



# 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:  $I_R \leq 4$   $\mu$ A
- 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; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ; $T_j = 25$ °C		-	710	850	mV
$I_R$	reverse current	$V_R = 75$ V; pulsed; $T_j = 25$ °C		-	1	4	$\mu$ A

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## 5. Pinning information

**Table 2. Pinning information**

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode <sup>[1]</sup>	 <b>SOD123</b>	 <b>sym001</b>
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	$T_j = 25^\circ\text{C}$		-	100	V
$I_F$	forward current			-	250	mA
$I_{FSM}$	non-repetitive peak forward current	$t_p < 10 \text{ ms}; T_{j(\text{init})} = 25^\circ\text{C}$ ; square wave		-	2.5	A
$P_{\text{tot}}$	total power dissipation	$T_{\text{amb}} \leq 25^\circ\text{C}$	[1]	-	390	mW
			[2]	-	660	mW
$T_j$	junction temperature			-	150	°C
$T_{\text{amb}}$	ambient temperature			-55	150	°C
$T_{\text{stg}}$	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  $1 \text{ cm}^2$ .

## 9. Thermal characteristics

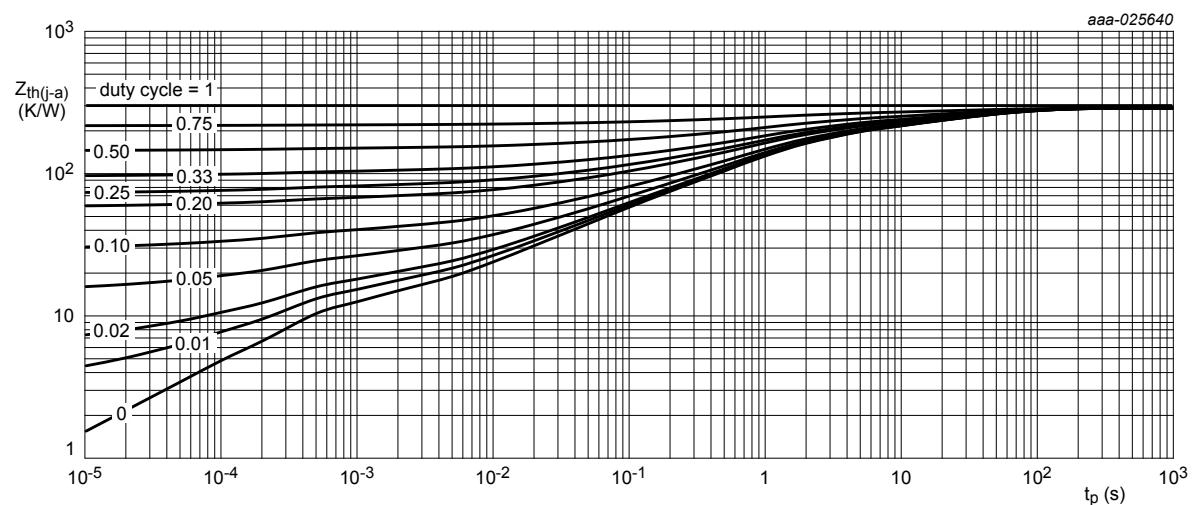
**Table 6. Thermal characteristics**

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

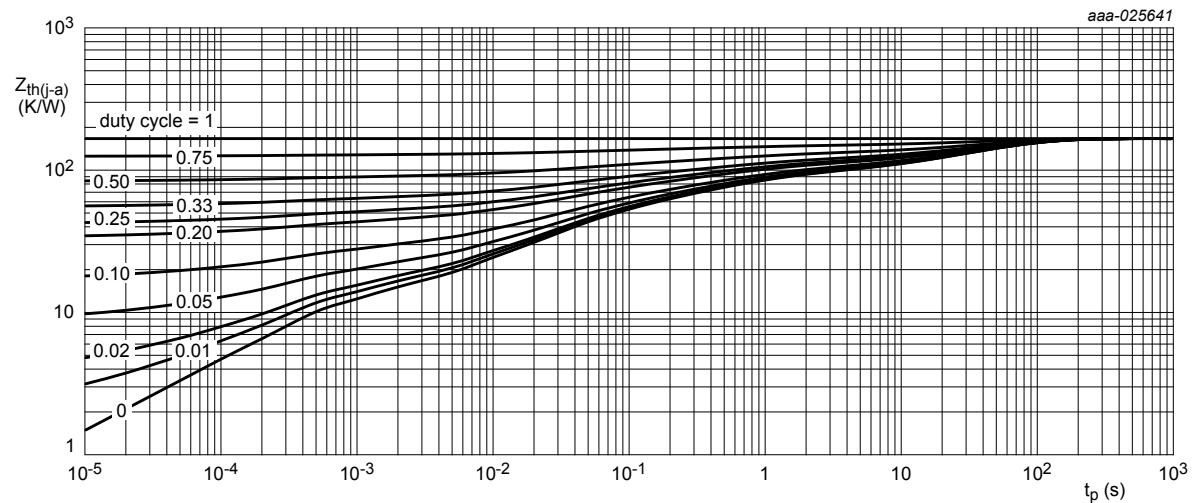
[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode  $1 \text{ cm}^2$ .

