

# BYQ28X-200

## Dual ultrafast rugged rectifier diode

Rev. 02 — 5 February 2009

Product data sheet

## 1. Product profile

### 1.1 General description

Dual ultrafast epitaxial rectifier diodes in a SOT186A (TO-220F) isolated plastic package.

### 1.2 Features and benefits

- Fast switching
- Guaranteed ESD capability
- High thermal cycling performance
- Low on-state losses
- Soft recovery minimizes power-consuming oscillations

### 1.3 Applications

- Output rectifiers in high-frequency switched-mode power supplies

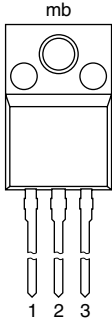
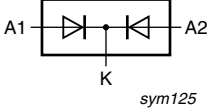
### 1.4 Quick reference data

Table 1. Quick reference

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	-	200	V
$I_{O(AV)}$	average output current	SQW; $\delta = 0.5$ ; $T_h \leq 92$ °C; both diodes conducting; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	-	10	A
$I_{FRM}$	repetitive peak forward current	SQW; $\delta = 0.5$ ; $t_p = 25$ $\mu$ s; $T_h \leq 92$ °C; per diode	-	-	10	A
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 100$ A/ $\mu$ s; $T_j = 25$ °C; ramp recovery; see <a href="#">Figure 5</a>	-	15	25	ns
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 5$ A; $T_j = 150$ °C; see <a href="#">Figure 4</a>	-	0.8	0.895	V
<b>Electrostatic discharge</b>						
$V_{ESD}$	electrostatic discharge voltage	HBM; C = 250 pF; R = 1.5 k $\Omega$ ; all pins	-	-	8	kV

## 2. Pinning information

**Table 2. Pinning information**

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1	 <p style="text-align: center;"><b>SOT186A (TO-220F)</b></p>	
2	K	cathode		
3	A2	anode 2		
mb	n.c.	mounting base; isolated		

## 3. Ordering information

**Table 3. Ordering information**

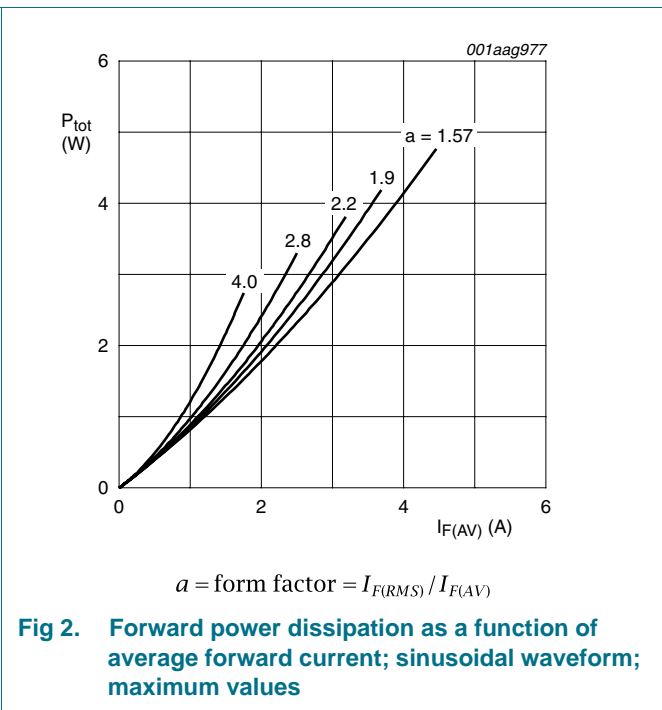
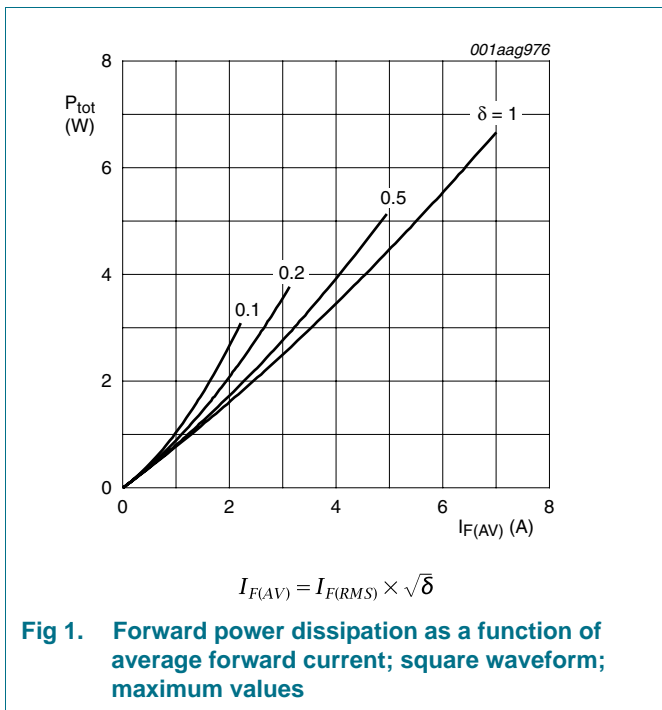
Type number	Package		Version
	Name	Description	
BYQ28X-200	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 3-lead TO-220 "full pack"	SOT186A

