

BYR29X-600

Rectifier diode ultrafast

Rev. 01 — 26 September 2003

Product data

1. Product profile

1.1 Description

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

1.2 Features

- Low forward voltage
- Soft recovery characteristic
- Fast switching
- Isolated mounting base.

1.3 Applications

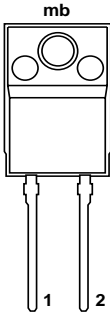
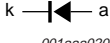
- Switched-mode power supplies
- Low loss rectification.

1.4 Quick reference data

- $V_R \leq 600$ V
- $I_{F(AV)} \leq 8$ A
- $V_F \leq 1.5$ V
- $t_{rr} \leq 75$ ns

2. Pinning information

Table 1: Pinning - SOD113, simplified outline and symbol

Pin	Description	Simplified outline	Symbol
1	cathode (k)		 001aaa020
2	anode (a)		
mb	mounting base; isolated		

Top view MBK088

SOD113



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3. Ordering information

Table 2: Ordering information

Type number	Package		Version
	Name	Description	
BYR29X-600	-	Plastic single-ended package; isolated heatsink mounted; 2-leads	SOD113

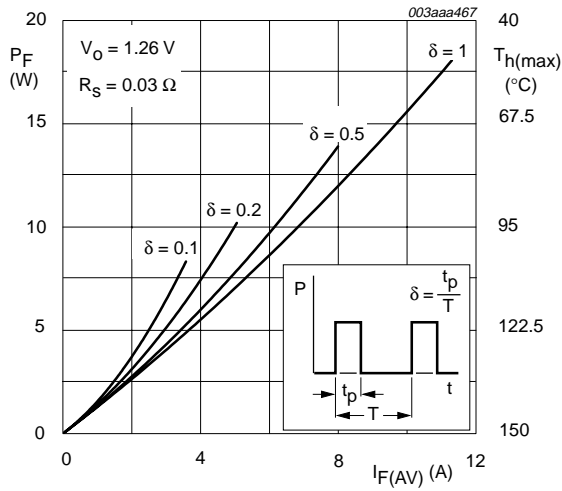
4. Limiting values

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	$T_h \leq 136 \text{ }^\circ\text{C}$	-	600	V
$I_{F(AV)}$	average forward current	square wave; $\delta = 0.5$; $T_h \leq 73 \text{ }^\circ\text{C}$	[1] -	8	A
I_{FRM}	repetitive peak forward current	square wave; $t = 25 \text{ } \mu\text{s}$; $\delta = 0.5$; $T_h \leq 73 \text{ }^\circ\text{C}$	-	16	A
I_{FSM}	non-repetitive peak forward current	sinusoidal; with reapplied $V_{RRM(max)}$			
		$t_p = 10 \text{ ms}$	-	60	A
		$t_p = 8.3 \text{ ms}$	-	66	A
T_{stg}	storage temperature		-40	+150	$^\circ\text{C}$
T_j	junction temperature		-	+150	$^\circ\text{C}$

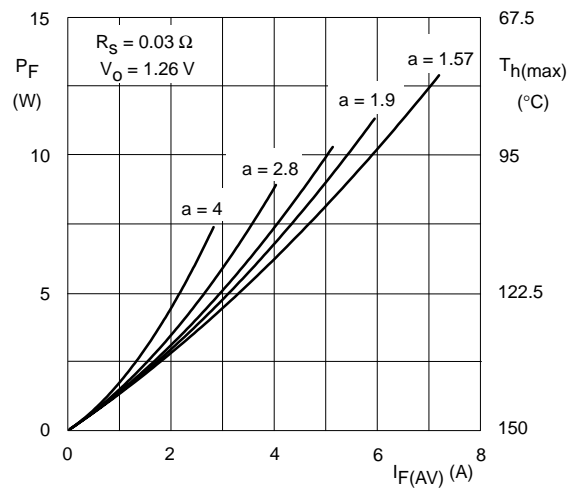
[1] Neglecting switching and reverse current losses.



Square current waveform

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

Fig 1. Maximum forward power dissipation (square current waveform) and maximum permissible heatsink temperature 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) and maximum permissible heatsink temperature as a function of average forward current.

