



# BYV29B-500

Ultrafast power diode

Rev. 2 — 3 April 2012

Product data sheet

## 1. Product profile

### 1.1 General description

Ultrafast power diode in a SOT404 (D2PAK) surface-mountable plastic package.

### 1.2 Features and benefits

- Fast switching
- High thermal cycling performance
- Low forward volt drop
- Low thermal resistance
- Soft recovery minimizes power-consuming oscillations
- Surface mountable package

### 1.3 Applications

- Discontinuous Current Mode (DCM) Power Factor Correction (PFC)
- Output rectifiers in high-frequency switched-mode power supplies

### 1.4 Quick reference data

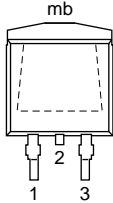

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	-	500	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$ ; $T_{mb} \leq 123$ °C; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	-	9	A
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 8$ A; $T_j = 150$ °C; see <a href="#">Figure 4</a>	-	0.9	1.03	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 100$ A/s; $T_j = 25$ °C; see <a href="#">Figure 7</a> ; see <a href="#">Figure 6</a>	-	50	60	ns



## 2. Pinning information

**Table 2. Pinning information**

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	no connection		
2	K	cathode <sup>[1]</sup>		
3	A	anode		
mb	K	mounting base; cathode		

**SOT404 (D2PAK)**

[1] it is not possible to make a connection to Pin 2 of the SOT404 package

## 3. Ordering information

**Table 3. Ordering information**

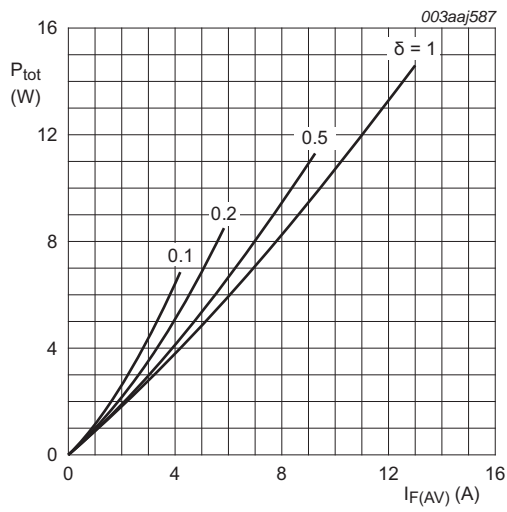
Type number	Package		Version
	Name	Description	
BYV29B-500	D2PAK	plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)	SOT404

## 4. Limiting values

**Table 4. Limiting values**

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

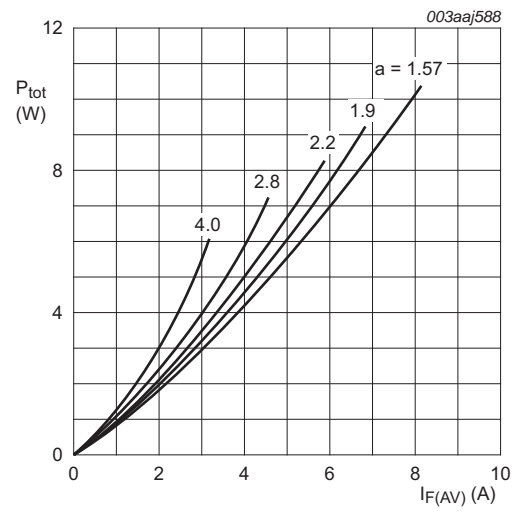
Symbol	Parameter	Conditions	Min	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	500	V
$V_{RWM}$	crest working reverse voltage		-	500	V
$V_R$	reverse voltage	DC	-	500	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$ ; $T_{mb} \leq 123$ °C; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	9	A
$I_{FRM}$	repetitive peak forward current	square-wave pulse; $\delta = 0.5$ ; $t_p = 25$ $\mu$ s; $T_{mb} \leq 123$ °C	-	18	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10$ ms; sine-wave pulse; $T_{j(init)} = 25$ °C	-	100	A
		$t_p = 8.3$ ms; sine-wave pulse; $T_{j(init)} = 25$ °C	-	110	A
$T_{stg}$	storage temperature		-40	150	°C
$T_j$	junction temperature		-	150	°C



$$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$$

$$V_O = 0.890 \text{ V}; R_S = 0.019 \text{ } \Omega$$

Fig 1. Forward power dissipation as a function of average forward current; square waveform; maximum values



$$a = \text{form factor} = I_{F(AV)} / I_{F(RMS)}$$

$$V_O = 0.890 \text{ V}; R_S = 0.019 \text{ } \Omega$$

Fig 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

### 5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	see <a href="#">Figure 3</a>	-	-	2.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	[1]	50	-	K/W

