



# BAT54

## Schottky barrier diode

1 July 2022

Product data sheet

### 1. General description

Planar Schottky barrier diode with an integrated guard ring for stress protection, encapsulated in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

### 2. Features and benefits

- Low forward voltage
- Low capacitance

### 3. Applications

- Ultra high-speed switching
- Line termination
- Voltage clamping
- Reverse polarity protection

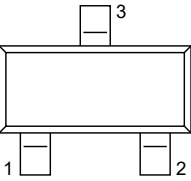
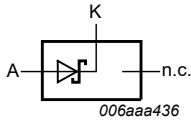
### 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_R$	reverse voltage		-	-	30	V
$V_F$	forward voltage	$I_F = 100 \text{ mA}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; pulsed; $T_{amb} = 25 \text{ } ^\circ\text{C}$	-	-	800	mV
$I_R$	reverse current	$V_R = 25 \text{ V}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; pulsed; $T_{amb} = 25 \text{ } ^\circ\text{C}$	-	-	2	$\mu\text{A}$

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode	 <p style="text-align: center;">SOT23</p>	
2	n.c.	not connected		
3	K	cathode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAT54	SOT23	plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body	SOT23
BAT54/DG	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]
BAT54	L4 %
BAT54/DG	GG %

[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
$V_R$	reverse voltage			-	30	V
$I_F$	forward current	$T_{amb} = 25\text{ °C}$		-	200	mA
$I_{FRM}$	repetitive peak forward current	$t_p \leq 1\text{ s}; \delta \leq 0.5; T_{amb} = 25\text{ °C}$		-	300	mA
$I_{FSM}$	non-repetitive peak forward current	$t_p < 10\text{ ms}; T_{j(init)} = 25\text{ °C}$		-	600	mA
<b>Per device; one diode loaded</b>						
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[1]	-	250	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.

## 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] [2]	-	-	500	K/W

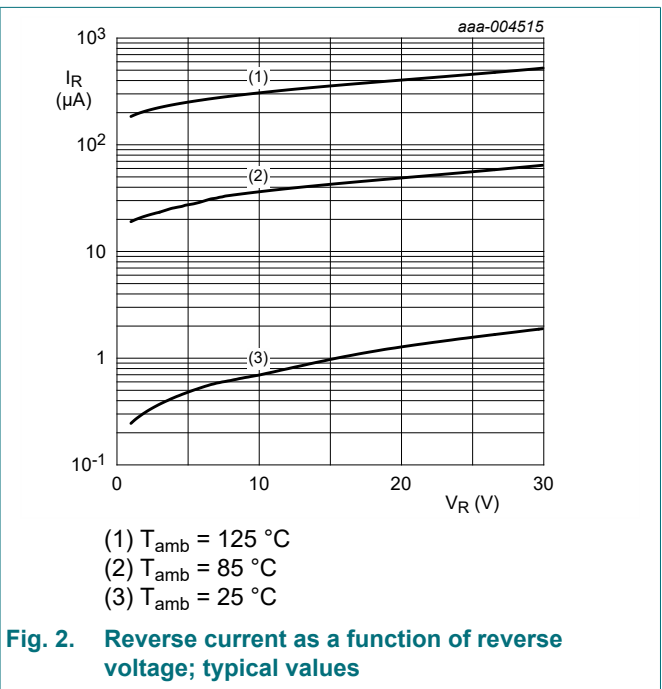
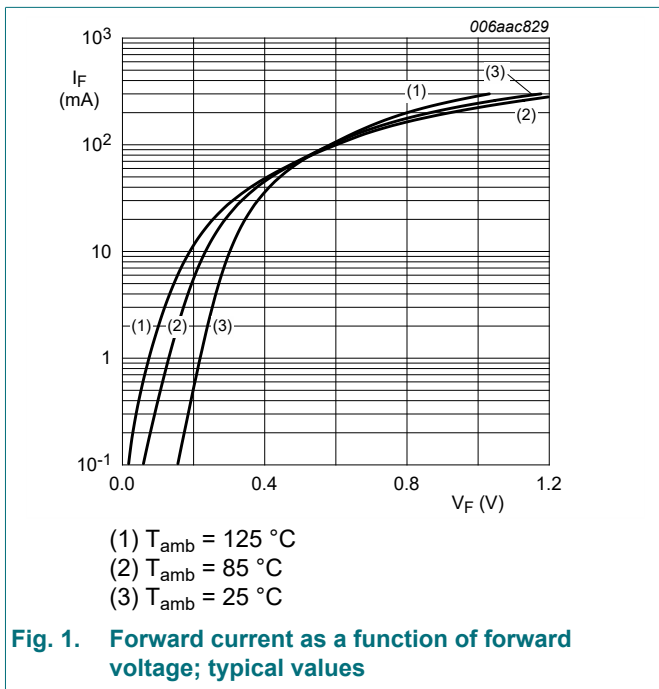
[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses PR are a significant part of the total power losses.

