

## 1. General description

Enhanced ultrafast power diode in a TO252 (DPAK) plastic package.

## 2. Features and benefits

- High thermal cycling performance
- Soft recovery characteristic
- Low on-state losses
- Surface-mountable package
- Low thermal resistance
- Enhanced avalanche energy capability

## 3. Applications

- Dual Mode (DCM and CCM) PFC
- Power Factor Correction (PFC) for Interleaved Topology

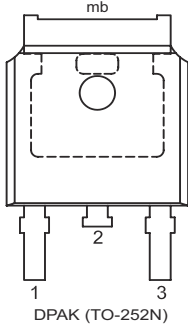

## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
<b>Absolute maximum rating</b>						
$V_{RRM}$	repetitive peak reverse voltage		600			V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 151$ °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	5			A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25$ $\mu$ s; $T_{mb} \leq 151$ °C; square-wave pulse	10			A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; <a href="#">Fig. 4</a>	70			A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse;	80			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 5$ A; $T_j = 25$ °C; <a href="#">Fig. 6</a>	-	1.35	1.8	V
		$I_F = 5$ A; $T_j = 150$ °C; <a href="#">Fig. 6</a>	-	-	1.45	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 50$ A/ $\mu$ s; $T_j = 25$ °C; <a href="#">Fig. 7</a>	-	38	50	ns
		$I_F = 5$ A; $V_R = 200$ V; $dI_F/dt = 200$ A/ $\mu$ s; $T_j = 25$ °C; <a href="#">Fig. 7</a>	-	39	-	ns
		$I_F = 5$ A; $V_R = 200$ V; $dI_F/dt = 200$ A/ $\mu$ s; $T_j = 125$ °C; <a href="#">Fig. 7</a>	-	62	-	ns

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	not connected	 <p style="text-align: center;">DPAK (TO-252N)</p>	
2	K	cathode <sup>[1]</sup>		
3	A	anode		
mb	mb	mounting base; connected to cathod		

[1] It is not possible to connect to pin 2 of the TO-252 package.

## 6. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
BYV5ED-600P	DPAK	plastic single-ended surface-mounted package (DPAK); 3-leads (one lead cropped)	TO252N

## 7. Marking

Table 4. Marking codes

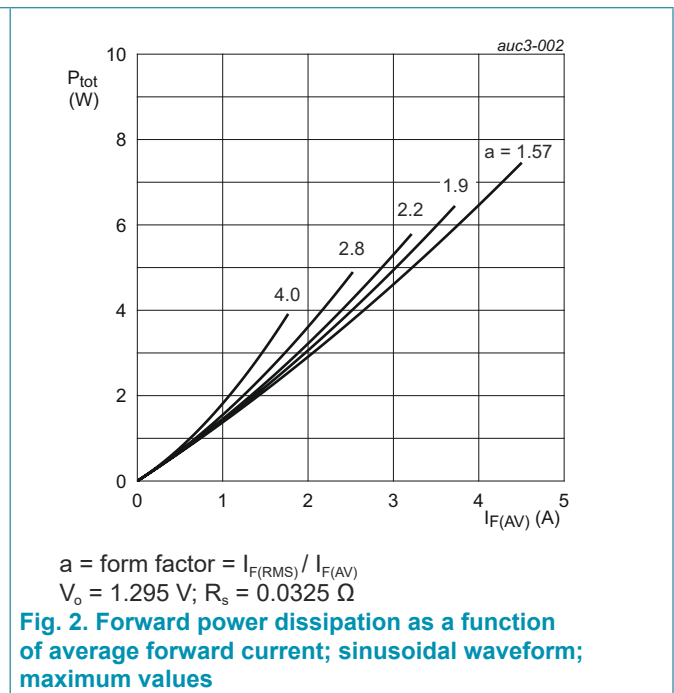
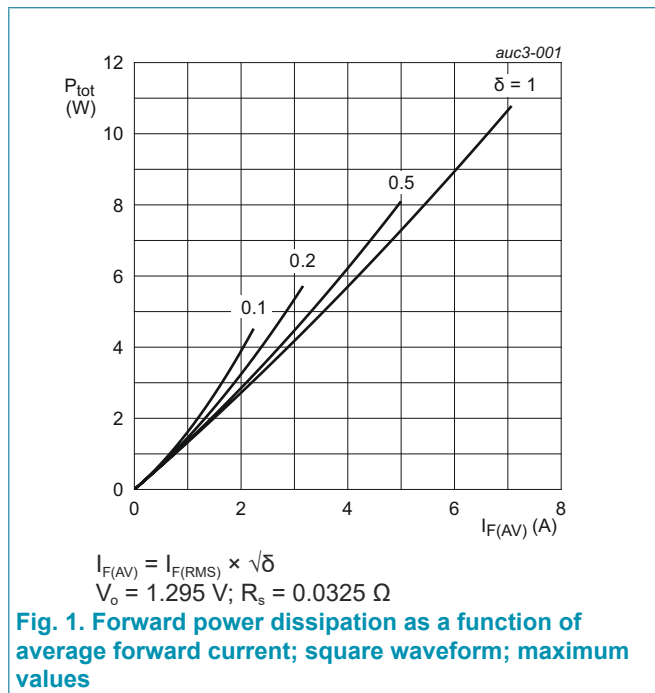
Type number	Marking codes
BYV5ED-600P	BYV5ED-600P

