



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

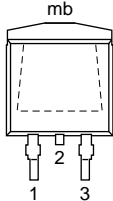

Table 1. Quick reference data

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 Figure 1 ; see Figure 2	-	-	9	A
Static characteristics						
V_F	forward voltage	$I_F = 8$ A; $T_j = 150$ °C; see Figure 4	-	0.9	1.03	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 100$ A/s; $T_j = 25$ °C; see Figure 7 ; see Figure 6	-	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 ^[1]		
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

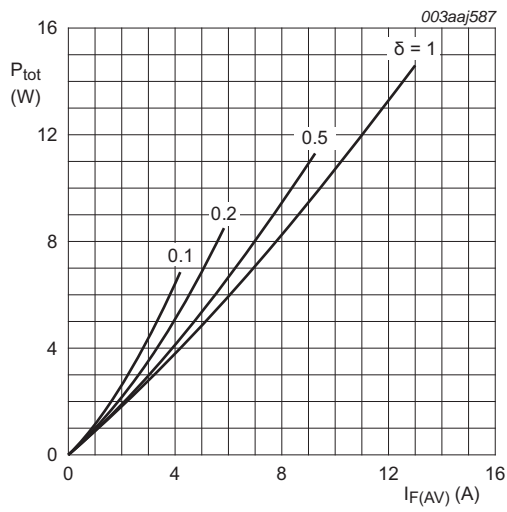
Type number	Package		
	Name	Description	Version
BYV29B-500	D2PAK	plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)	SOT404

4. Limiting values

Table 4. Limiting values

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

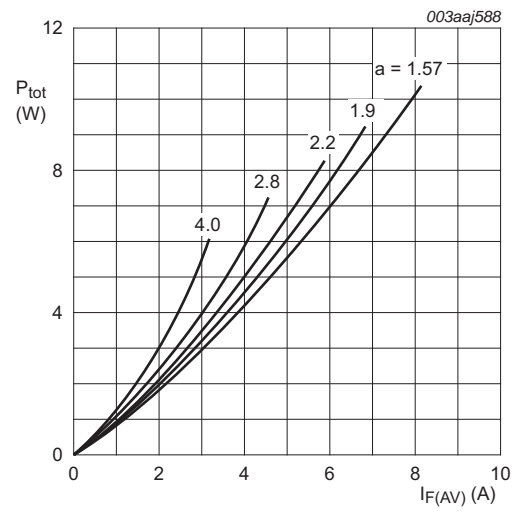
Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	500	V
V_{RWM}	crest working reverse voltage		-	500	V
V_R	reverse voltage	DC	-	500	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$; $T_{mb} \leq 123$ °C; see Figure 1 ; see Figure 2	-	9	A
I_{FRM}	repetitive peak forward current	square-wave pulse; $\delta = 0.5$; $t_p = 25$ μ 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 Figure 3	-	-	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.

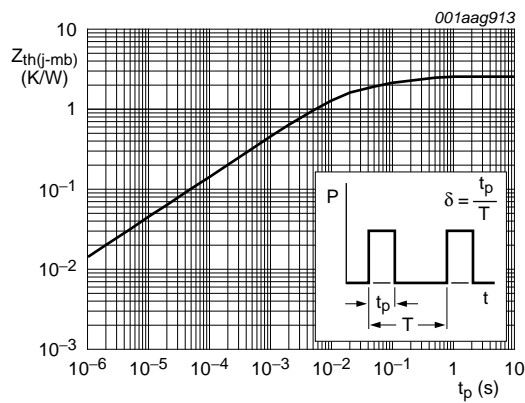
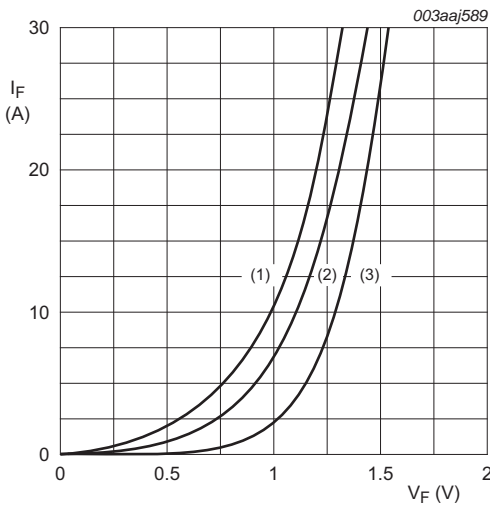


Fig 3. Transient thermal impedance from junction to mounting base as a function of pulse width

