BYV25FB-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 SOT404 (D2PAK) 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

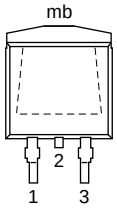
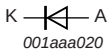
1.4 Quick reference data

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; δ = 0.5 ; T_{mb} ≤ 126 °C; see Figure 1; see Figure 2	-	-	5	A
Static characteristics						
V_F	forward voltage	I_F = 5 A; T_j = 25 °C; see Figure 5	-	1.3	1.9	V
		I_F = 5 A; T_j = 150 °C; see Figure 5	-	1.1	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; 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	 SOT404 (D2PAK)	
2	K	cathode[1]		
3	A	anode		
mb	K	mounting base; cathode		

[1] It is not possible to connect to pin 2 of the SOT404 package.

3. Ordering information

Table 3. Ordering information

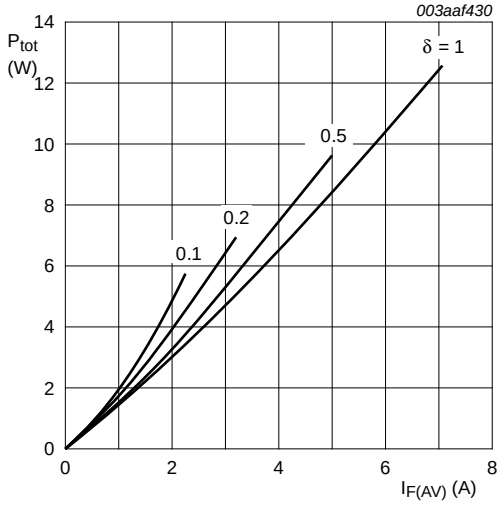
Type number	Package		
	Name	Description	Version
BYV25FB-600	D2PAK	plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)	SOT404

4. Limiting values

Table 4. Limiting values

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

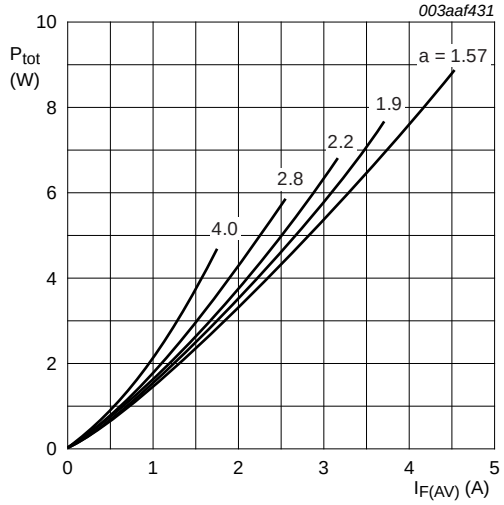
Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	600	V
V_{RWM}	crest working reverse voltage		-	600	V
V_R	reverse voltage	DC	-	600	V
$I_{F(AV)}$	average forward current	square-wave pulse; δ = 0.5 ; $T_{mb} \leq 126$ °C; see Figure 1; see Figure 2	-	5	A
I_{FRM}	repetitive peak forward current	square-wave pulse; δ = 0.5 ; t_p = 25 µs; $T_{mb} \leq 126$ °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; sine-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 = 1.50 V; R_s = 0.041 Ω