[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**



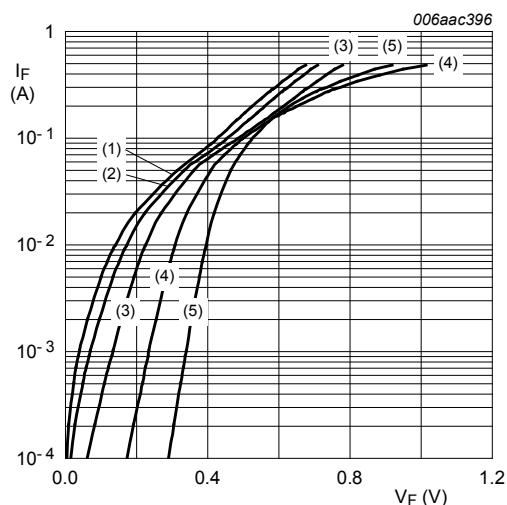
FR4 PCB, mounting pad for cathode  $1 \text{ cm}^2$

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

## 10. Characteristics

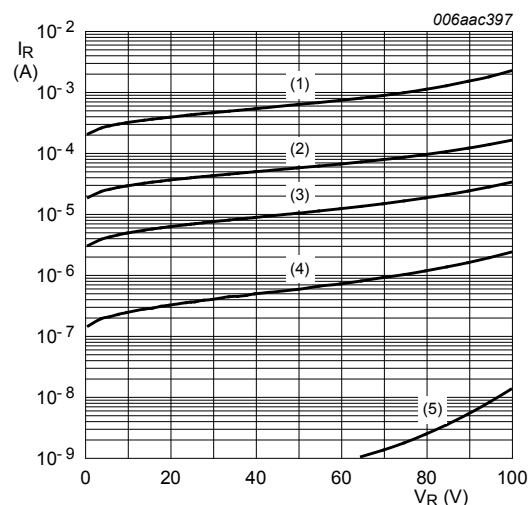
Table 7. Characteristics

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



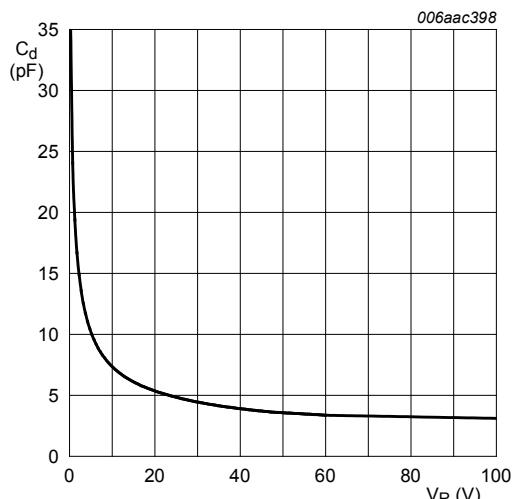
- (1)  $T_{amb} = 150 \text{ }^{\circ}\text{C}$
- (2)  $T_{amb} = 125 \text{ }^{\circ}\text{C}$
- (3)  $T_{amb} = 85 \text{ }^{\circ}\text{C}$
- (4)  $T_{amb} = 25 \text{ }^{\circ}\text{C}$
- (5)  $T_{amb} = -40 \text{ }^{\circ}\text{C}$

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



- (1)  $T_{amb} = 125 \text{ }^{\circ}\text{C}$
- (2)  $T_{amb} = 85 \text{ }^{\circ}\text{C}$
- (3)  $T_{amb} = 60 \text{ }^{\circ}\text{C}$
- (4)  $T_{amb} = 25 \text{ }^{\circ}\text{C}$
- (5)  $T_{amb} = -40 \text{ }^{\circ}\text{C}$

