BYV29B-500

Ultrafast power diode

13 July 2018 Product data sheet

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

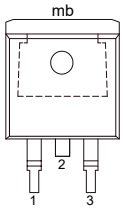
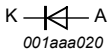
4. Quick reference data

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; Fig. 1; Fig. 2		-	-	9	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ µs; $T_{mb} \leq 123$ °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
Static characteristics							
V_F	forward voltage	$I_F = 8$ A; $T_j = 150$ °C; Fig. 4		-	0.9	1.03	V
		$I_F = 8$ A; $T_j = 25$ °C; Fig. 4		-	1.05	1.25	V
		$I_F = 20$ A; $T_j = 25$ °C; Fig. 4		-	1.2	1.4	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; Fig. 5; Fig. 6		-	50	60	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	no connection	 **D2PAK (SOT404)**	
2	K	cathode[1]		
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

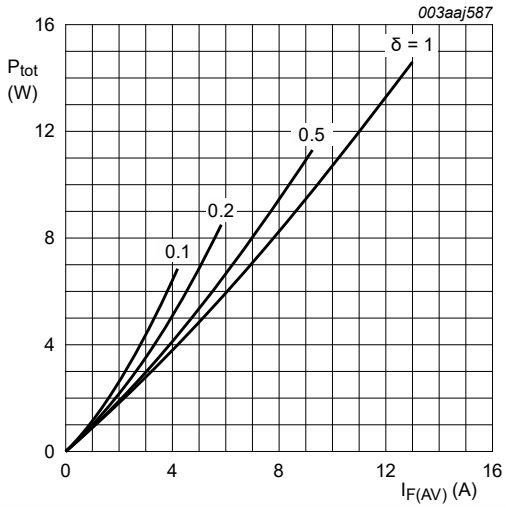
Type number	Package		
	Name	Description	Version
BYV29B-500	D2PAK	plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)	SOT404

7. Limiting values

Table 4. Limiting values

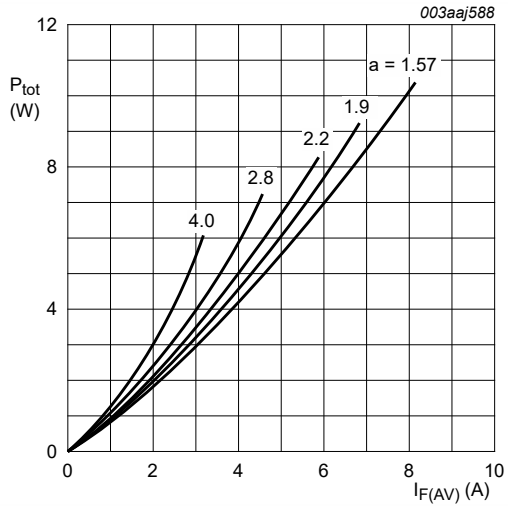
In accordance with the Absolute Maximum Rating System (IEC 60134).

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	δ = 0.5 ; T_{mb} ≤ 123 °C; SQW; Fig. 1; Fig. 2		-	9	A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; T_{mb} ≤ 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
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 Ω

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



a = form factor = $I_{F(RMS)} / I_{F(AV)}$
V_o = 0.890 V; R_s = 0.019 Ω

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
$R_{th(j\text{-}mb)}$	thermal resistance from junction to mounting base	Fig. 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.

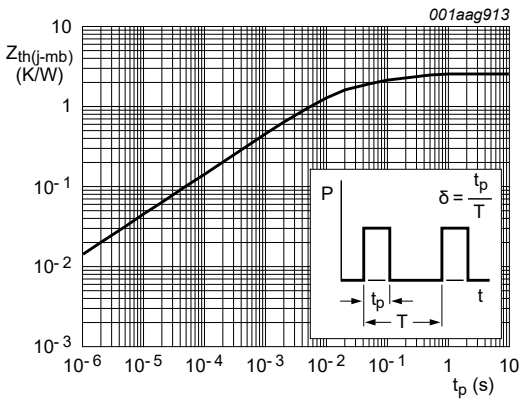
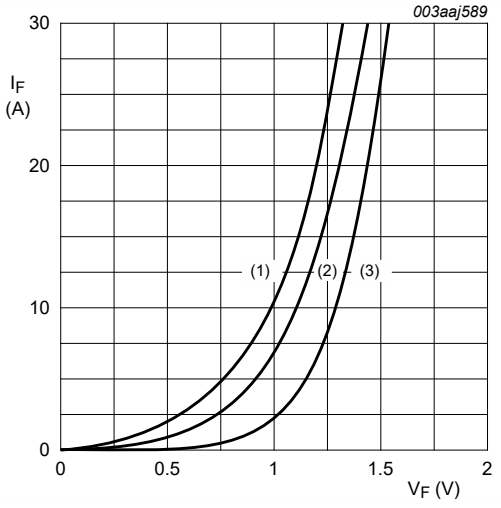


