

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	$\delta = 0.5$; $t_p = 25$ μ 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
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.	not connected		
2	K	cathode		
3	A	anode		
mb	K	mounting base; connected to cathode		

[1] it is not possible to make connection to Pin 2 of the TO263 package.

6. Ordering information

Table 3. Ordering information

Type number	Package name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
BYV29B-500	TO263	BYV29B-500,118	Reel	800	TO263N (N)	26-Sep-2016
					TO263P (P)	12-Jun-2023

7. Marking

Table 4. Marking codes

Type number	Marking codes	
	Assembly factory: N	Assembly factory: P
BYV29B-500	BAV29B 500 PJNxxxx xx	BYV29B 500 PJPxxxx xx

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	$^\circ\text{C}$

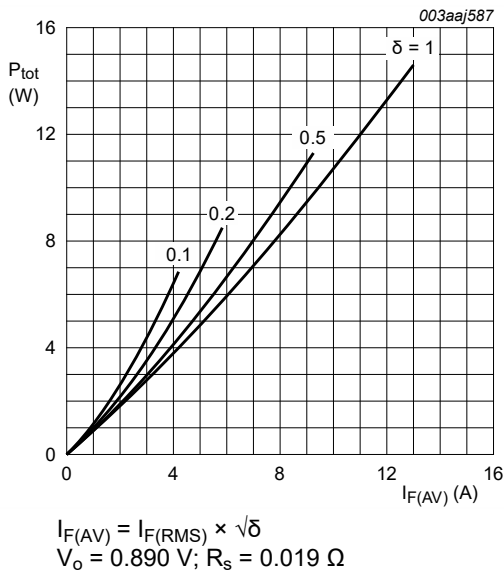


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

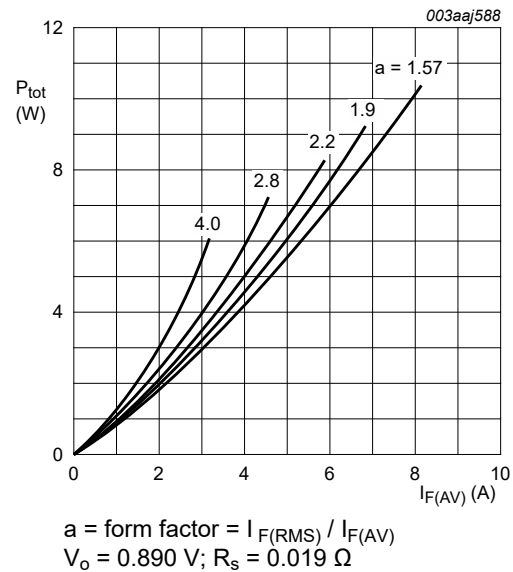


Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

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	Fig. 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.

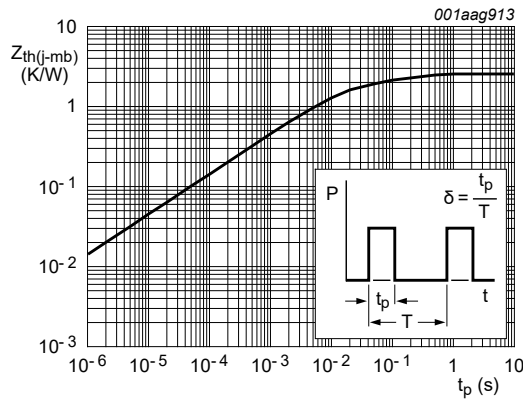
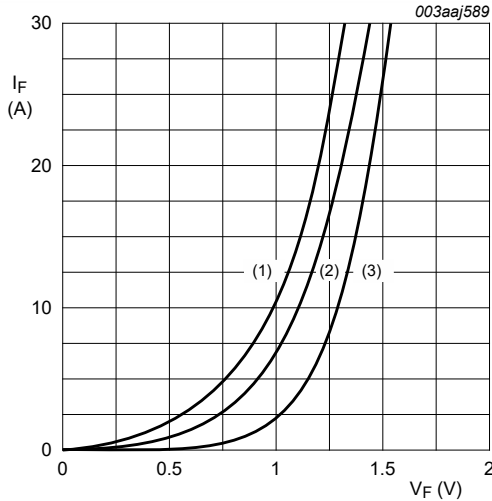