## 8. Limiting values

**Table 5. Limiting values**

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

Symbol	Parameter	Conditions	Values	Unit
$V_{RRM}$	repetitive peak reverse voltage		600	V
$V_{RWM}$	crest working reverse voltage		600	V
$V_R$	reverse voltage	DC	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 151\text{ }^\circ\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	5	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 151\text{ }^\circ\text{C}$ ; square-wave pulse	10	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; sine-wave pulse; <a href="#">Fig. 4</a>	70	A
		$t_p = 8.3\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; sine-wave pulse;	80	A
$T_{stg}$	storage temperature		-40 to 175	$^\circ\text{C}$
$T_j$	junction temperature		175	$^\circ\text{C}$



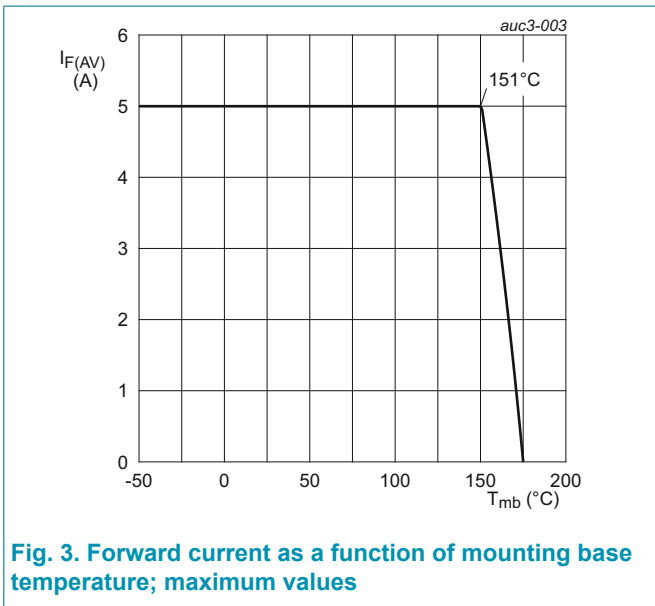


Fig. 3. Forward current as a function of mounting base temperature; maximum values

