BYW29ED-200

Ultrafast power diode

26 September 2018 Product data sheet

1. General description

Ultrafast, epitaxial rectifier diode in a SOT428 (DPAK) surface-mountable package.

2. Features and benefits

- Low forward voltage drop
- Fast switching
- Soft recovery characteristic
- Surface-mountable package
- High thermal cycling performance
- Low thermal resistance

3. Applications

- High-frequency switched-mode power supplies
- Low loss rectification

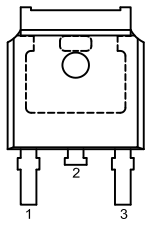
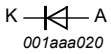
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_R	reverse voltage	DC		-	-	200	V
V_{RRM}	repetitive peak reverse voltage			-	-	200	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 128$ °C; square-wave pulse; Fig. 1; Fig. 2		-	-	8	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; with reapplied $V_{RRM(Max)}$		-	-	80	A
Static characteristics							
V_F	forward voltage	$I_F = 8$ A; $T_j = 25$ °C; Fig. 5		-	0.92	1.05	V
		$I_F = 20$ A; $T_j = 25$ °C; Fig. 5		-	1.1	1.3	V
		$I_F = 8$ A; $T_j = 150$ °C; Fig. 5		-	0.8	0.895	V
Dynamic characteristics							
t_{rr}	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 100$ A/µs; $T_j = 25$ °C; ramp recovery; Fig. 6; Fig. 7; Fig. 8		-	20	25	ns
		step recovery; when switched from $I_F = 0.5$ A to $I_R = 1$ A measured at $I_R = 0.25$ A		-	15	20	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	no connection	 DPAK (SOT428)	
2	K	cathode[1]		
3	A	anode		
mb	K	mounting base; cathode		

[1] it is not possible to make connection with Pin 2 of the SOT428 package

6. Ordering information

Table 3. Ordering information

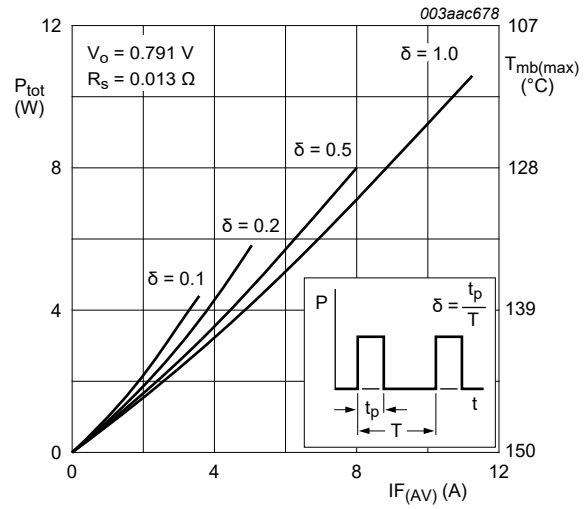
Type number	Package		
	Name	Description	Version
BYW29ED-200	DPAK	plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)	SOT428

7. Limiting values

Table 4. Limiting values

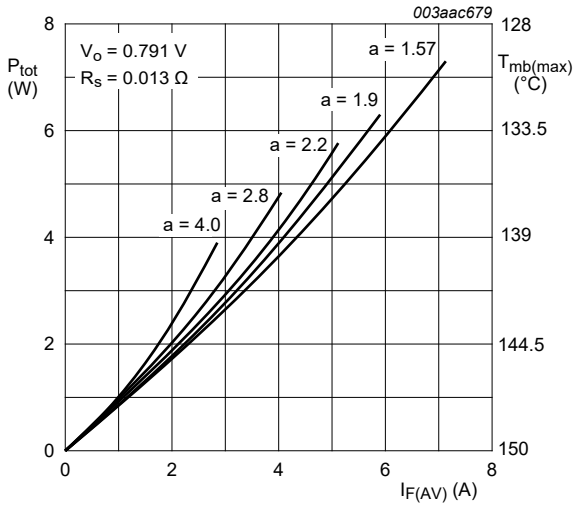
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	200	V
V_{RWM}	crest working reverse voltage			-	200	V
V_R	reverse voltage	DC		-	200	V
$I_{F(AV)}$	average forward current	δ = 0.5 ; $T_{mb} \leq$ 128 °C; square-wave pulse; Fig. 1; Fig. 2		-	8	A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; $T_{mb} \leq$ 128 °C		-	16	A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; with reapplied $V_{RRM(Max)}$		-	80	A
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; with reapplied $V_{RRM(Max)}$		-	88	A
I_{RRM}	repetitive peak reverse current	δ = 0.001 ; t_p = 2 µs		-	0.2	A
I_{RSM}	non-repetitive peak reverse current	t_p = 100 µs		-	0.2	A
T_{stg}	storage temperature			-40	150	°C
T_j	junction temperature			-	150	°C
V_{ESD}	electrostatic discharge voltage	C = 250 pF; R = 1.5 kΩ; all pins; human body model		-	8	kV



