



BYV10ED-600P

Ultrafast power diode

24 July 2015

Product data sheet

1. General description

Enhanced ultrafast power diode in a SOT428 (DPAK) plastic package.

2. Features and benefits

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

3. Applications

- Dual Mode (DCM and CCM) PFC
- Power Factor Correction (PFC) for Interleaved Topology

4. Quick reference data

Table 1. Quick reference data

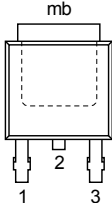
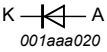
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V _{RRM}	repetitive peak reverse voltage			-	-	600	V
I _{F(AV)}	average forward current	δ = 0.5 ; T _{mb} ≤ 118 °C; Square-wave pulse; Fig. 1 ; Fig. 2 ; Fig. 3		-	-	10	A
I _{FRM}	repetitive peak forward current	δ = 0.5 ; t _p = 25 μs; T _{mb} ≤ 118 °C; Square-wave pulse		-	-	20	A
I _{FSM}	non-repetitive peak forward current	t _p = 10 ms; T _{j(initial)} = 25 °C; SIN; Fig. 4		-	-	70	A
		t _p = 8.3 ms; T _{j(initial)} = 25 °C; SIN; Fig. 4		-	-	80	A
Static characteristics							
V _F	forward voltage	I _F = 10 A; T _j = 25 °C; Fig. 6		-	1.5	2	V
		I _F = 10 A; T _j = 150 °C; Fig. 6		-	-	1.6	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		-	35	50	ns



Symbol	Parameter	Conditions	Min	Typ	Max	Unit
		$I_F = 10\text{ A}$; $V_R = 200\text{ V}$; $di_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 25\text{ }^\circ\text{C}$; Fig. 7	-	50	-	ns
		$I_F = 10\text{ A}$; $V_R = 200\text{ V}$; $di_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 125\text{ }^\circ\text{C}$; Fig. 7	-	78	-	ns
Avalanche energy						
E_{AS}	non-repetitive avalanche energy	$I_R = 2.6\text{ A}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; $L = 15\text{ mH}$	-	50	-	mJ

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	not connected	 DPAK (SOT428)	
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
BYV10ED-600P	DPAK	plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)	SOT428

7. Marking

Table 4. Marking codes

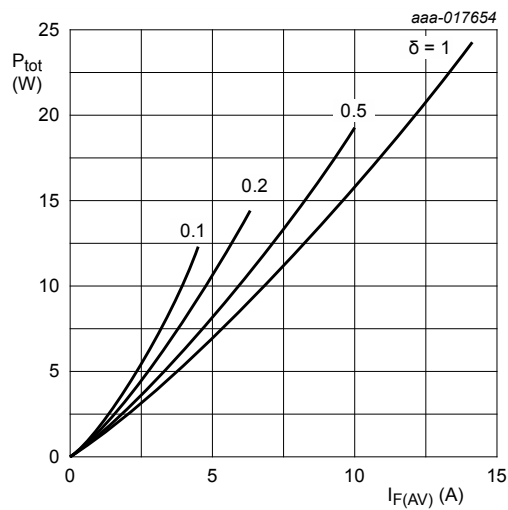
Type number	Marking code
BYV10ED-600P	BYV10ED-600P

8. Limiting values

Table 5. Limiting values

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

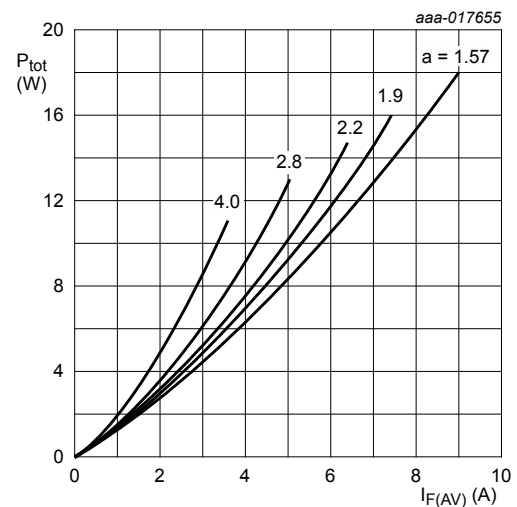
Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	600	V
V_{RWM}	crest working reverse voltage		-	600	V
V_R	reverse voltage	DC	-	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 118^\circ\text{C}$; Square-wave pulse; Fig. 1 ; Fig. 2 ; Fig. 3	-	10	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 118^\circ\text{C}$; Square-wave pulse	-	20	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25^\circ\text{C}$; SIN; Fig. 4	-	70	A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25^\circ\text{C}$; SIN; Fig. 4	-	80	A
T_{stg}	storage temperature		-40	175	$^\circ\text{C}$
T_j	junction temperature		-	175	$^\circ\text{C}$



