



# THE DATASHEET OF BAT54SWF





# 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
Per diode						
$V_R$	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

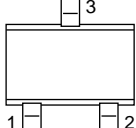
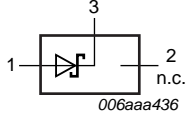
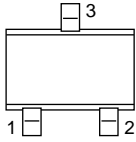
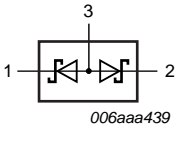
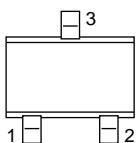
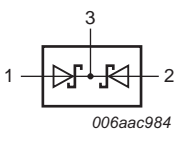
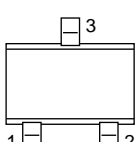
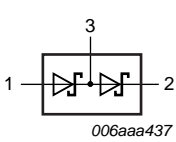
Pin	Description	Simplified outline	Graphic symbol
BAT54W			
1	anode		
2	not connected		
3	cathode		

Table 2. Pinning ...continued

Pin	Description	Simplified outline	Graphic symbol
<b>BAT54AW</b>			
1	cathode (diode 1)		 006aaa439
2	cathode (diode 2)		
3	common anode		
<b>BAT54CW</b>			
1	anode (diode 1)		 006aac984
2	anode (diode 2)		
3	common cathode		
<b>BAT54SW</b>			
1	anode (diode 1)		 006aaa437
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

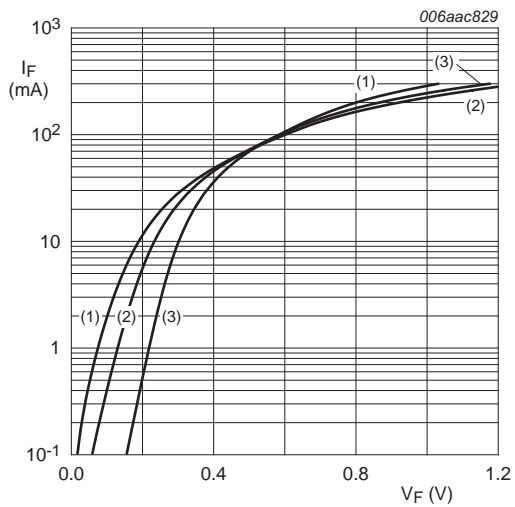
**Table 7. Characteristics**

$T_{amb} = 25\text{ °C}$  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

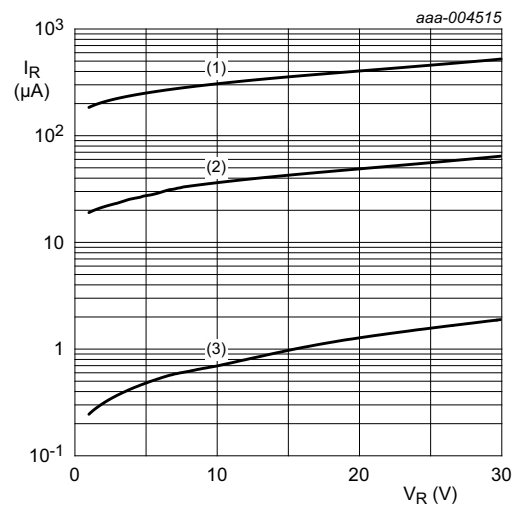
[1] Pulse test:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$ .