### 4. Limiting values

**Table 4. Limiting values**

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

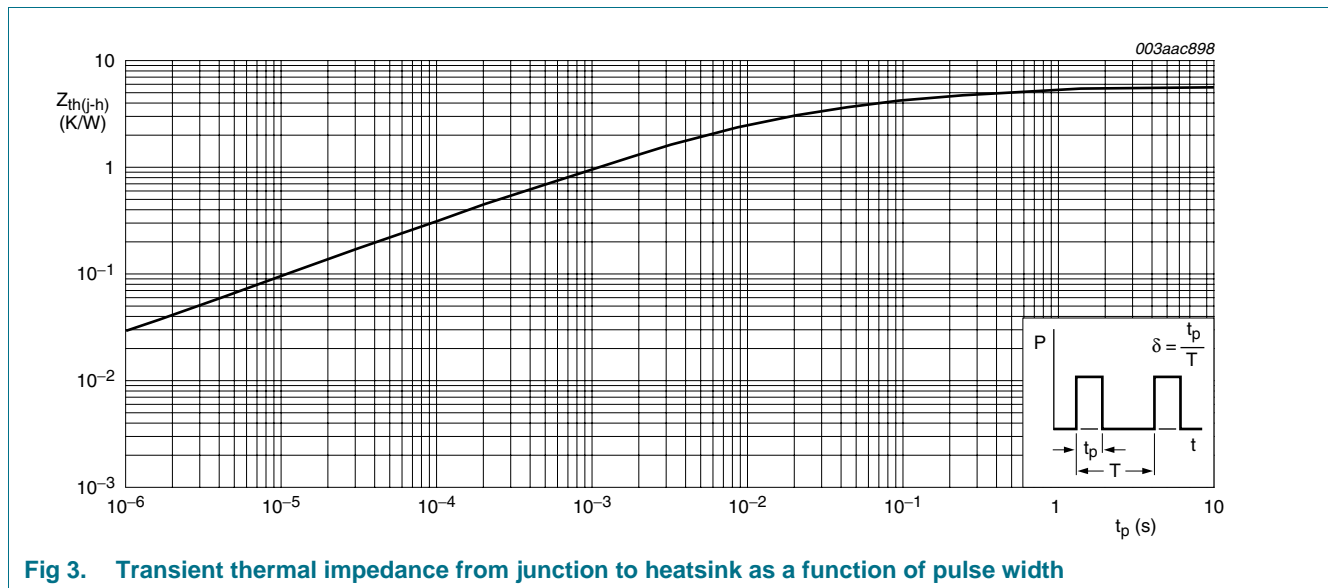
Symbol	Parameter	Conditions	Min	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	200	V
$V_{RWM}$	crest working reverse voltage		-	200	V
$V_R$	reverse voltage	DC	-	200	V
$I_{O(AV)}$	average output current	SQW; $\delta = 0.5$ ; $T_h \leq 92\text{ }^\circ\text{C}$ ; both diodes conducting; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	10	A
$I_{FRM}$	repetitive peak forward current	SQW; $\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_h \leq 92\text{ }^\circ\text{C}$ ; per diode	-	10	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\text{ ms}$ ; SIN; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; per diode	-	50	A
		$t_p = 8.3\text{ ms}$ ; SIN; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; per diode	-	55	A
$I_{RRM}$	repetitive peak reverse current	$t_p = 2\text{ }\mu\text{s}$ ; $\delta = 0.001$	-	0.2	A
$I_{RSM}$	non-repetitive peak reverse current	$t_p = 100\text{ }\mu\text{s}$	-	0.2	A
$T_{stg}$	storage temperature		-40	150	$^\circ\text{C}$
$T_j$	junction temperature		-	150	$^\circ\text{C}$
<b>Electrostatic discharge</b>					
$V_{ESD}$	electrostatic discharge voltage	HBM; C = 250 pF; R = 1.5 k $\Omega$ ; all pins	-	8	kV



