



# BAT54W series

Schottky barrier diodes

Rev. 3 — 20 November 2012

Product data sheet

## 1. Product profile

### 1.1 General description

Planar Schottky barrier diodes with an integrated guard ring for stress protection, encapsulated in a very small SOT323 (SC-70) Surface-Mounted Device (SMD) plastic package.

### 1.2 Features and benefits

- Low forward voltage
- Low capacitance
- AEC-Q101 qualified

### 1.3 Applications

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

### 1.4 Quick reference data

Table 1. Quick reference data

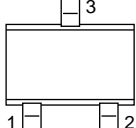
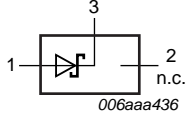
$T_{amb} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per diode</b>						
$V_R$	reverse voltage		-	-	30	V
$V_F$	forward voltage	$I_F = 100\text{ mA}$	[1]	-	800	mV
$I_R$	reverse current	$V_R = 25\text{ V}$	[1]	-	2	$\mu\text{A}$

[1] Pulse test:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$ .

## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
<b>BAT54W</b>			
1	anode		
2	not connected		
3	cathode		

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Table 2. Pinning ...continued

Pin	Description	Simplified outline	Graphic symbol
<b>BAT54AW</b>			
1	cathode (diode 1)		
2	cathode (diode 2)		
3	common anode		
<b>BAT54CW</b>			
1	anode (diode 1)		
2	anode (diode 2)		
3	common cathode		
<b>BAT54SW</b>			
1	anode (diode 1)		
2	cathode (diode 2)		
3	cathode (diode 1), anode (diode 2)		

### 3. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
BAT54W series	SC-70	plastic surface-mounted package; 3 leads	SOT323

### 4. Marking

Table 4. Marking codes

Type number	Marking code <sup>[1]</sup>
BAT54W	L4*
BAT54AW	42*
BAT54CW	43*
BAT54SW	44*

[1] \* = placeholder for manufacturing site code.

## 5. Limiting values

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions	Min	Max	Unit
<b>Per diode</b>					
$V_R$	reverse voltage		-	30	V
$I_F$	forward current		-	200	mA
$I_{FRM}$	repetitive peak forward current	$t_p \leq 1$ s; $\delta \leq 0.5$		300	mA
$I_{FSM}$	non-repetitive peak forward current	square wave; $t_p < 10$ ms	[1] -	600	mA
<b>Per device; one diode loaded</b>					
$P_{tot}$	total power dissipation	$T_{amb} \leq 25$ °C	[2] -	200	mW
$T_j$	junction temperature		-	150	°C
$T_{amb}$	ambient temperature		-55	+150	°C
$T_{stg}$	storage temperature		-65	+150	°C

[1]  $T_j = 25$  °C before surge.

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

## 6. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per device; one diode loaded</b>						
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1] -	-	625	K/W

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

## 7. Characteristics

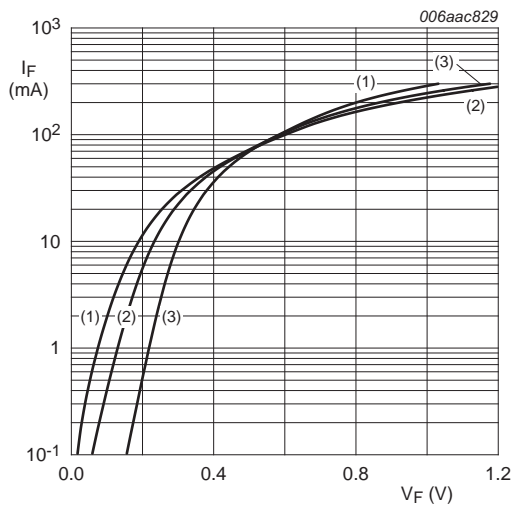
**Table 7. Characteristics**

$T_{amb} = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per diode</b>						
$V_F$	forward voltage		[1]			
		$I_F = 0.1\text{ mA}$	-	-	240	mV
		$I_F = 1\text{ mA}$	-	-	320	mV
		$I_F = 10\text{ mA}$	-	-	400	mV
		$I_F = 30\text{ mA}$	-	-	500	mV
$I_F = 100\text{ mA}$	-	-	800	mV		
$I_R$	reverse current	$V_R = 25\text{ V}$	[1]	-	2	$\mu\text{A}$
$C_d$	diode capacitance	$f = 1\text{ MHz}; V_R = 1\text{ V}$	-	-	10	pF
$t_{rr}$	reverse recovery time		[2]	-	5	ns

