BYV30B-600P

Ultrafast power diode

Rev.03 - 21 February 2024 Product data sheet

1. General description

Ultrafast diode in a TO263 (D2PAK) plastic package.

2. Features and benefits

- Very low on-state loss
- Fast switching
- Low leakage current
- Low thermal resistance

3. Applications

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

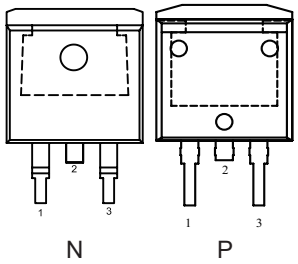
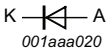
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Absolute maximum rating							
V_R	reverse voltage	DC		-	-	600	V
$I_{F(AV)}$	average forward current	δ = 0.5 ; square-wave pulse; $T_{mb} \leq 122$ °C; Fig. 1; Fig. 2; Fig. 3		-	-	30	A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; $T_{mb} \leq 122$ °C; square-wave pulse		-	-	60	A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; Fig. 4		-	-	290	A
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse		-	-	330	A
Static characteristics							
V_F	forward voltage	I_F = 30 A; T_j = 25 °C; Fig. 6		-	1.18	1.55	V
		I_F = 30 A; T_j = 150 °C; Fig. 6		-	0.98	1.35	V
Dynamic characteristics							
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 50 A/µs; T_j = 25 °C; Fig. 7		-	42	75	ns
		I_F = 30 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	65	-	ns
		I_F = 30 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	101	-	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	not connected	 N P	 001aaa020
2	K	cathode		
3	A	anode		
mb	mb	mounting base; connected to cathod		

[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
BYV30B-600P	TO263	BYV30B-600PJ	Reel	800	TO263N (N)	26-Sep-2016
					TO263P (P)	12-Jun-2023

7. Marking

Table 4. Marking codes

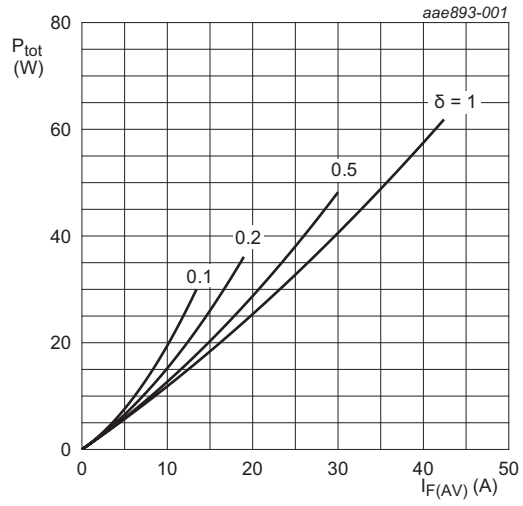
Type number	Marking codes	
	Assembly factory: N	Assembly factory: P
BYV30B-600P	BYV30B 600P PJNxxxx xx	BYV30B 600P PJPxxxx xx

8. Limiting values

Table 5. Limiting values

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

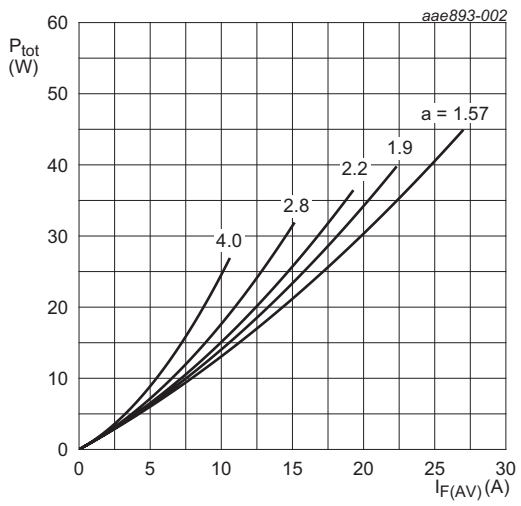
Symbol	Parameter	Conditions		Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	600	V
V_{RWM}	crest working reverse voltage			-	600	V
V_R	reverse voltage	DC		-	600	V
$I_{F(AV)}$	average forward current	δ = 0.5 ; square-wave pulse; $T_{mb} \leq 122$ °C; Fig. 1; Fig. 2; Fig. 3		-	30	A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; $T_{mb} \leq 122$ °C; square-wave pulse		-	60	A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; Fig. 4		-	290	A
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse		-	330	A
T_{stg}	storage temperature			-55	175	°C
T_j	junction temperature			-	175	°C



