

BYV29B-600

Rectifier diode ultrafast

Rev. 01 — 11 August 2003

Product data

1. Product profile

1.1 Description

Ultra-fast, epitaxial rectifier diode in a surface mount plastic package.

Product availability:

BYV29B-600 in SOT404 (D²-PAK).

1.2 Features

- Low forward voltage
- Fast switching
- Soft recovery characteristic
- High thermal cycling performance.

1.3 Applications

- Switched-mode power supplies
- Low loss rectification.

1.4 Quick reference data

- $V_R \leq 600 \text{ V}$
- $V_F \leq 1.03 \text{ V}$
- $I_{F(AV)} \leq 9 \text{ A}$
- $t_{rr} \leq 60 \text{ ns}$

2. Pinning information

Table 1: Pinning - SOT404 (D²-PAK), simplified outline and symbol

Pin	Description	Simplified outline	Symbol
1	no connection		
2	cathode (k) [1]		
3	anode (a)		
mb	mounting base; connected to cathode (k)		

SOT404 (D²-PAK)

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

3. Ordering information

Table 2: Ordering information

Type number	Package		
	Name	Description	Version
BYV29B-600	D ² -PAK	Plastic single-ended surface mounted package; 3 leads (one lead cropped)	SOT404

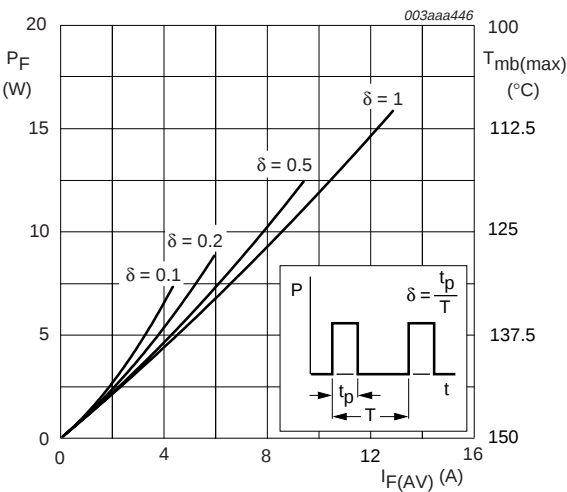
4. Limiting values

Table 3: 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		-	600	V
$I_{F(AV)}$	average forward current	square wave; $\delta = 0.5$; $T_{mb} \leq 120\text{ }^{\circ}\text{C}$	[1] -	9	A
I_{FRM}	repetitive peak forward current	square wave; $t = 25\text{ }\mu\text{s}$; $\delta = 0.5$; $T_{mb} \leq 120\text{ }^{\circ}\text{C}$	-	18	A
I_{FSM}	non-repetitive peak forward current	sinusoidal; with reapplied $V_{RRM(max)}$			
		$t_p = 10\text{ ms}$	-	70	A
		$t_p = 8.3\text{ ms}$	-	77	A
T_{stg}	storage temperature		-40	+150	$^{\circ}\text{C}$
T_j	junction temperature		-	+150	$^{\circ}\text{C}$

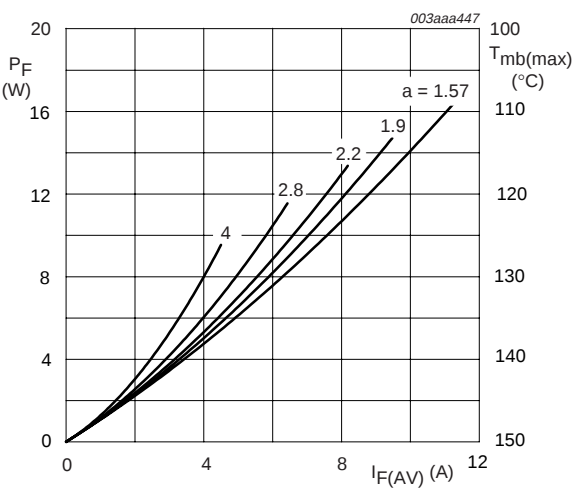
[1] Neglecting switching and reverse current losses.