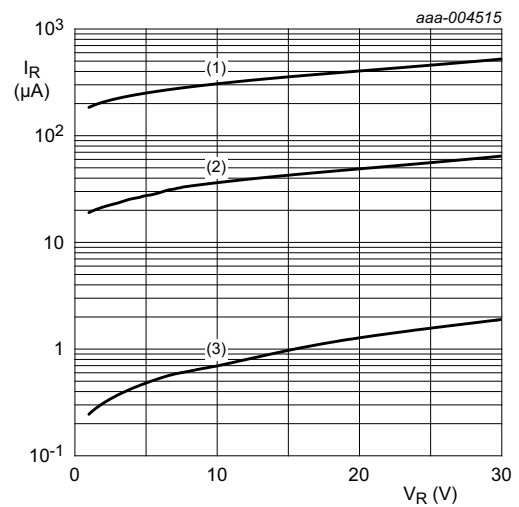
[1] Pulse test:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$ .

[2] When switched from  $I_F = 10\text{ mA}$  to  $I_R = 10\text{ mA}$ ;  $R_L = 100\text{ }\Omega$ ; measured at  $I_R = 1\text{ mA}$ .



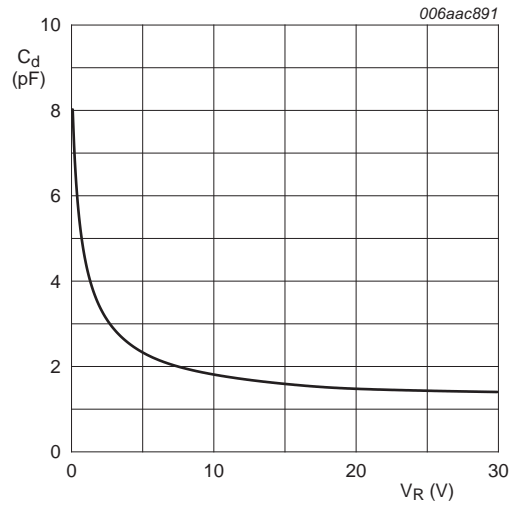
- (1)  $T_{amb} = 125\text{ °C}$
- (2)  $T_{amb} = 85\text{ °C}$
- (3)  $T_{amb} = 25\text{ °C}$

**Fig 1. Forward current as a function of forward voltage; typical values**



- (1)  $T_{amb} = 125\text{ °C}$
- (2)  $T_{amb} = 85\text{ °C}$
- (3)  $T_{amb} = 25\text{ °C}$

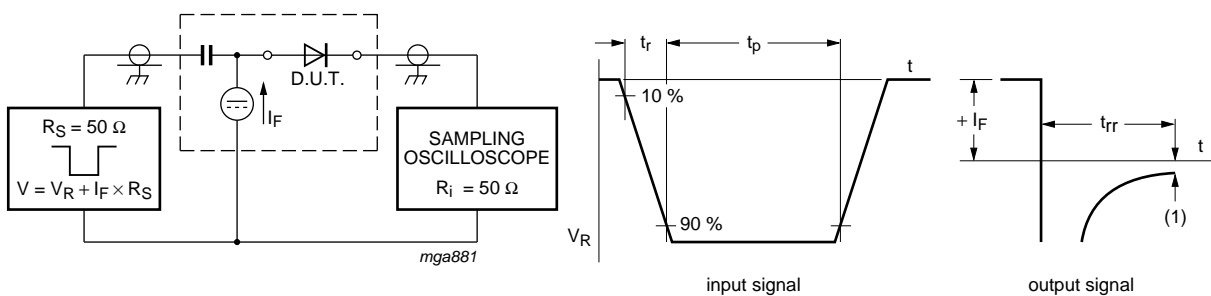
**Fig 2. Reverse current as a function of reverse voltage; typical values**