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse width

9. 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; Fig. 4		-	0.9	1.03	V
		I_F = 8 A; T_j = 25 °C; Fig. 4		-	1.05	1.25	V
		I_F = 20 A; T_j = 25 °C; Fig. 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							
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/s; T_j = 25 °C; Fig. 5; Fig. 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; Fig. 5; Fig. 7		-	4	5.5	A
Q_r	recovered charge	I_F = 2 A; V_R = 30 V; dI_F/dt = 20 A/s; T_j = 25 °C; Fig. 8; Fig. 5		-	40	60	nC
V_{FR}	forward recovery voltage	I_F = 10 A; dI_F/dt = 10 A/s; T_j = 25 °C; Fig. 9		-	2.5	-	V



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

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

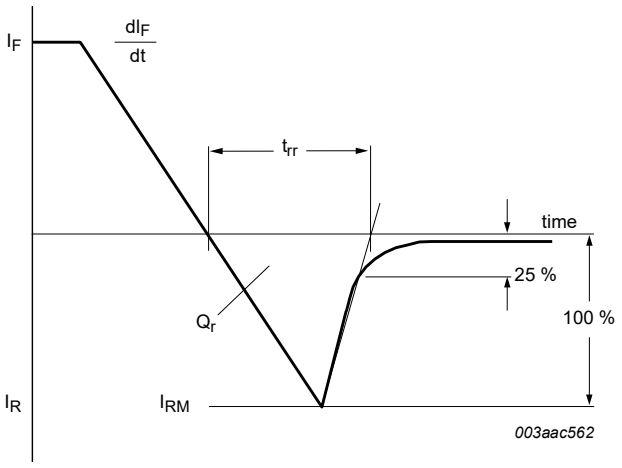
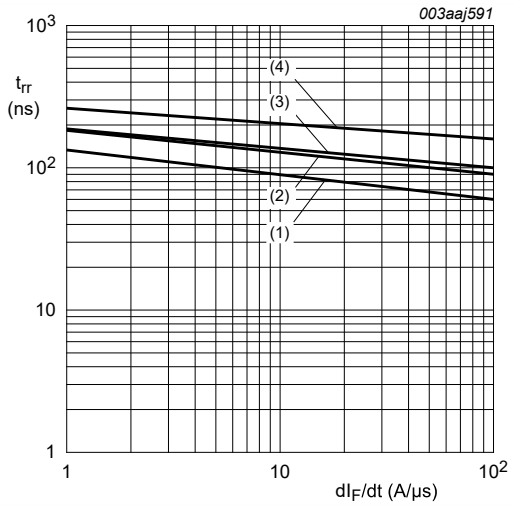


Fig. 5.



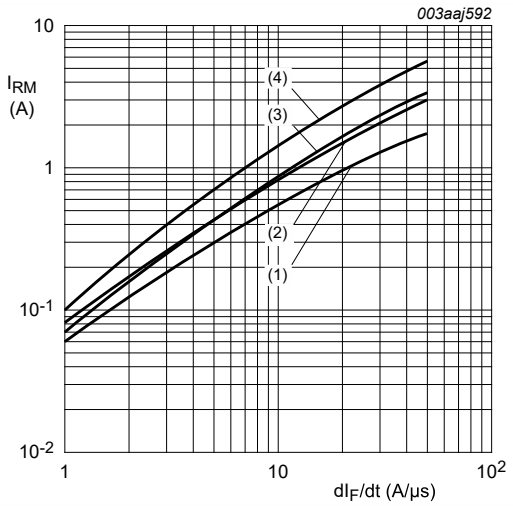
(1) $I_F = 1$ A; $T_j = 25$ °C;

(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



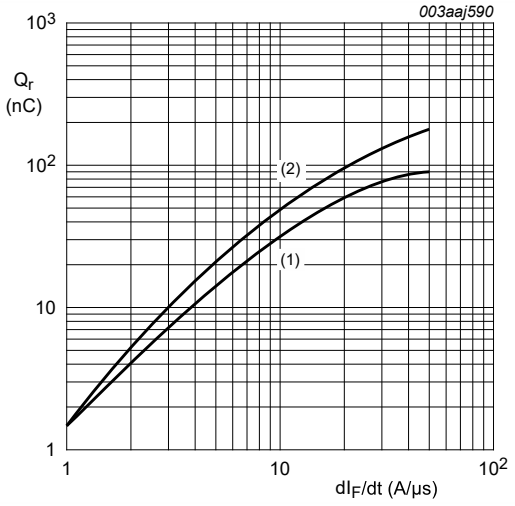
(1) $I_F = 1$ A; $T_j = 25$ °C;

