

BYV25FD-600

Enhanced ultrafast power diode

Rev. 1 — 1 October 2010

Product data sheet

1. Product profile

1.1 General description

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

1.2 Features and benefits

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

1.3 Applications

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

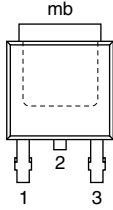

1.4 Quick reference data

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	square-wave pulse; $\delta = 0.5$; $T_{mb} \leq 121\text{ °C}$; see Figure 1 ; see Figure 2	-	-	5	A
Static characteristics						
V_F	forward voltage	$I_F = 5\text{ A}$; $T_j = 25\text{ °C}$; see Figure 5	-	1.3	1.9	V
		$I_F = 5\text{ A}$; $T_j = 150\text{ °C}$; see Figure 5	-	1.1	1.7	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1\text{ A}$; $V_R = 30\text{ V}$; $di_F/dt = 100\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; see Figure 6	-	17.5	35	ns

2. Pinning information

Table 2. Pinning information

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

SOT428 (DPAK)

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

3. Ordering information

Table 3. Ordering information

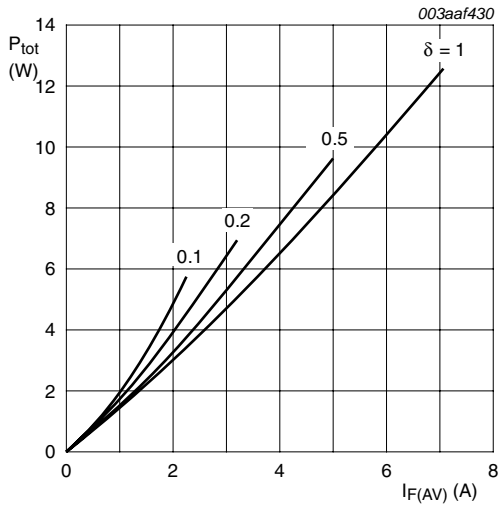
Type number	Package		Version
	Name	Description	
BYV25FD-600	DPAK	plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)	SOT428

4. Limiting values

Table 4. Limiting values

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

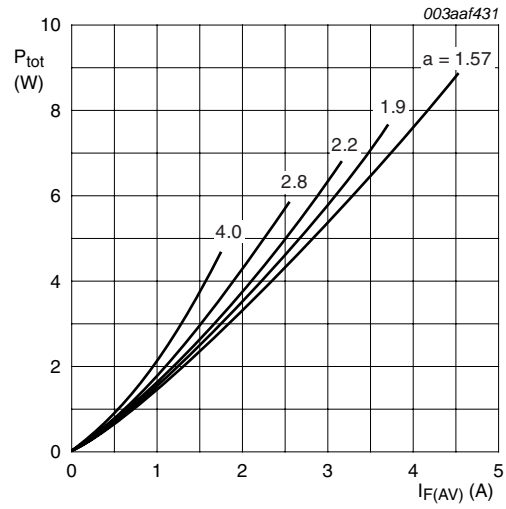
Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	600	V
V_{RWM}	crest working reverse voltage		-	600	V
V_R	reverse voltage	DC	-	600	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$; $T_{mb} \leq 121$ °C; see Figure 1 ; see Figure 2	-	5	A
I_{FRM}	repetitive peak forward current	square-wave pulse; $\delta = 0.5$; $t_p = 25$ μ s; $T_{mb} \leq 121$ °C	-	10	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; sine-wave pulse; $T_{j(init)} = 25$ °C; see Figure 3	-	60	A
		$t_p = 8.3$ ms; sin-wave pulse; $T_{j(init)} = 25$ °C; see Figure 3	-	66	A
T_{stg}	storage temperature		-40	150	°C
T_j	junction temperature		-	150	°C