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



$f = 1 \text{ MHz}; T_{amb} = 25 \text{ }^{\circ}\text{C}$

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

## 11. Test information

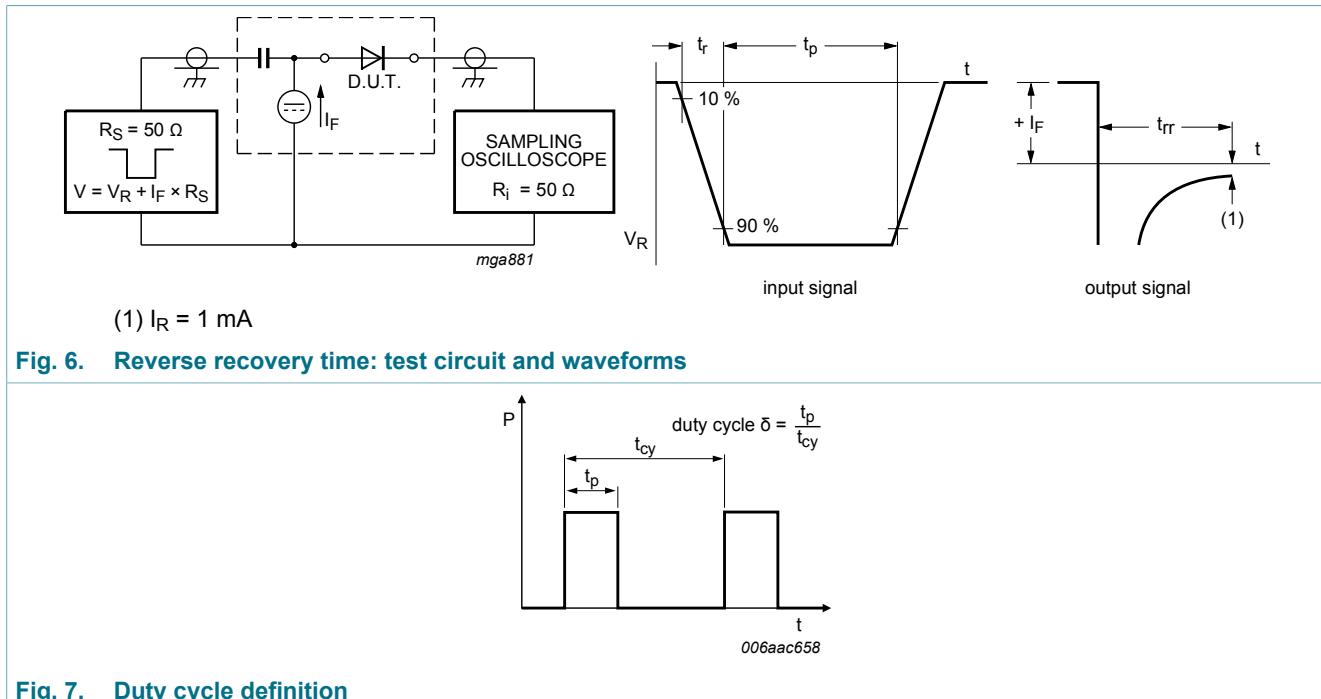


Fig. 6. Reverse recovery time: test circuit and waveforms