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

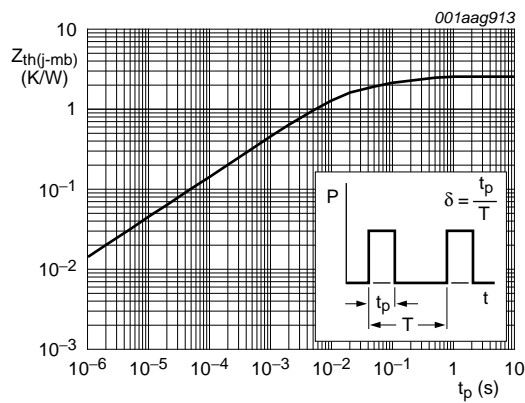
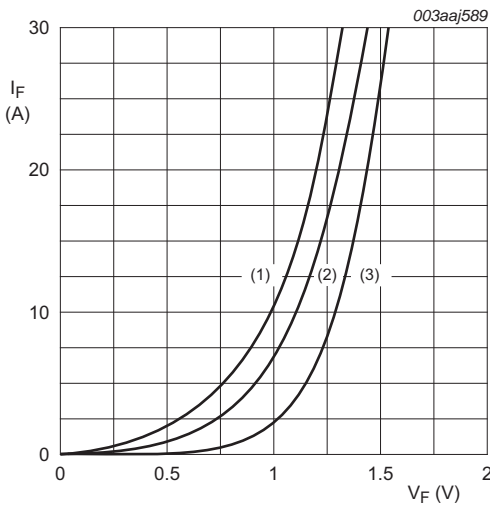


Fig 3. Transient thermal impedance from junction to mounting base as a function of pulse width

**6. Characteristics**

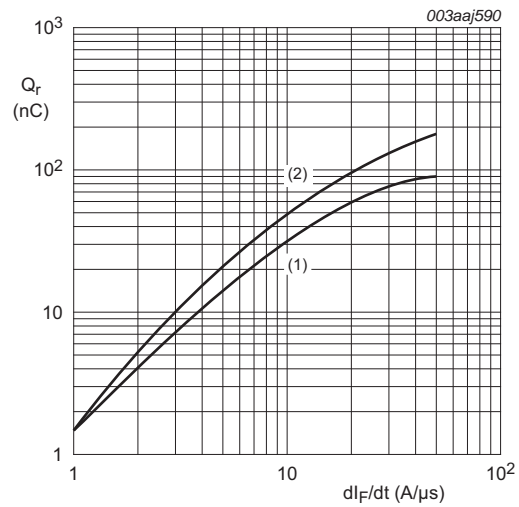
**Table 6. Characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 8\text{ A}; T_j = 150\text{ °C};$ see <a href="#">Figure 4</a>	-	0.9	1.03	V
		$I_F = 8\text{ A}; T_j = 25\text{ °C};$ see <a href="#">Figure 4</a>	-	1.05	1.25	V
		$I_F = 20\text{ A}; T_j = 25\text{ °C};$ see <a href="#">Figure 4</a>	-	1.2	1.4	V
$I_R$	reverse current	$V_R = 500\text{ V}; T_j = 25\text{ °C}$	-	2	50	$\mu\text{A}$
		$V_R = 500\text{ V}; T_j = 100\text{ °C}$	-	0.1	0.35	mA
<b>Dynamic characteristics</b>						
$Q_r$	recovered charge	$I_F = 2\text{ A}; V_R = 30\text{ V}; dI_F/dt = 20\text{ A/s};$ $T_j = 25\text{ °C};$ see <a href="#">Figure 5</a> ; see <a href="#">Figure 6</a>	-	40	60	nC
$t_{rr}$	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 100\text{ A/s};$ $T_j = 25\text{ °C};$ see <a href="#">Figure 7</a> ; see <a href="#">Figure 6</a>	-	50	60	ns
$I_{RM}$	peak reverse recovery current	$I_F = 10\text{ A}; V_R = 30\text{ V}; dI_F/dt = 50\text{ A/s};$ $T_j = 100\text{ °C};$ see <a href="#">Figure 8</a> ; see <a href="#">Figure 6</a>	-	4	5.5	A
$V_{FRM}$	forward recovery voltage	$I_F = 10\text{ A}; dI_F/dt = 10\text{ A/s}; T_j = 25\text{ °C};$ see <a href="#">Figure 9</a>	-	2.5	-	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;  
 $V_O = 0.890\text{ V}; R_S = 0.019\ \Omega$

**Fig 4. Forward current as a function of forward voltage**



(1)  $I_F = 2\text{ A}; T_j = 25\text{ °C};$   
 (2)  $I_F = 10\text{ A}; T_j = 25\text{ °C}$