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

Fig. 1. Total power dissipation and permissible mounting base temperature as a function of average forward current; square waveform; maximum values



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

Fig. 2. Total power dissipation and permissible mounting base temperature 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	with heatsink compound; Fig. 3		-	-	2.7	K/W
$R_{th(j\text{-}a)}$	thermal resistance from junction to ambient free air	in free air; Fig. 4	[1]	-	50	-	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin plated and standard footprint

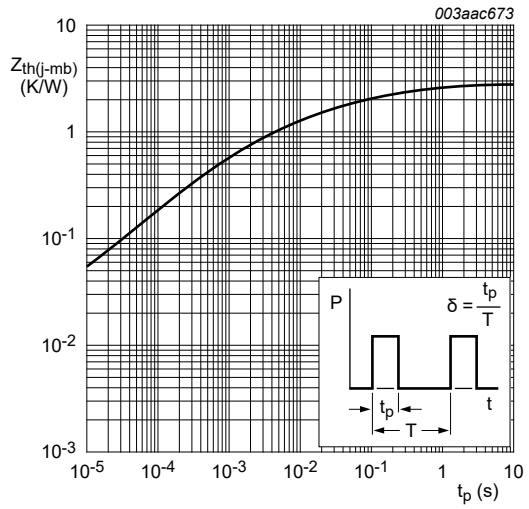


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse width

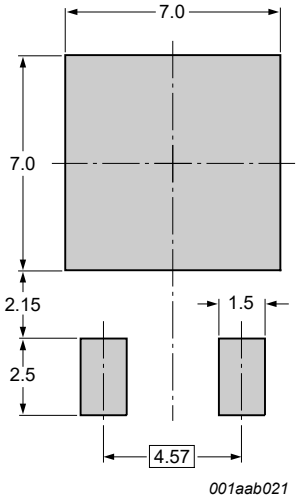
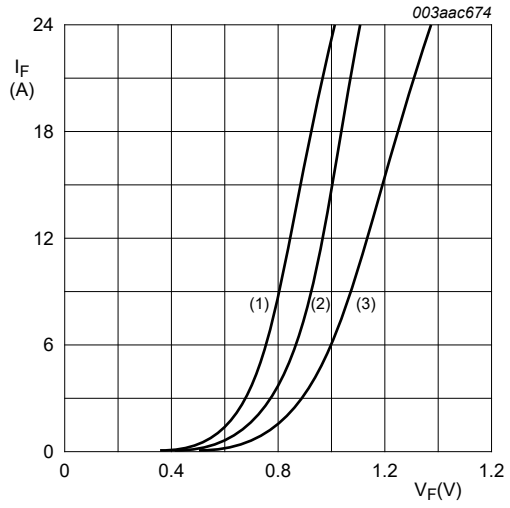


