BYV29FD-600

Enhanced ultrafast power diode

Rev.03 - 22 November 2017 Product data sheet

1. General description

Enhanced ultrafast power diode in a TO252 (DPAK) surface-mountable plastic package.

2. Features and benefits

- High thermal cycling performance
- Low on-state losses
- Low thermal resistance
- Soft recovery characteristic
- Surface-mountable package

3. Applications

- Dual mode (DCM and CCM) Power Factor Correction (PFC)
- Power Factor Correction (PFC) for Interleaved Topology
- U-inverter (DC-AC converter for individual solar panels)

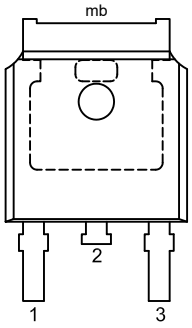
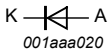
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_R	reverse voltage	DC		-	-	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 115$ °C; square-wave pulse; Fig. 1; Fig. 2		-	-	9	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ µs; $T_{mb} \leq 115$ °C; square-wave pulse		-	-	18	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; Fig. 3		-	-	91	A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; Fig. 3		-	-	100	A
Static characteristics							
V_F	forward voltage	$I_F = 8$ A; $T_j = 25$ °C; Fig. 5		-	1.45	1.9	V
		$I_F = 8$ A; $T_j = 150$ °C		-	1.25	1.7	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; Fig. 6		-	17.5	35	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	not connected	 DPAK (TO252N)	
2	K	cathode[1]		
3	A	anode		
mb	K	mounting base; connected to cathode		

[1] It is not possible to connect to pin 2 of the SOT428 package.

6. Ordering information

Table 3. Ordering information

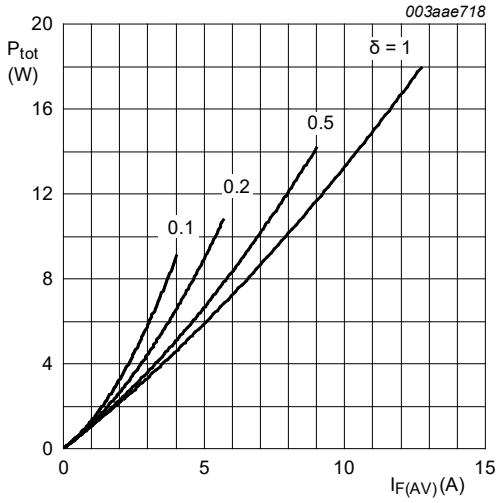
Type number	Package		
	Name	Description	Version
BYV29FD-600	DPAK	plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)	TO252N

7. Limiting values

Table 4. Limiting values

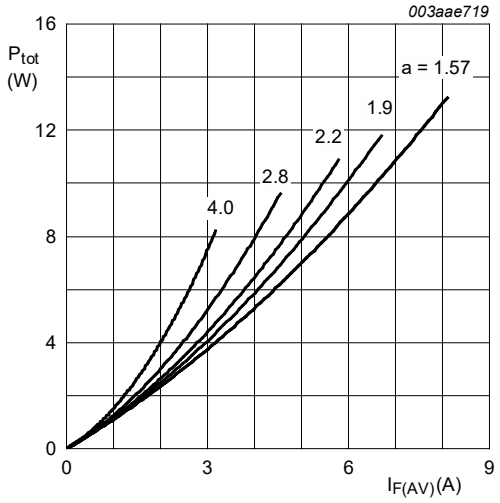
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	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 ; T_{mb} ≤ 115 °C; square-wave pulse; Fig. 1; Fig. 2		-	9	A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; T_{mb} ≤ 115 °C; square-wave pulse		-	18	A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; Fig. 3		-	91	A
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; Fig. 3		-	100	A
T_{stg}	storage temperature			-40	150	°C
T_j	junction temperature			-	150	°C



