

BYR29X-800

Ultrafast power diode

Rev. 01 — 12 July 2010

Product data sheet

1. Product profile

1.1 General description

Ultrafast power diode in a SOD113 (2-lead TO-220F) plastic package.

1.2 Features and benefits

- Fast switching
- Isolated plastic package
- Low forward voltage drop
- Soft recovery characteristic

1.3 Applications

- Discontinuous Current Mode (DCM) Power Factor Correction (PFC)
- High frequency switched-mode power supplies

1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	-	800	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$; $T_h \leq 73$ °C; see Figure 1 ; see Figure 2 ; see Figure 3	-	-	8	A
I_{FSM}	non-repetitive peak forward current	$T_{j(init)} = 25$ °C; $t_p = 10$ ms; sine-wave pulse	-	-	60	A
Static characteristics						
V_F	forward voltage	$I_F = 8$ A; $T_j = 150$ °C; see Figure 5	-	1.07	1.5	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 100$ A/ μ s; $T_j = 25$ °C; see Figure 8 ; see Figure 7	-	60	75	ns

[1] Neglecting switching and reverse current losses



2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		
2	A	anode		
mb	n.c.	mounting base; isolated		

SOD113 (TO-220F)

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BYR29X-800	TO-220F	plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack"	SOD113

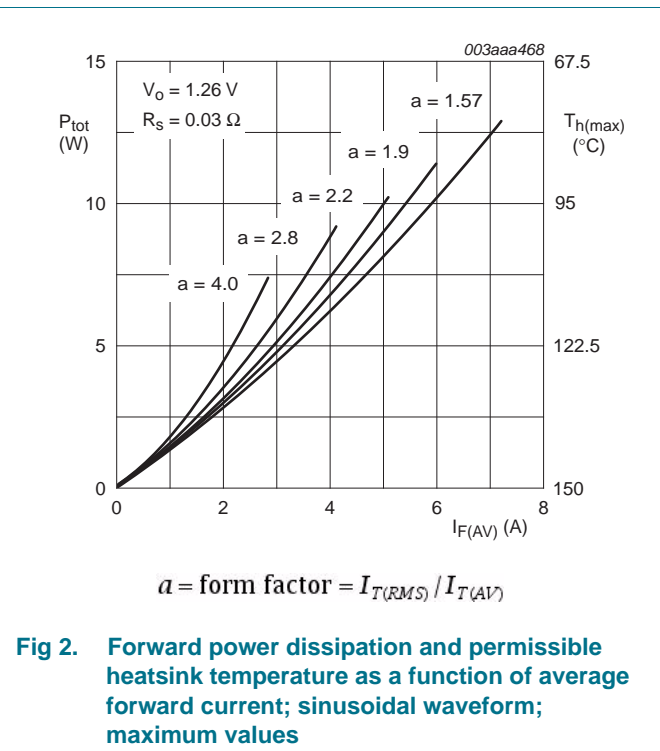
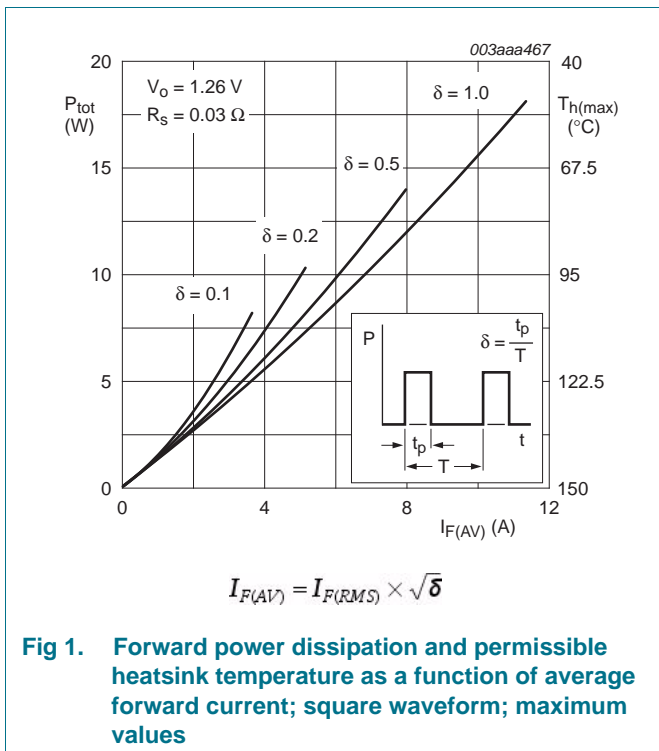
4. Limiting values