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

$$V_o = 1.241\text{ V}; R_s = 0.034\text{ }\Omega$$

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



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

$$V_o = 1.241\text{ V}; R_s = 0.034\text{ }\Omega$$

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

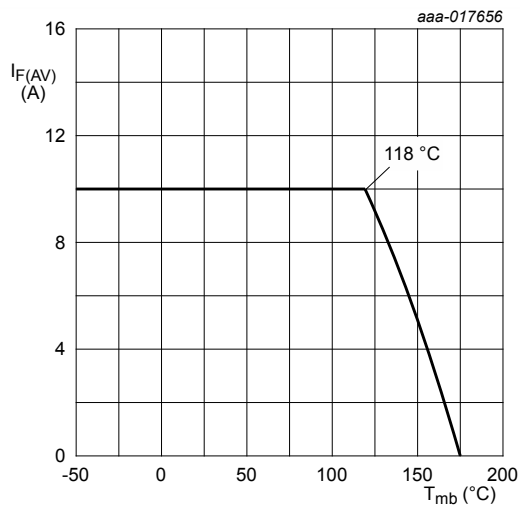


Fig. 3. Forward current as a function of mounting base temperature; maximum values

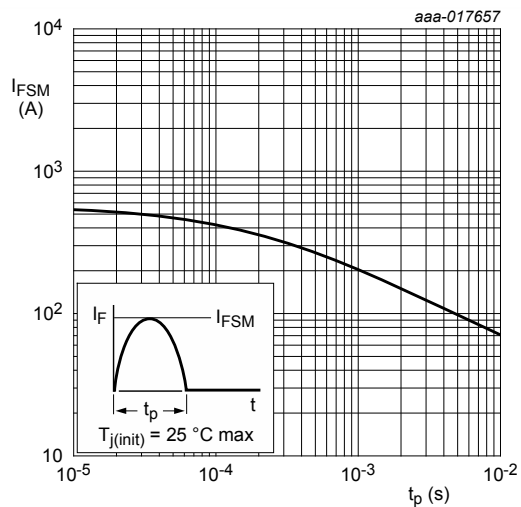


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

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	With heatsink compound; Fig. 5		-	-	3	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	50	-	K/W

