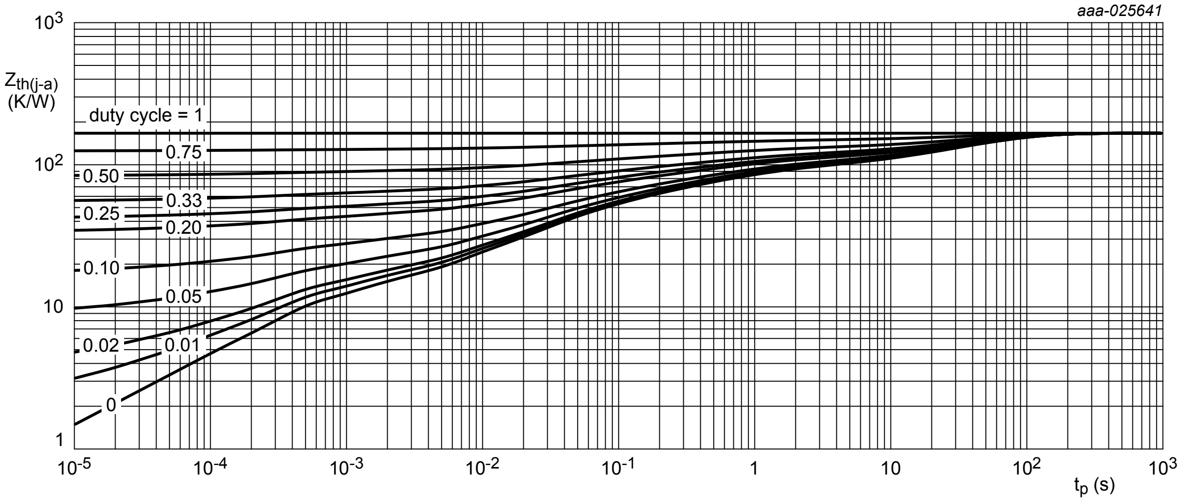
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	320	K/W
			[2]	-	-	190	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[3]	-	-	35	K/W

[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^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



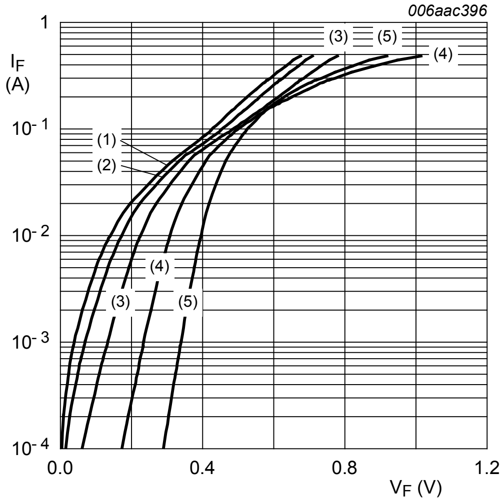
FR4 PCB, mounting pad for cathode 1 cm^2

