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

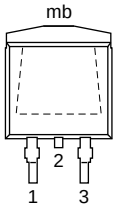
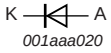
1.4 Quick reference data

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; δ = 0.5 ; T_{mb} ≤ 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

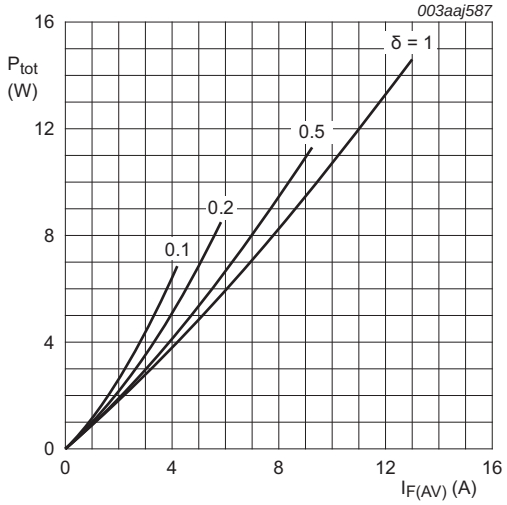
Type number	Package		
	Name	Description	Version
BYV29B-500	D2PAK	plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)	SOT404

4. Limiting values

Table 4. Limiting values

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

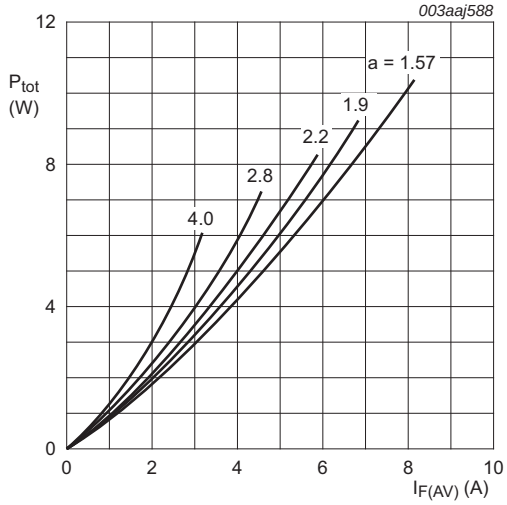
Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	500	V
V_{RWM}	crest working reverse voltage		-	500	V
V_R	reverse voltage	DC	-	500	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$; $T_{mb} \leq 123$ °C; see Figure 1; see Figure 2	-	9	A
I_{FRM}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



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

$V_O = 0.890\ V; R_S = 0.019\ \Omega$

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



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

$V_O = 0.890\ V; R_S = 0.019\ \Omega$

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
$R_{th(j\text{-}mb)}$	thermal resistance from junction to mounting base	see Figure 3		-	-	2.5	K/W
$R_{th(j\text{-}a)}$	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.

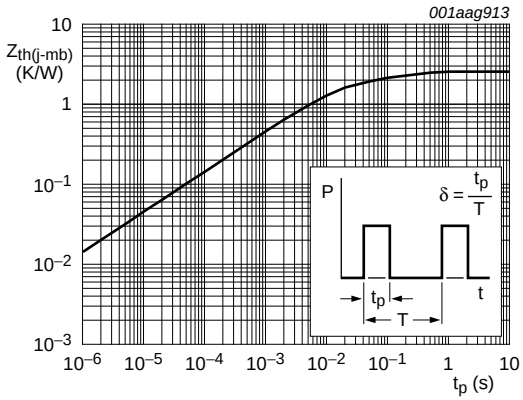
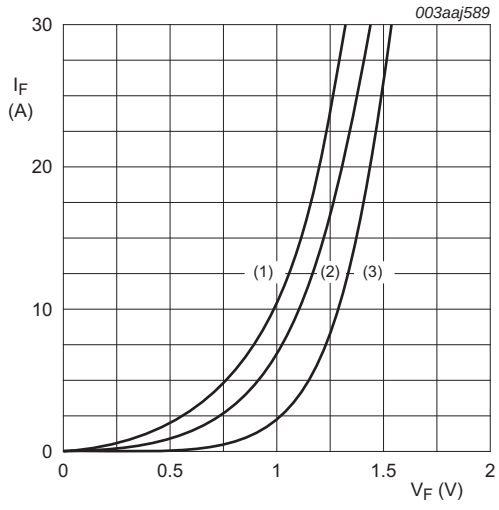


Fig 3. Transient thermal impedance from junction to mounting base as a function of pulse width

