



# BAT54S

## Schottky barrier diodes

1 July 2022

Product data sheet

## 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.

## 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; $T_{\text{amb}} = 25 \text{ } ^\circ\text{C}$	-	-	800	mV
$I_R$	reverse current	$V_R = 25 \text{ V}$ ; $t_p \leq 300 \text{ } \mu\text{s}$ ; $\delta \leq 0.02$ ; pulsed; $T_{\text{amb}} = 25 \text{ } ^\circ\text{C}$	-	-	2	$\mu\text{A}$

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode (diode 1)	 SOT23	 006aaa437
2	K2	cathode (diode 2)		
3	K1; A2	cathode 1; anode 2		

## 6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BAT54S	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]
BAT54S	%V4

[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

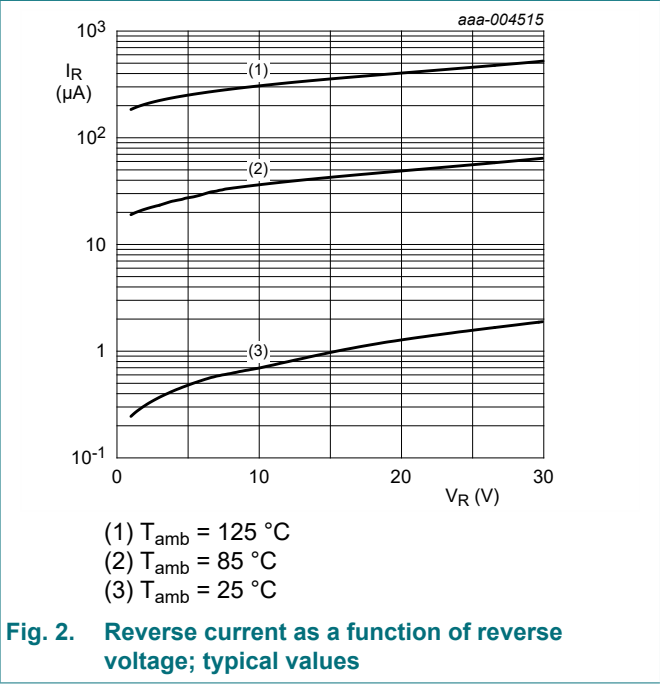
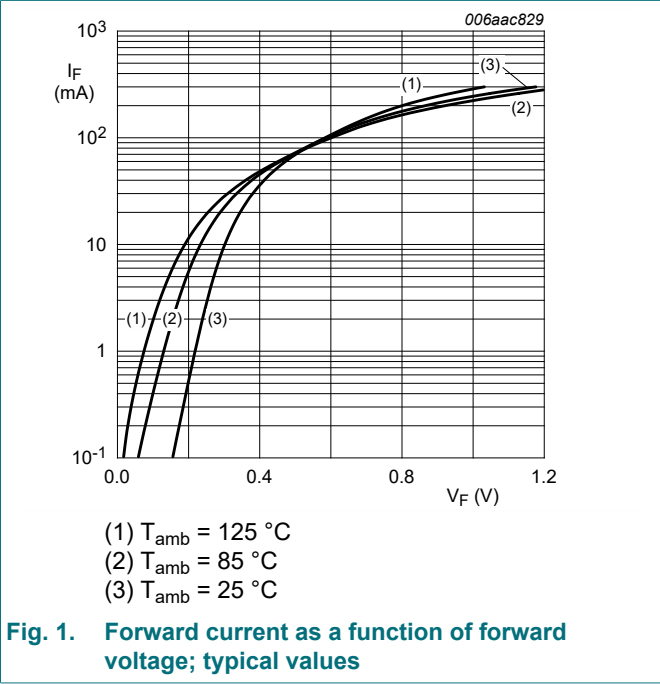
[1] For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses  $P_R$  are a significant part of the total power losses.