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

10. Characteristics

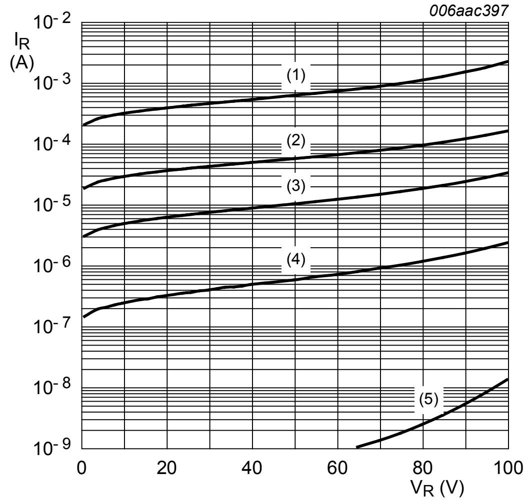
Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{(BR)R}$	reverse breakdown voltage	I_R = 1 mA; $t_p \le$ 300 μs; $\delta \le$ 0.02 ; T_j = 25 °C		100	-	-	V
V_F	forward voltage	I_F = 0.1 mA; $t_p \le$ 300 μs; $\delta \le$ 0.02 ; T_j = 25 °C		-	175	200	mV
		I_F = 10 mA; $t_p \le$ 300 μs; $\delta \le$ 0.02 ; T_j = 25 °C		-	315	350	mV
		I_F = 10 mA; $t_p \le$ 300 μs; $\delta \le$ 0.02 ; T_j = -40 °C		-	-	470	mV
		I_F = 50 mA; $t_p \le$ 300 μs; $\delta \le$ 0.02 ; T_j = 25 °C		-	415	475	mV
		I_F = 50 mA; $t_p \le$ 300 μs; $\delta \le$ 0.02 ; T_j = -40 °C		-	-	560	mV
		I_F = 250 mA; $t_p \le$ 300 μs; $\delta \le$ 0.02 ; T_j = 25 °C		-	710	850	mV
I_R	reverse current	V_R = 1.5 V; T_j = 25 °C		-	0.2	0.5	μA
		V_R = 1.5 V; pulsed; T_j = 60 °C		-	-	12	μA
		V_R = 10 V; pulsed; T_j = 25 °C		-	0.3	0.8	μA
		V_R = 10 V; pulsed; T_j = 60 °C		-	-	20	μA
		V_R = 50 V; pulsed; T_j = 25 °C		-	0.7	2	μA
		V_R = 50 V; pulsed; T_j = 60 °C		-	-	44	μA
		V_R = 75 V; pulsed; T_j = 25 °C		-	1	4	μA
		V_R = 75 V; pulsed; T_j = 60 °C		-	-	80	μA
		V_R = 100 V; pulsed; T_j = 25 °C		-	2	9	μA
		V_R = 100 V; pulsed; T_j = 60 °C		-	-	120	μA
		V_R = 100 V; pulsed; T_j = 85 °C		-	-	600	μA
C_d	diode capacitance	V_R = 0 V; f = 1 MHz; T_j = 25 °C		-	-	39	pF
		V_R = 1 V; f = 1 MHz; T_j = 25 °C		-	-	21	pF
t_{rr}	reverse recovery time	I_F = 10 mA; I_R = 10 mA; $I_{R(meas)}$ = 1 mA; R_L = 100 Ω; T_j = 25 °C		-	5.9	-	ns



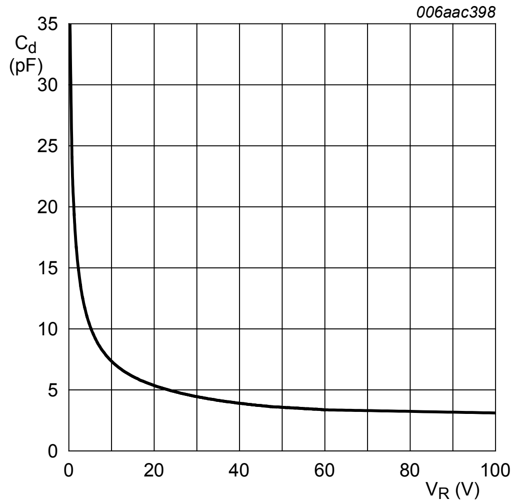
(1) T_{amb} = 150 °C
(2) T_{amb} = 125 °C
(3) T_{amb} = 85 °C
(4) T_{amb} = 25 °C
(5) T_{amb} = -40 °C

Fig. 3. Forward current as a function of forward voltage; typical values



(1) T_{amb} = 125 °C
(2) T_{amb} = 85 °C
(3) T_{amb} = 60 °C
(4) T_{amb} = 25 °C
(5) T_{amb} = -40 °C

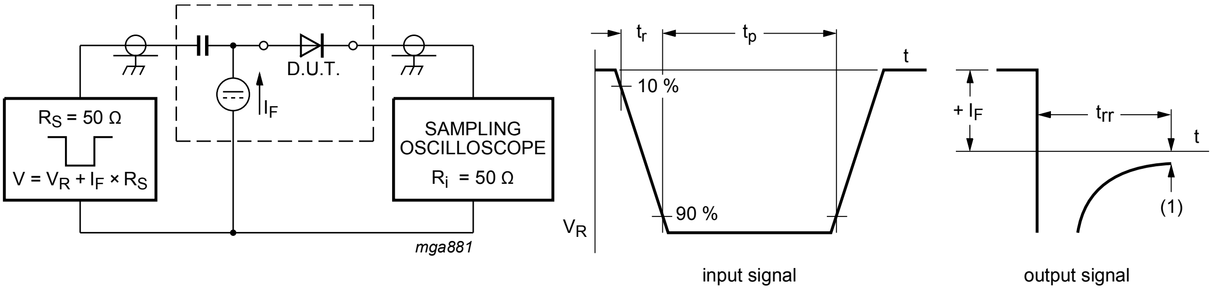
Fig. 4. Reverse current as a function of reverse voltage; typical values