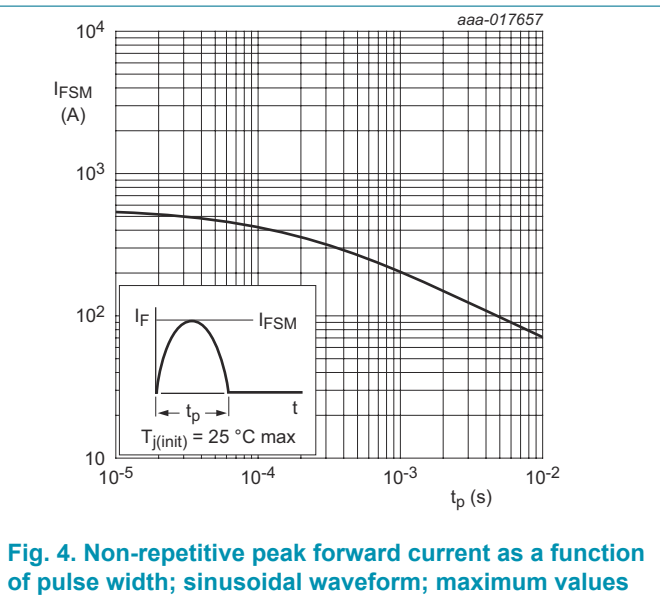


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

## 9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	With heatsink compound; <a href="#">Fig. 5</a>	-	-	3	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	50	-	K/W

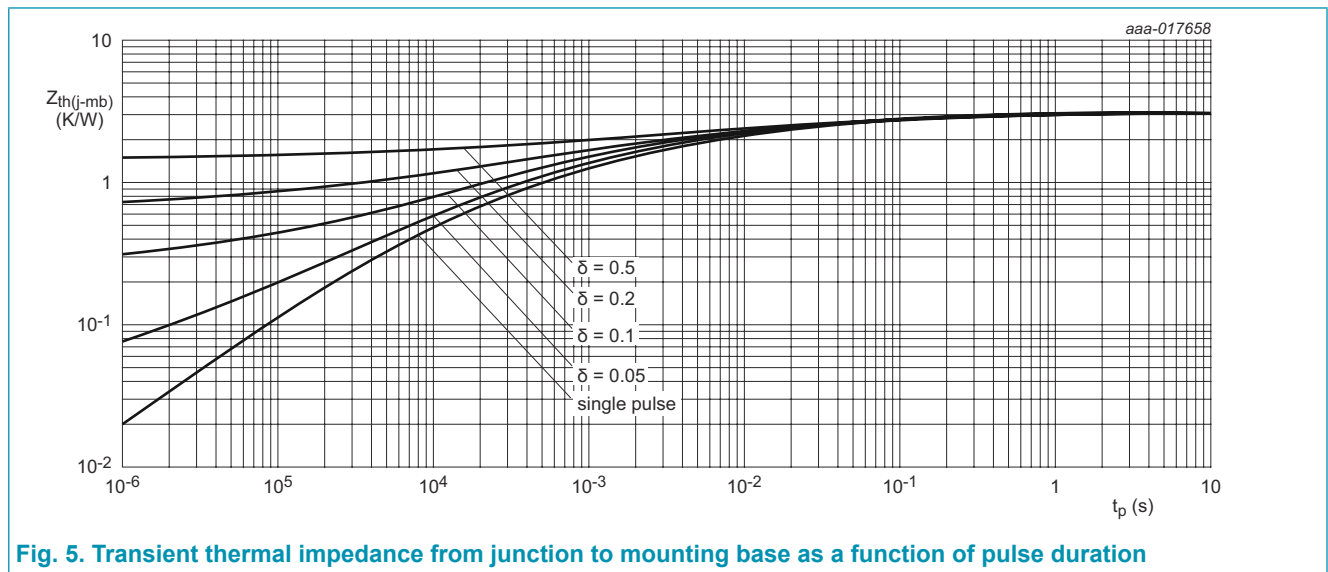
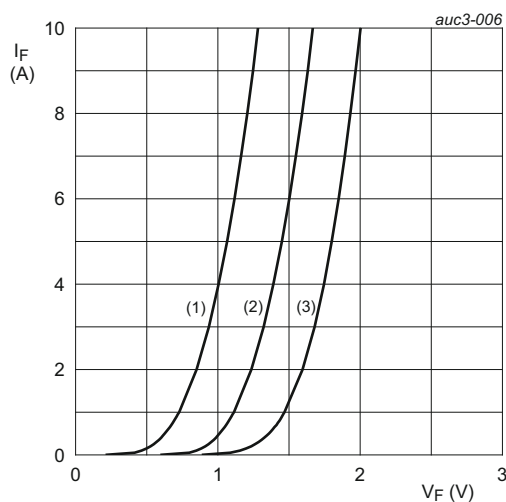