## 5. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; see <a href="#">Figure 3</a>	-	-	5.7	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air		-	55	-	K/W



**Fig 3. Transient thermal impedance from junction to heatsink as a function of pulse width**

## 6. Isolation characteristics

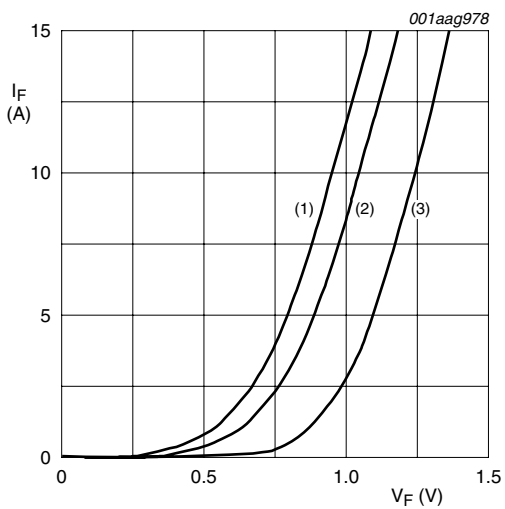
**Table 6. Isolation characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	50 Hz < f < 60 Hz; sinusoidal waveform; relative humidity < 65 %; clean and dust free; from all terminals to external heatsink	-	-	2500	V
$C_{isol}$	isolation capacitance	from cathode to external heatsink; f = 1 MHz	-	10	-	pF

## 7. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 10\text{ A}; T_j = 25\text{ °C}$	-	1.1	1.25	V
		$I_F = 5\text{ A}; T_j = 150\text{ °C}$ ; see <a href="#">Figure 4</a>	-	0.8	0.895	V
		$I_F = 5\text{ A}; T_j = 25\text{ °C}$	-	0.95	1.1	V
$I_R$	reverse current	$V_R = 200\text{ V}; T_j = 25\text{ °C}$	-	2	10	$\mu\text{A}$
		$V_R = 200\text{ V}; T_j = 100\text{ °C}$	-	0.1	0.2	mA
<b>Dynamic characteristics</b>						
$Q_r$	recovered charge	$I_F = 2\text{ A}; V_R = 30\text{ V}; dI_F/dt = 20\text{ A}/\mu\text{s}; T_j = 25\text{ °C}$	-	4	9	$\mu\text{C}$
$t_{rr}$	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 100\text{ A}/\mu\text{s};$ ramp recovery; $T_j = 25\text{ °C}$ ; see <a href="#">Figure 5</a>	-	15	25	ns
		$I_F = 0.5\text{ A}; I_R = 1\text{ A}$ ; step recovery; measured at $I_R = 0.25\text{ A}; T_j = 25\text{ °C}$ ; see <a href="#">Figure 6</a>	-	-	20	ns
$I_{RM}$	peak reverse recovery current	$I_F = 5\text{ A}; V_R \geq 30\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s}; T_j = 25\text{ °C}$ ; see <a href="#">Figure 5</a>	-	0.5	0.7	A
$V_{FRM}$	peak forward recovery voltage	$I_F = 1\text{ A}; dI_F/dt = 10\text{ A}/\mu\text{s}; T_j = 25\text{ °C}$ ; see <a href="#">Figure 7</a>	-	1	-	V



- (1)  $T_j = 150\text{ °C}$ ; typical values
- (2)  $T_j = 150\text{ °C}$ ; maximum values
- (3)  $T_j = 25\text{ °C}$ ; maximum values