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse width

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 8 \text{ A}; T_j = 150 \text{ }^\circ\text{C}; \text{ Fig. 4}$	-	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	μA
		$V_R = 500 \text{ V}; T_j = 100 \text{ }^\circ\text{C}$	-	0.1	0.35	mA
Dynamic characteristics						
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

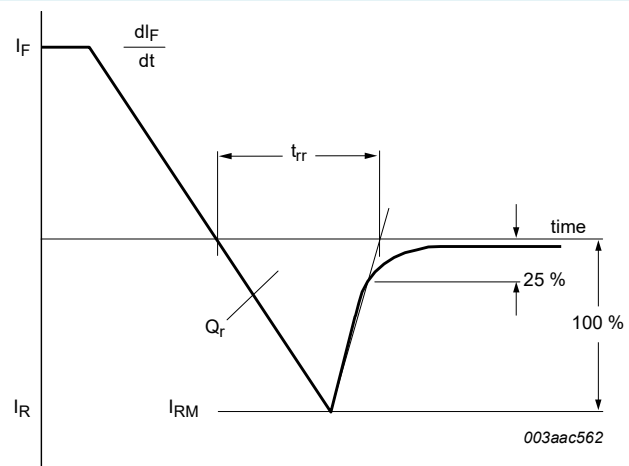
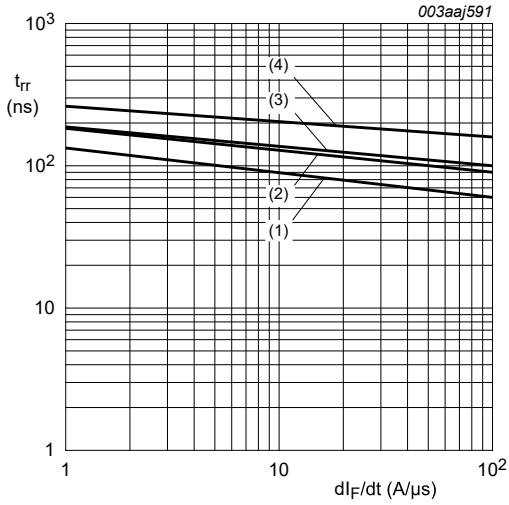
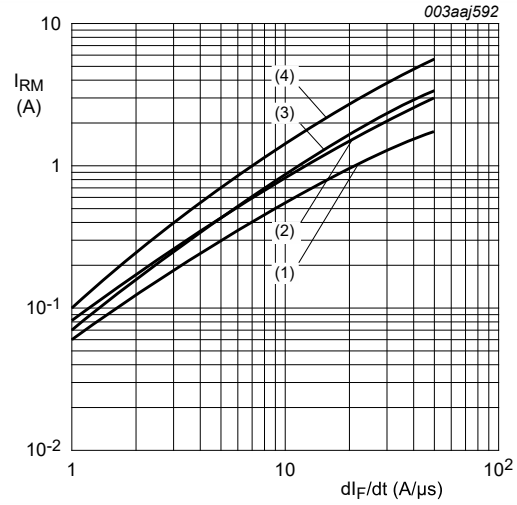


Fig. 5.