Fig. 4. SOT428: minimum pad sizes for surface-mounting

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V_F	forward voltage	I_F = 8 A; T_j = 25 °C; Fig. 5		-	0.92	1.05	V
		I_F = 20 A; T_j = 25 °C; Fig. 5		-	1.1	1.3	V
		I_F = 8 A; T_j = 150 °C; Fig. 5		-	0.8	0.895	V
I_R	reverse current	V_R = 200 V; T_j = 25 °C		-	2	10	µA
		V_R = 200 V; T_j = 100 °C		-	0.2	0.6	mA
Dynamic characteristics							
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/µs; T_j = 25 °C; ramp recovery; Fig. 6; Fig. 7; Fig. 8		-	20	25	ns
		step recovery; when switched from I_F = 0.5 A to I_R = 1 A measured at I_R = 0.25 A		-	15	20	ns
I_{RM}	peak reverse recovery current	I_F = 10 A; V_R = 30 V; dI_F/dt = 50 A/µs; T_j = 25 °C; Fig. 9		-	-	1.8	A
Q_r	recovered charge	I_F = 2 A; V_R = 30 V; dI_F/dt = 20 A/µs; T_j = 25 °C; Fig. 10		-	4	11	nC
V_{FR}	forward recovery voltage	I_F = 1 A; dI_F/dt = 10 A/µs; Fig. 11		-	1	-	V



V_o = 0.791 V; R_s = 0.013 Ω
(1) T_j = 150 °C; typical values
(2) T_j = 150 °C; maximum values
(3) T_j = 25 °C; maximum values

Fig. 5. Forward current as a function of forward voltage

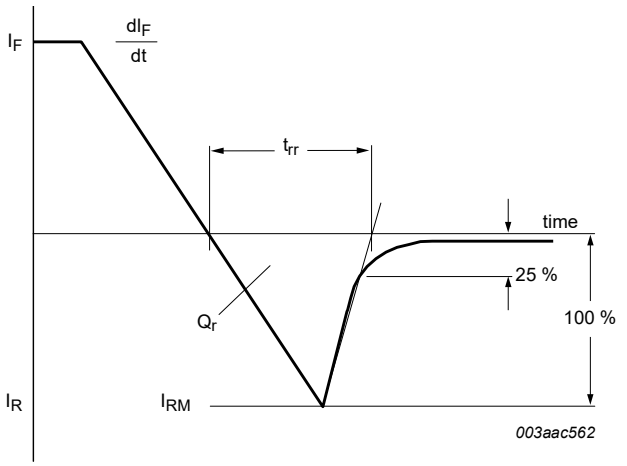


Fig. 6. Reverse recovery definitions; ramp recovery

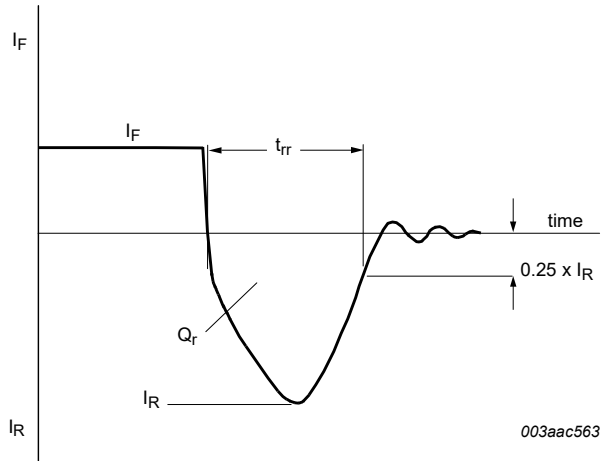
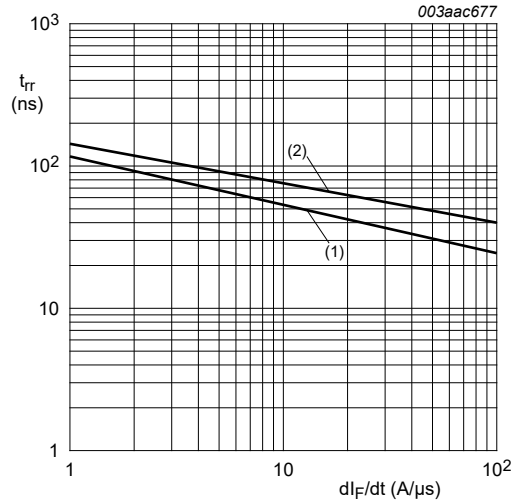
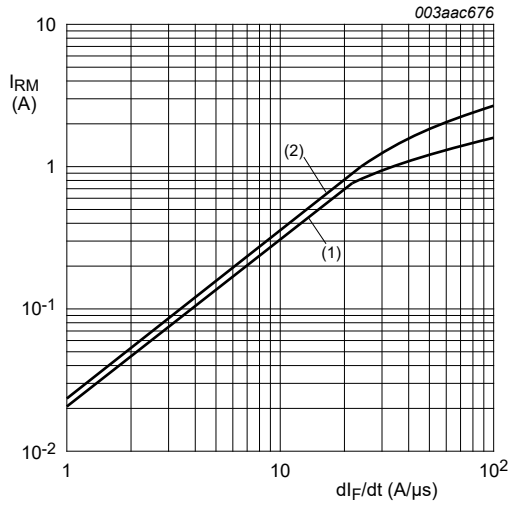