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

$V_o = 1.499 \text{ V}; R_s = 0.041 \Omega$

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



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

$V_o = 1.499 \text{ V}; R_s = 0.041 \Omega$

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

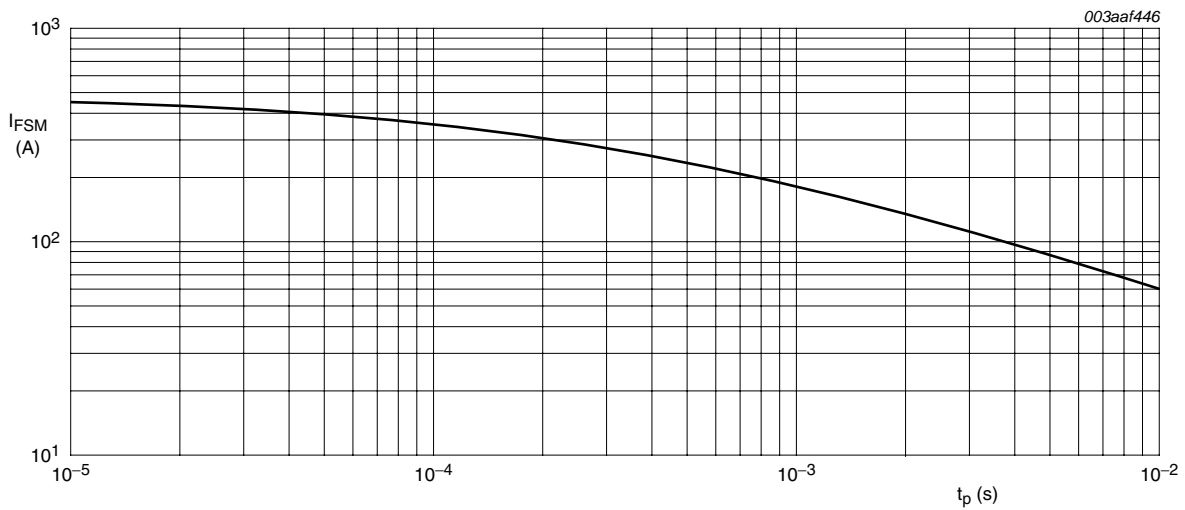


Fig 3. non-repetitive peak forward current as a function of pulse width; square waveform; maximum values

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	see Figure 4	-	-	3	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	50	-	K/W

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

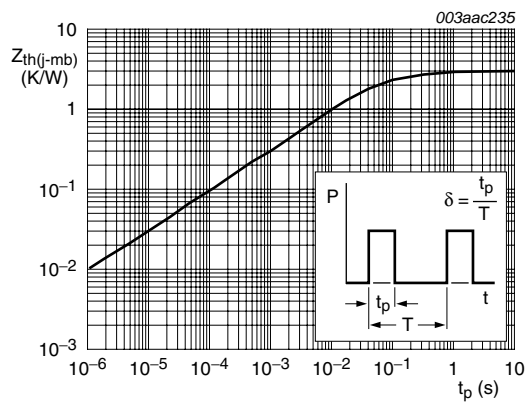
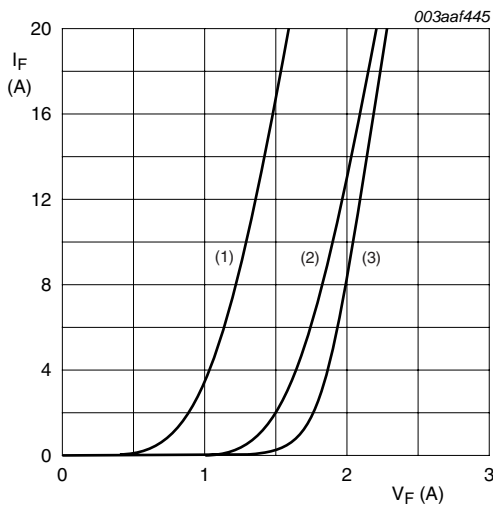


Fig 4. Transient thermal impedance from junction to mounting base as a function of pulse width

6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 5 \text{ A}; T_j = 25 \text{ }^\circ\text{C};$ see Figure 5	-	1.3	1.9	V
		$I_F = 5 \text{ A}; T_j = 150 \text{ }^\circ\text{C};$ see Figure 5	-	1.1	1.7	V
I_R	reverse current	$V_R = 600 \text{ V}; T_j = 100 \text{ }^\circ\text{C}$	-	-	1.5	mA
		$V_R = 600 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	-	50	μA
Dynamic characteristics						
Q_r	recovered charge	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C};$ see Figure 6	-	13	-	nC
t_{rr}	reverse recovery time	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C};$ see Figure 6	-	17.5	35	ns
I_{RM}	peak reverse recovery current	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C};$ see Figure 6	-	1.5	-	A
V_{FRM}	forward recovery voltage	$I_F = 1 \text{ A}; dI_F/dt = 100 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C};$ see Figure 7	-	3.2	-	V