6. Characteristics

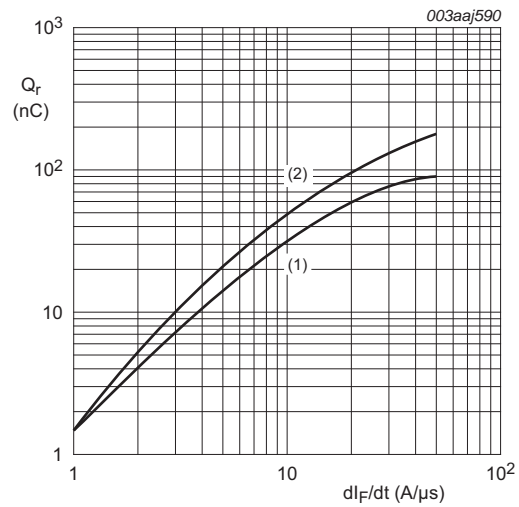
Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 8\text{ A}; T_j = 150\text{ °C};$ see Figure 4	-	0.9	1.03	V
		$I_F = 8\text{ A}; T_j = 25\text{ °C};$ see Figure 4	-	1.05	1.25	V
		$I_F = 20\text{ A}; T_j = 25\text{ °C};$ see Figure 4	-	1.2	1.4	V
I_R	reverse current	$V_R = 500\text{ V}; T_j = 25\text{ °C}$	-	2	50	μA
		$V_R = 500\text{ V}; T_j = 100\text{ °C}$	-	0.1	0.35	mA
Dynamic characteristics						
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 Figure 5 ; see Figure 6	-	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 Figure 7 ; see Figure 6	-	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 Figure 8 ; see Figure 6	-	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 Figure 9	-	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

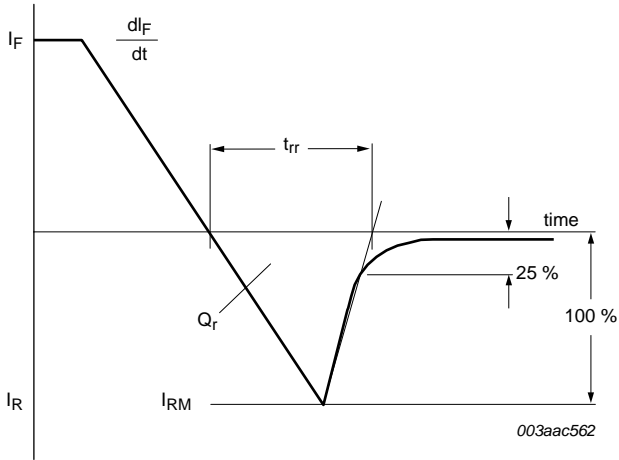
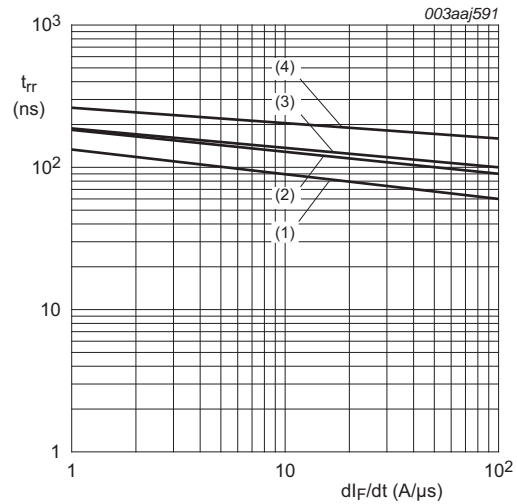
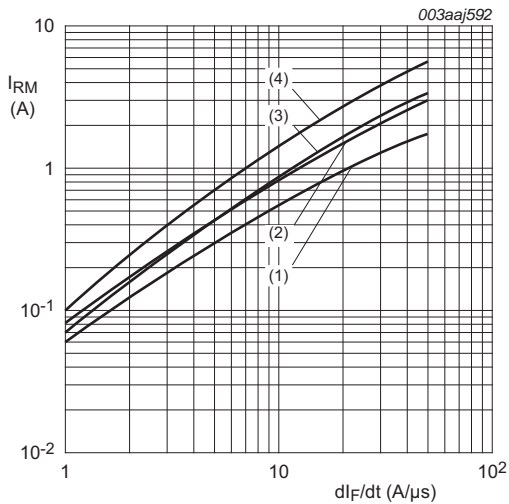