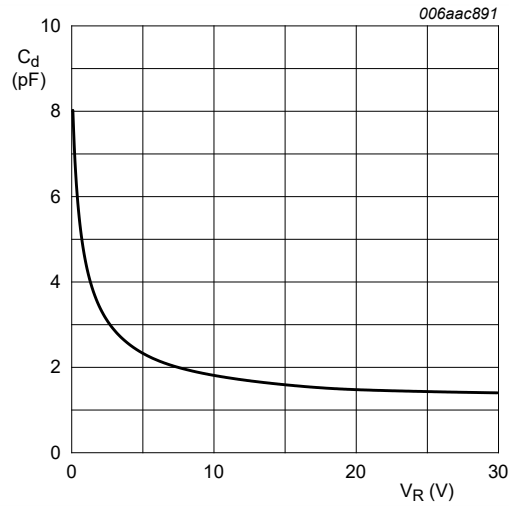
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_F$	forward voltage	$I_F = 0.1 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02;$ pulsed; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	240	mV
		$I_F = 1 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02;$ pulsed; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	320	mV
		$I_F = 10 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02;$ pulsed; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	400	mV
		$I_F = 30 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02;$ pulsed; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	500	mV
		$I_F = 100 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02;$ pulsed; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	800	mV
$I_R$	reverse current	$V_R = 25 \text{ V}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02;$ pulsed; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	2	$\mu\text{A}$
$C_d$	diode capacitance	$V_R = 1 \text{ V}; f = 1 \text{ MHz}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	10	pF
$t_{rr}$	reverse recovery time	$I_F = 10 \text{ mA}; I_R = 10 \text{ mA}; I_{R(\text{meas})} = 1 \text{ mA};$ $R_L = 100 \Omega; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$	-	-	5	ns