Square current waveform

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

Fig 1. Maximum forward power dissipation (square current waveform) as a function of average forward current.



Sinusoidal current waveform

$$a = \frac{I_{F(RMS)}}{I_{F(AV)}}$$

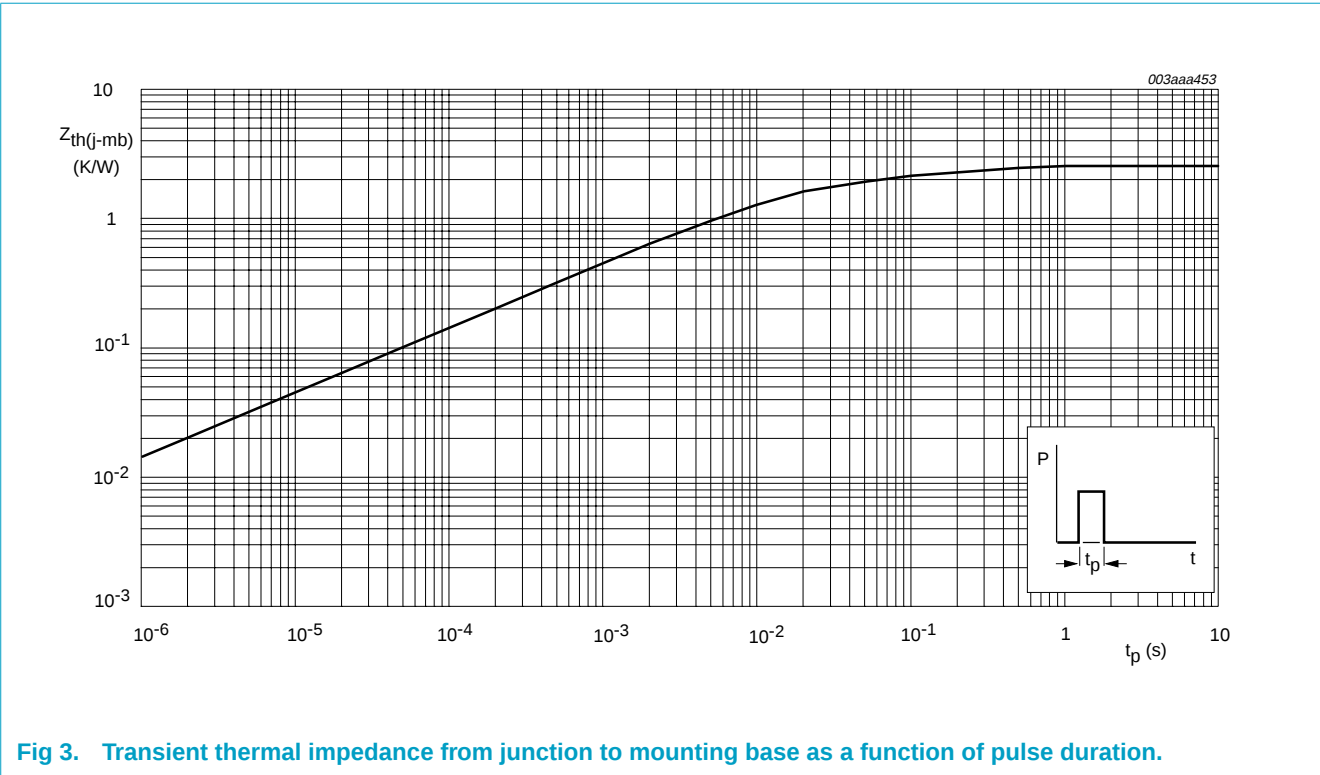
Fig 2. Maximum forward power dissipation (sinusoidal current waveform) as a function of average forward current.