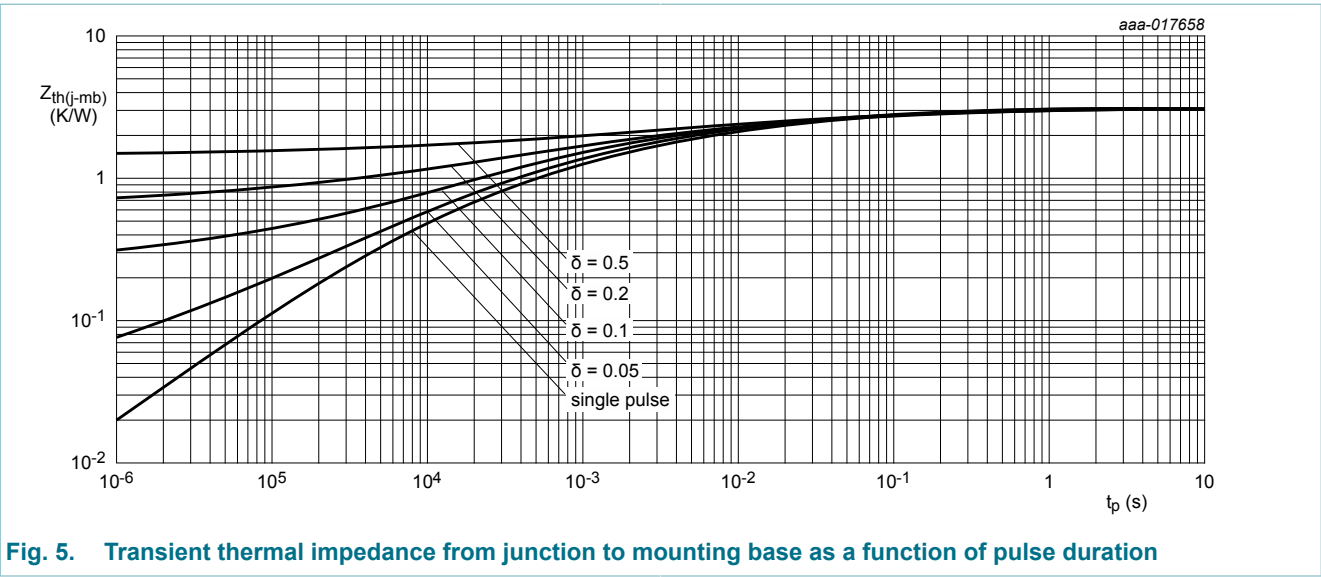
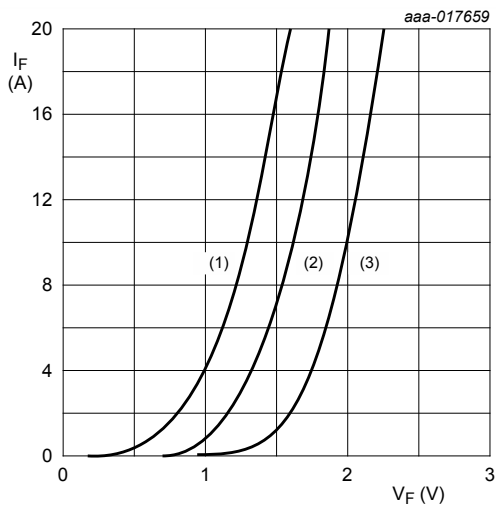


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V _F	forward voltage	I _F = 10 A; T _j = 25 °C; Fig. 6		-	1.5	2	V
		I _F = 10 A; T _j = 150 °C; Fig. 6		-	-	1.6	V
I _R	reverse current	V _R = 600 V; T _j = 25 °C		-	-	10	μA
		V _R = 600 V; T _j = 150 °C		-	-	500	μA
Dynamic characteristics							
Q _r	recovered charge	I _F = 10 A; V _R = 200 V; dI _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	123	-	nC
		I _F = 10 A; V _R = 200 V; dI _F /dt = 200 A/μs; T _j = 125 °C; Fig. 7		-	305	-	nC
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		-	35	50	ns
		I _F = 10 A; V _R = 200 V; dI _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	50	-	ns
		I _F = 10 A; V _R = 200 V; dI _F /dt = 200 A/μs; T _j = 125 °C; Fig. 7		-	78	-	ns
I _{RM}	peak reverse recovery current	I _F = 10 A; V _R = 200 V; dI _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	4.9	-	A
		I _F = 10 A; V _R = 200 V; dI _F /dt = 200 A/μs; T _j = 125 °C; Fig. 7		-	7.8	-	A
Avalanche energy							
E _{AS}	non-repetitive avalanche energy	I _R = 2.6 A; T _{j(init)} = 25 °C; L = 15 mH		-	50	-	mJ



$V_o = 1.241\text{ V}; R_s = 0.034\ \Omega$

- (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. 6. Forward current as a function of forward voltage