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

### 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward current	$I_F = 5 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 6}$	-	1.35	1.8	V
		$I_F = 5 \text{ A}; T_j = 150 \text{ }^\circ\text{C}; \text{ Fig. 6}$	-	-	1.6	V
$I_R$	reverse current	$V_R = 600 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	-	10	$\mu\text{A}$
		$V_R = 600 \text{ V}; T_j = 150 \text{ }^\circ\text{C}$	-	-	500	$\mu\text{A}$
<b>Dynamic characteristics</b>						
$Q_r$	reverse charge	$I_F = 5 \text{ A}; V_R = 200 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$	-	98	-	nC
		$I_F = 5 \text{ A}; V_R = 200 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 125 \text{ }^\circ\text{C}; \text{ Fig. 7}$	-	245	-	nC
$t_{rr}$	reverse recovery time	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 50 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$	-	38	50	ns
		$I_F = 5 \text{ A}; V_R = 200 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$	-	39	-	ns
		$I_F = 5 \text{ A}; V_R = 200 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 125 \text{ }^\circ\text{C}; \text{ Fig. 7}$	-	62	-	ns
$I_{RM}$	peak reverse recovery current	$I_F = 5 \text{ A}; V_R = 200 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$	-	4.5	-	A
		$I_F = 5 \text{ A}; V_R = 200 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 125 \text{ }^\circ\text{C}; \text{ Fig. 7}$	-	7.2	-	A
$E_{as}$	non-repetitive avalanche energy	$I_R = 1.2 \text{ A}; T_{j(\text{init})} = 25 \text{ }^\circ\text{C}; L = 15 \text{ mH}$	10.8	-	-	mJ



$V_o = 1.295 \text{ V}; R_s = 0.0325 \text{ } \Omega$   
 (1)  $T_j = 150 \text{ }^\circ\text{C};$  typical values  
 (2)  $T_j = 150 \text{ }^\circ\text{C};$  maximum values  
 (3)  $T_j = 25 \text{ }^\circ\text{C};$  maximum values