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 = 1.50 V; R_s = 0.041 Ω

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

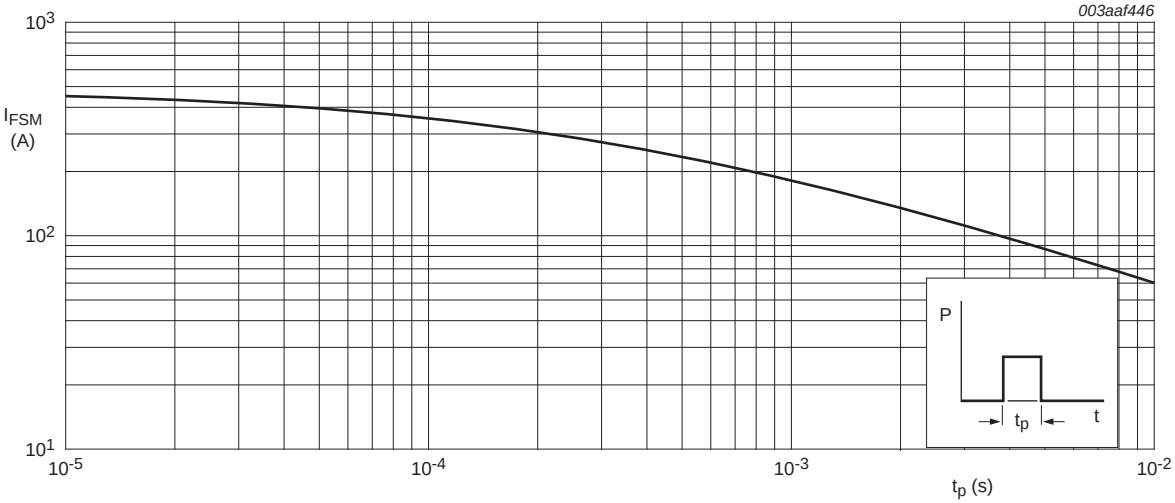


Fig 3. Non-repetitive peak forward current as a function of pulse width; square waveform; maximum values

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j\text{-}mb)}$	thermal resistance from junction to mounting base	see Figure 4		-	-	2.5	K/W
$R_{th(j\text{-}a)}$	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.

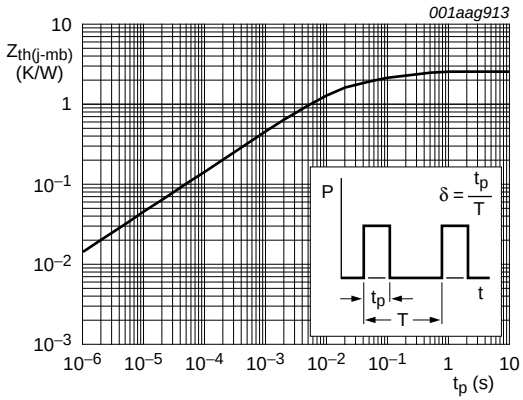
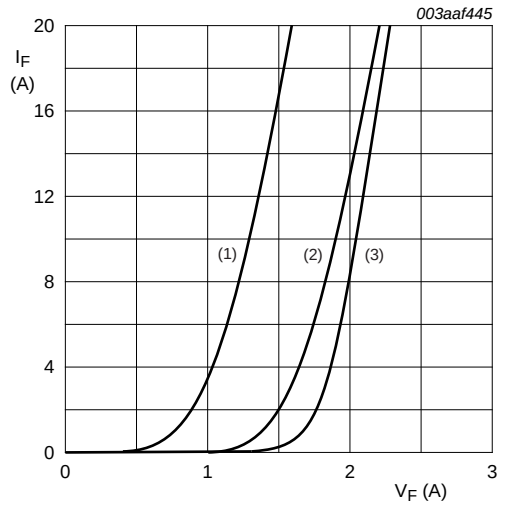


Fig 4. Transient thermal impedance from junction to mounting base as a function of pulse width

6. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	I_F = 5 A; T_j = 25 °C; see Figure 5	-	1.3	1.9	V
		I_F = 5 A; T_j = 150 °C; see Figure 5	-	1.1	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						
Q_r	recovered charge	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/µs; T_j = 25 °C; see Figure 6	-	13	-	nC
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/µs; T_j = 25 °C; see Figure 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; T_j = 25 °C; see Figure 6	-	1.5	-	A
V_{FRM}	forward recovery voltage	I_F = 1 A; dI_F/dt = 100 A/µs; T_j = 25 °C; see Figure 7	-	3.2	-	V