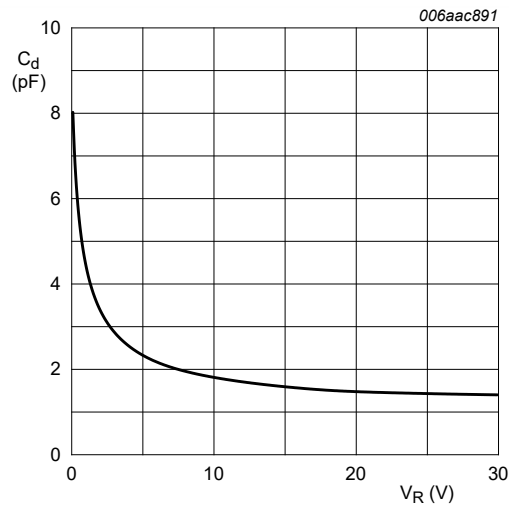
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 0.1 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; pulsed; T <sub>amb</sub> = 25 °C		-	-	240	mV
		I <sub>F</sub> = 1 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; pulsed; T <sub>amb</sub> = 25 °C		-	-	320	mV
		I <sub>F</sub> = 10 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; pulsed; T <sub>amb</sub> = 25 °C		-	-	400	mV
		I <sub>F</sub> = 30 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; pulsed; T <sub>amb</sub> = 25 °C		-	-	500	mV
		I <sub>F</sub> = 100 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; pulsed; T <sub>amb</sub> = 25 °C		-	-	800	mV
I <sub>R</sub>	reverse current	V <sub>R</sub> = 25 V; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; pulsed; T <sub>amb</sub> = 25 °C		-	-	2	μA
C <sub>d</sub>	diode capacitance	V <sub>R</sub> = 1 V; f = 1 MHz; T <sub>amb</sub> = 25 °C		-	-	10	pF
t <sub>rr</sub>	reverse recovery time	I <sub>F</sub> = 10 mA; I <sub>R</sub> = 10 mA; I <sub>R(meas)</sub> = 1 mA; R <sub>L</sub> = 100 Ω; T <sub>amb</sub> = 25 °C		-	-	5	ns