(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

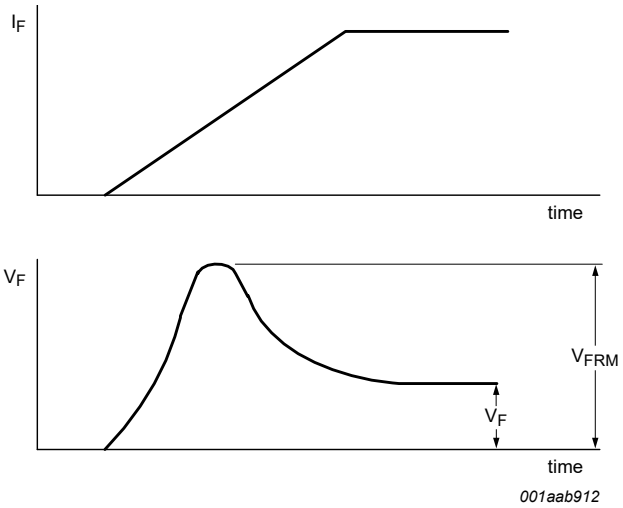
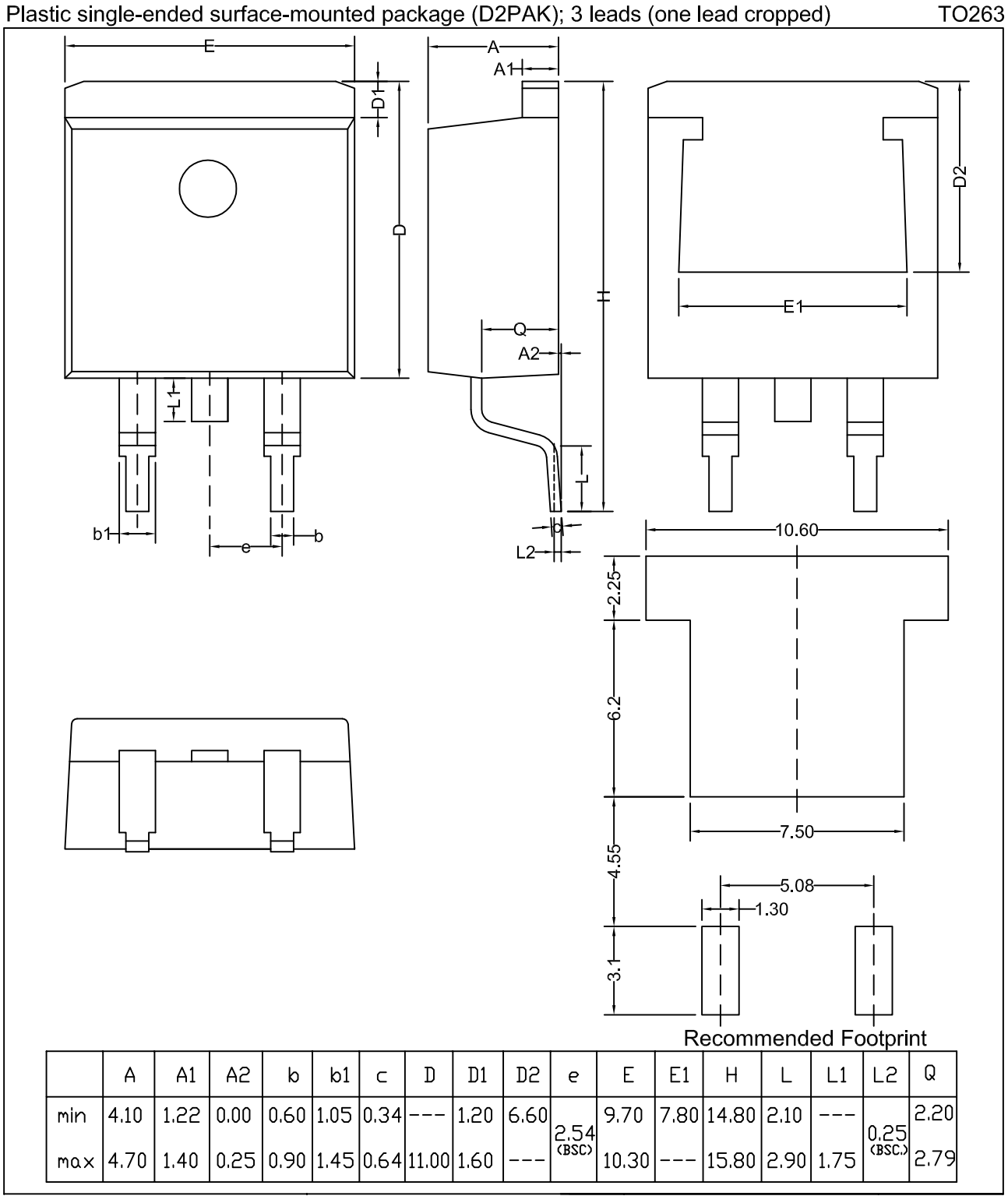


Fig. 9. Forward recovery definitions

10. Package outline



	A	A1	A2	b	b1	c	D	D1	D2	e	E	E1	H	L	L1	L2	Q
min	4.10	1.22	0.00	0.60	1.05	0.34	---	1.20	6.60	2.54 (BSC)	9.70	7.80	14.80	2.10	---	0.25 (BSC)	2.20
max	4.70	1.40	0.25	0.90	1.45	0.64	11.00	1.60	---		10.30	---	15.80	2.90	1.75		2.79

Fig. 10. Package outline D2PAK (SOT404)

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12. Contents

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