Fig 4. Forward current as a function of forward voltage

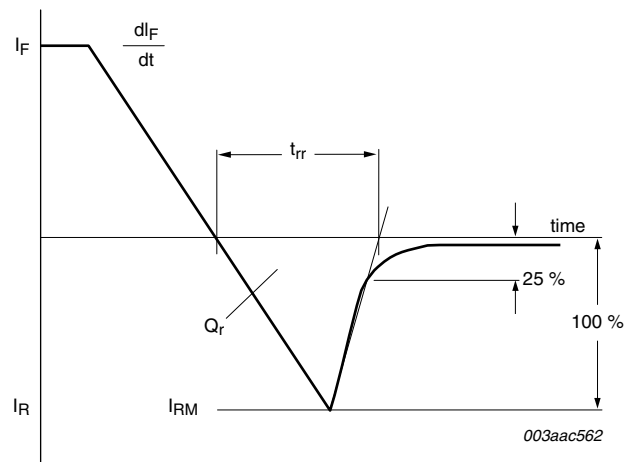


Fig 5. Reverse recovery definitions; ramp recovery

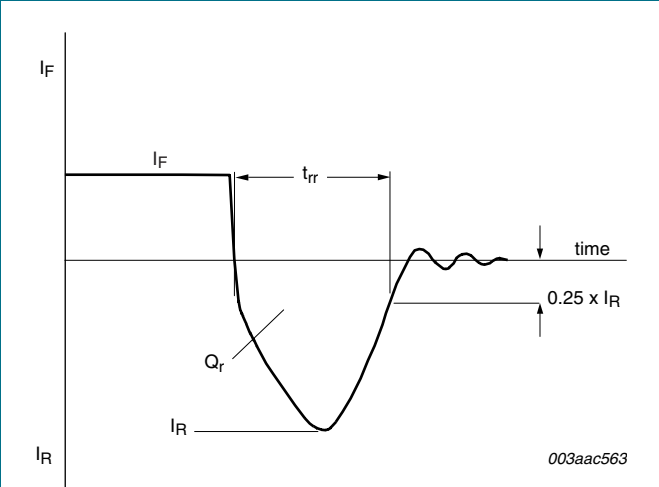


Fig 6. Reverse recovery definitions; step recovery

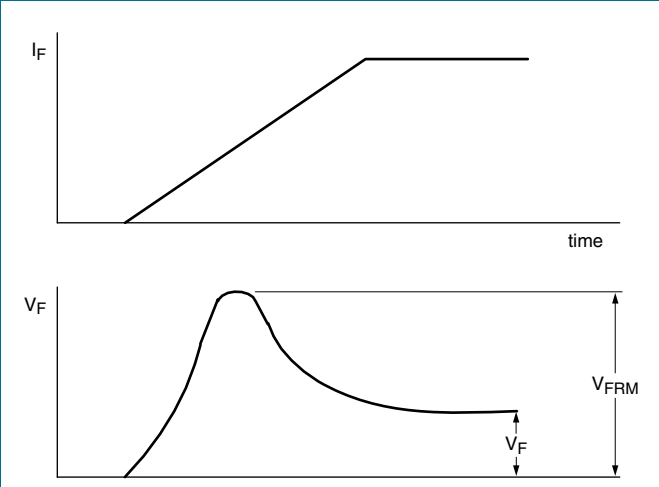


Fig 7. Forward recovery definitions

### 8. Package outline

Plastic single-ended package; isolated heatsink mounted;  
1 mounting hole; 3-lead TO-220 'full pack'

