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; $T_{j(init)}$ = 25 °C; SIN; Fig. 4		-	-	70	A
		t_p = 8.3 ms; $T_{j(init)}$ = 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

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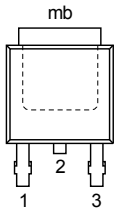
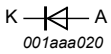
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
		I_F = 10 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	50	-	ns
		I_F = 10 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	78	-	ns
Avalanche energy							
E_{AS}	non-repetitive avalanche energy	I_R = 2.6 A; $T_{j(init)}$ = 25 °C; L = 15 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

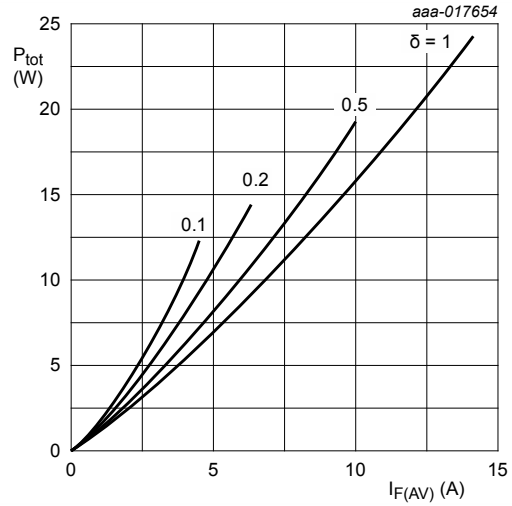
Type number	Marking code
BYV10ED-600P	BYV10ED-600P

8. Limiting values

Table 5. Limiting values

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

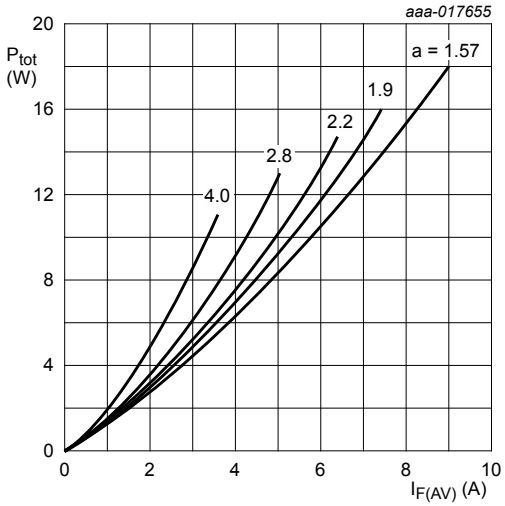
Symbol	Parameter	Conditions		Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	600	V
V_{RWM}	crest working reverse voltage			-	600	V
V_R	reverse voltage	DC		-	600	V
$I_{F(AV)}$	average forward current	δ = 0.5 ; T_{mb} ≤ 118 °C; Square-wave pulse; Fig. 1; Fig. 2; Fig. 3		-	10	A
I_{FRM}	repetitive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



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

V_o = 1.241 V; R_s = 0.034 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 = 1.241 V; R_s = 0.034 Ω

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

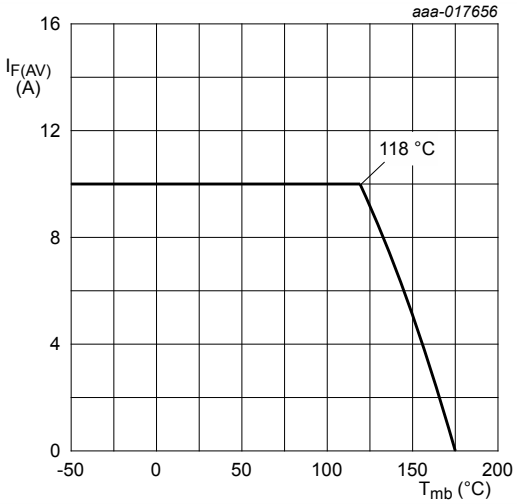


Fig. 3. Forward current as a function of mounting base temperature; maximum values