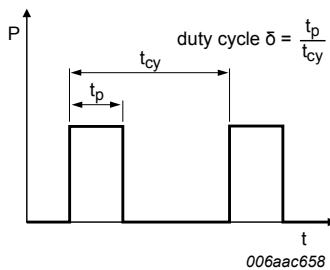


Fig. 7. Duty cycle definition

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

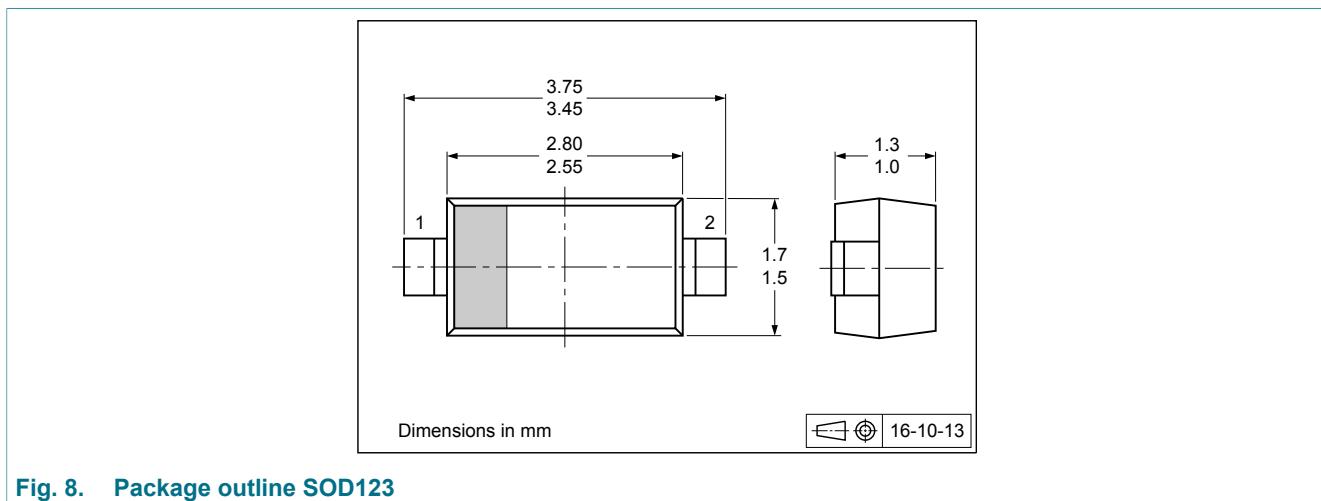


Fig. 8. Package outline SOD123

## 13. Soldering

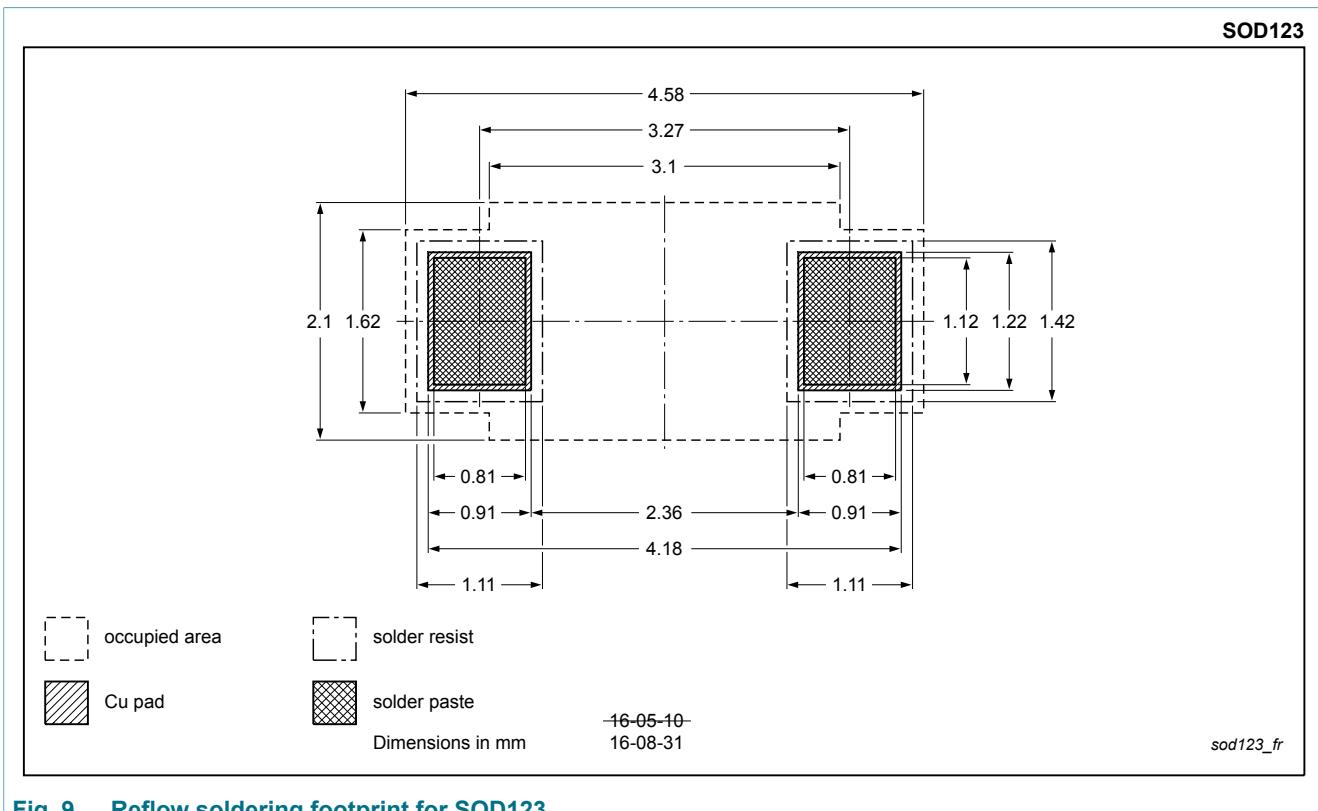


Fig. 9. Reflow soldering footprint for SOD123