5. Thermal characteristics

Table 4: Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Figure 3	-	-	2.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	50	-	K/W

5.1 Transient thermal impedance



6. Characteristics

Table 5: Characteristics

$T_j = 25\text{ °C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V _F	forward voltage	I _F = 8 A				
		T _j = 150 °C; Figure 4	-	0.9	1.03	V
		T _j = 25 °C; Figure 4	-	1.05	1.25	V
		I _F = 20 A	-	1.3	1.45	V
I _R	reverse current	V _R = V _{RRM}				
		T _j = 100 °C	-	0.1	0.35	mA
		T _j = 25 °C	-	2	50	μA
Dynamic characteristics						
C _d	diode capacitance	f = 1 MHz; V _R = 100 V; Figure 8	-	7	-	pF
Q _{rr}	reverse recovery charge	I _F = 2 A; V _R ≥ 30 V; dI _F /dt = 20 A/μs; Figure 7	-	40	70	nC
t _{rr}	reverse recovery time	I _F = 1 A; V _R ≥ 30 V; dI _F /dt = 100 A/μs; Figure 5	-	50	60	ns
I _{rrm}	peak reverse recovery current	I _F = 10 A; V _R ≥ 30 V; dI _F /dt = 50 A/μs T _j = 100 °C; Figure 6	-	3	5.5	A
V _{fr}	forward recovery voltage	I _F = 10 A; dI _F /dt = 10 A/μs	-	3.2	-	V

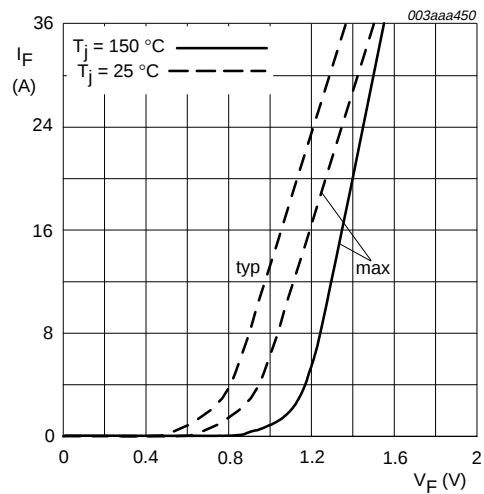


Fig 4. Forward current as a function of forward voltage; typical values.

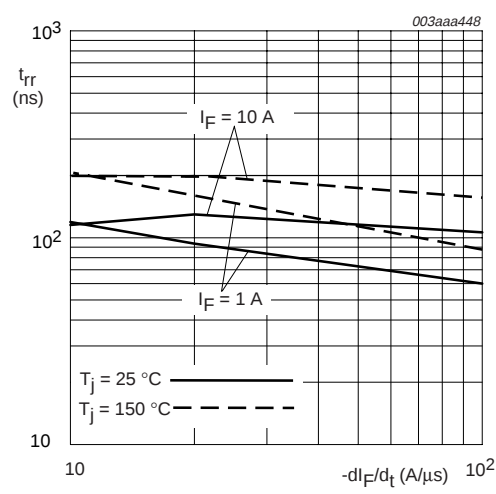


Fig 5. Maximum reverse recovery time as a function of rate of change of forward current.

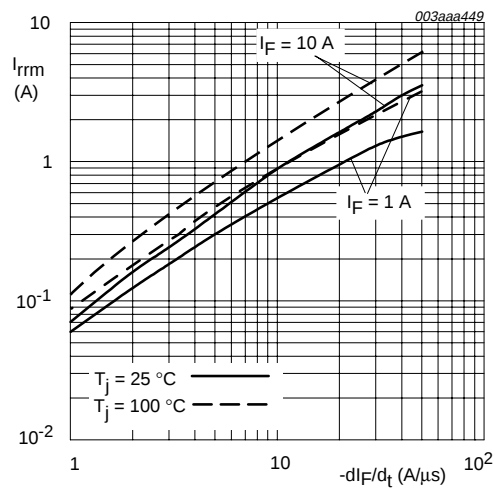


Fig 6. Reverse current as a function of rate of change of forward current; typical values.