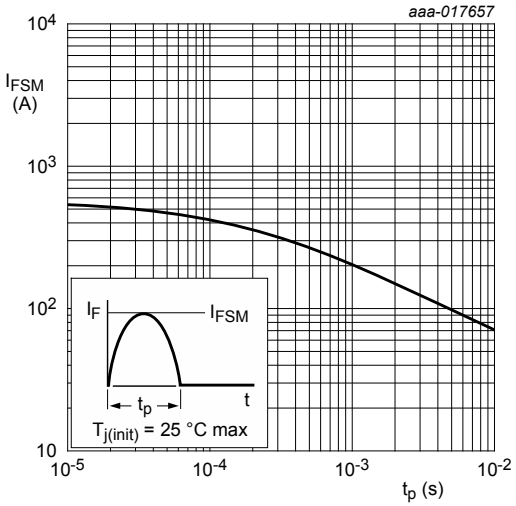


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

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	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

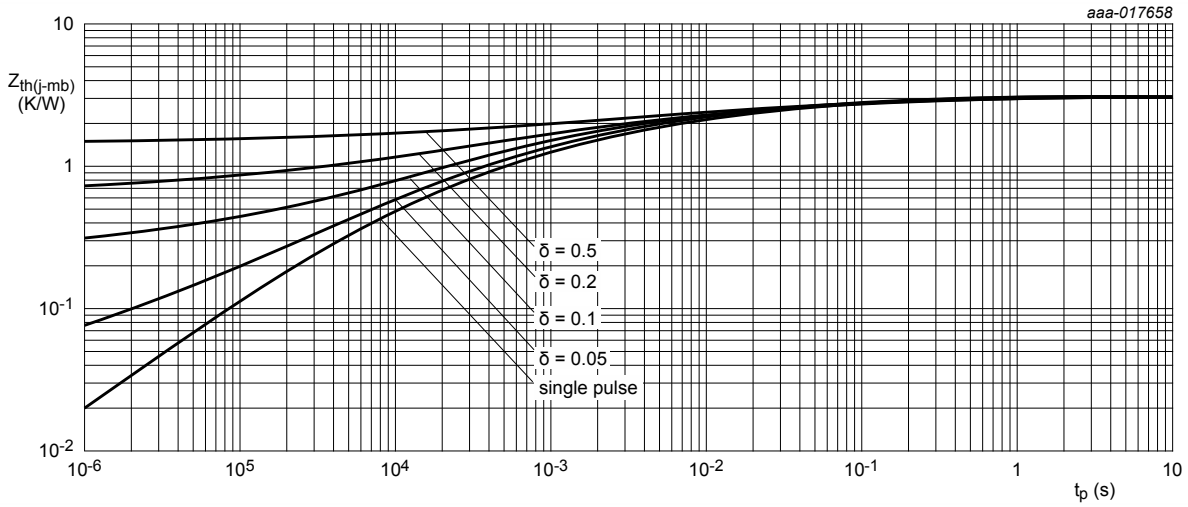
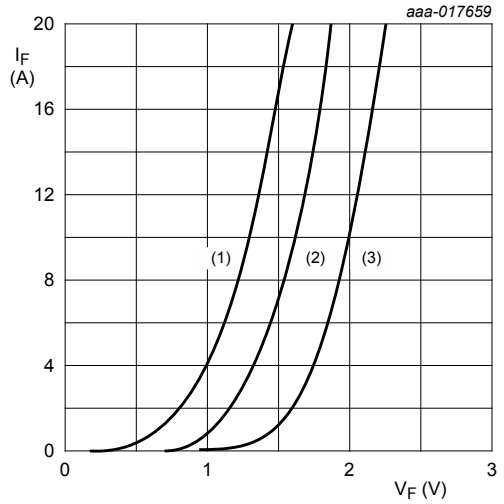


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

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 V; R_s = 0.034 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