SOT186A

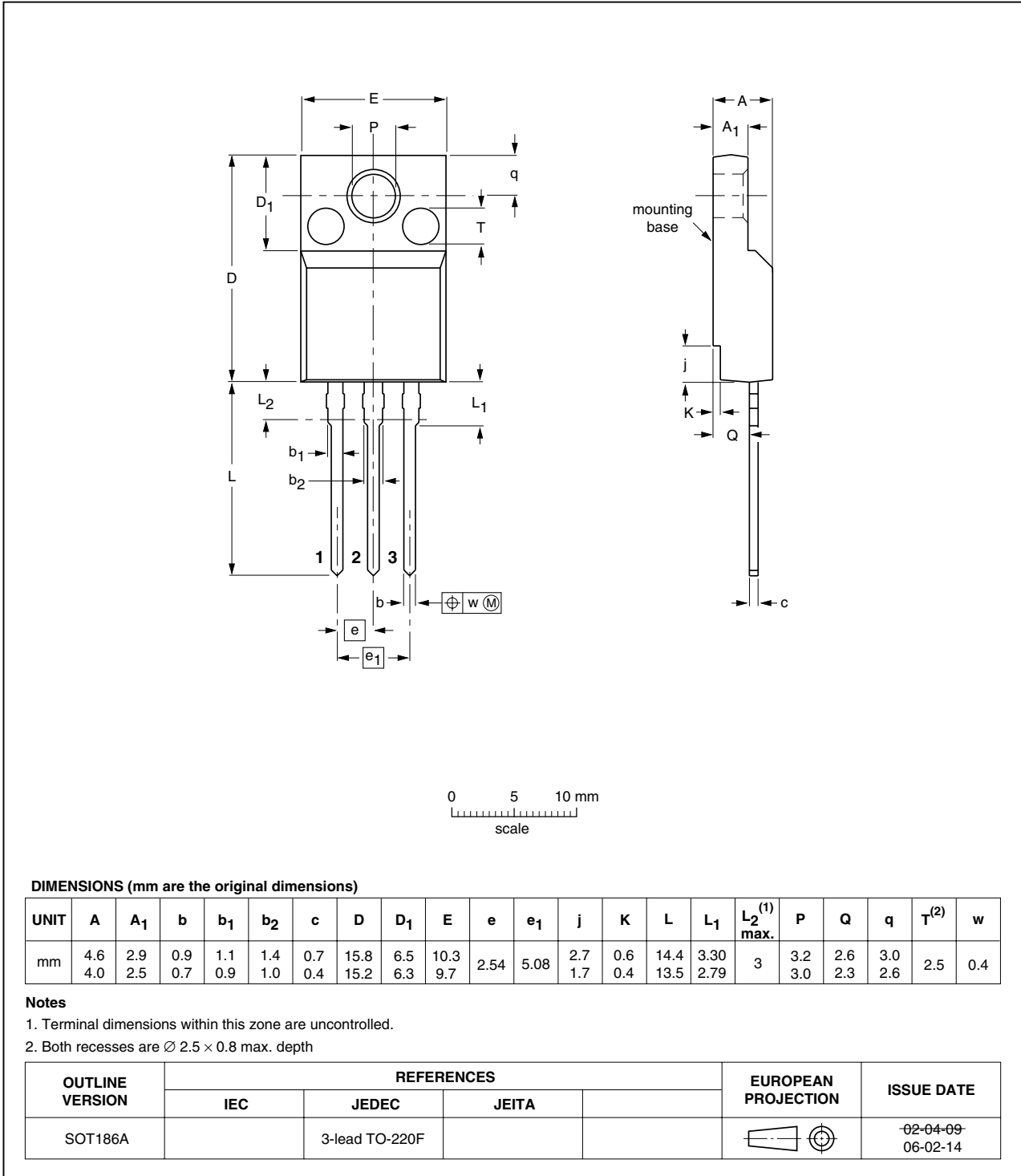


Fig 8. Package outline SOT186A (TO-220F)

## 9. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYQ28X-200_2	20090205	Product data sheet	-	BYQ28X_SERIES_1
Modifications:				
				<ul style="list-style-type: none"><li>• The format of this data sheet 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>• Type number BYQ28X-200 separated from data sheet BYQ28X_SERIES_1.</li></ul>
BYQ28X_SERIES_1	19960801	Product data sheet	-	-

## 10. Legal information

### 10.1 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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## 12. Contents

- 1 Product profile . . . . .1**
- 1.1 General description . . . . .1
- 1.2 Features and benefits . . . . .1
- 1.3 Applications . . . . .1
- 1.4 Quick reference data . . . . .1
- 2 Pinning information . . . . .2**
- 3 Ordering information . . . . .2**
- 4 Limiting values . . . . .3**
- 5 Thermal characteristics . . . . .4**
- 6 Isolation characteristics . . . . .4**
- 7 Characteristics . . . . .5**
- 8 Package outline . . . . .7**
- 9 Revision history . . . . .8**
- 10 Legal information . . . . .9**
- 10.1 Data sheet status . . . . .9
- 10.2 Definitions . . . . .9
- 10.3 Disclaimers . . . . .9
- 10.4 Trademarks . . . . .9
- 11 Contact information . . . . .9**

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