$V_o = 1.499 \text{ V}; R_s = 0.041 \text{ } \Omega$

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

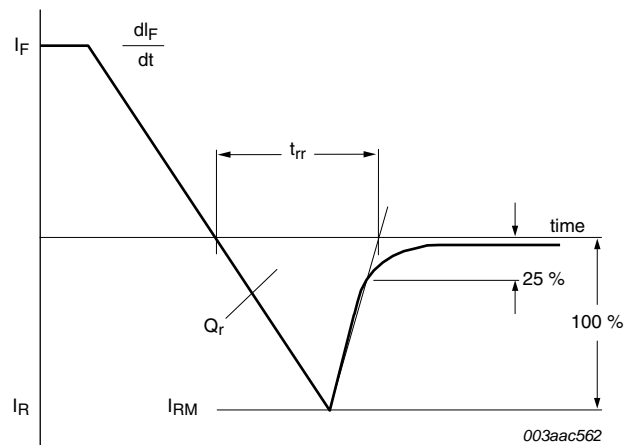


Fig 6. Reverse recovery definitions; ramp recovery

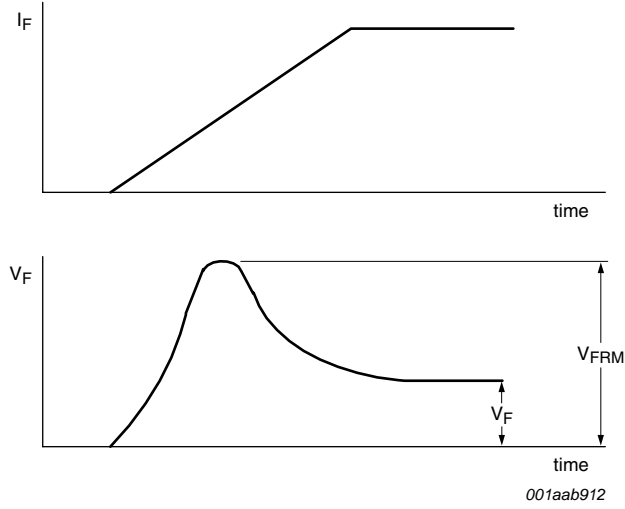


Fig 7. Forward recovery definitions

7. Package outline

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

SOT428

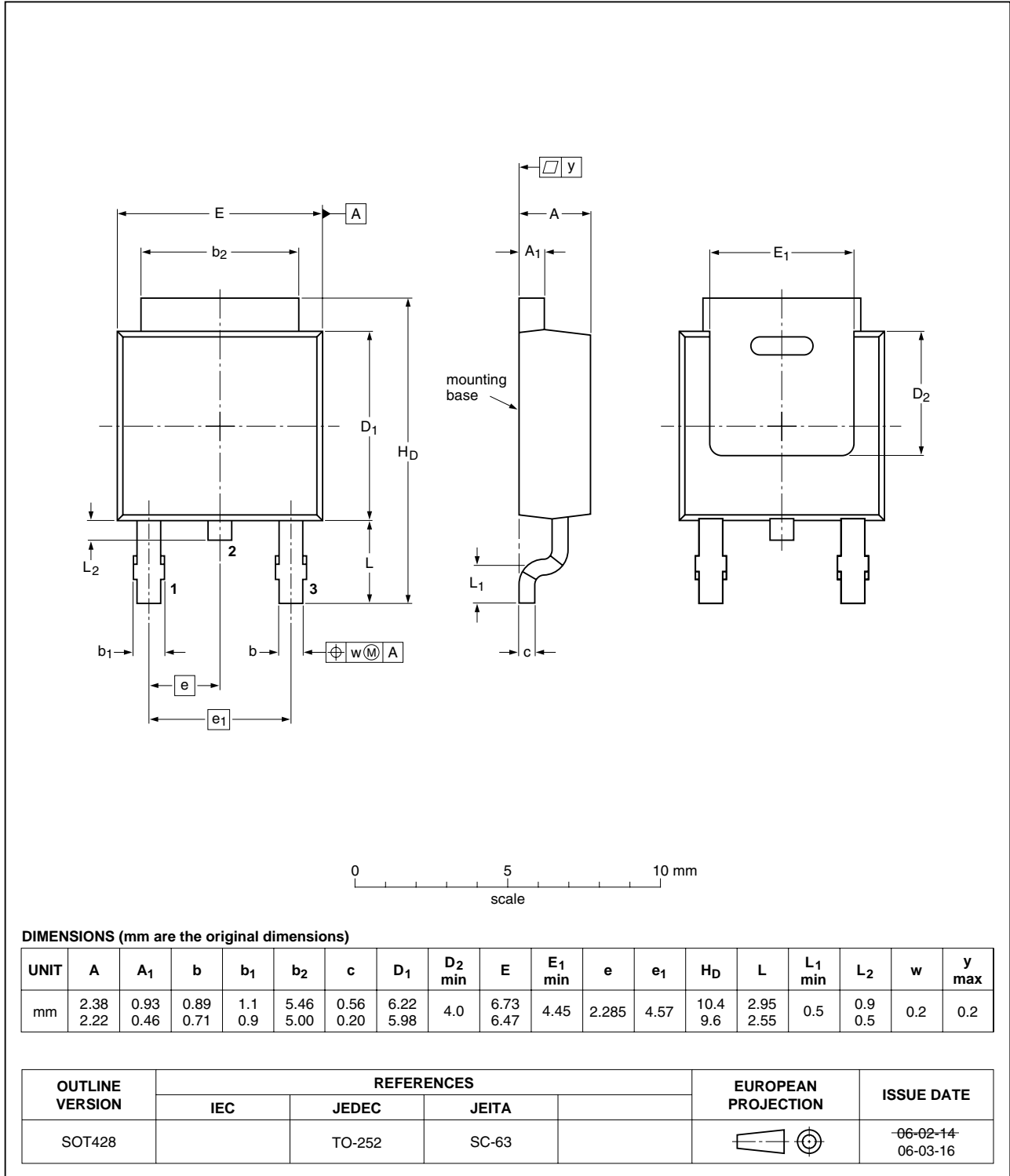


Fig 8. Package outline SOT428 (DPAK)