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		-	800	V
V_{RWM}	crest working reverse voltage		-	800	V
V_R	reverse voltage	$T_h \leq 136\text{ }^\circ\text{C}$; DC	-	800	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$; [1] $T_h \leq 73\text{ }^\circ\text{C}$; see Figure 1 ; see Figure 2 ; see Figure 3	-	8	A
I_{FRM}	repetitive peak forward current	square-wave pulse; $\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_h \leq 73\text{ }^\circ\text{C}$	-	16	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ ms}$; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ $t_p = 8.3\text{ ms}$; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$	-	60 66	A
T_{stg}	storage temperature		-40	150	$^\circ\text{C}$
T_j	junction temperature		-	150	$^\circ\text{C}$

[1] Neglecting switching and reverse current losses



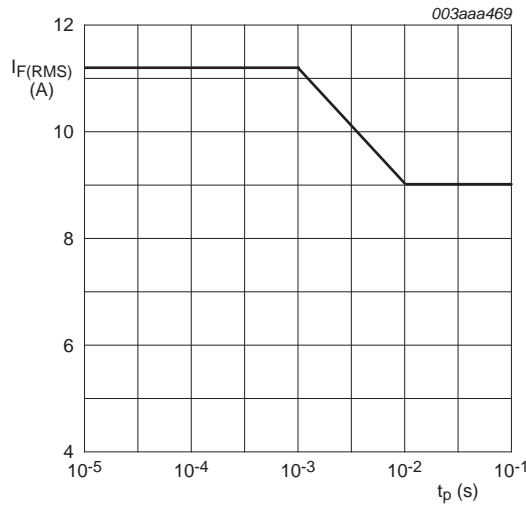


Fig 3. Forward RMS current as a function of pulse width; maximum values

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 Figure 4	-	-	5.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	55	-	K/W

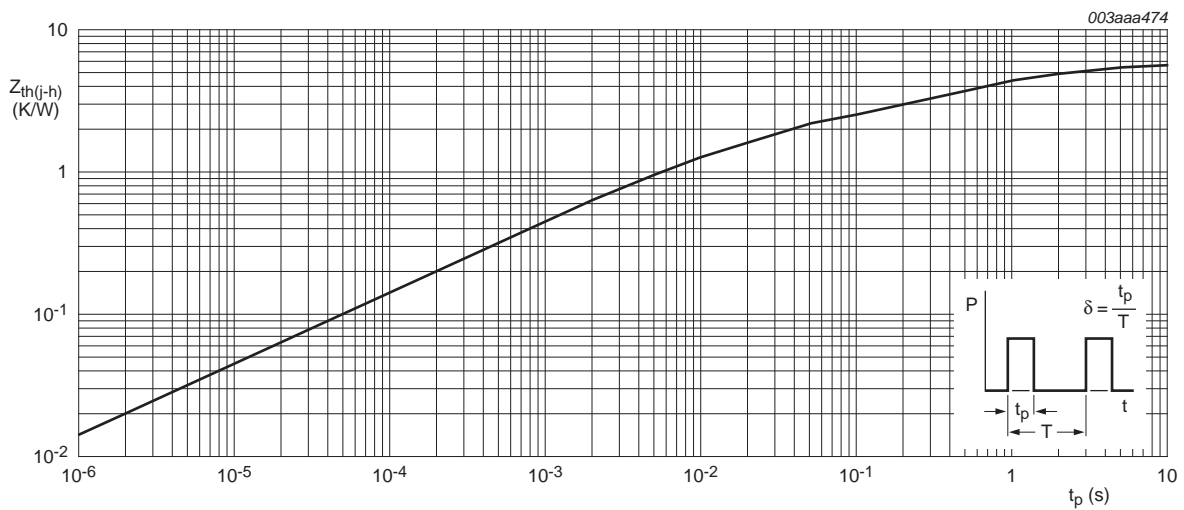


Fig 4. Transient thermal impedance from junction to heatsink as a function of pulse width

