



BAT54 series

Schottky barrier diodes

Rev. 5 — 5 October 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 small SOT23 (TO-236AB) 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	μA

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

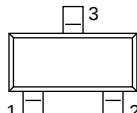
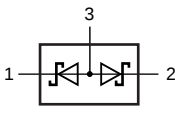
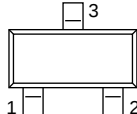
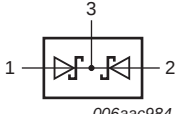
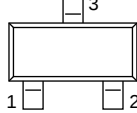
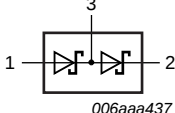
2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
BAT54			
1	anode		
2	not connected		
3	cathode		



Table 2. Pinning ...continued

Pin	Description	Simplified outline	Graphic symbol
BAT54A			
1	cathode (diode 1)		
2	cathode (diode 2)		
3	common anode		
BAT54C			
1	anode (diode 1)		
2	anode (diode 2)		
3	common cathode		
BAT54S			
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		
	Name	Description	Version
BAT54 series	-	plastic surface-mounted package; 3 leads	SOT23

4. Marking

Table 4. Marking codes

Type number	Marking code ^[1]
BAT54	L4*
BAT54A	*V3
BAT54C	*W1
BAT54S	*V4

[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
Per diode					
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	square wave; $t_p < 10\text{ ms}$	[1] -	600	mA
Per device; one diode loaded					
P_{tot}	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[2] -	250	mW
T_j	junction temperature		-	150	°C
T_{amb}	ambient temperature		-55	+150	°C
T_{stg}	storage temperature		-65	+150	°C

[1] $T_j = 25\text{ °C}$ 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
Per device; one diode loaded						
$R_{th(j-a)}$	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 P_R are a significant part of the total power losses.

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

7. Characteristics

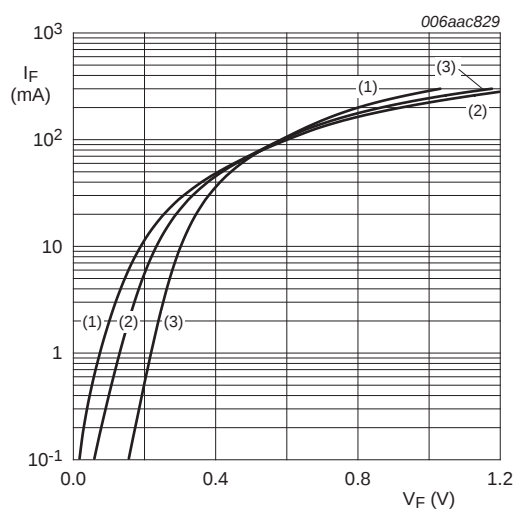
Table 7. Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Per diode						
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	μA
C_d	diode capacitance	$f = 1\text{ MHz}; V_R = 1\text{ V}$	-	-	10	pF
t_{rr}	reverse recovery time		[2]	-	5	ns

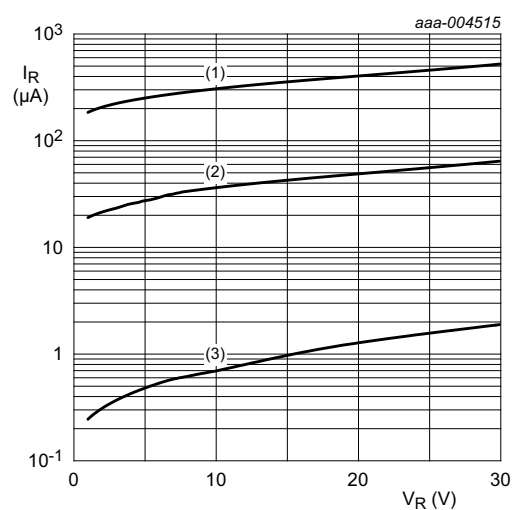
[1] Pulse test: $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$.

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



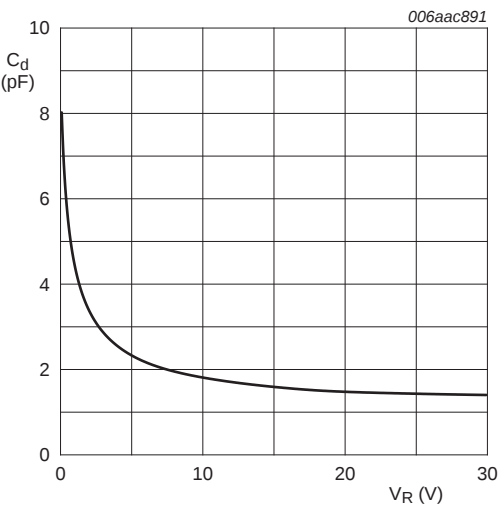
- (1) $T_{amb} = 125\text{ }^{\circ}\text{C}$
- (2) $T_{amb} = 85\text{ }^{\circ}\text{C}$
- (3) $T_{amb} = 25\text{ }^{\circ}\text{C}$

