

## 1. General description

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

## 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

## 3. Applications

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

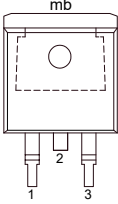
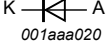
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_R$	reverse voltage	DC	-	-	500	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; $T_{mb} \leq 123$ °C; SQW; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a>	-	-	9	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25$ $\mu$ s; $T_{mb} \leq 123$ °C; SQW	-	-	18	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; SIN	-	-	100	A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; SIN	-	-	110	A
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 8$ A; $T_j = 150$ °C; <a href="#">Fig. 4</a>	-	0.9	1.03	V
		$I_F = 8$ A; $T_j = 25$ °C; <a href="#">Fig. 4</a>	-	1.05	1.25	V
		$I_F = 20$ A; $T_j = 25$ °C; <a href="#">Fig. 4</a>	-	1.2	1.4	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; <a href="#">Fig. 5</a> ; <a href="#">Fig. 6</a>	-	50	60	ns

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	no connection	 <p style="text-align: center;"><b>D2PAK (SOT404)</b></p>	
2	K	cathode <sup>[1]</sup>		
3	A	anode		
mb	K	mounting base; cathode		

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

## 6. Ordering information

Table 3. Ordering information

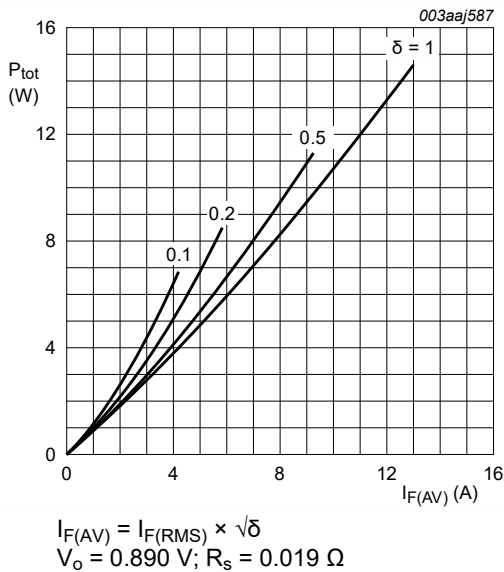
Type number	Package		
	Name	Description	Version
BYV29B-500	D2PAK	plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)	SOT404

## 7. Limiting values

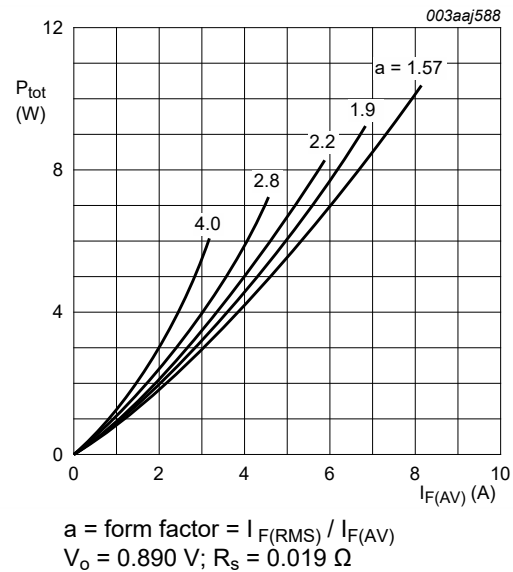
**Table 4. Limiting values**

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	$\delta = 0.5$ ; $T_{mb} \leq 123\text{ }^\circ\text{C}$ ; SQW; Fig. 1; Fig. 2	-	9	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 123\text{ }^\circ\text{C}$ ; SQW	-	18	A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; SIN	-	100	A
		$t_p = 8.3\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; SIN	-	110	A
$T_{stg}$	storage temperature		-40	150	$^\circ\text{C}$
$T_j$	junction temperature		-	150	$^\circ\text{C}$



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



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

## 8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	<a href="#">Fig. 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.