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



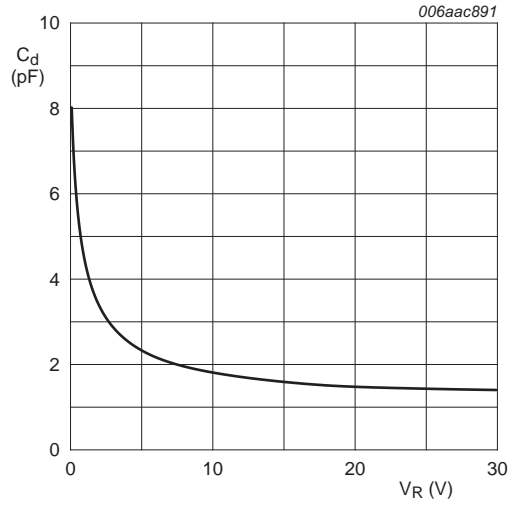
- (1)  $T_{amb} = 125\text{ °C}$
- (2)  $T_{amb} = 85\text{ °C}$
- (3)  $T_{amb} = 25\text{ °C}$

**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)  $T_{amb} = 25\text{ °C}$

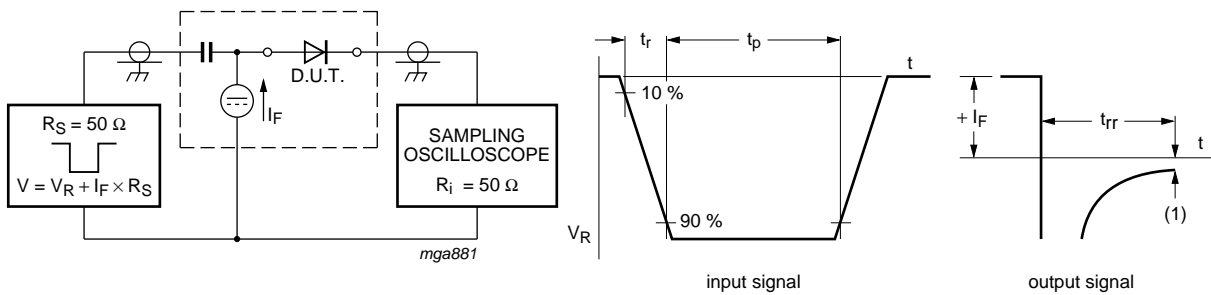
**Fig 2. Reverse current as a function of reverse voltage; typical values**