V_o = 1.50 V; R_s = 0.041 Ω

(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

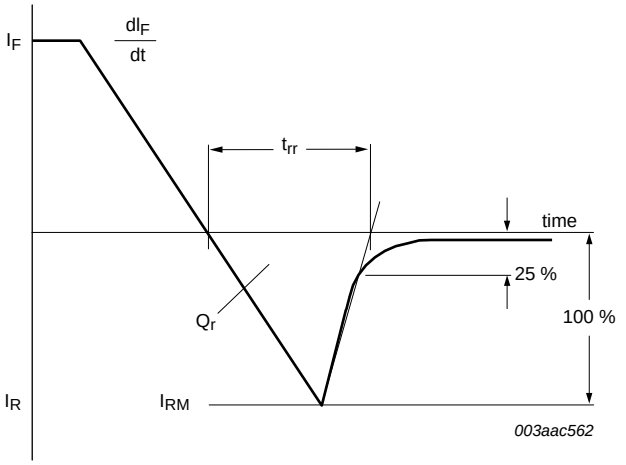


Fig 6. Reverse recovery definitions; ramp recovery

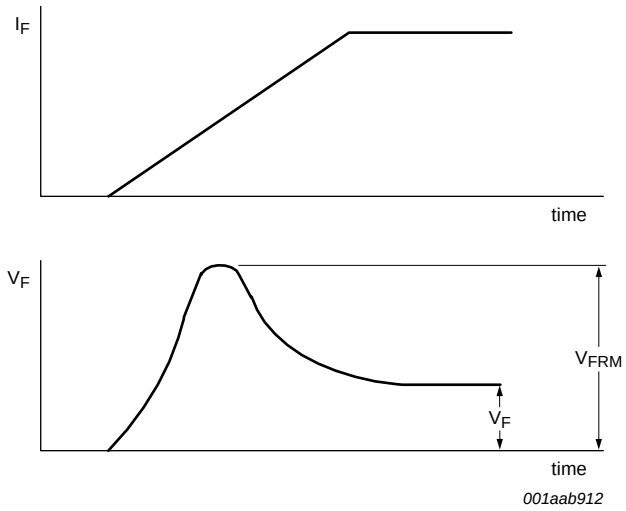
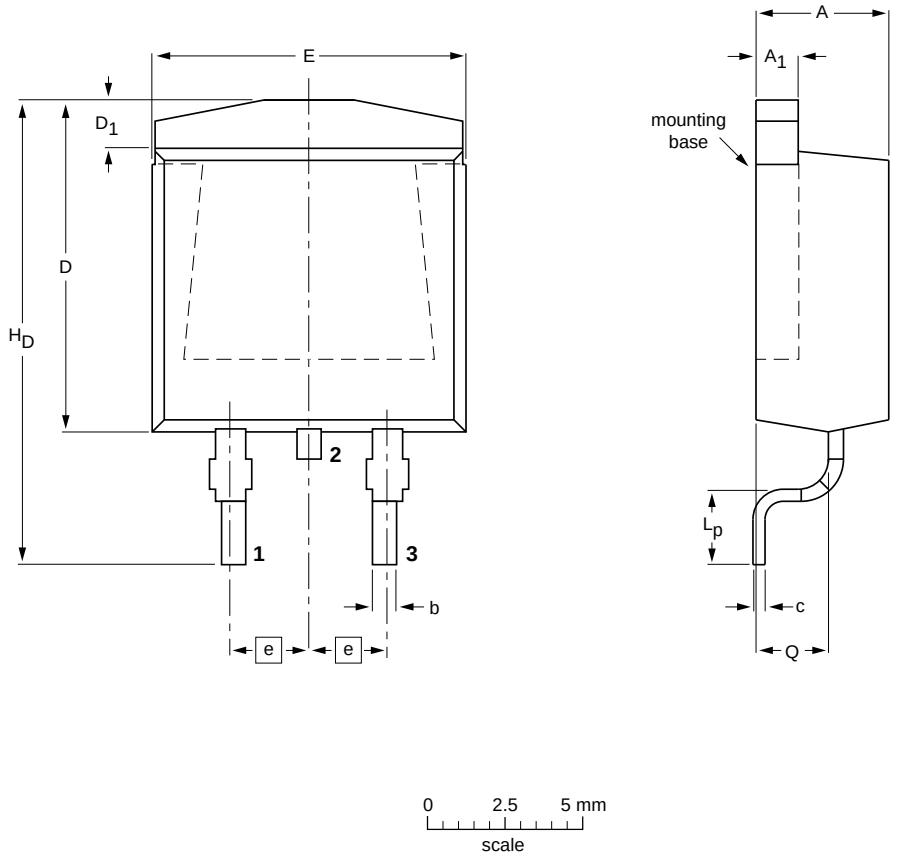