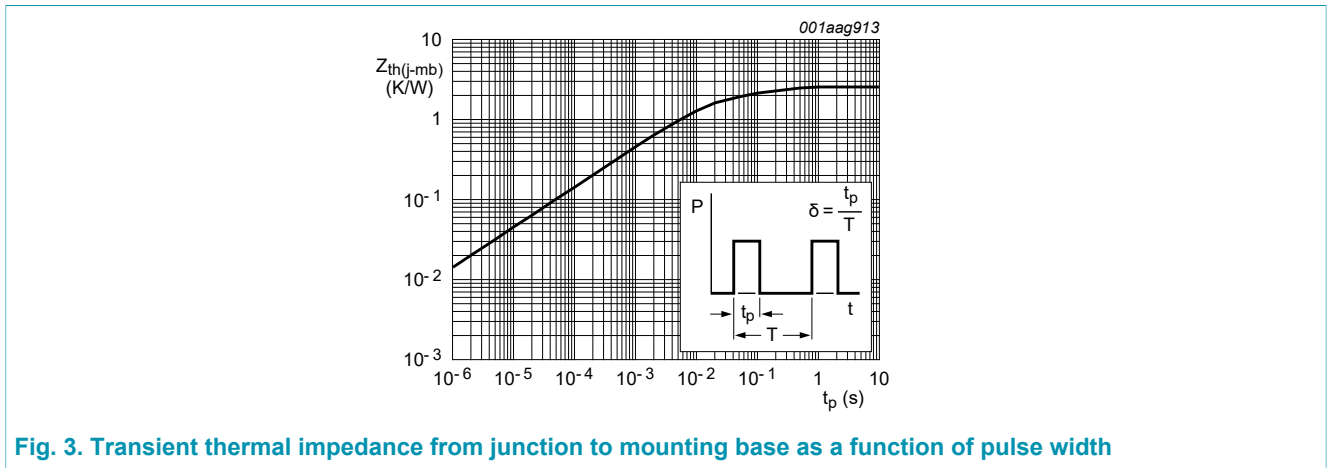
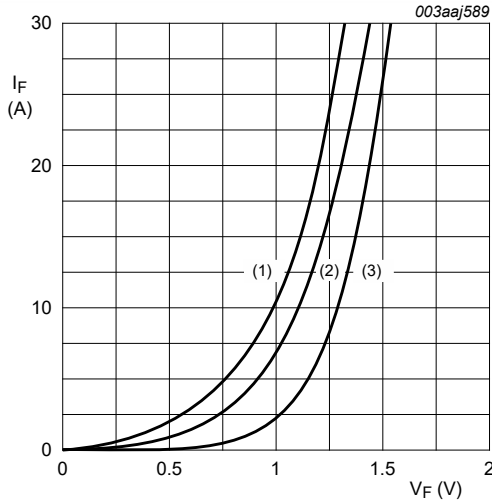


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse width

### 9. Characteristics

Table 6. Characteristics

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



$V_o = 0.890 \text{ V}; R_s = 0.019 \text{ } \Omega$   
 (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. 4. Forward current as a function of forward voltage