**Fig 5. Recovered charge as a function of rate of change of forward current; maximum values**

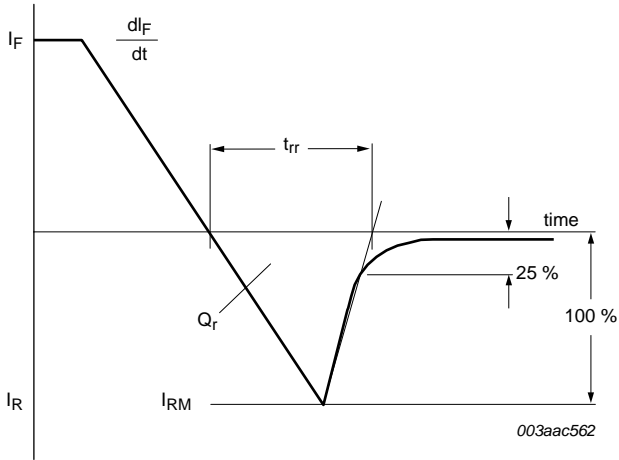
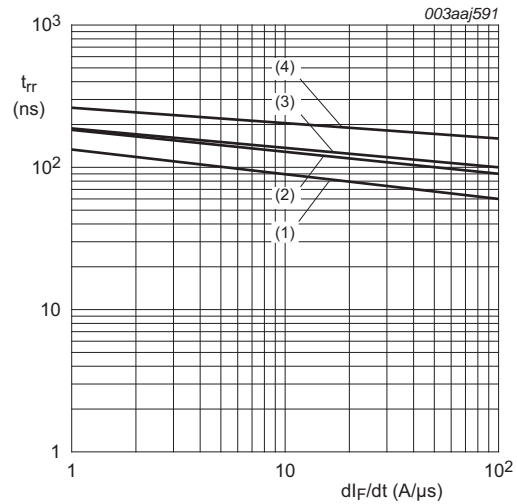
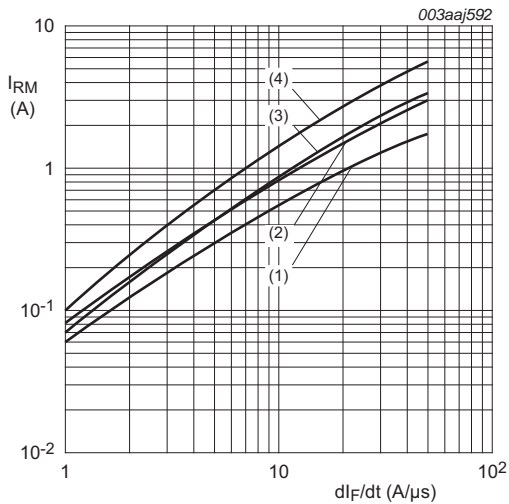


Fig 6. Reverse recovery definitions; ramp recovery



- (1)  $I_F = 1 \text{ A}; T_j = 25 \text{ }^\circ\text{C};$
- (2)  $I_F = 1 \text{ A}; T_j = 100 \text{ }^\circ\text{C};$
- (3)  $I_F = 10 \text{ A}; T_j = 25 \text{ }^\circ\text{C};$
- (4)  $I_F = 10 \text{ A}; T_j = 100 \text{ }^\circ\text{C}$

Fig 7. Reverse recovery time as a function of rate of change of forward current; maximum values



- (1)  $I_F = 1 \text{ A}; T_j = 25 \text{ }^\circ\text{C};$
- (2)  $I_F = 1 \text{ A}; T_j = 100 \text{ }^\circ\text{C};$
- (3)  $I_F = 10 \text{ A}; T_j = 25 \text{ }^\circ\text{C};$
- (4)  $I_F = 10 \text{ A}; T_j = 100 \text{ }^\circ\text{C}$

Fig 8. Peak reverse recovery current as a function of rate of change of forward current; maximum values