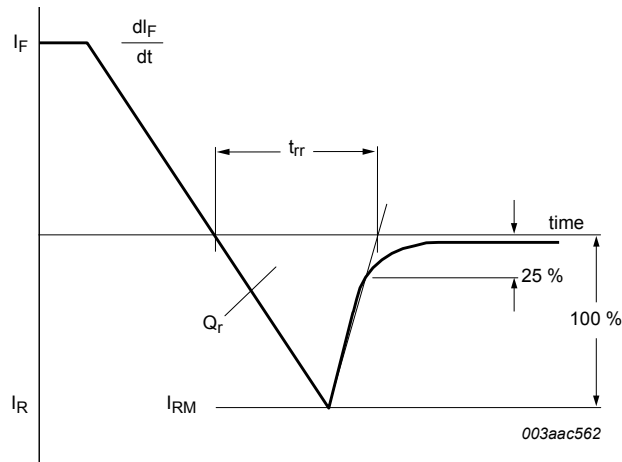


Fig. 7. Reverse recovery definitions; ramp recovery

11. Package outline

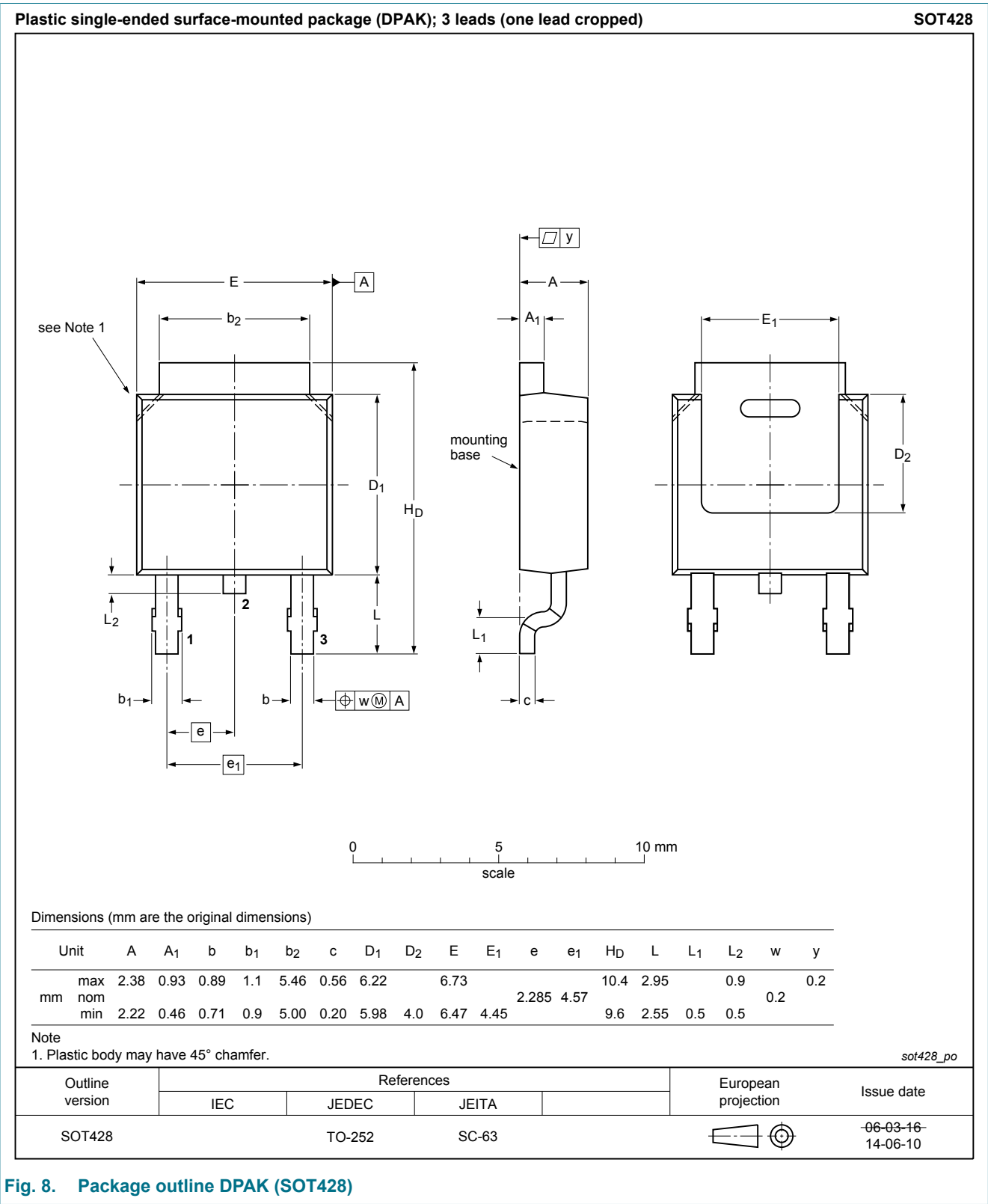


Fig. 8. Package outline DPAK (SOT428)

12. Legal information

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Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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- [2] The term 'short data sheet' is explained in section "Definitions".
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Date of release: 24 July 2015

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Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru

moschip.ru_4

moschip.ru_6

moschip.ru_9