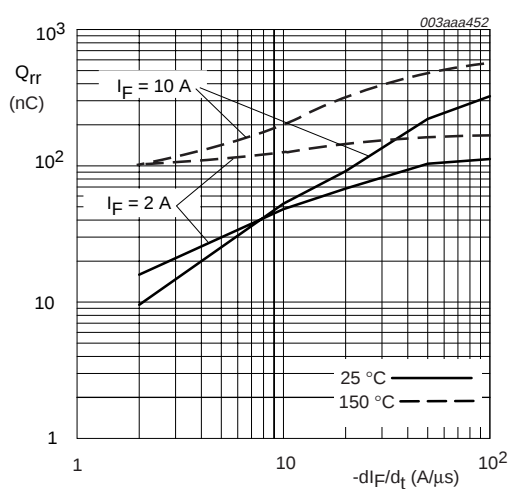
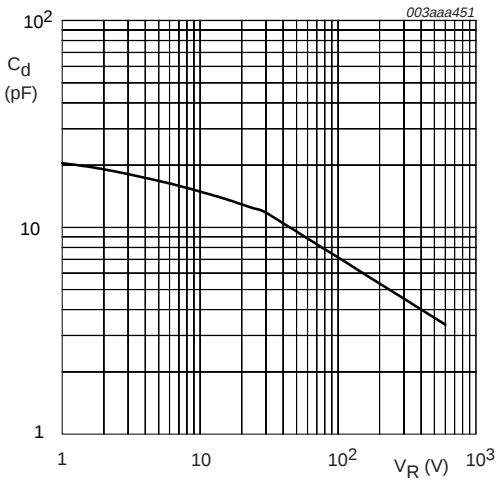


Fig 7. Maximum reverse recovery charge as a function of rate of change of forward current.



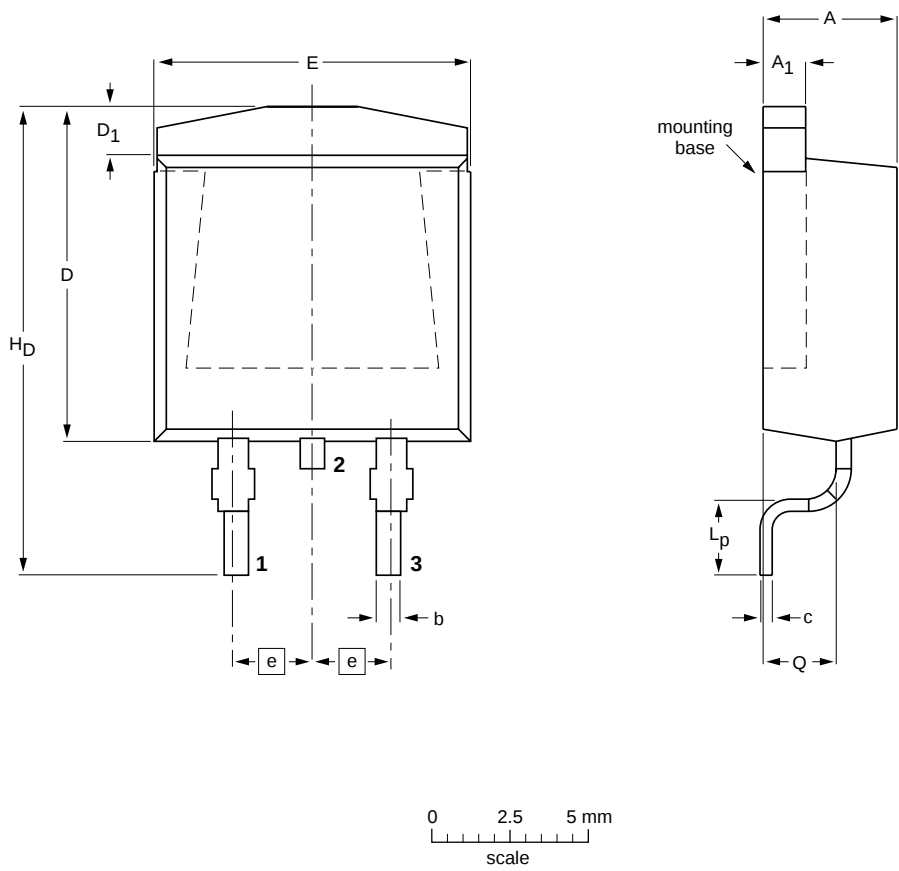
f = 1MHz

Fig 8. Diode capacitance as a function of reverse voltage; typical values.