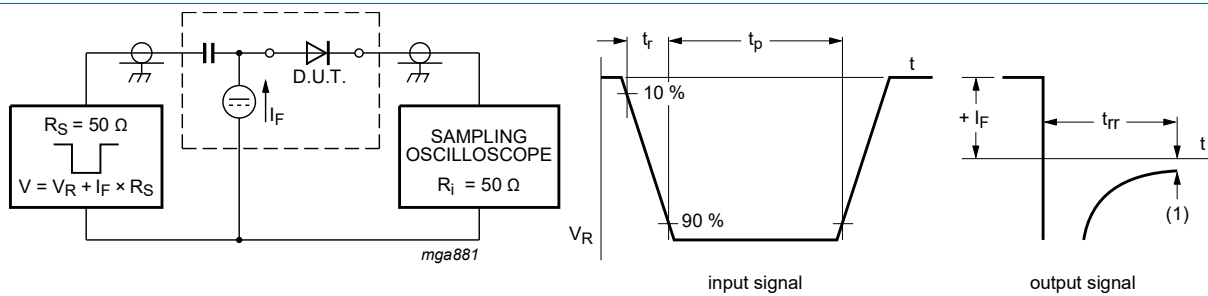




$T_{amb} = 25\text{ }^\circ\text{C}; f = 1\text{ MHz}$

Fig. 3. Diode capacitance as a function of reverse voltage; typical values

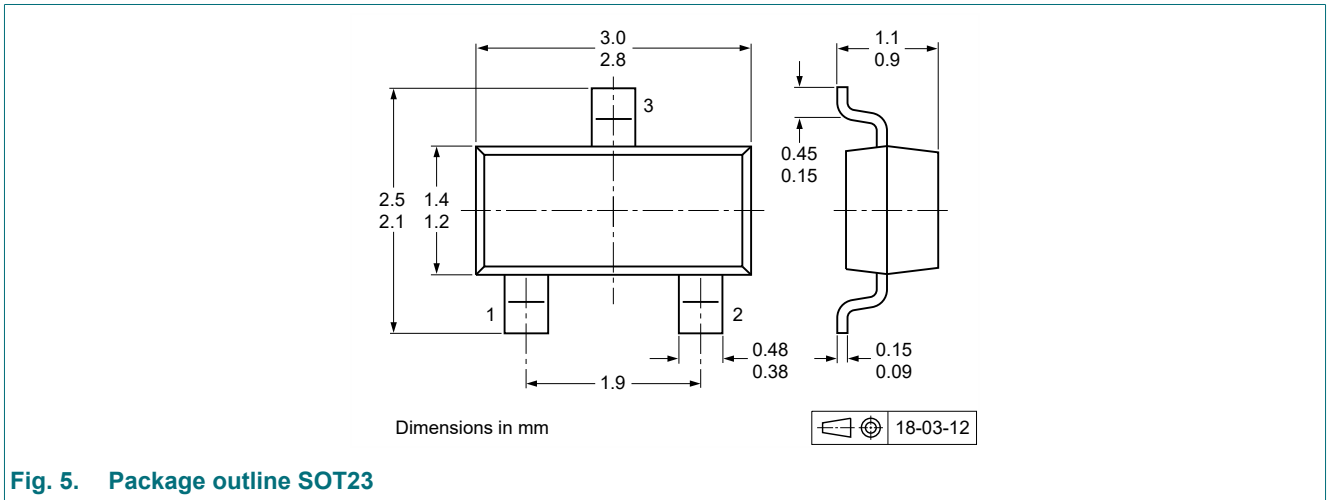
### 11. Test information



(1)  $I_R = 1\text{ mA}$

Fig. 4. Reverse recovery time test circuit and waveforms

## 12. Package outline



### 13. Soldering

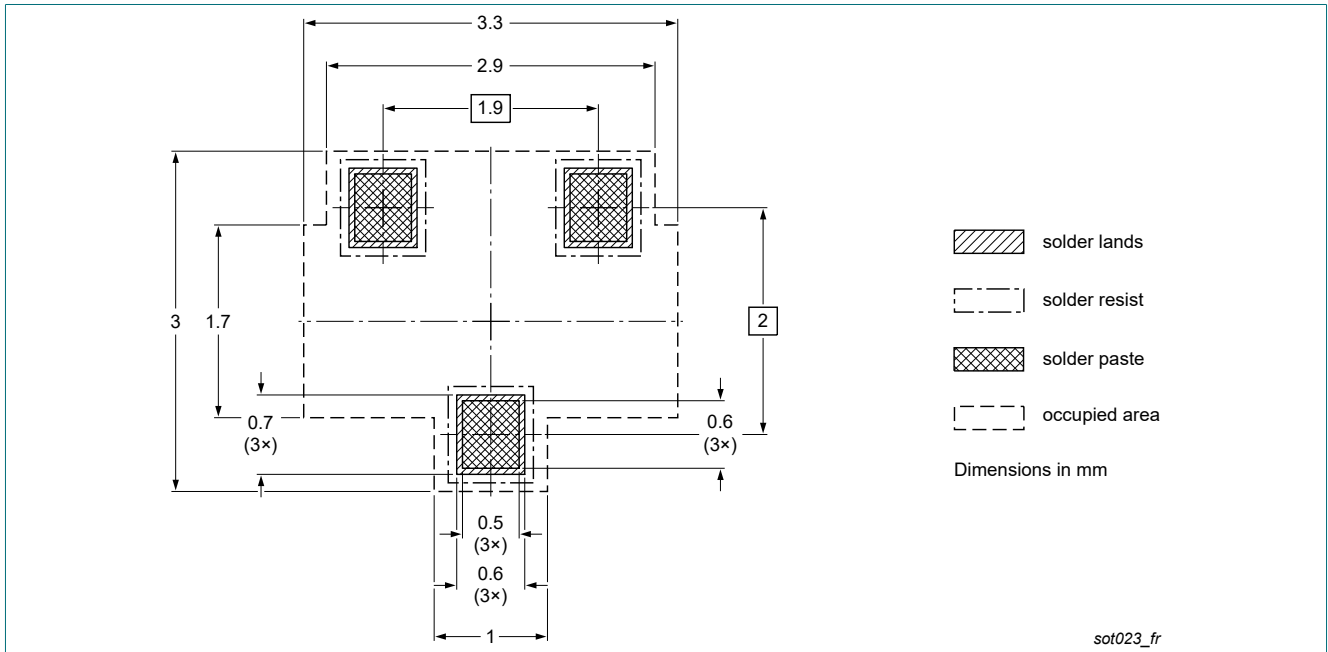


Fig. 6. Reflow soldering footprint for SOT23

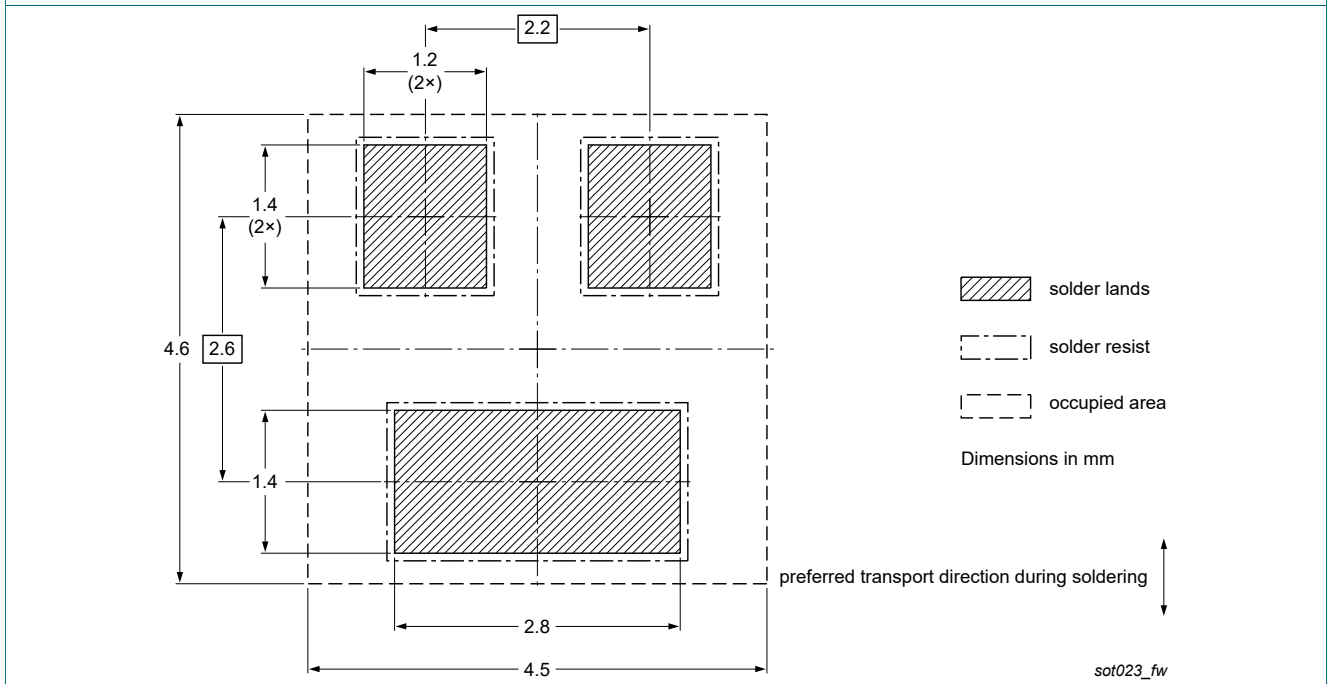


Fig. 7. Wave soldering footprint for SOT23

## 14. Revision history

Table 8. Revision history

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAT54 v.6	20220701	Product data sheet	-	BAT54_SER v.5
Modifications:	<ul style="list-style-type: none"> <li>Family data sheet reduced to single type data sheet.</li> <li>Product changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternative(s).</li> <li>Packing information removed.</li> </ul>			
BAT54_SER v.5	20121005	Product data sheet	-	BAT54_SERIES v.4
BAT54_SERIES v.4	20020304	Product data sheet	-	BAT54_SERIES v.3
BAT54_SERIES v.3	20011012	Product specification	-	BAT54 v.2
BAT54 v.2	19990506	Product specification	-	BAT54 v.1
BAT54 v.1	19960319	Product specification	-	-



## 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".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at <https://www.nexperia.com>.

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