f = 1 MHz; T<sub>amb</sub> = 25 °C

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

## 8. Test information



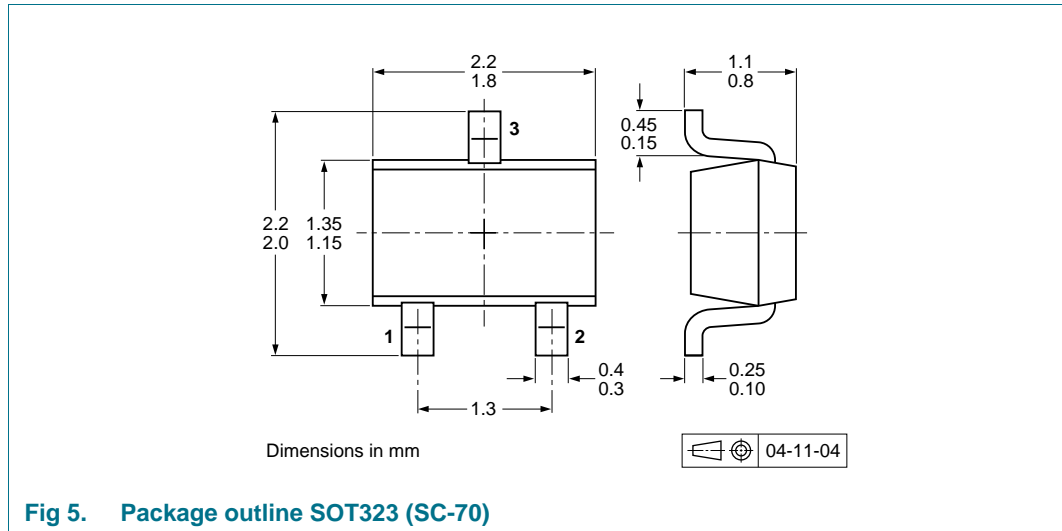
(1) I<sub>R</sub> = 1 mA

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

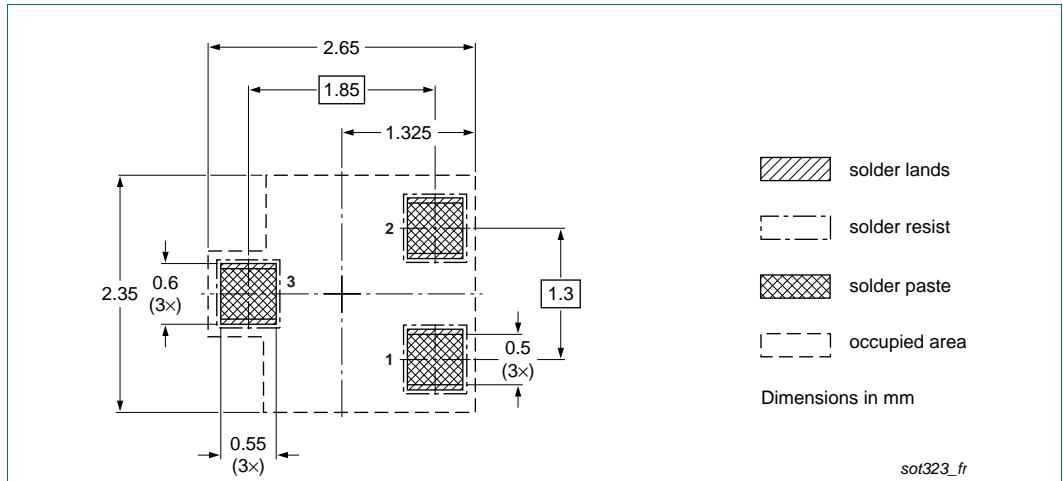
**Table 8. Packing methods**

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

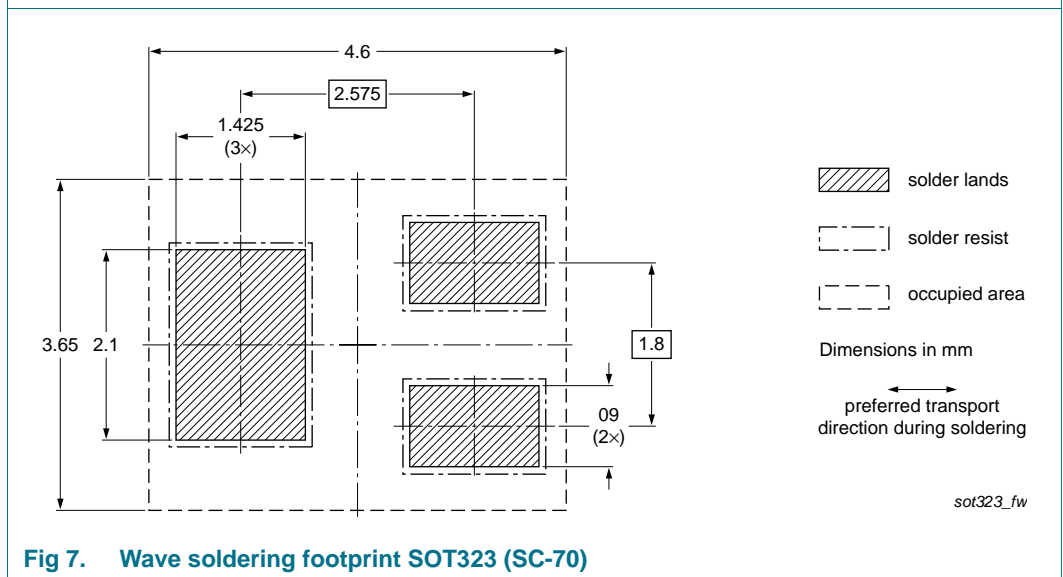
Type number	Package	Description	Packing quantity	
			3000	10000
BAT54W series	SOT323	4 mm pitch, 8 mm tape and reel	-115	-135

[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".

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