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

V_o = 1.098 V; R_s = 0.0085 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 = 1.098 V; R_s = 0.0085 Ω

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

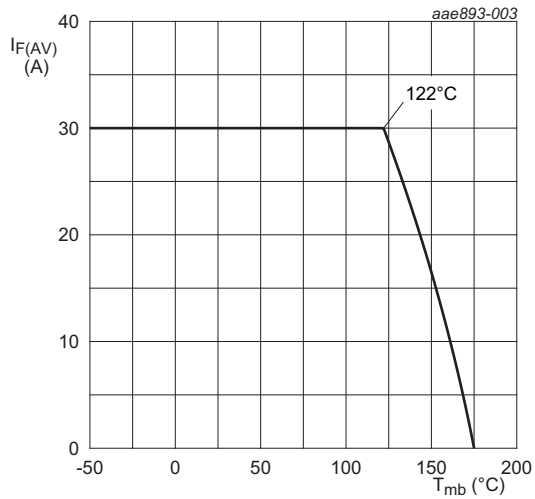


Fig. 3. Forward current as a function of mounting base temperature; maximum values

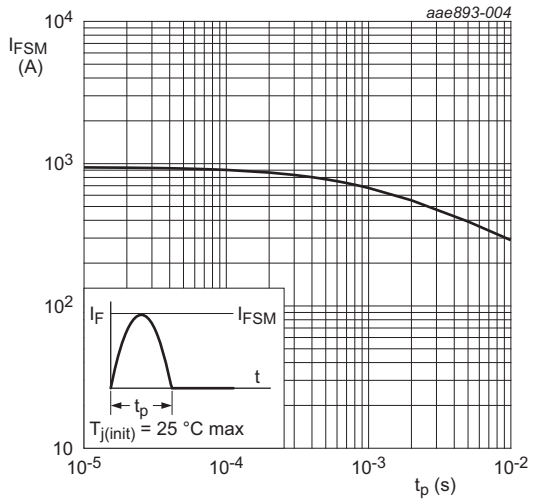


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 5		-	-	1.1	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	50	-	K/W

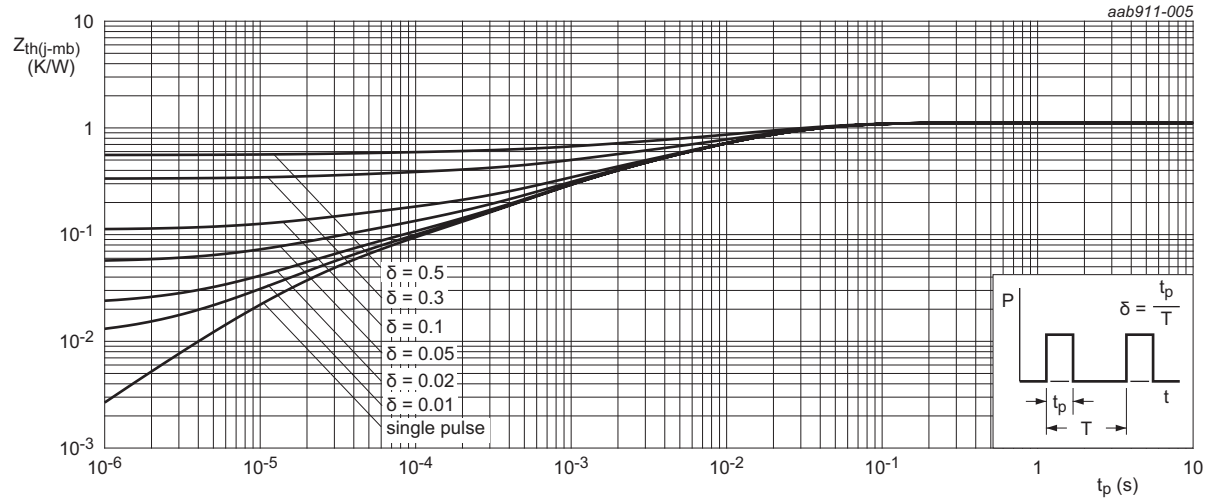
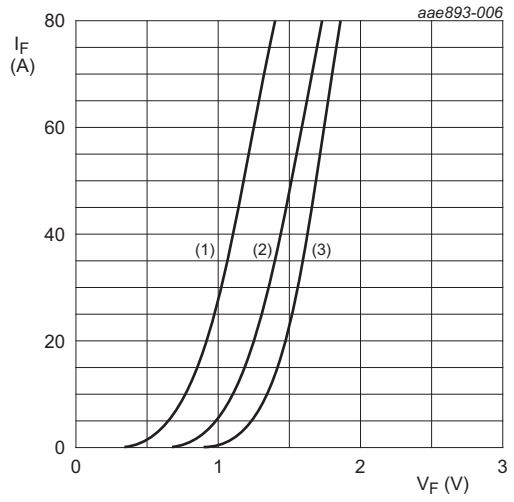