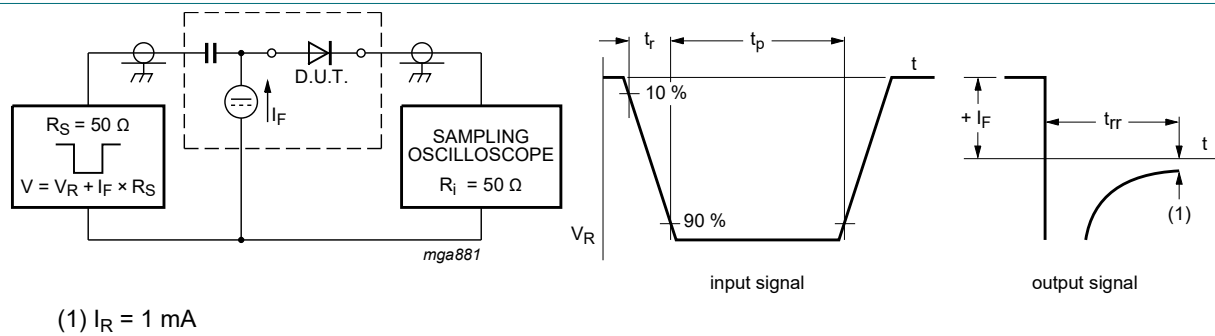




$T_{amb} = 25\text{ }^{\circ}\text{C}$ ;  $f = 1\text{ MHz}$

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

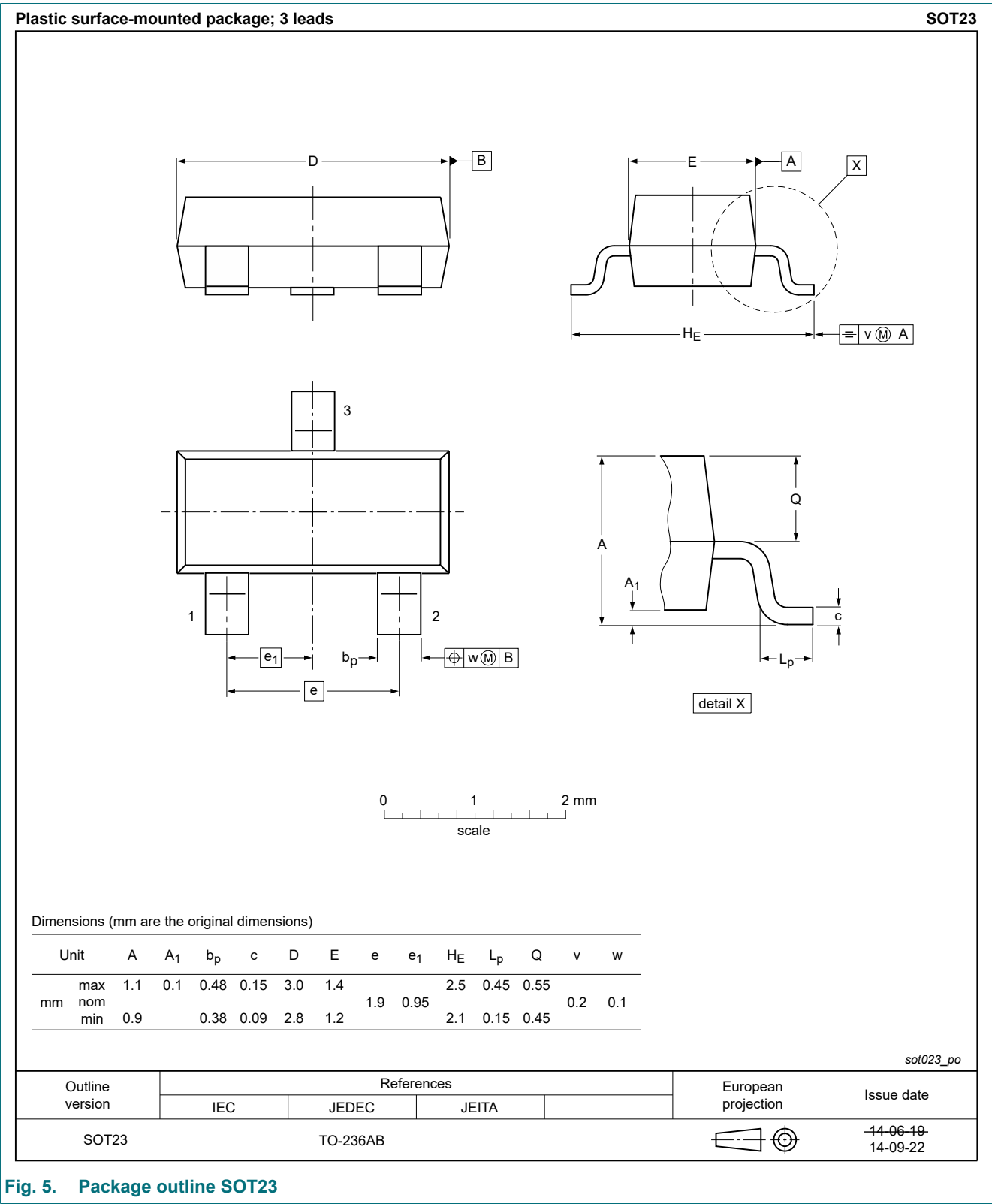


Fig. 5. Package outline SOT23

13. Soldering

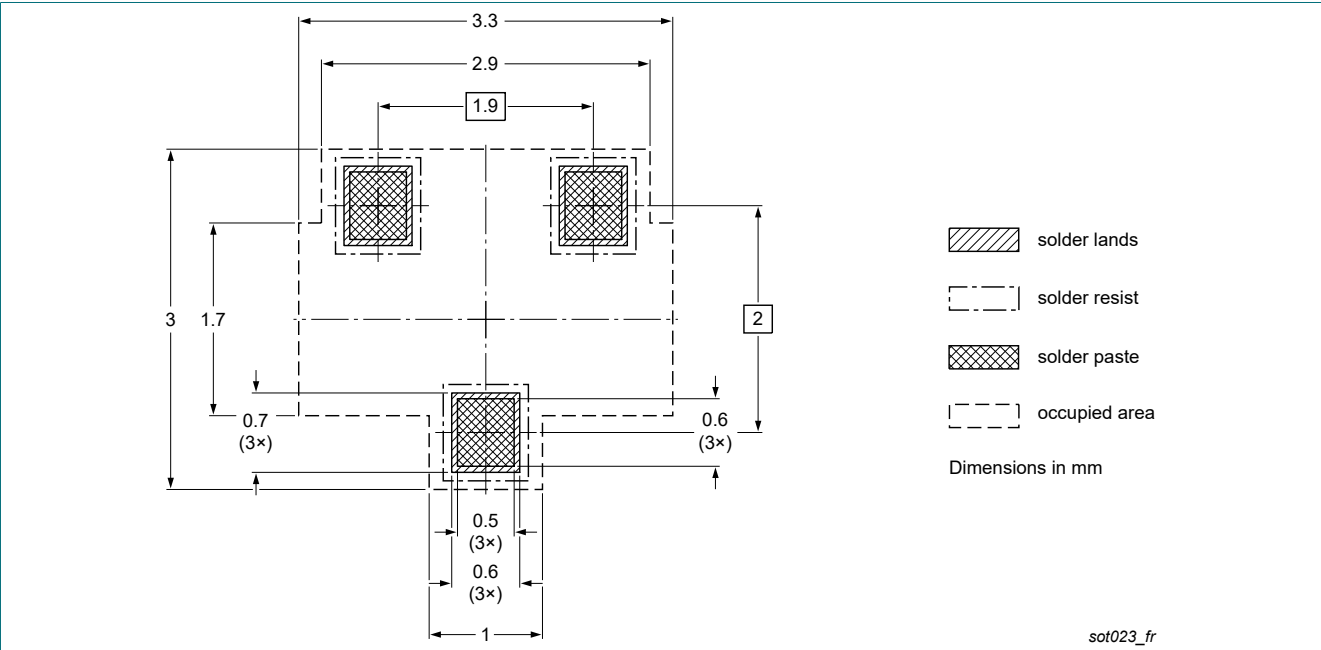


Fig. 6. Reflow soldering footprint for SOT23

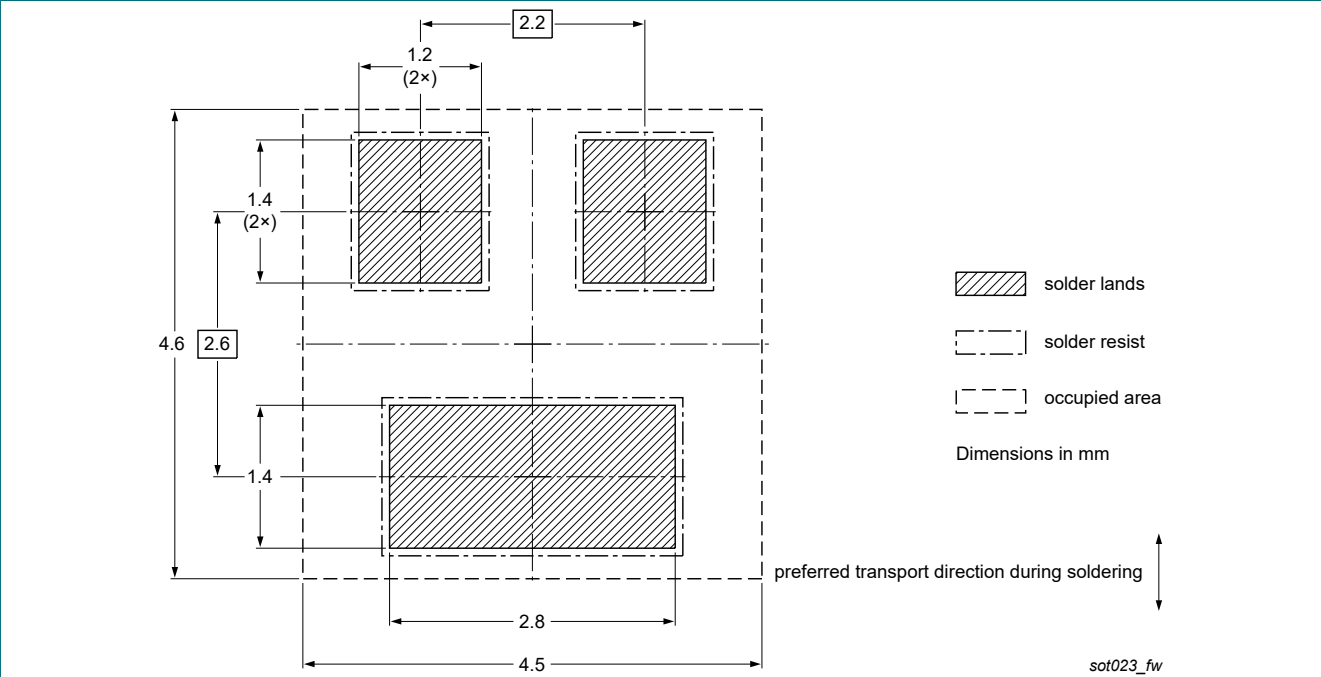


Fig. 7. Wave soldering footprint for SOT23

## 14. Revision history

**Table 8. Revision history**

Data sheet ID	Release date	Data sheet status	Change notice	Supersedes
BAT54S 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 <a href="https://www.nexperia.com">nexperia.com</a> 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".
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## Contents

1. General description.....	1
2. Features and benefits.....	1
3. Applications.....	1
4. Quick reference data.....	1
5. Pinning information.....	1
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values.....	2
9. Thermal characteristics.....	2
10. Characteristics.....	3
11. Test information.....	4
12. Package outline.....	5
13. Soldering.....	6
14. Revision history.....	7
15. Legal information.....	8

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