f = 1 MHz; T<sub>amb</sub> = 25 °C

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

## 8. Test information



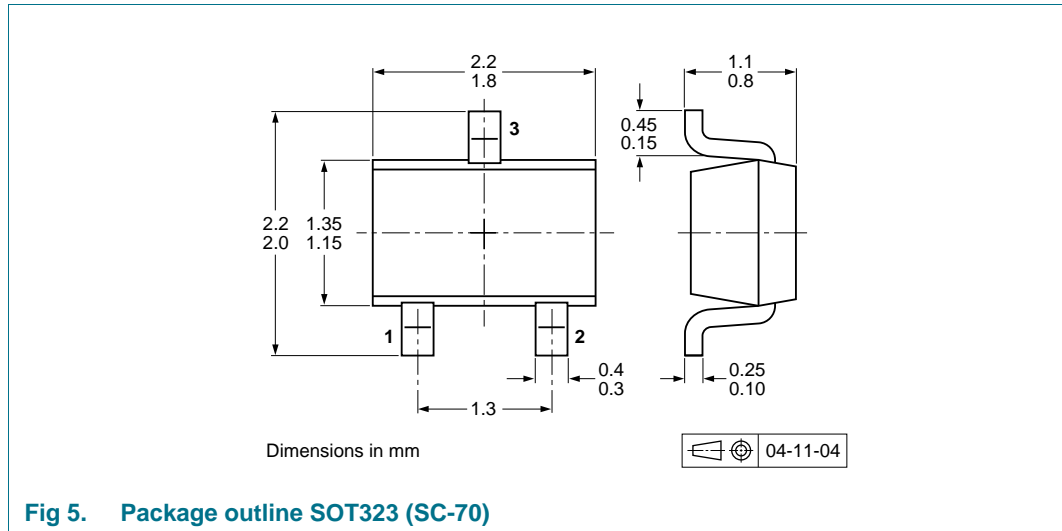
(1)  $I_R = 1 \text{ mA}$

Fig 4. Reverse recovery time test circuit and waveforms

### 8.1 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.

## 9. Package outline



## 10. Packing information

**Table 8. Packing methods**

The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

Type number	Package	Description	Packing quantity	
			3000	10000
BAT54W series	SOT323	4 mm pitch, 8 mm tape and reel	-115	-135

[1] For further information and the availability of packing methods, see [Section 14](#).