Fig 7. Forward recovery definitions

7. Package outline

Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped) **SOT404**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	c	D max.	D_1	E	e	L_p	H_D	Q
mm	4.50 4.10	1.40 1.27	0.85 0.60	0.64 0.46	11	1.60 1.20	10.30 9.70	2.54	2.90 2.10	15.80 14.80	2.60 2.20

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT404						~~05-02-11~~ 06-03-16

Fig 8. Package outline SOT404 (D2PAK)

8. Soldering

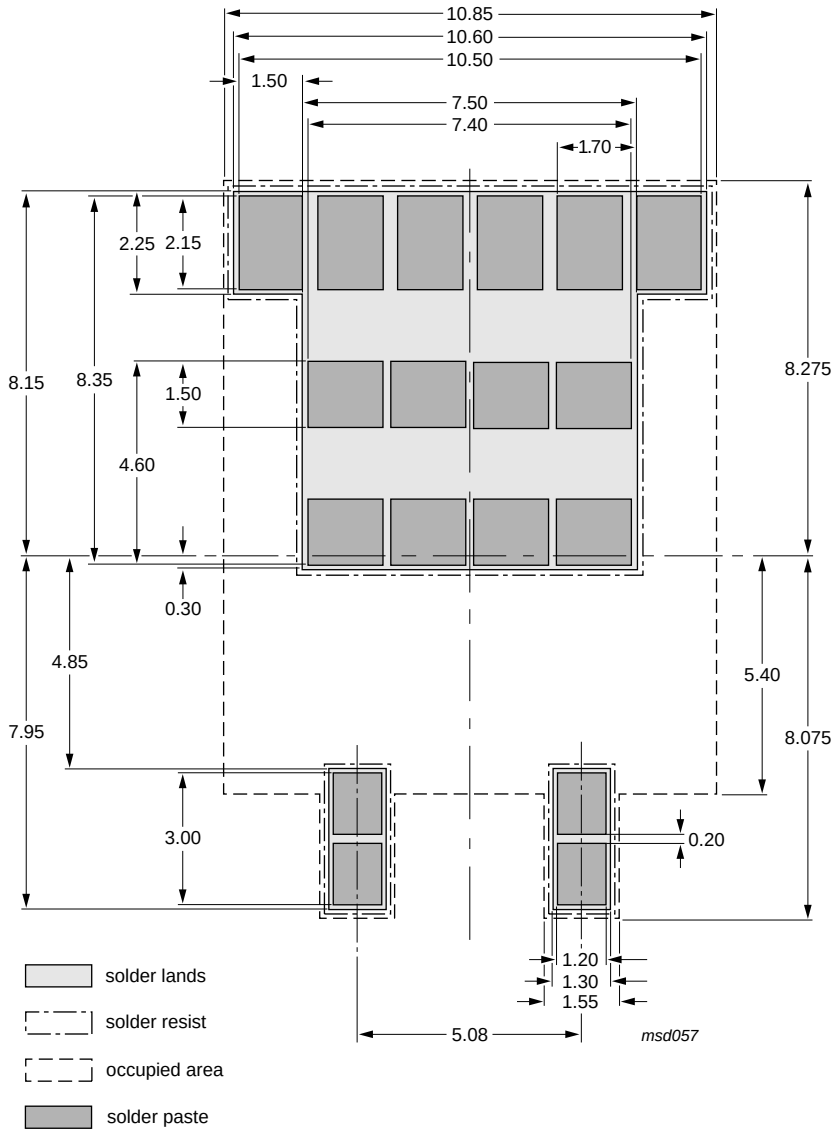


Fig 9. Reflow soldering footprint for SOT404 (D2PAK)

9. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BYV25FB-600 v.2	20110307	Product data sheet	-	BYV25FB-600 v.1
Modifications:	• Various changes to content.			
BYV25FB-600 v.1	20100930	Product data sheet	-	-

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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.

[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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