6. Isolation characteristics

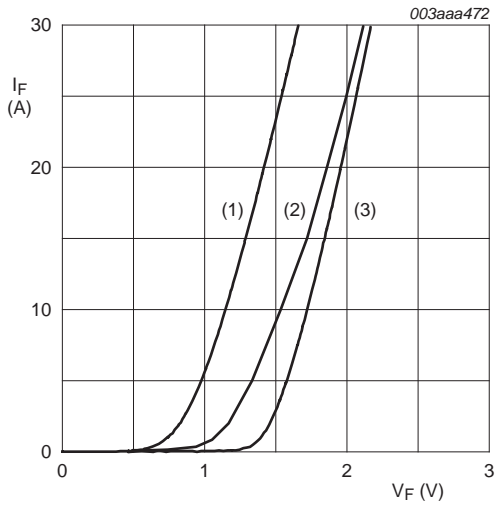
Table 6. Isolation characteristics

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

7. Characteristics

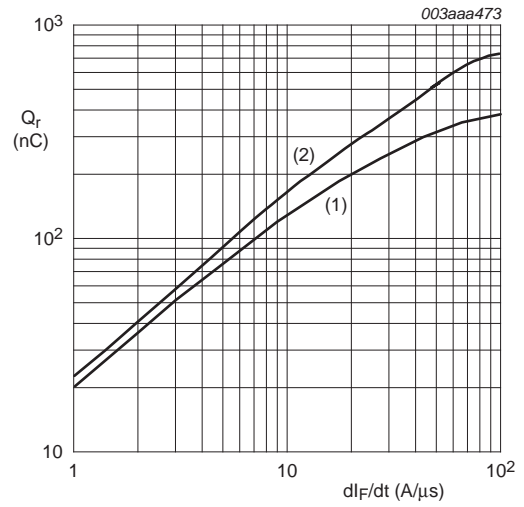
Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 8$ A; $T_j = 150$ °C; see Figure 5	-	1.07	1.5	V
		$I_F = 20$ A; $T_j = 25$ °C; see Figure 5	-	1.75	1.95	V
		$I_F = 8$ A; $T_j = 25$ °C; see Figure 5	-	-	1.7	V
I_R	reverse current	$V_R = 800$ V; $T_j = 25$ °C	-	1	10	μ A
		$V_R = 800$ V; $T_j = 100$ °C	-	0.1	0.2	mA
Dynamic characteristics						
Q_r	recovered charge	$I_F = 2$ A; $V_R = 30$ V; $di_F/dt = 20$ A/s; $T_j = 25$ °C; see Figure 6 ; see Figure 7	-	150	200	nC
t_{rr}	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 100$ A/ μ s; $T_j = 25$ °C; see Figure 8 ; see Figure 7	-	60	75	ns
I_{RM}	peak reverse recovery current	$I_F = 10$ A; $V_R = 30$ V; $di_F/dt = 50$ A/ μ s; $T_j = 100$ °C; see Figure 9 ; see Figure 7	-	-	6	A
V_{FR}	forward recovery voltage	$I_F = 10$ A; $di_F/dt = 10$ A/ μ s; $T_j = 25$ °C; see Figure 10	-	5	-	V