Fig. 7. Reverse recovery definitions; step recovery



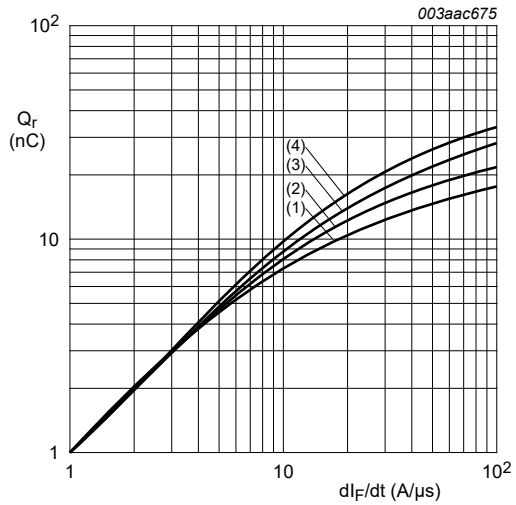
(1) I_F = 1 A
(2) I_F = 10 A

Fig. 8. Reverse recovery time as a function of rate of change of forward current and initial forward current; maximum values



(1) I_F = 1 A
(2) I_F = 10 A

Fig. 9. Peak reverse recovery current as a function of rate of change of forward current and initial forward current; maximum values



(1) I_F = 1 A
(2) I_F = 2 A
(3) I_F = 5 A
(4) I_F = 10 A

Fig. 10. Recovered charge as a function of rate of change of forward current; maximum values