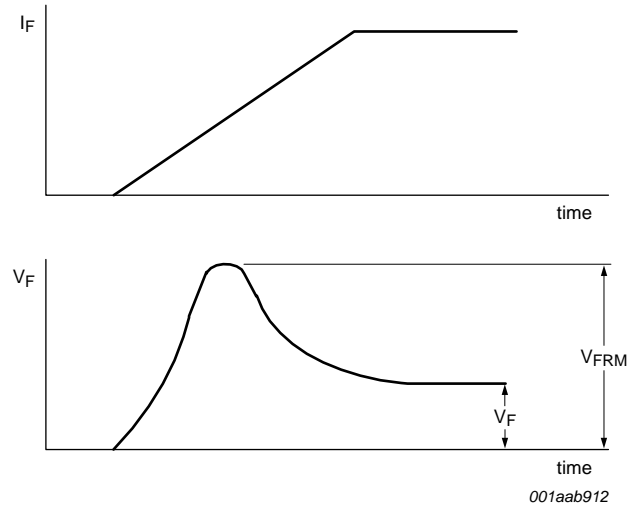
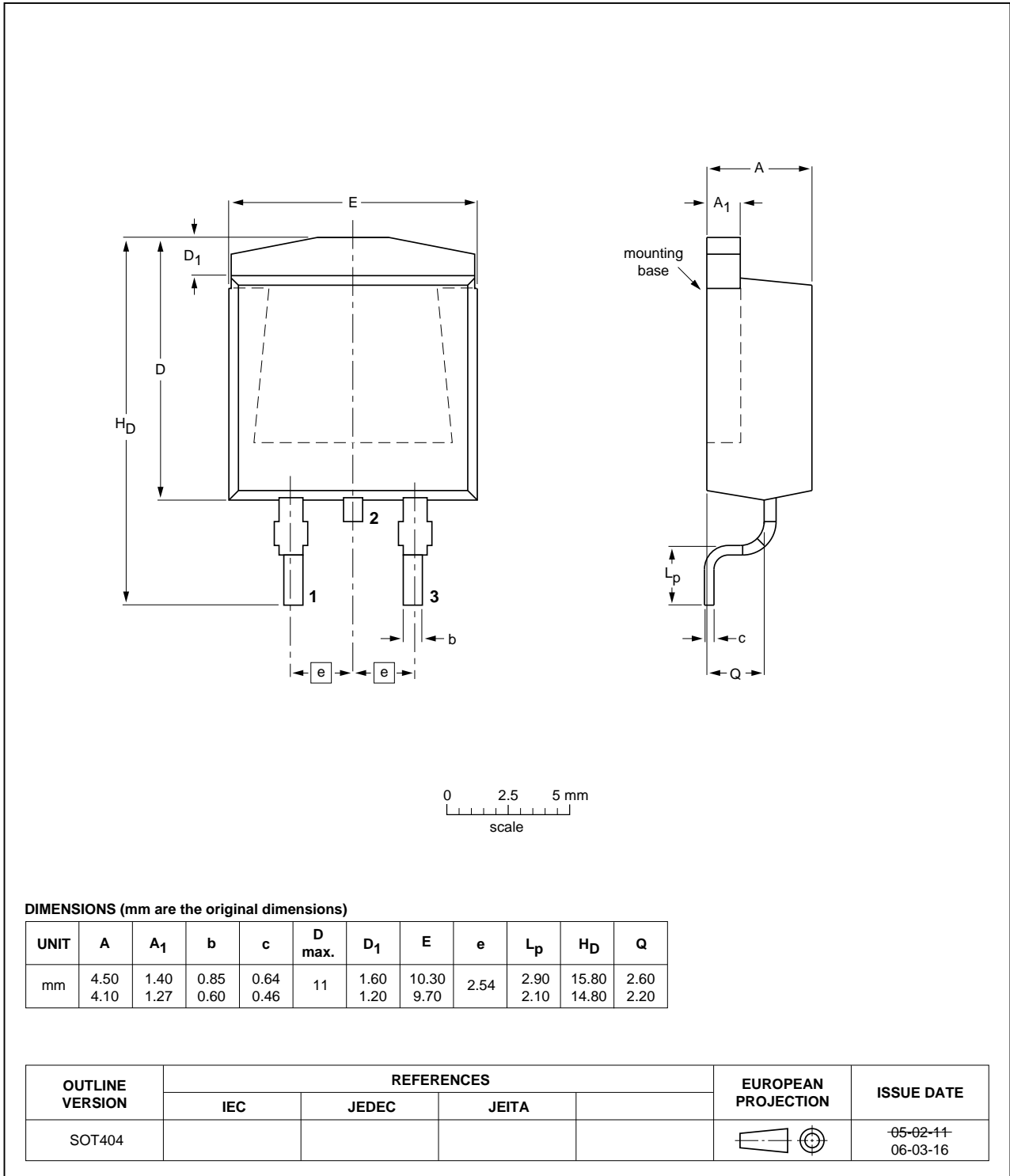


Fig 9. Forward recovery definitions

**7. Package outline**

Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)

**SOT404**



**Fig 10. Package outline SOT404 (D2PAK)**

## 8. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYV29B-500 v.2	20120403	Product data sheet	-	BYV29B-500 v.1
Modifications:	<ul style="list-style-type: none"><li>• The format of this document 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></ul>			
BYV29B-500 v.1	20010901	Product data sheet	-	-



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Document status <sup>[1]</sup> [2]	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.

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[2] The term 'short data sheet' is explained in section "Definitions".

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