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

Fig 5. Forward current as a function of forward voltage



(1) $I_F = 2\text{ A}$ (2) $I_F = 10\text{ A}$

Fig 6. Recovered charge as a function of rate of change of forward current

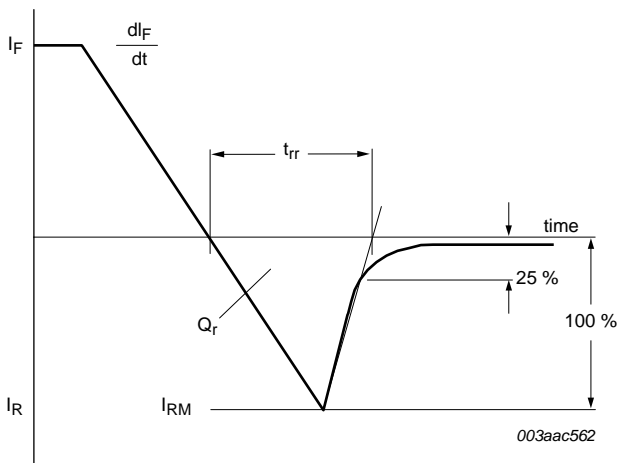
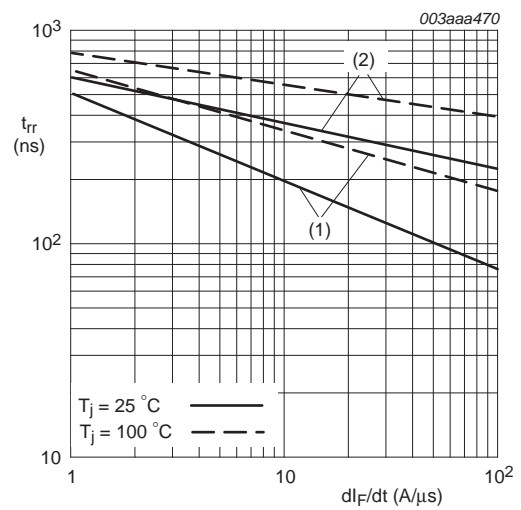


Fig 7. Reverse recovery definitions; ramp recovery



(1) $I_F = 1\text{ A}$ (2) $I_F = 10\text{ A}$

Fig 8. Reverse recovery time as a function of rate of change of forward current at indicated temperatures; maximum values

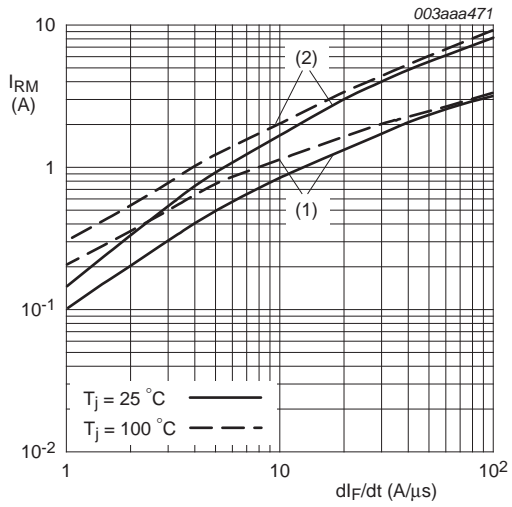


Fig 9. Peak reverse recovery current as a function of rate of change of forward current at indicated temperatures

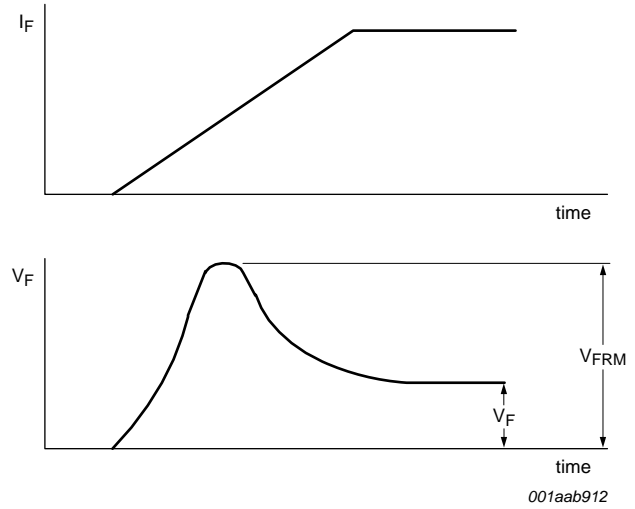


Fig 10. Forward recovery definitions

8. Package outline

Plastic single-ended package; isolated heatsink mounted;
1 mounting hole; 2-lead TO-220 'full pack'