11. Soldering

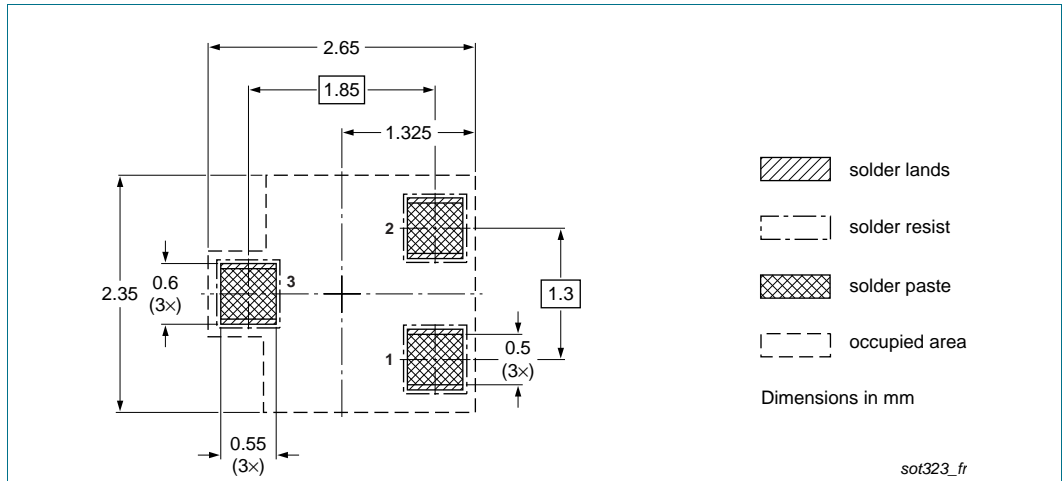


Fig 6. Reflow soldering footprint SOT323 (SC-70)

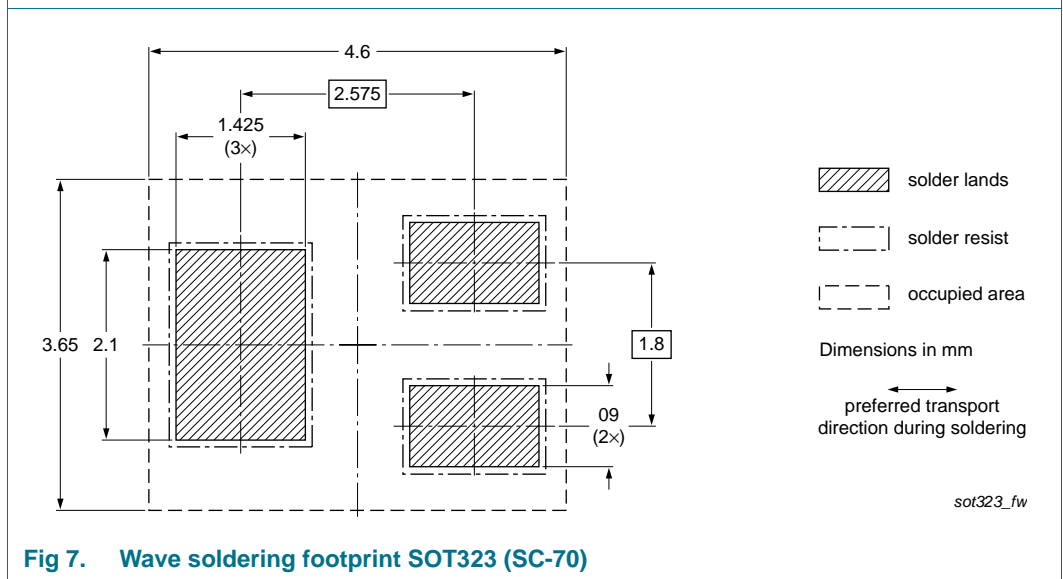


Fig 7. Wave soldering footprint SOT323 (SC-70)

## 12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BAT54W_SER v.3	20121120	Product data sheet	-	BAT54W v.2
Modifications:	<ul style="list-style-type: none"> <li>• The format of this document has been redesigned to comply with the new identity guidelines of NXP Semiconductors</li> <li>• Legal texts have been adapted to the new company name where appropriate.</li> <li>• <a href="#">Section 1</a>: updated</li> <li>• <a href="#">Section 4</a>: updated</li> <li>• <a href="#">Table 5</a>: updated ambient temperature <math>T_{amb}</math> maximum value to 150 °C</li> <li>• <a href="#">Figure 1</a> to <a href="#">4</a>: updated</li> <li>• <a href="#">Section 8 "Test information"</a>: added</li> <li>• <a href="#">Figure 5</a>: replaced by minimized package outline drawing</li> <li>• <a href="#">Section 10 "Packing information"</a>: added</li> <li>• <a href="#">Section 11 "Soldering"</a>: added</li> <li>• <a href="#">Section 13 "Legal information"</a>: updated</li> </ul>			
BAT54W v.2	19960319	Product specification	-	BAT54W v.1



## 13. Legal information

### 13.1 Data sheet status

Document status <sup>[1][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.

[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 URL <http://www.nexperia.com>.

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