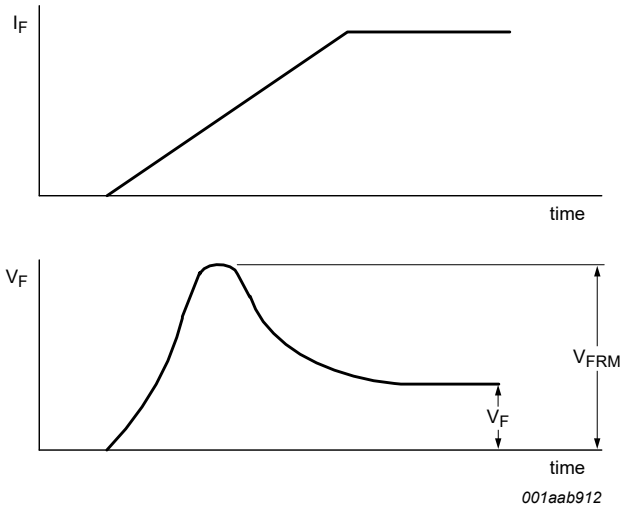
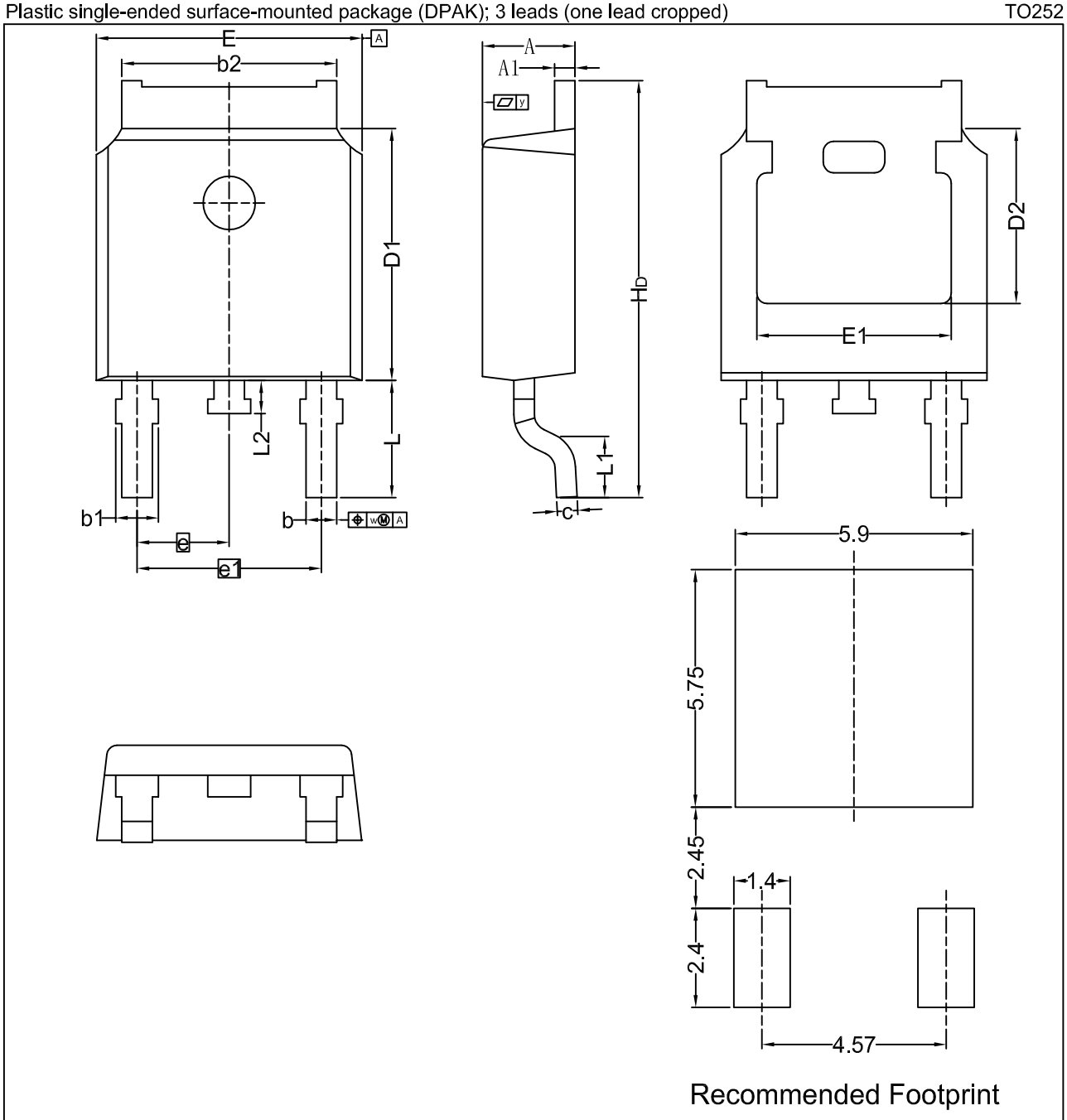


Fig. 11. Forward recovery definitions

10. Package outline

Plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped) TO252



Unit	A	A1	b	b1	b2	c	D1	D2	E	E1	e	e1	H_D	L	L1	L2	w	y
min	2.22	0.46	0.71	0.72	5.00	0.20	5.98	4.00	6.47	4.45	2.285	4.57	9.60	2.90 (Ref.)	0.50	0.50	0.20	
mm nom																		
max	2.38	0.93	0.89	1.10	5.46	0.56	6.22	---	6.73	---			10.40		---	0.90		0.20

Fig. 12. Package outline DPAK (SOT428)

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Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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