8. Soldering

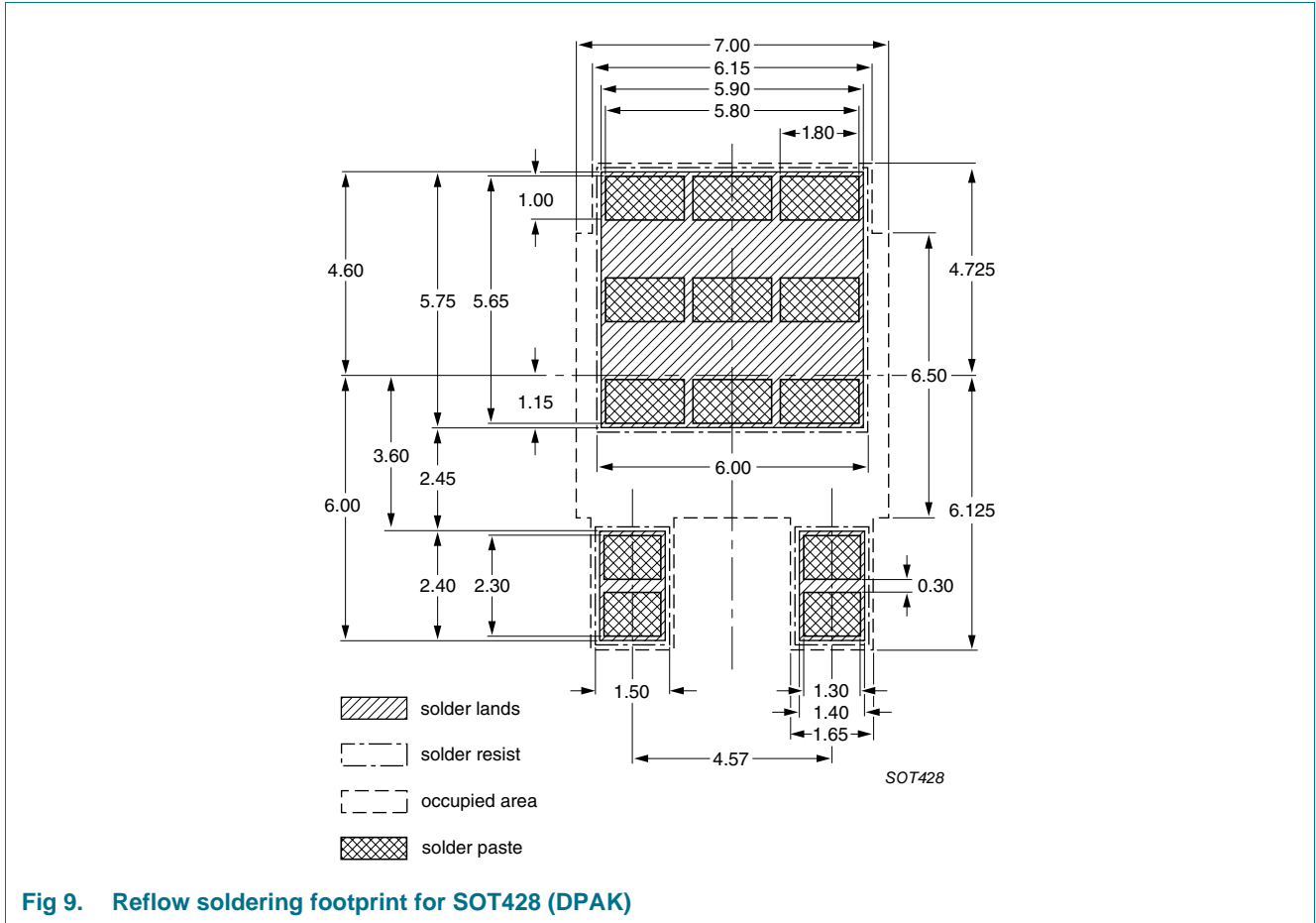


Fig 9. Reflow soldering footprint for SOT428 (DPAK)

9. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYV25FD-600 v.1	20101001	Product data sheet	-	-

10. Legal information

10.1 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.

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[2] The term 'short data sheet' is explained in section "Definitions".

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