Fig 1. 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) $T_{amb} = 25\text{ }^{\circ}\text{C}$

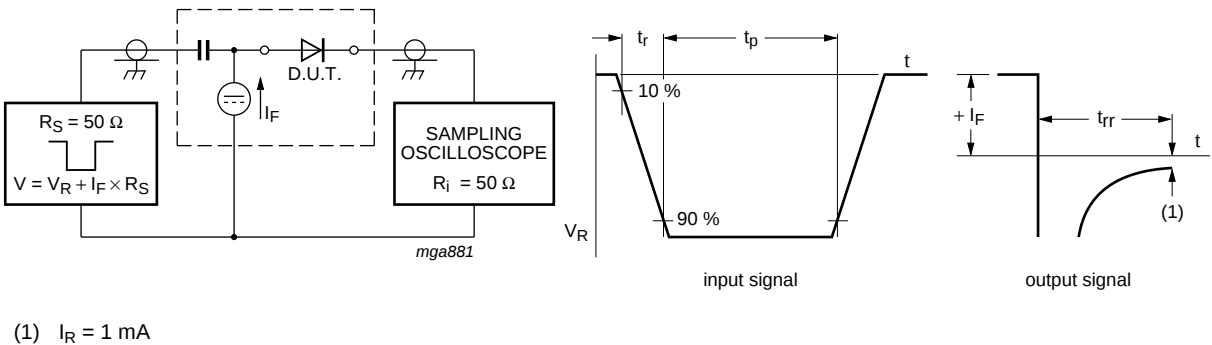
Fig 2. Reverse current as a function of reverse voltage; typical values



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

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

8. Test information



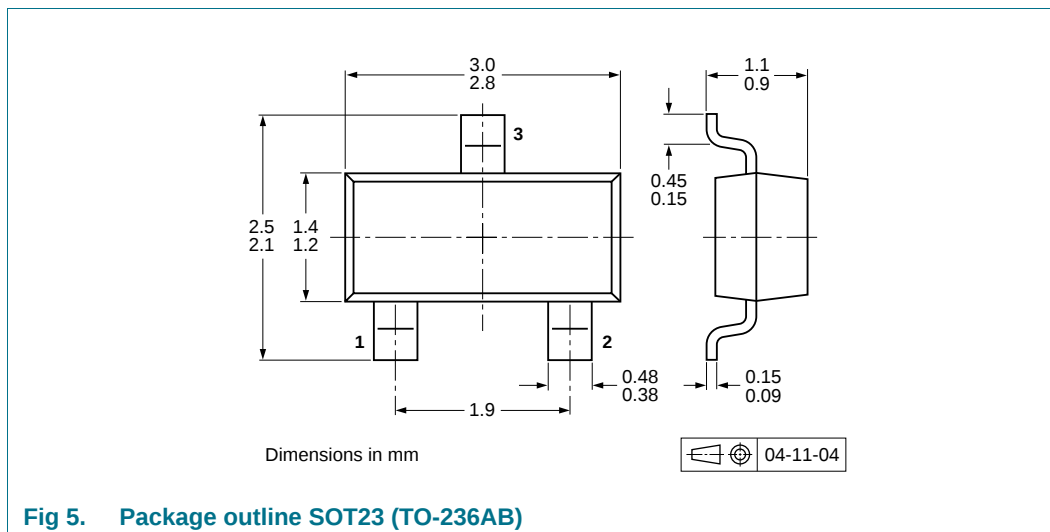
(1) $I_R = 1\text{ mA}$

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.^[1]

Type number	Package	Description	Packing quantity	
			3000	10000
BAT54 series	SOT23	4 mm pitch, 8 mm tape and reel	-215	-235