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V_F	forward current	I_F = 30 A; T_j = 25 °C; Fig. 6		-	1.18	1.55	V
		I_F = 30 A; T_j = 150 °C; Fig. 6		-	0.98	1.35	V
I_R	reverse current	V_R = 600 V; T_j = 25 °C		-	2	10	µA
		V_R = 600 V; T_j = 125 °C		-	-	500	µA
Dynamic characteristics							
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 50 A/µs; T_j = 25 °C; Fig. 7		-	42	75	ns
		I_F = 30 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	65	-	ns
		I_F = 30 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	101	-	ns
I_{RM}	peak reverse recovery current	I_F = 30 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	8.4	-	A
		I_F = 30 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	15.2	-	A
Q_r	reverse charge	I_F = 30 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	272	-	nC
		I_F = 30 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	775	-	nC



V_o = 1.098 V; R_s = 0.0085 Ω
(1) T_j = 150 °C; typical values
(2) T_j = 150 °C; maximum values
(3) T_j = 25 °C; maximum values

Fig. 6. Forward current as a function of forward voltage

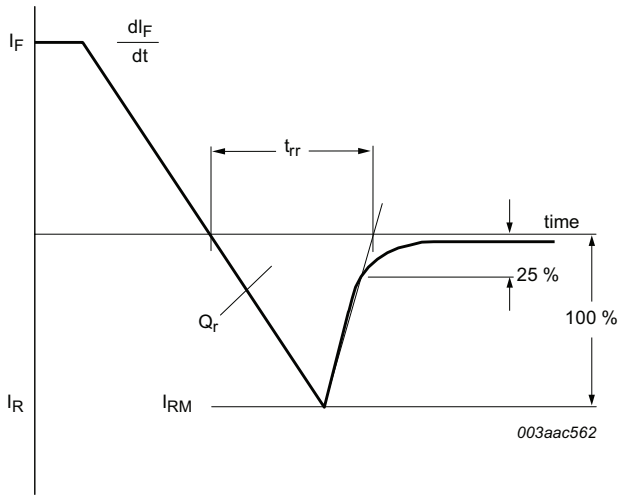
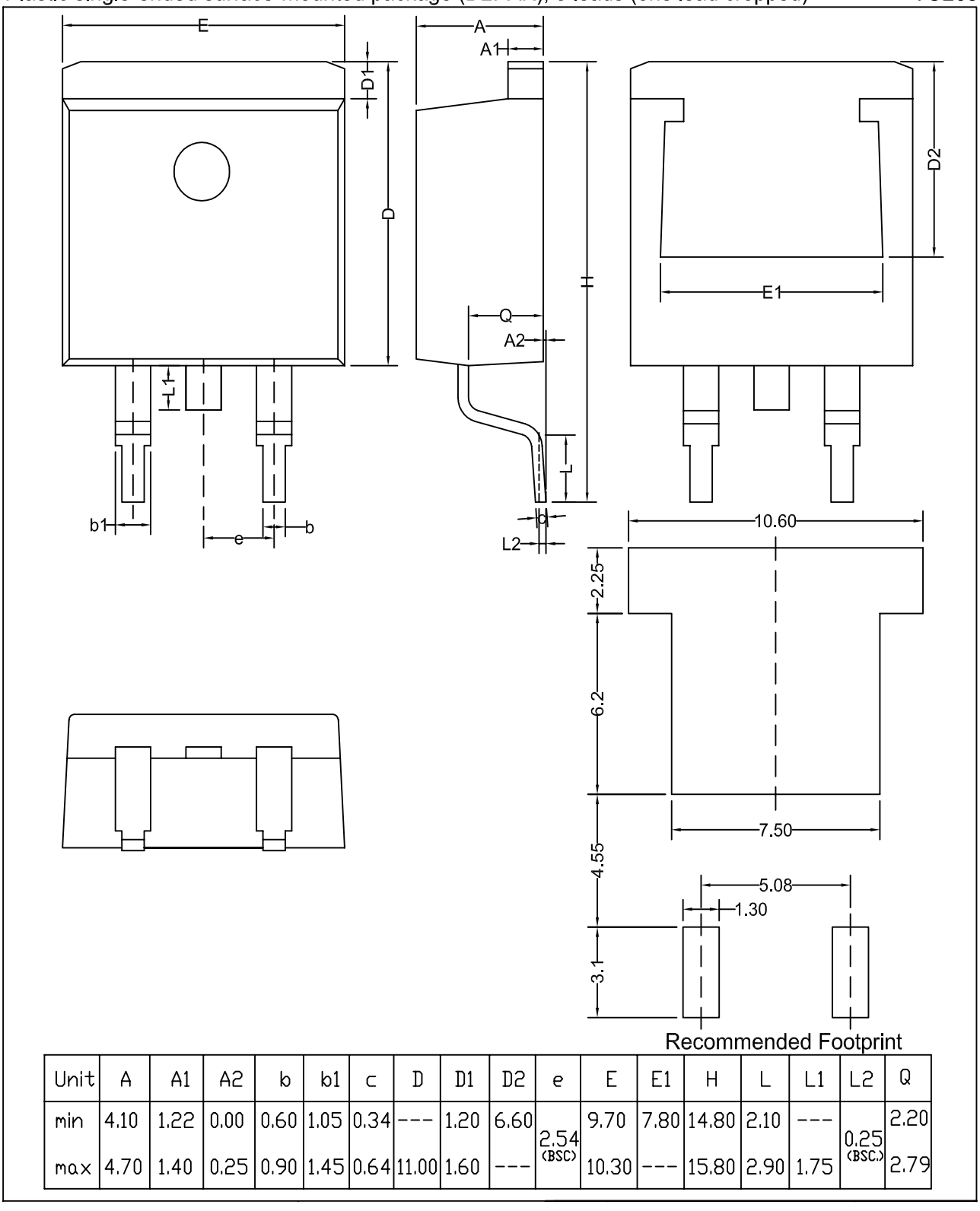