f = 1 MHz; T_{amb} = 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

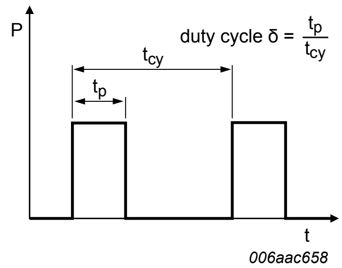


Fig. 7. Duty cycle definition

The current ratings for the typical waveforms are calculated according to the equations: $I_{F(AV)} = I_M \times \delta$ with I_M defined as peak current, $I_{RMS} = I_{F(AV)}$ at DC, and $I_{RMS} = I_M \times \sqrt{\delta}$ with I_{RMS} defined as RMS current.

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

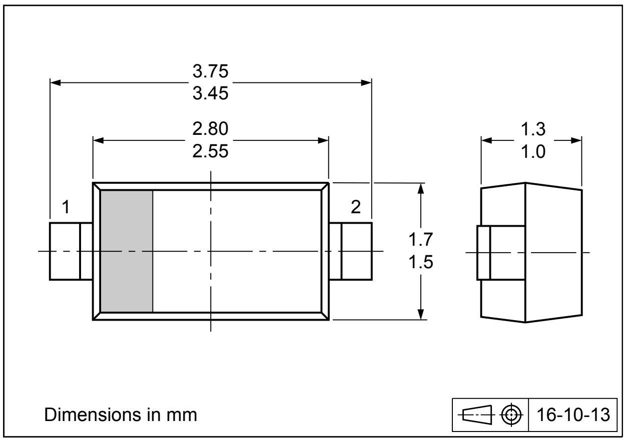