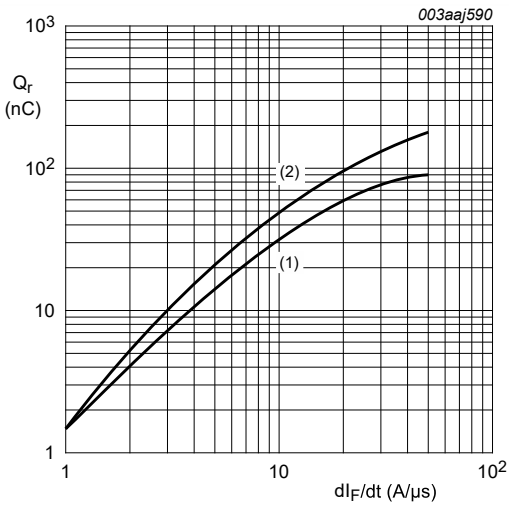
- (1) $I_F = 1$ A; $T_j = 25$ °C;
- (2) $I_F = 1$ A; $T_j = 100$ °C;
- (3) $I_F = 10$ A; $T_j = 25$ °C;
- (4) $I_F = 10$ A; $T_j = 100$ °C

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

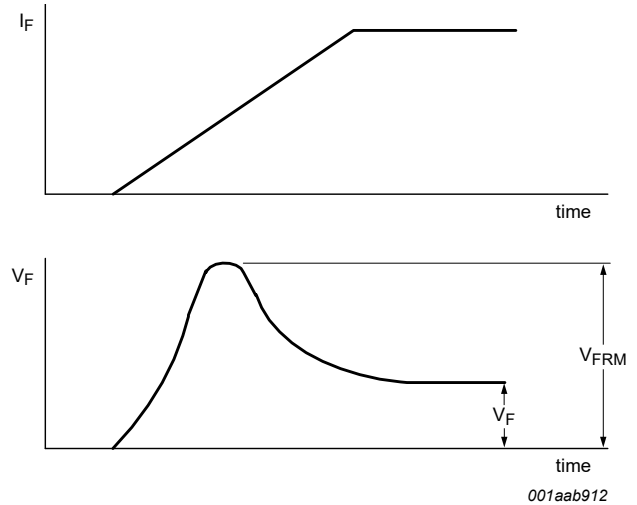
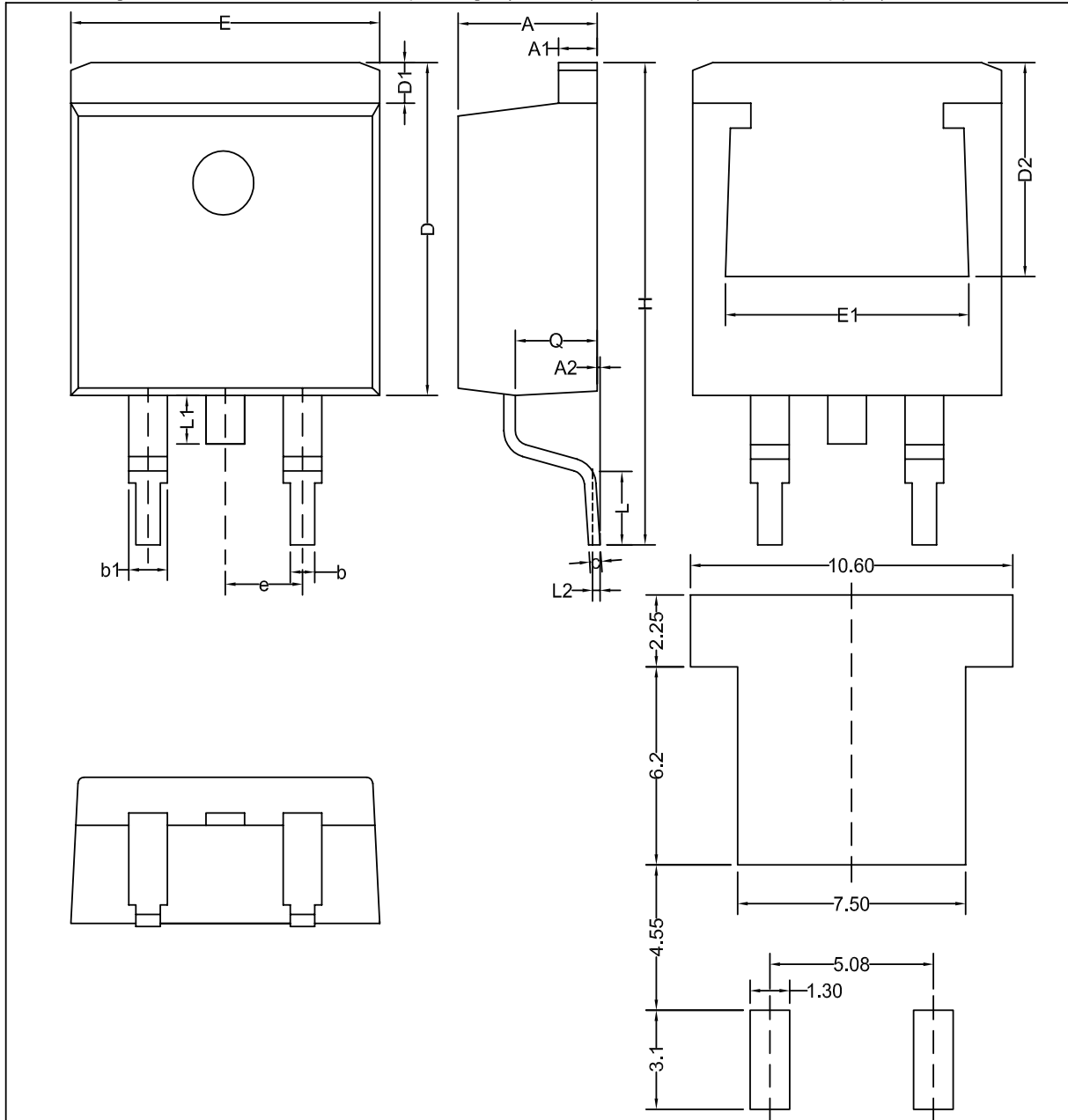


