



# BYV25FD-600

## Enhanced ultrafast power diode

Rev. 02 — 7 March 2011

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

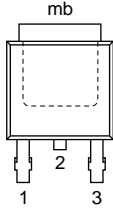

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	-	600	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$ ; $T_{mb} \leq 121\text{ }^{\circ}\text{C}$ ; see <a href="#">Figure 1</a> ; see <a href="#">Figure 2</a>	-	-	5	A
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 5\text{ A}$ ; $T_j = 25\text{ }^{\circ}\text{C}$ ; see <a href="#">Figure 5</a>	-	1.3	1.9	V
		$I_F = 5\text{ A}$ ; $T_j = 150\text{ }^{\circ}\text{C}$ ; see <a href="#">Figure 5</a>	-	1.1	1.7	V
<b>Dynamic characteristics</b>						
$t_{rr}$	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 <a href="#">Figure 6</a>	-	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 <sup>[1]</sup>		
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**

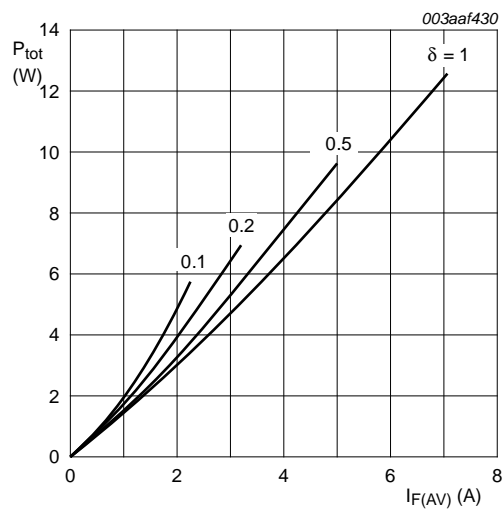
Type number	Package		
	Name	Description	Version
BYV25FD-600	DPAK	plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)	SOT428

## 4. Limiting values

**Table 4. Limiting values**

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

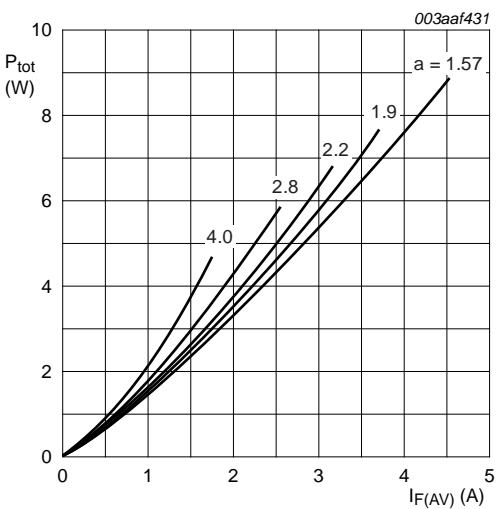
Symbol	Parameter	Conditions	Min	Max	Unit
$V_{RRM}$	repetitive peak reverse voltage		-	600	V
$V_{RWM}$	crest working reverse voltage		-	600	V
$V_R$	reverse voltage	DC	-	600	V
$I_{F(AV)}$	average forward current	square-wave pulse; $\delta = 0.5$ ; $T_{mb} \leq 121\text{ }^{\circ}\text{C}$ ; see <a href="#">Figure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