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

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



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

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

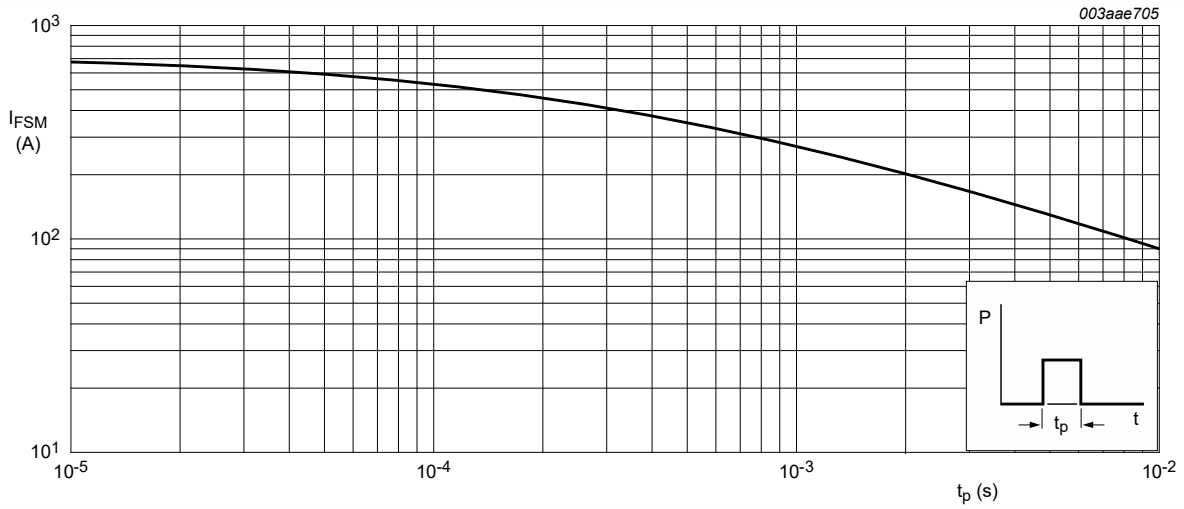


Fig. 3. Non-repetitive peak forward current as a function of pulse width; square waveform; maximum values

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. 4		-	-	2.5	K/W
$R_{th(j\text{-}a)}$	thermal resistance from junction to ambient free air	in free air		-	60	-	K/W

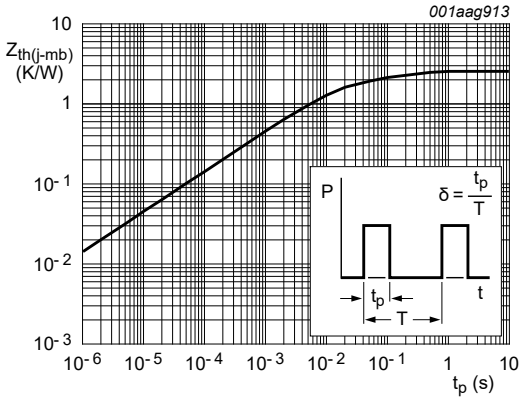
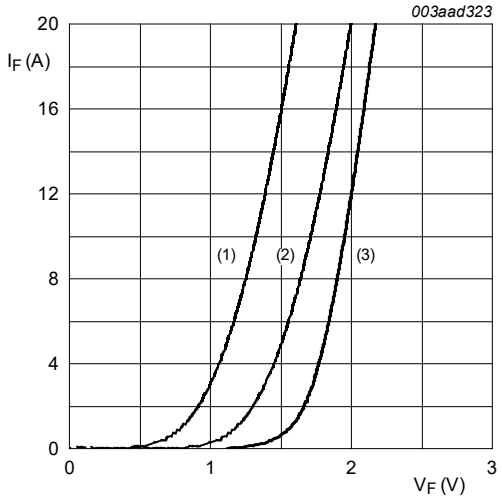


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse width

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V_F	forward voltage	I_F = 8 A; T_j = 25 °C; Fig. 5		-	1.45	1.9	V
		I_F = 8 A; T_j = 150 °C		-	1.25	1.7	V
I_R	reverse current	V_R = 600 V; T_j = 100 °C		-	-	1.5	mA
		V_R = 600 V; T_j = 25 °C		-	-	50	µA
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; Fig. 6		-	17.5	35	ns
I_{RM}	peak reverse recovery current	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/µs; Fig. 6		-	1.5	-	A
Q_r	recovered charge			-	13	-	nC
V_{FR}	forward recovery voltage	I_F = 1 A; dI_F/dt = 100 A/µs; Fig. 6		-	3.2	-	V