Fig. 9. Forward recovery definitions

10. Package outline

Assembly factory: N

Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped) TO263



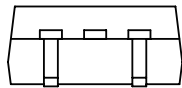
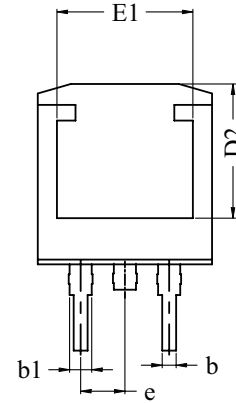
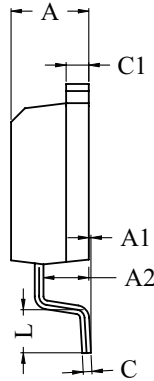
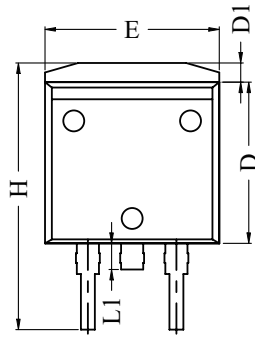
Recommended Footprint

Unit	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

Assembly factory: P

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

TO263



Dim	All Dimensions in Millimeters		
	Min	Typ	Max
A	4.30	4.46	4.60
A1	0	0.13	0.25
A2	2.50	2.60	2.70
b	0.70	0.80	0.90
b1	1.10	1.27	1.45
C	0.40	0.52	0.60
C1	1.17	1.30	1.40
D	9.10	9.25	9.40
D1	1.00	1.10	1.30
D2	7.40	7.70	8.00
E	9.80	10.00	10.20
E1	7.60	7.80	8.00
e	2.54 BSC		
H	14.80	15.30	15.80
L	2.10	2.47	2.80
L1	1.30	1.50	1.70

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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.
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