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

11. Soldering

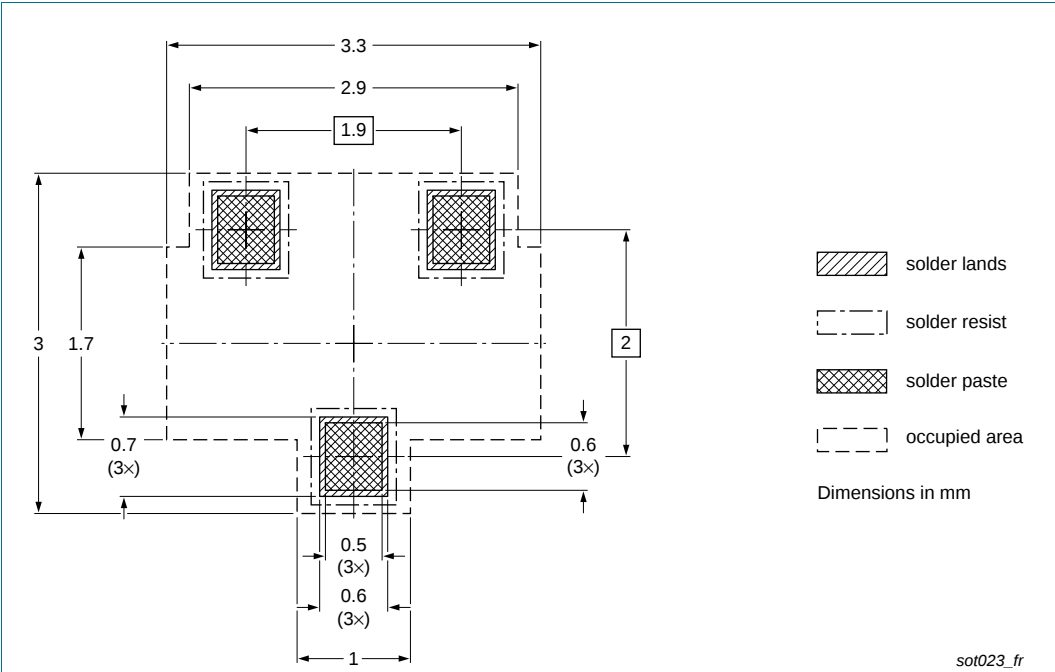


Fig 6. Reflow soldering footprint SOT23 (TO-236AB)

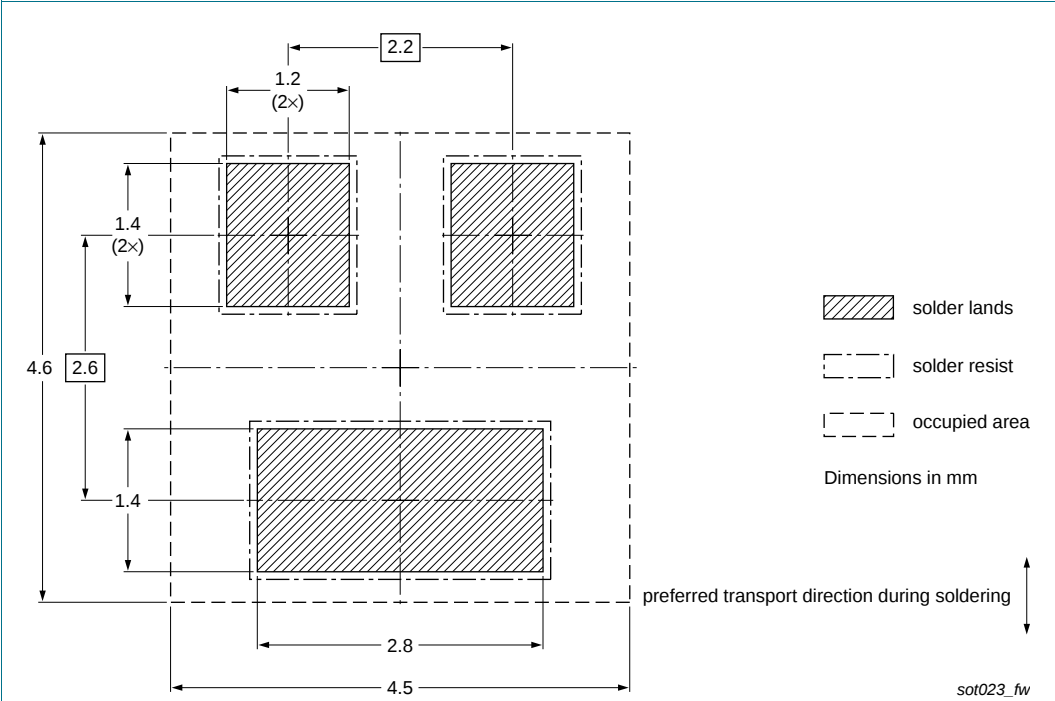


Fig 7. Wave soldering footprint SOT23 (TO-236AB)

12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BAT54_SER v.5	20121005	Product data sheet	-	BAT54_SERIES v.4
Modifications:	• The format of this document has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Section 1: updated • Section 4: updated • Table 5: added ambient temperature T_{amb}, updated total power dissipation P_{tot}, updated junction temperature T_j • Figure 1 to 4: updated • Section 8 "Test information": added • Figure 5: replaced by minimized package outline drawing • Section 10 "Packing information": added • Section 11 "Soldering": added • Section 13 "Legal information": updated			
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	-	-

13. Legal information

13.1 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".

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