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

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

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



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

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

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

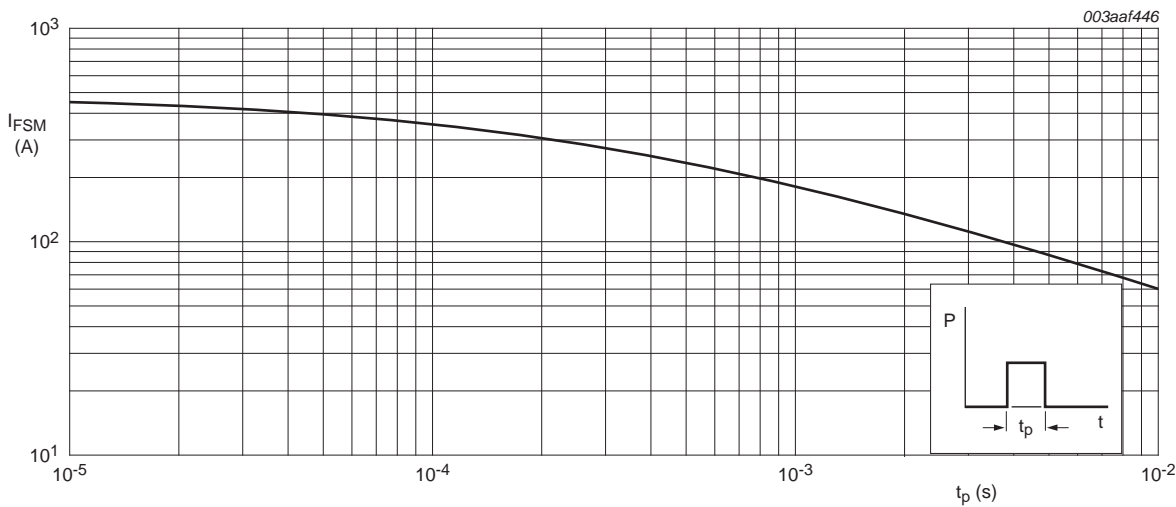


Fig 3. Non-repetitive peak forward current as a function of pulse width; square waveform; maximum values

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 <a href="#">Figure 4</a>	-	-	3	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	<a href="#">[1]</a> -	50	-	K/W

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

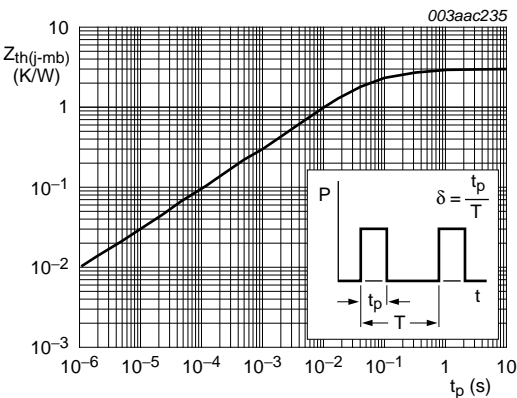
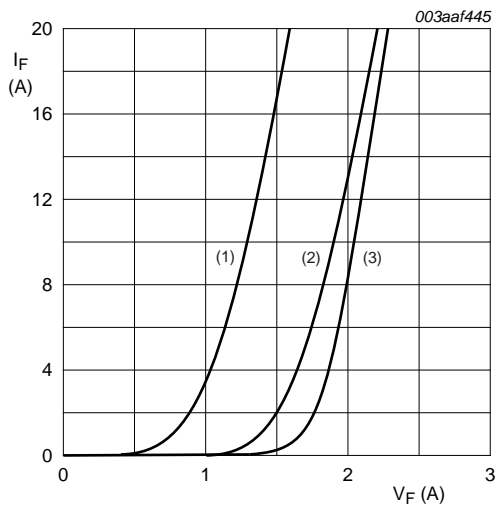


Fig 4. Transient thermal impedance from junction to mounting base as a function of pulse width

## 6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 5 A; T <sub>j</sub> = 25 °C; see <a href="#">Figure 5</a>	-	1.3	1.9	V
		I <sub>F</sub> = 5 A; T <sub>j</sub> = 150 °C; see <a href="#">Figure 5</a>	-	1.1	1.7	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 600 V; T <sub>j</sub> = 100 °C	-	-	1.5	mA
		V <sub>R</sub> = 600 V; T <sub>j</sub> = 25 °C	-	-	50	µA
Dynamic characteristics						
Q <sub>r</sub>	recovered charge	I <sub>F</sub> = 1 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 100 A/µs; T <sub>j</sub> = 25 °C; see <a href="#">Figure 6</a>	-	13	-	nC
t <sub>rr</sub>	reverse recovery time	I <sub>F</sub> = 1 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 100 A/µs; T <sub>j</sub> = 25 °C; see <a href="#">Figure 6</a>	-	17.5	35	ns
I <sub>RM</sub>	peak reverse recovery current	I <sub>F</sub> = 1 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 100 A/µs; T <sub>j</sub> = 25 °C; see <a href="#">Figure 6</a>	-	1.5	-	A
V <sub>FRM</sub>	forward recovery voltage	I <sub>F</sub> = 1 A; dI <sub>F</sub> /dt = 100 A/µs; T <sub>j</sub> = 25 °C; see <a href="#">Figure 7</a>	-	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