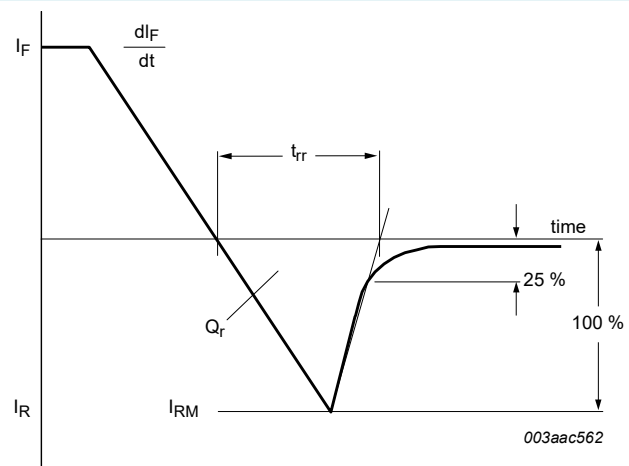
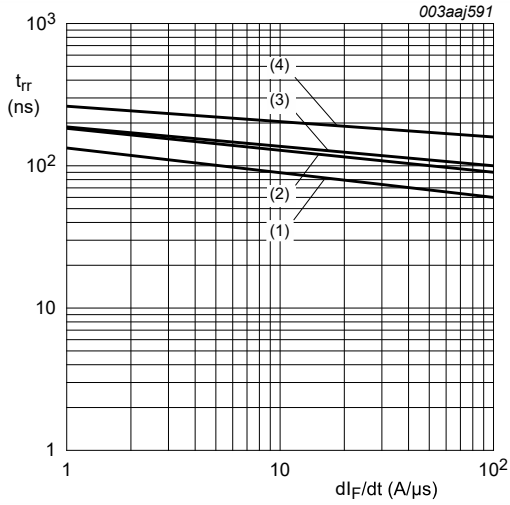
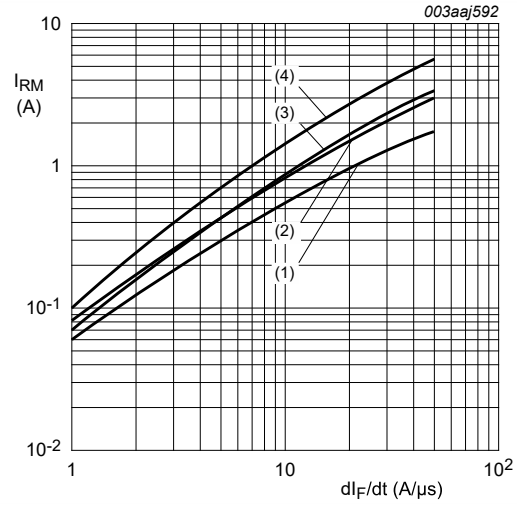


Fig. 5.



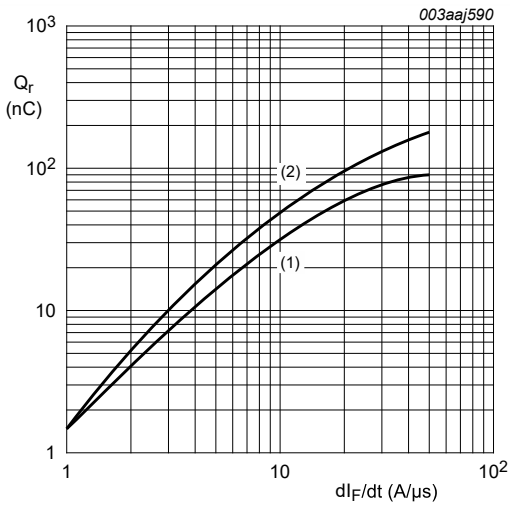
- (1)  $I_F = 1$  A;  $T_j = 25$  °C;
- (2)  $I_F = 1$  A;  $T_j = 100$  °C;
- (3)  $I_F = 10$  A;  $T_j = 25$  °C;
- (4)  $I_F = 10$  A;  $T_j = 100$  °C

Fig. 6. 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. 7. Peak reverse recovery current as a function of rate of change of forward current; maximum values



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

Fig. 8. Recovered charge as a function of rate of change of forward current; maximum values

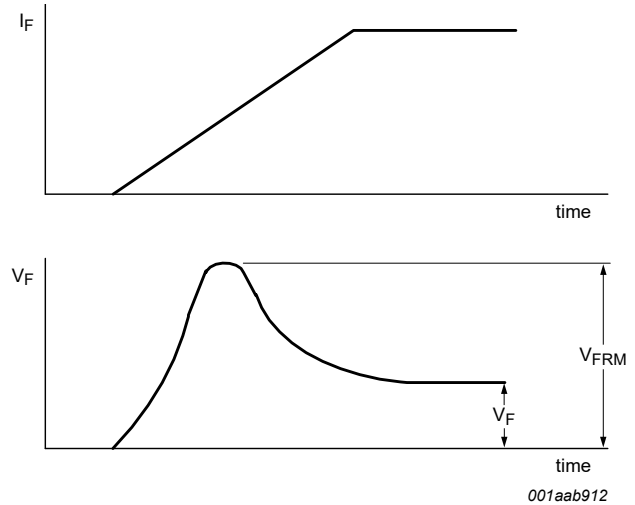


Fig. 9. Forward recovery definitions



# 11. Legal information

## 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.
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