SOD113

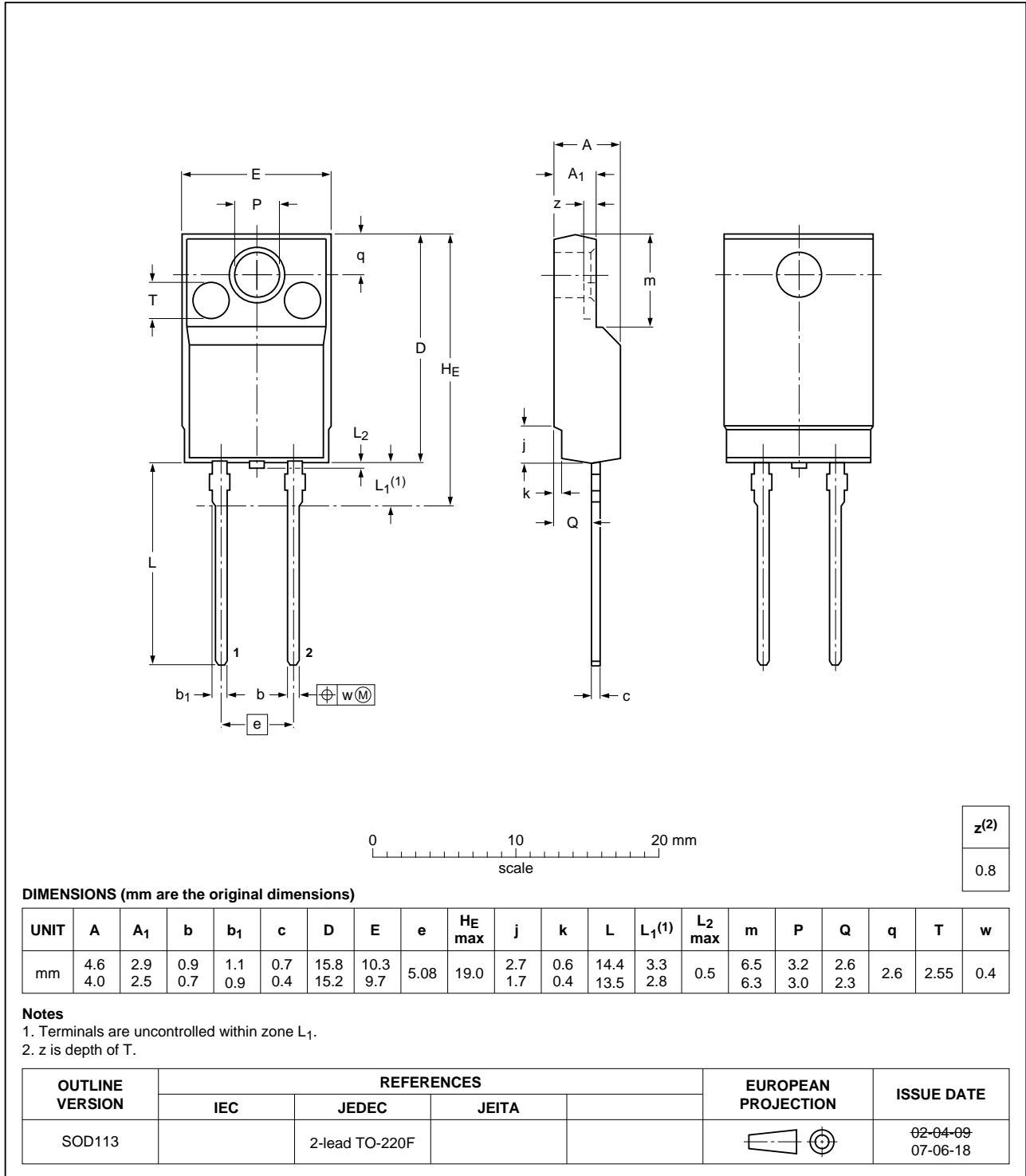


Fig 11. Package outline SOD113 (TO-220F)

9. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYR29X-800 v.1	20100712	Product data sheet	-	-

10. Legal information

10.1 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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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	5
7	Characteristics	5
8	Package outline	8
9	Revision history	9
10	Legal information	10
10.1	Data sheet status	10
10.2	Definitions	10
10.3	Disclaimers	10
10.4	Trademarks	11
11	Contact information	11

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Date of release: 12 July 2010

Document identifier: BYR29X-800