Fig 6. Reverse recovery definitions; ramp recovery



- (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

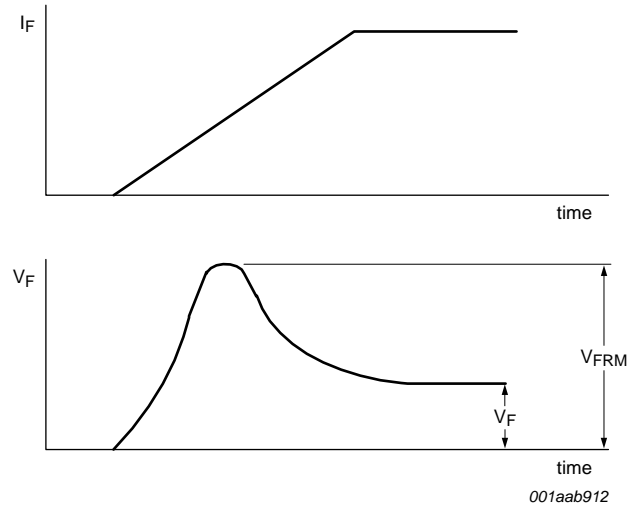


Fig 9. Forward recovery definitions

7. Package outline

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

SOT404

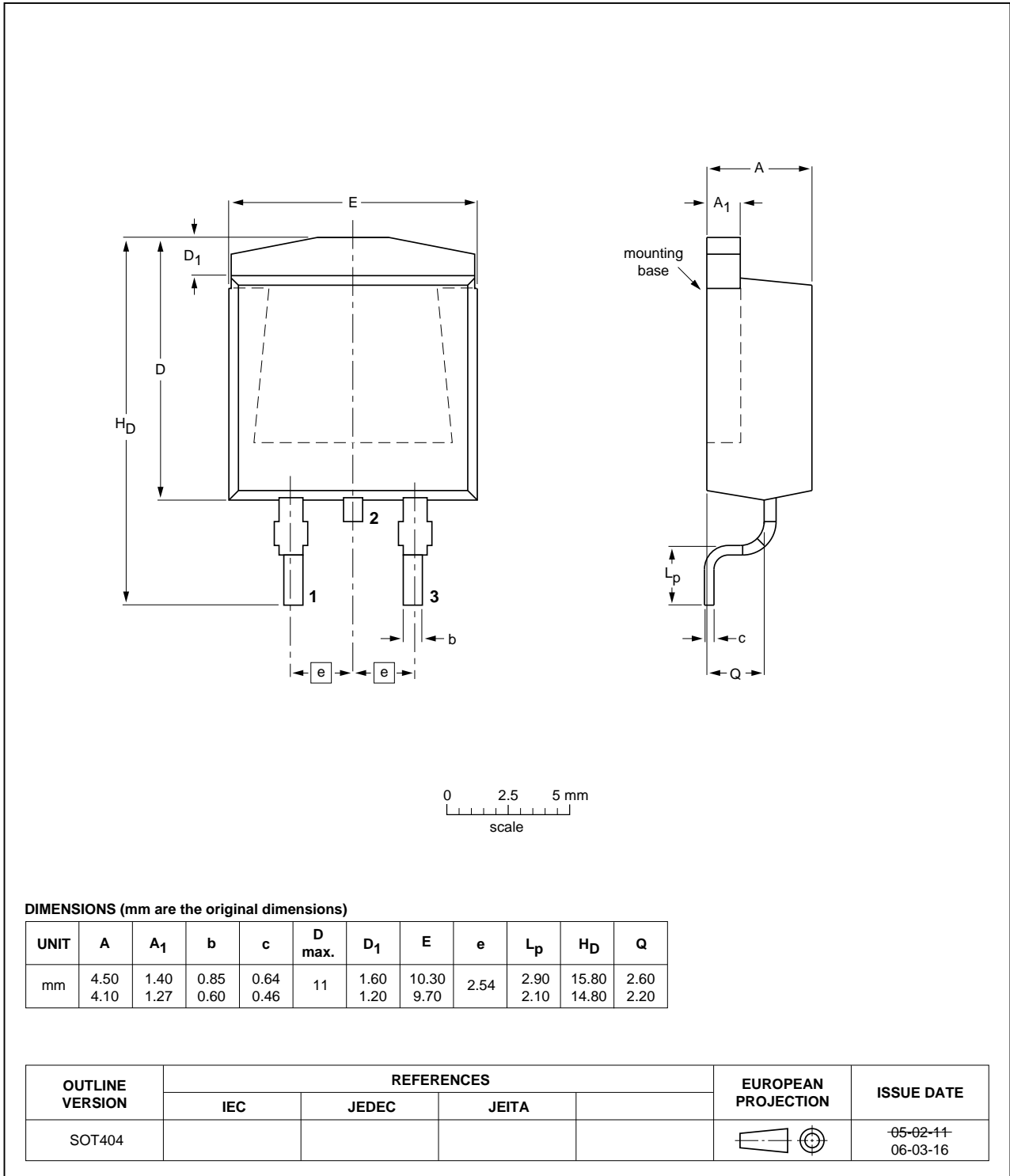


Fig 10. Package outline SOT404 (D2PAK)

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">• The format of this document has been redesigned to comply with the new identity guidelines of NXP Semiconductors.• Legal texts have been adapted to the new company name where appropriate.			
BYV29B-500 v.1	20010901	Product data sheet	-	-

9. Legal information

9.1 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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