6. Characteristics

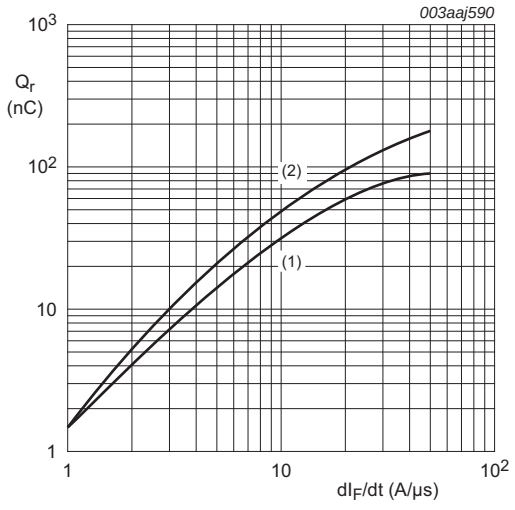
Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	I_F = 8 A; T_j = 150 °C; see Figure 4	-	0.9	1.03	V
		I_F = 8 A; T_j = 25 °C; see Figure 4	-	1.05	1.25	V
		I_F = 20 A; T_j = 25 °C; see Figure 4	-	1.2	1.4	V
I_R	reverse current	V_R = 500 V; T_j = 25 °C	-	2	50	µA
		V_R = 500 V; T_j = 100 °C	-	0.1	0.35	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 5; see Figure 6	-	40	60	nC
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
I_{RM}	peak reverse recovery current	I_F = 10 A; V_R = 30 V; dI_F/dt = 50 A/s; T_j = 100 °C; see Figure 8; see Figure 6	-	4	5.5	A
V_{FRM}	forward recovery voltage	I_F = 10 A; dI_F/dt = 10 A/s; T_j = 25 °C; see Figure 9	-	2.5	-	V



(1) T_j = 150 °C; typical values;
(2) T_j = 150 °C; maximum values;
(3) T_j = 25 °C; maximum values;
V_O = 0.890 V; R_S = 0.019 Ω

Fig 4. Forward current as a function of forward voltage



(1) I_F = 2 A; T_j = 25 °C;
(2) I_F = 10 A; T_j = 25 °C

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

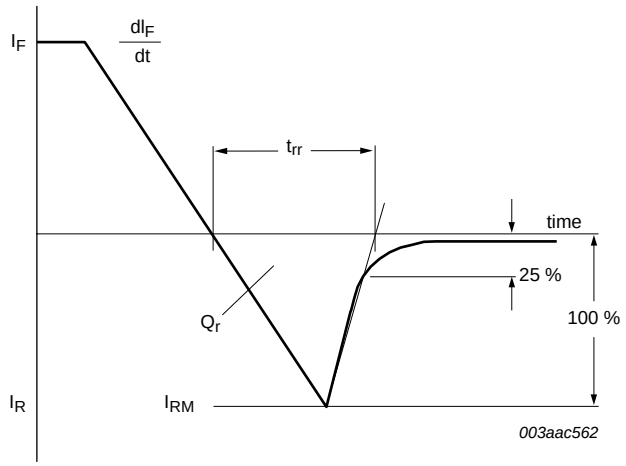
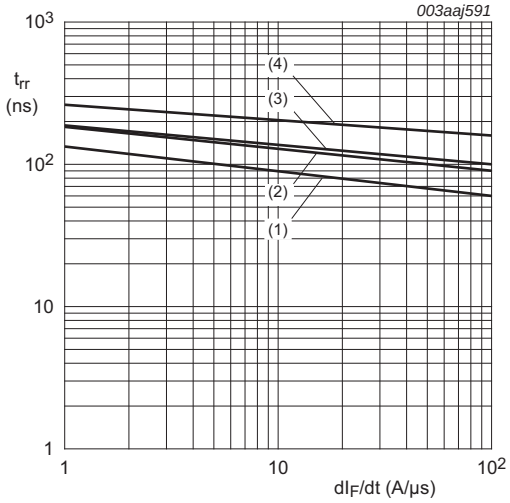
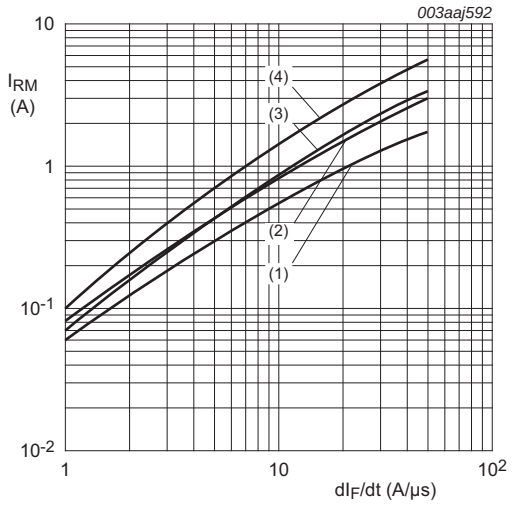