7. Package outline

Plastic single-ended surface mounted package (Philips version of D²-PAK); 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

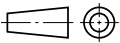
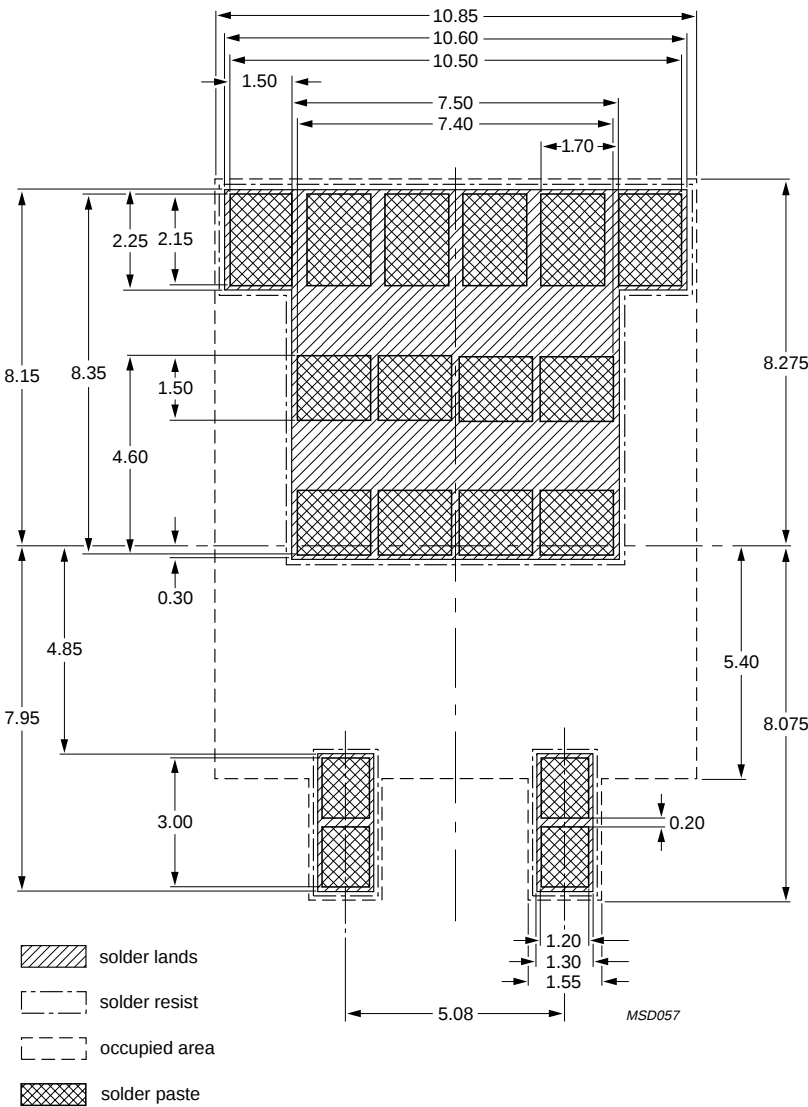
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT404						-99-06-25 01-02-12

Fig 9. SOT404 (D²-PAK).

8. Soldering



Dimensions in mm.

Fig 10. Reflow soldering footprint for SOT404.

9. Revision history

Table 6: Revision history

Rev	Date	CPCN	Description
01	20030811	-	Product data (9397 750 11884).

10. Data sheet status

Level	Data sheet status ^[1]	Product status ^{[2][3]}	Definition
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
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[2] The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.

[3] For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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