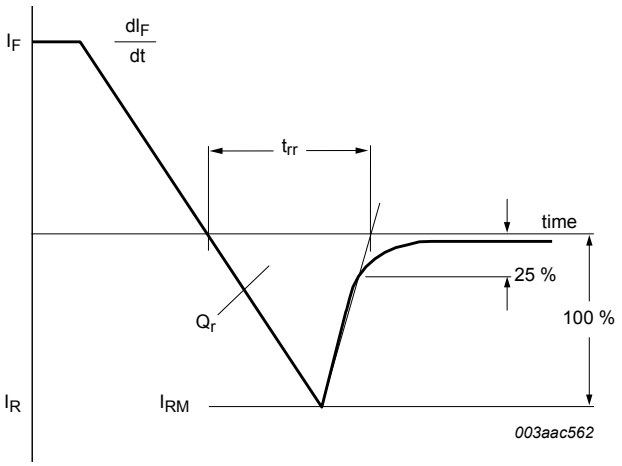
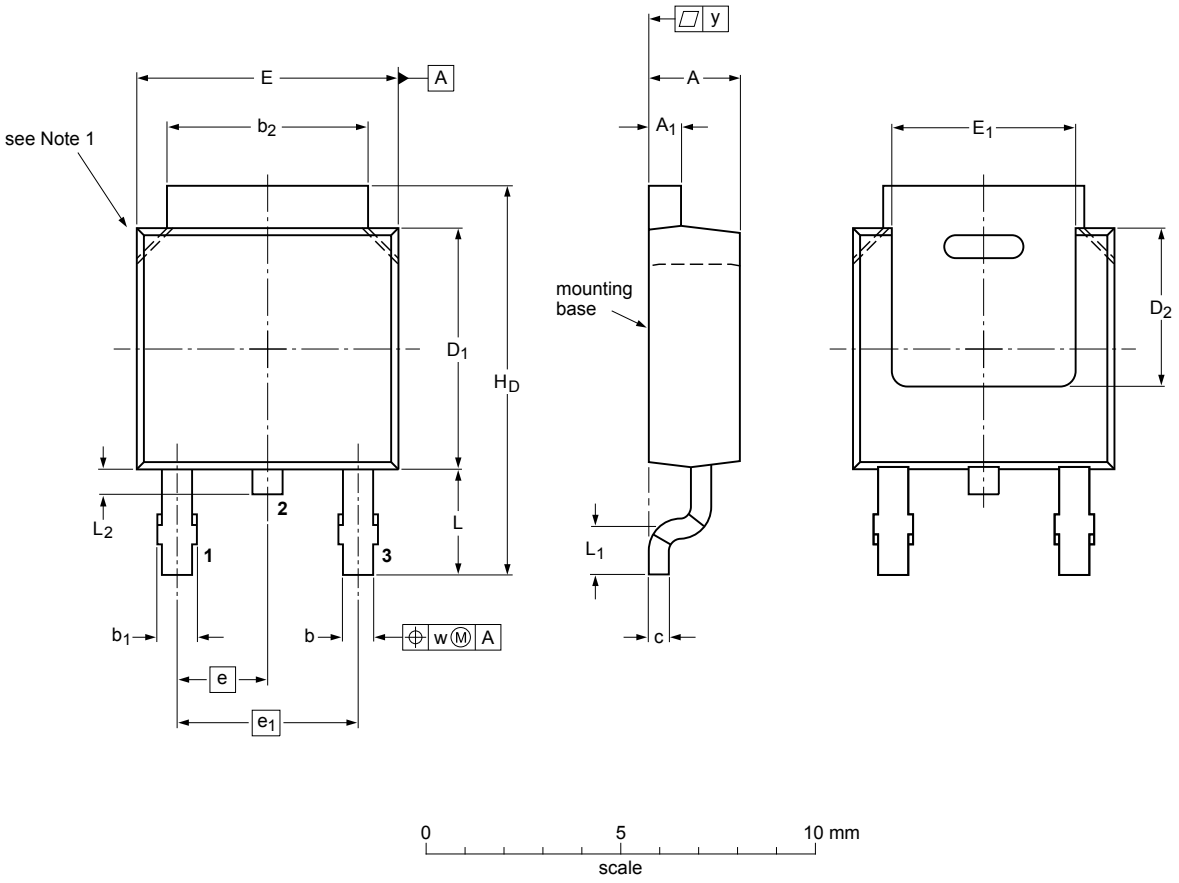


Fig. 7. Reverse recovery definitions; ramp recovery

11. Package outline

Plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped) **SOT428**



Dimensions (mm are the original dimensions)

Unit		A	A_1	b	b_1	b_2	c	D_1	D_2	E	E_1	e	e_1	H_D	L	L_1	L_2	w	y
mm	max	2.38	0.93	0.89	1.1	5.46	0.56	6.22		6.73				10.4	2.95		0.9		0.2
	nom											2.285	4.57					0.2	
	min	2.22	0.46	0.71	0.9	5.00	0.20	5.98	4.0	6.47	4.45			9.6	2.55	0.5	0.5		

Note
1. Plastic body may have 45° chamfer.

sot428_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT428		TO-252	SC-63			~~06-03-16~~ 14-06-10

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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