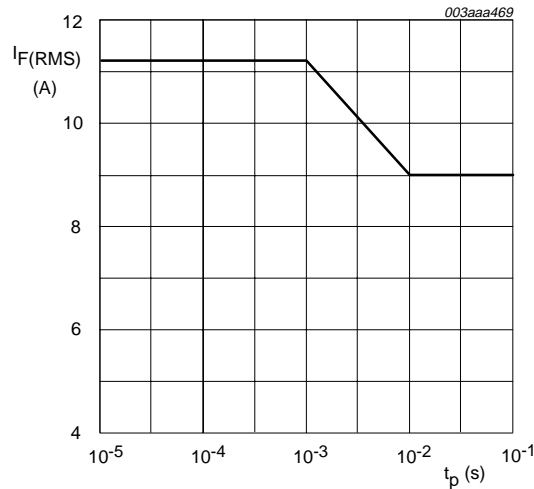


Fig 3. Maximum permissible forward RMS current as a function of pulse width.

5. Thermal characteristics

Table 4: Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; Figure 4	-	-	5.5	K/W
		without heatsink compound	-	-	7.2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	55	-	K/W

5.1 Transient thermal impedance

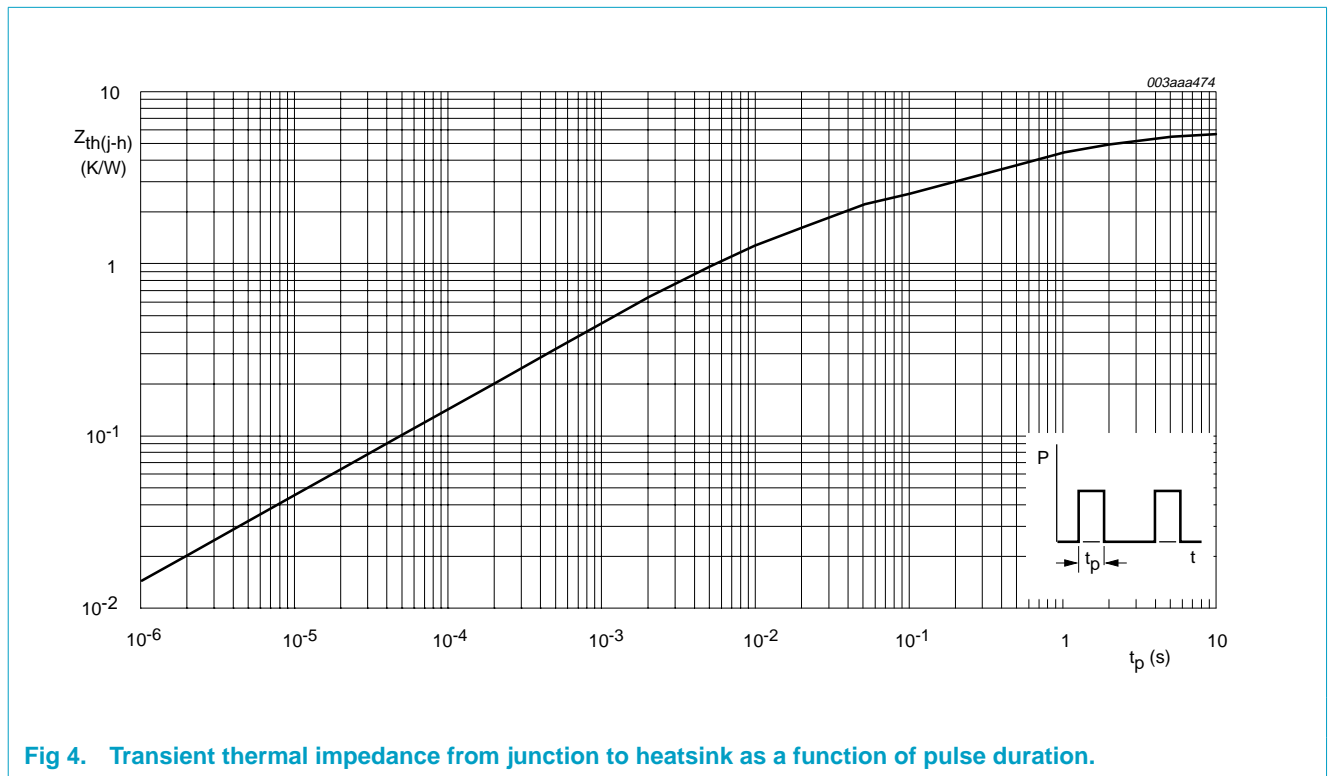


Fig 4. Transient thermal impedance from junction to heatsink as a function of pulse duration.