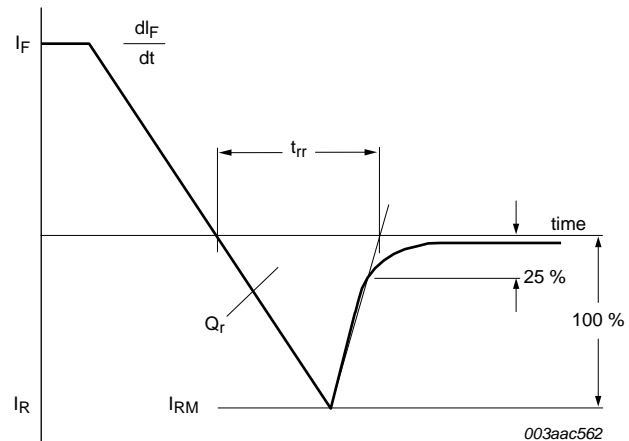


Fig 6. Reverse recovery definitions; ramp recovery

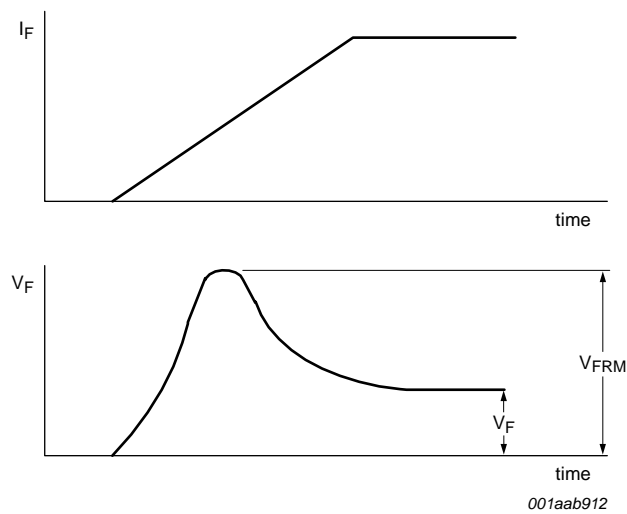


Fig 7. Forward recovery definitions

7. Package outline

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

SOT428

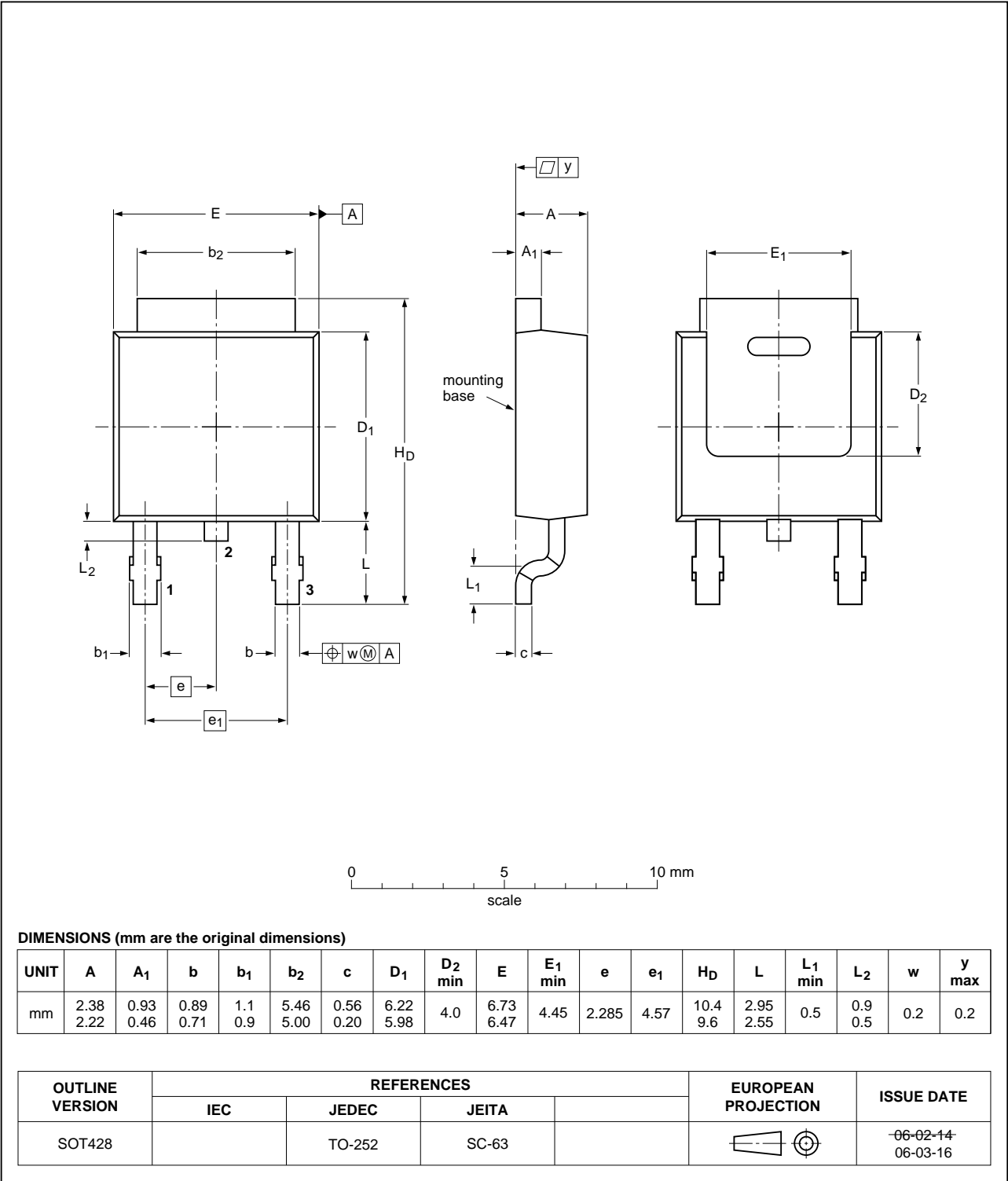


Fig 8. Package outline SOT428 (DPAK)

8. Soldering

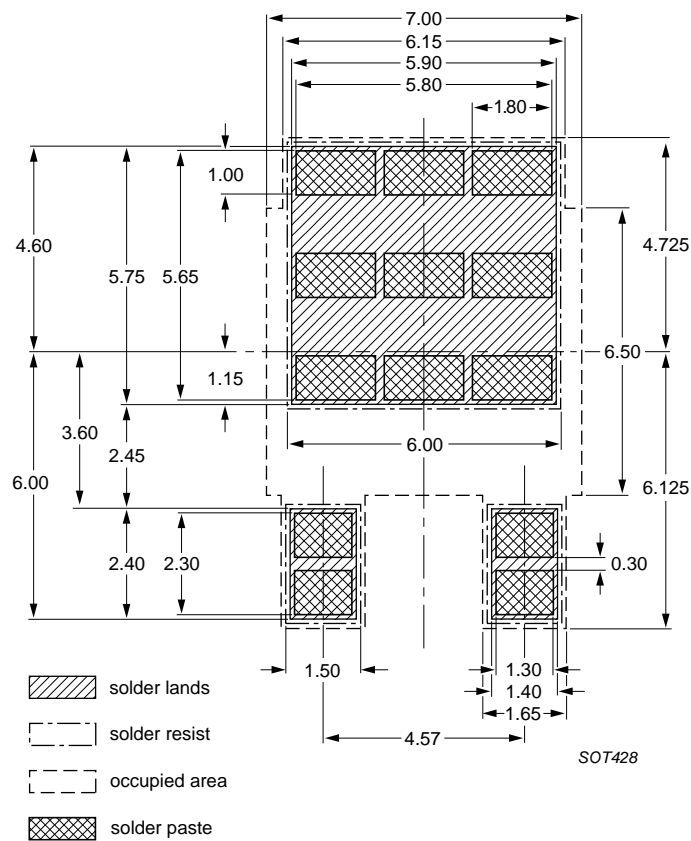


Fig 9. Reflow soldering footprint for SOT428 (DPAK)

## 9. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYV25FD-600 v.2	20110307	Product data sheet	-	BYV25FD-600 v.1
Modifications:	• Various changes to content.			
BYV25FD-600 v.1	20101001	Product data sheet	-	-

## 10. Legal information

### 10.1 Data sheet status

Document status <sup>[1] [2]</sup>	Product status <sup>[3]</sup>	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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