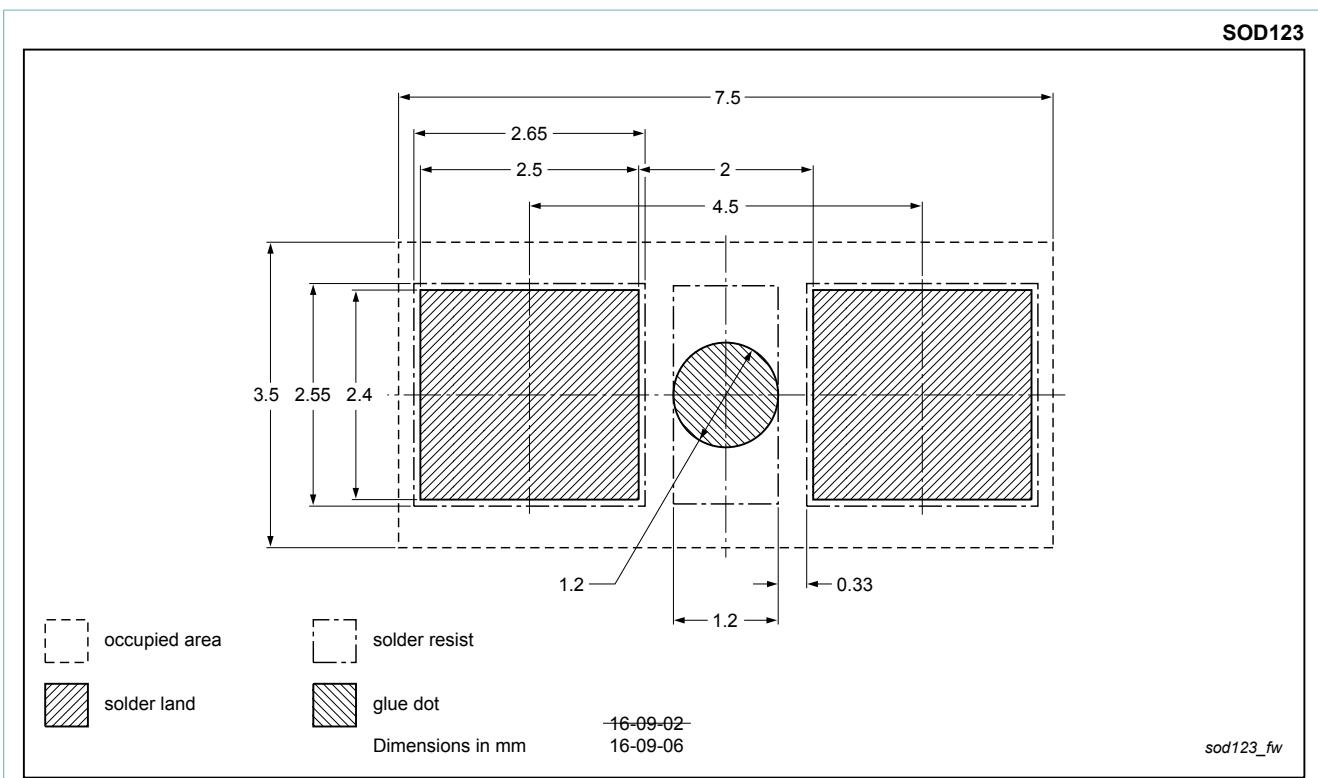


Fig. 10. Wave soldering footprint for SOD123

## 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 <sup>[1]</sup> <sup>[2]</sup>	Product status <sup>[3]</sup>	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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