6. Characteristics

Table 5: Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 8\text{ A}$				
		$T_j = 150\text{ }^\circ\text{C}$; Figure 5	-	1.07	1.5	V
		$T_j = 25\text{ }^\circ\text{C}$; Figure 5	-	-	1.7	V
I_R	reverse current	$I_F = 20\text{ A}$	-	1.75	1.95	V
		$V_R = V_{RRM}$				
		$T_j = 100\text{ }^\circ\text{C}$	-	0.1	0.2	mA
		$T_j = 25\text{ }^\circ\text{C}$	-	1	10	μA
Dynamic characteristics						
Q_r	recovered charge	$I_F = 2\text{ A}$; $V_R \geq 30\text{ V}$; $dI_F/dt = 20\text{ A}/\mu\text{s}$; Figure 8	-	150	200	nC
t_{rr}	reverse recovery time	$I_F = 1\text{ A}$; $V_R \geq 30\text{ V}$; $dI_F/dt = 100\text{ A}/\mu\text{s}$; Figure 6	-	60	75	ns
I_{rrm}	peak reverse recovery current	$I_F = 10\text{ A}$; $V_R \geq 30\text{ V}$; $dI_F/dt = 50\text{ A}/\mu\text{s}$; $T_j = 100\text{ }^\circ\text{C}$; Figure 7	-	-	6	A
V_{fr}	forward recovery voltage	$I_F = 10\text{ A}$; $dI_F/dt = 10\text{ A}/\mu\text{s}$	-	5	-	V

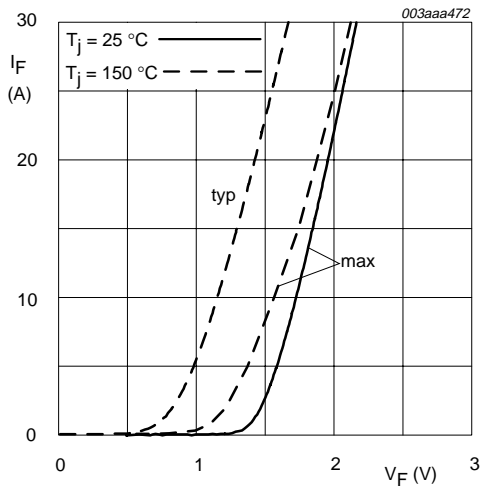


Fig 5. Forward current as a function of forward voltage; typical values.

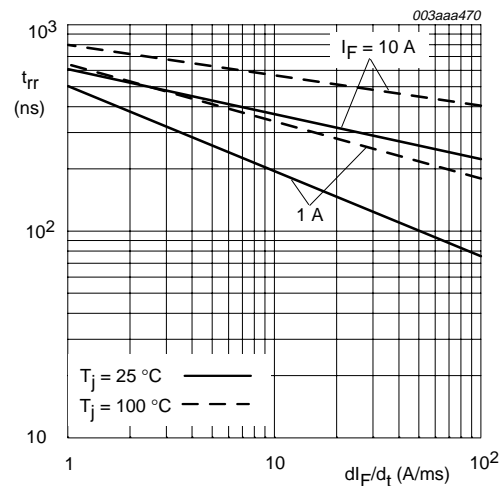


Fig 6. Maximum reverse recovery time as a function of rate of change of forward current.

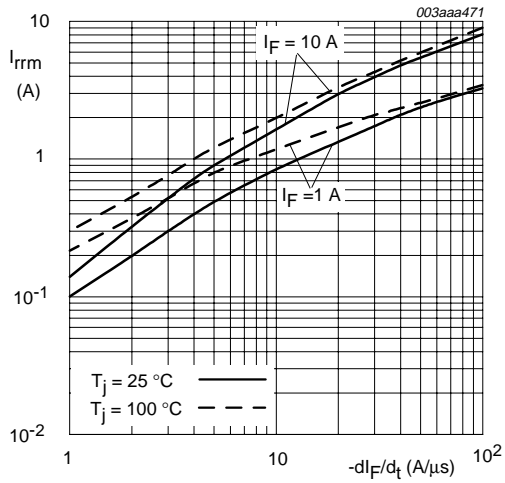


Fig 7. Maximum reverse current as a function of rate of change of forward current.

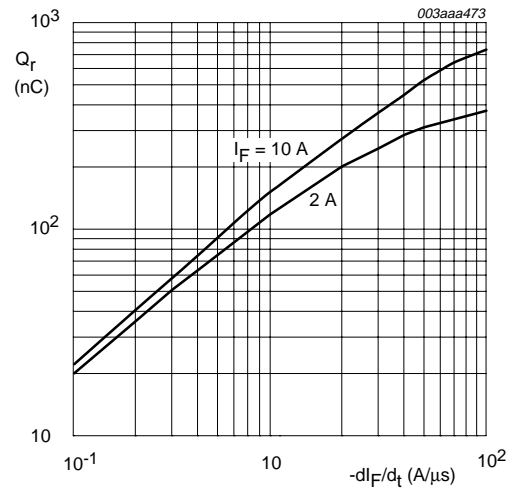


Fig 8. Maximum recovered charge as a function of rate of change of forward current.