(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

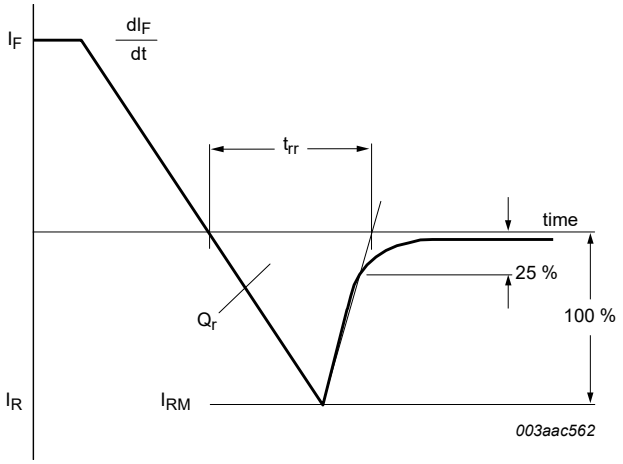
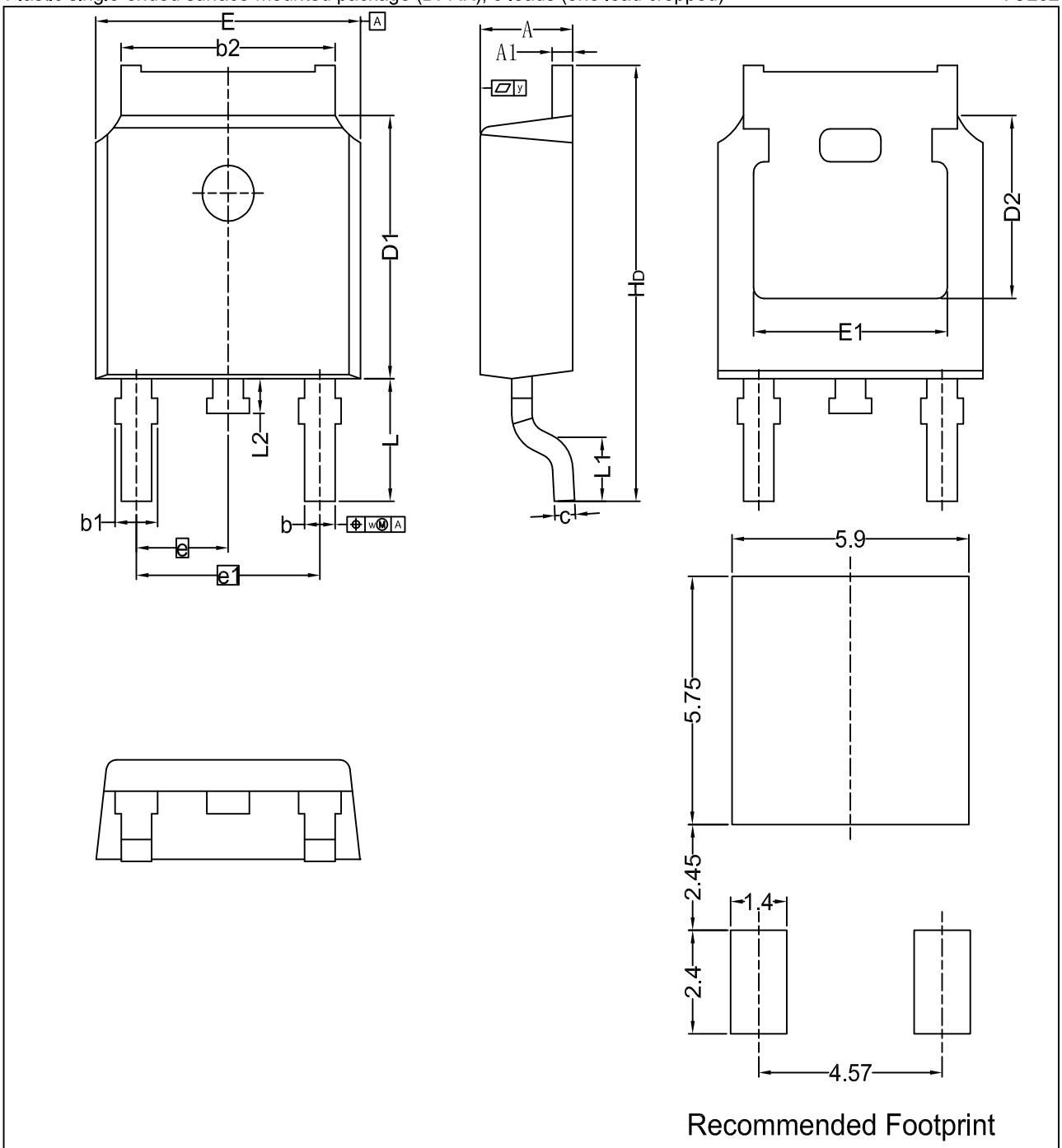


Fig. 6. Reverse recovery definitions; ramp recovery

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. 7. Package outline DPAK (TO252N)

11. Revision history

Table 6. Revision history

Document ID	Date	Changes
BYV29FD-600 Rev.01	20110307	• Initial release
BYV29FD-600 Rev.02	20170815	• The format of this data sheet has been redesigned to comply with the new identity guidelines of WeEn Semiconductors. • Legal texts have been adapted to the new company name where appropriate. • Update "Package outline" due to subcon transfer.
BYV29FD-600 Rev.03	20171122	• Add version number and revision history on this datasheet. • Update "SOT428" to "TO252" on "General description" section.

12. 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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.
[2] The term 'short data sheet' is explained in section "Definitions".
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