Fig 6. Reverse recovery definitions; ramp recovery



(1) $I_F = 1$ A; $T_j = 25$ °C;
(2) $I_F = 1$ A; $T_j = 100$ °C;
(3) $I_F = 10$ A; $T_j = 25$ °C;
(4) $I_F = 10$ A; $T_j = 100$ °C

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



(1) $I_F = 1$ A; $T_j = 25$ °C;
(2) $I_F = 1$ A; $T_j = 100$ °C;
(3) $I_F = 10$ A; $T_j = 25$ °C;
(4) $I_F = 10$ A; $T_j = 100$ °C

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

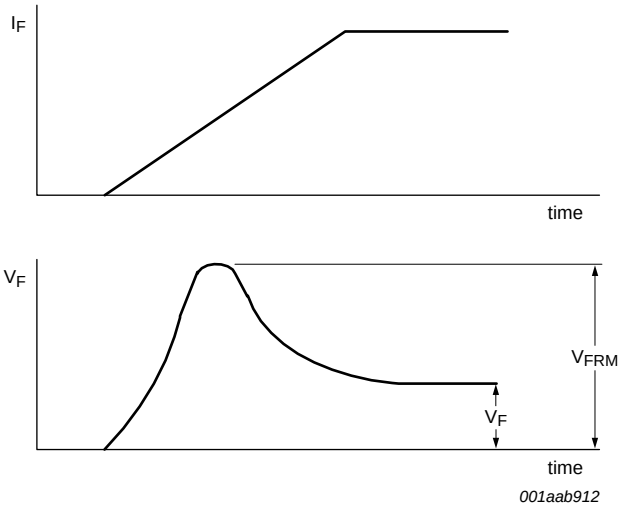
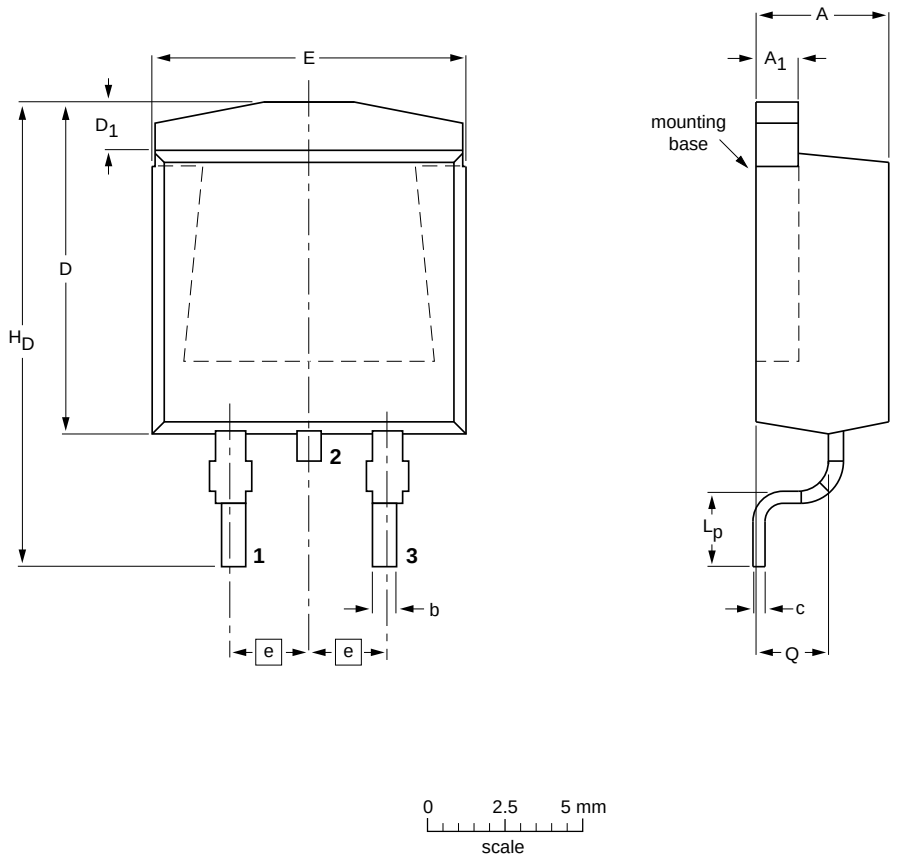


Fig 9. Forward recovery definitions

7. Package outline

Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped) **SOT404**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	c	D max.	D_1	E	e	L_p	H_D	Q
mm	4.50 4.10	1.40 1.27	0.85 0.60	0.64 0.46	11	1.60 1.20	10.30 9.70	2.54	2.90 2.10	15.80 14.80	2.60 2.20

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT404						~~05-02-11~~ 06-03-16

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:	• 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	-	-

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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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11. Contents

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Date of release: 3 April 2012
Document identifier: BYV29B-500

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