7. Isolation characteristics

Table 6: Isolation characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{(isol)MR}$	Repetitive peak isolation voltage from both terminals to external heatsink.	RH \leq 65%; clean and dust-free.	-	-	1500	V
$C_{(k-h)}$	Capacitance from cathode to external heatsink.		-	12	-	pF

8. Package outline

Plastic single-ended package; isolated heatsink mounted;
1 mounting hole; 2-lead TO-220 'full pack'

SOD113

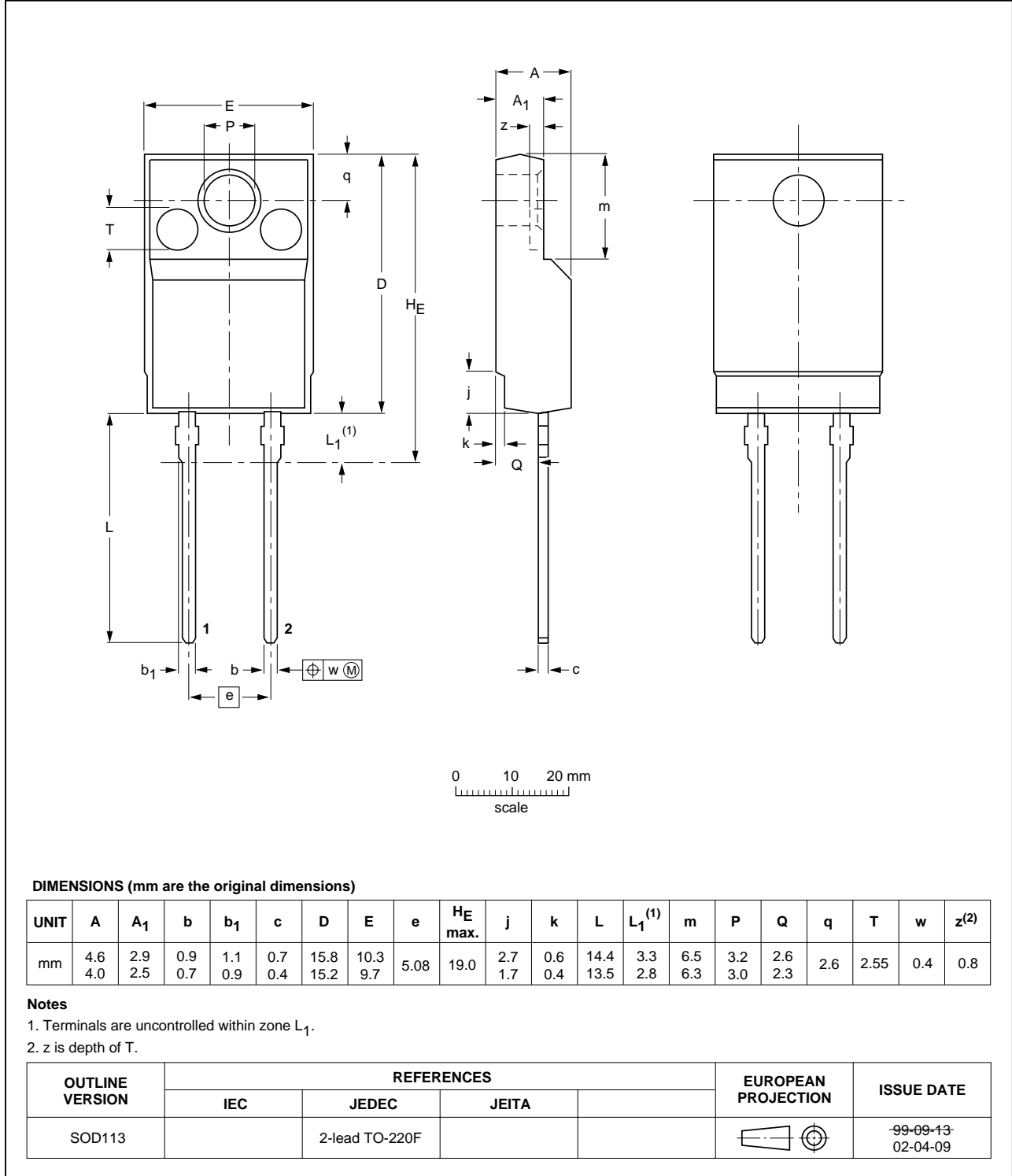


Fig 9. SOD113.

9. Revision history

Table 7: Revision history

Rev	Date	CPCN	Description
01	20030926	-	Product data (9397 750 12006).

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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[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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