Fig. 6. Forward current as a function of forward voltage

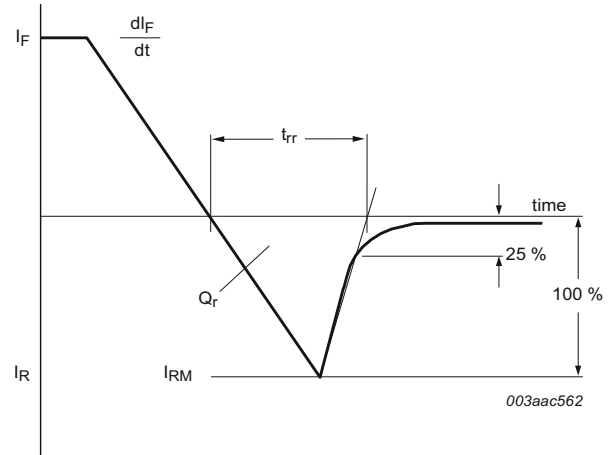
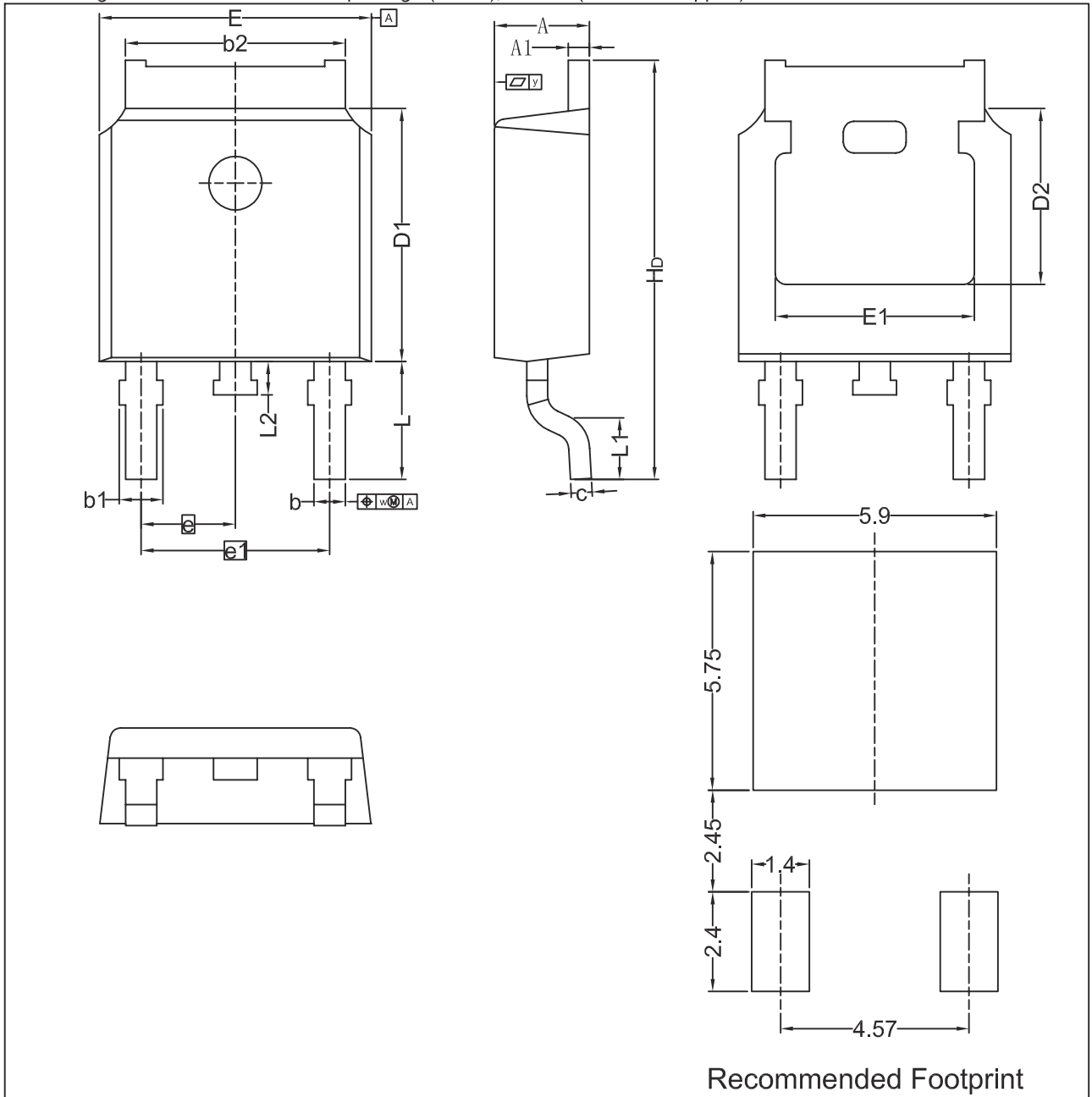


Fig. 7. Reverse recovery definitions; ramp recovery

### 11. Package outline

Plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)

TO252



Recommended Footprint

Unit	A	A1	b	b1	b2	c	D1	D2	E	E1	e	e1	H <sub>D</sub>	L	L1	L2	w	y
min	2.22	0.46	0.71	0.72	5.00	0.20	5.98	4.00	6.47	4.45	2.285	4.57	9.60	2.90 (Ref.)	0.50	0.50	0.20	
nom																		
max	2.38	0.93	0.89	1.10	5.46	0.56	6.22	---	6.73	---			10.40	---	0.90			0.20

Fig. 8. Package outline DPAK (TO252N)

## 12. Legal information

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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## 13. Contents

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

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