Fig. 8. Package outline SOD123

13. Soldering

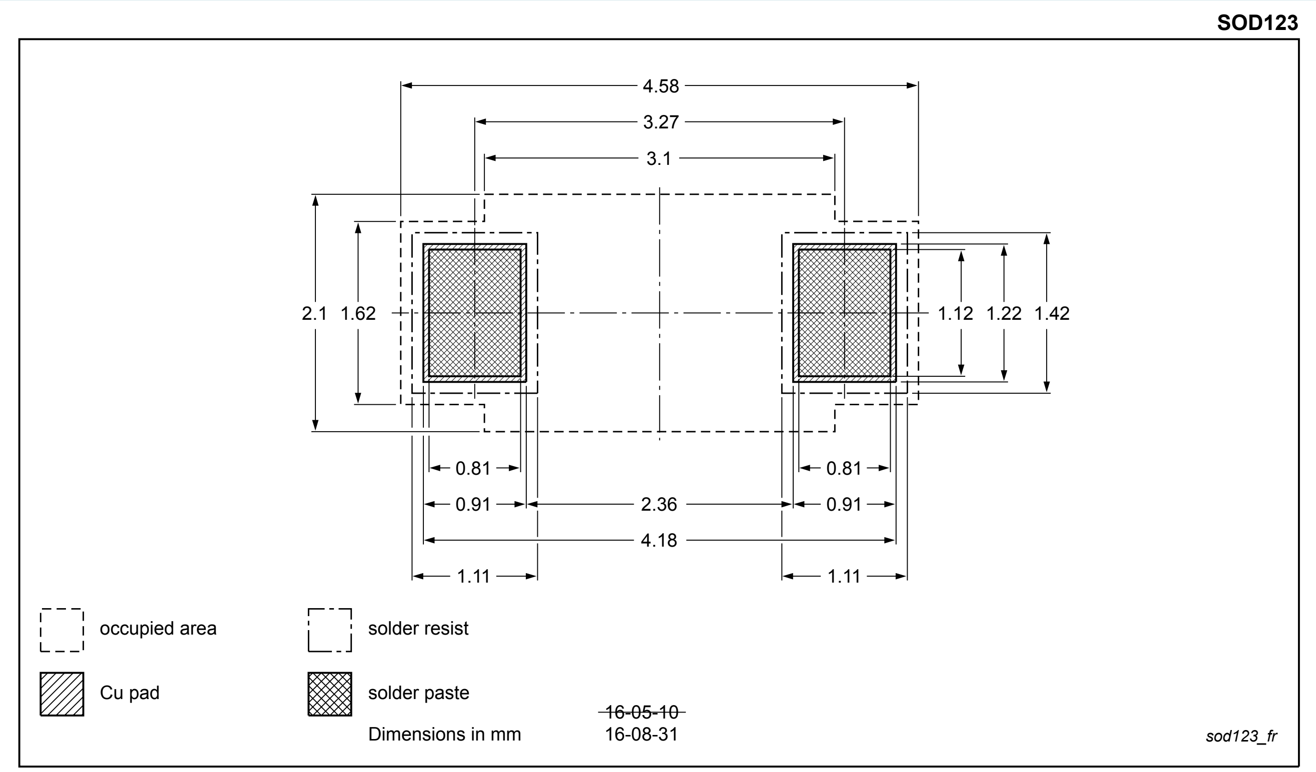


Fig. 9. Reflow soldering footprint for SOD123

SOD123

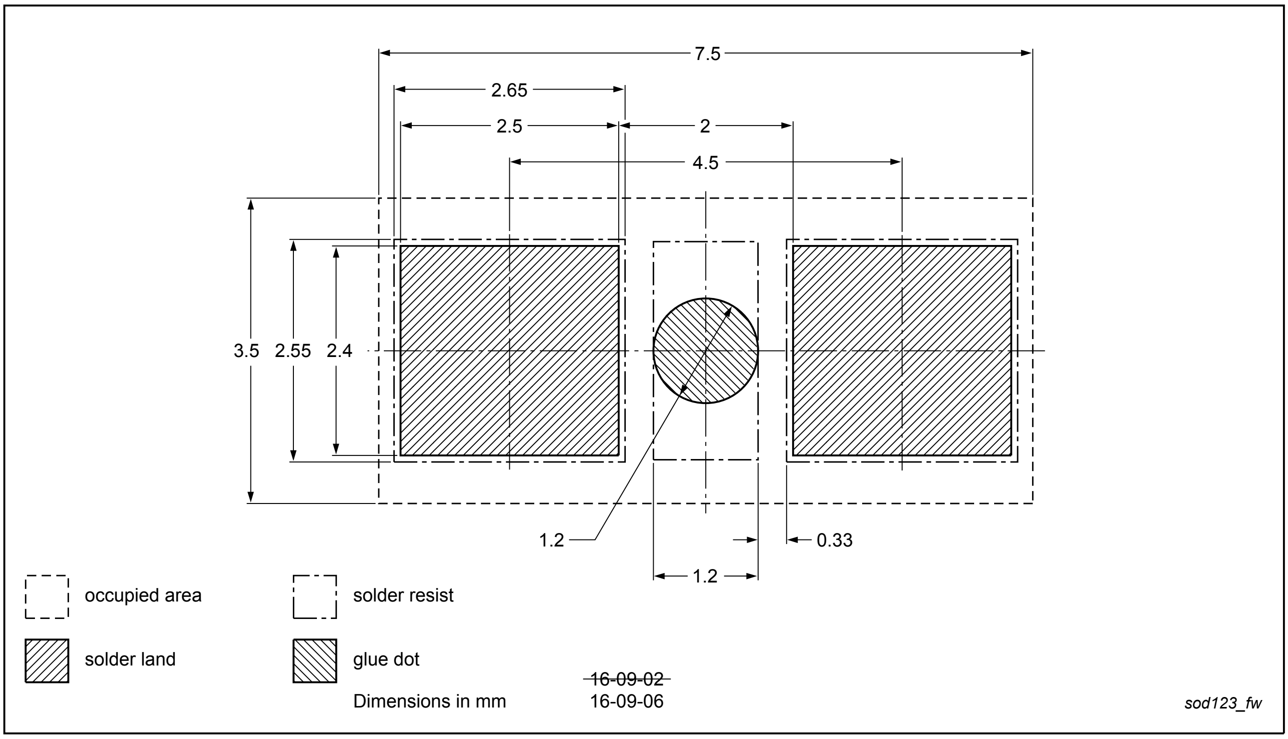


Fig. 10. Wave soldering footprint for SOD123

14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAT46GW v.1	20161124	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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16. Contents

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