Fig. 7. Reverse recovery definitions; ramp recovery

11. Package outline

Assembly factory: N

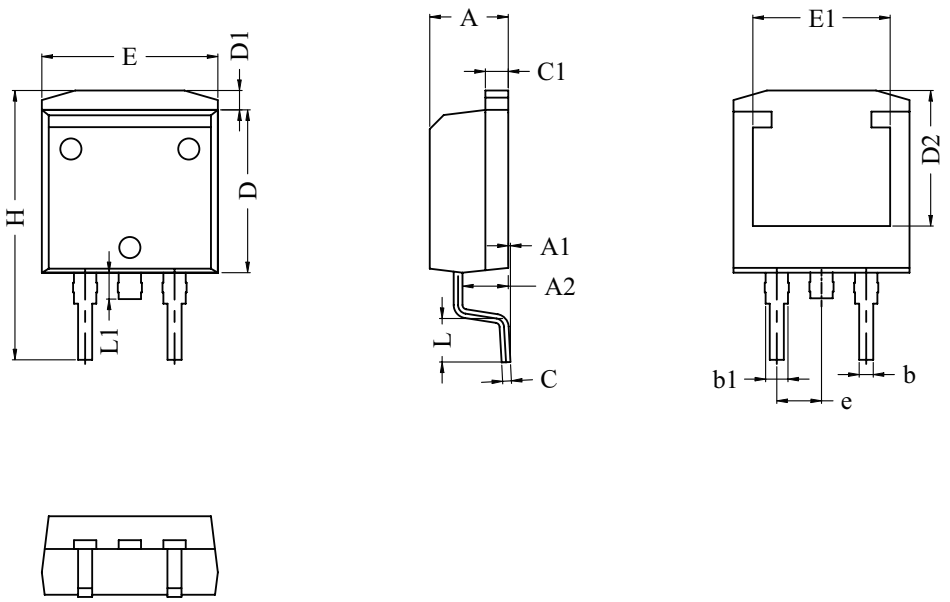
Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped) TO263



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.
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13. Contents

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