# 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) | | |
| 2 | anode (a) | | |
| mb | mounting base; isolated | | |



Top view    MBK088

**SOD113**

k —▮◄— a

001aaa020

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

[1]   Neglecting switching and reverse current losses.

9397 750 12006

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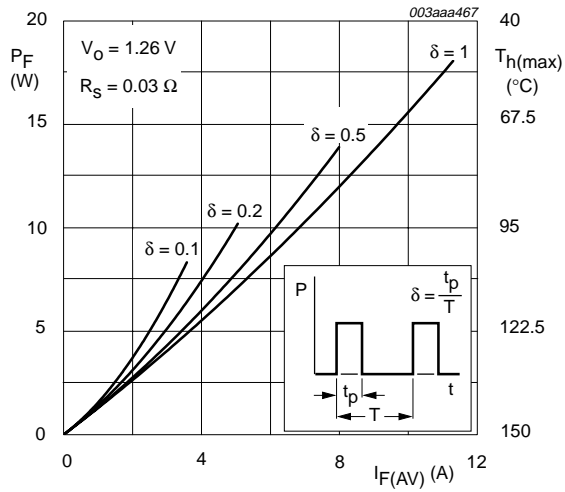
Square current waveform

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

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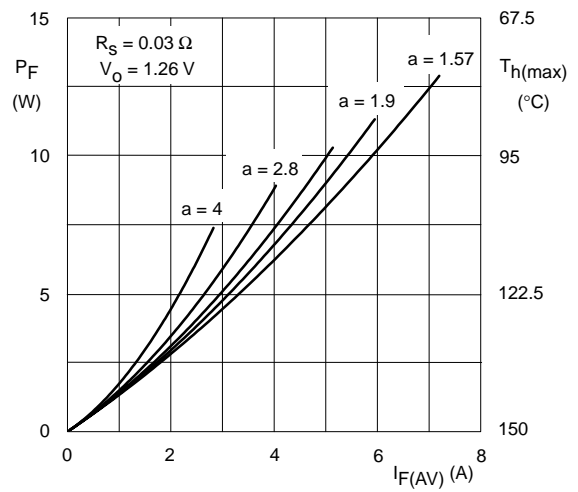
Sinusoidal current waveform

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

**Fig 2.** Maximum forward power dissipation (sinusoidal current waveform) and maximum permissible heatsink temperature as a function of average forward current.
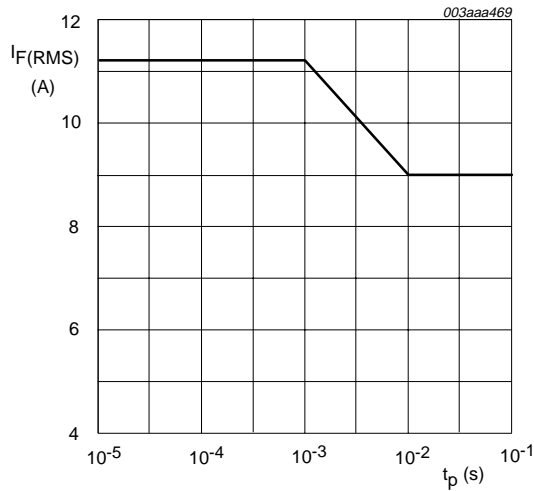
**Fig 3.** Maximum permissible forward RMS current as a function of pulse width.

## 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 |

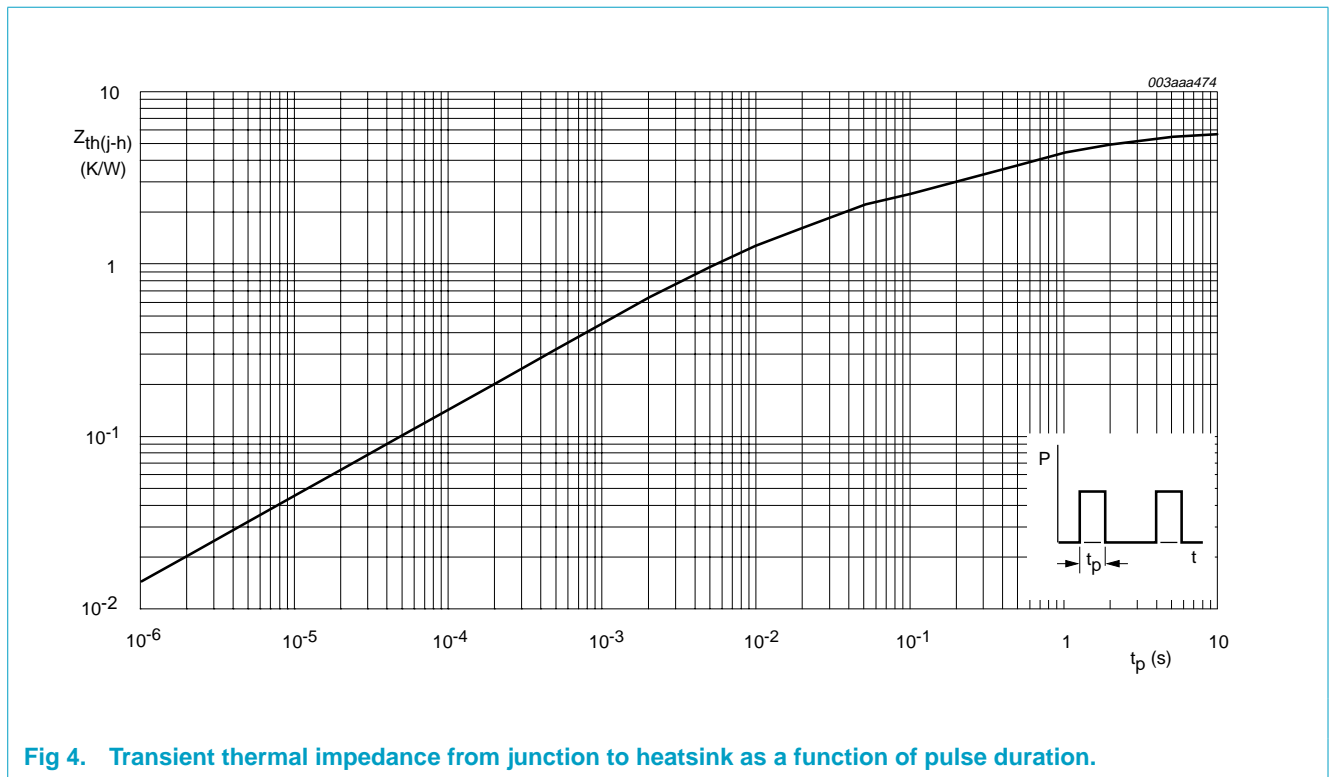### 5.1  Transient thermal impedance



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

## 6. Characteristics

**Table 5:   Characteristics**

*$T_j$ = 25 °C unless otherwise specified.*

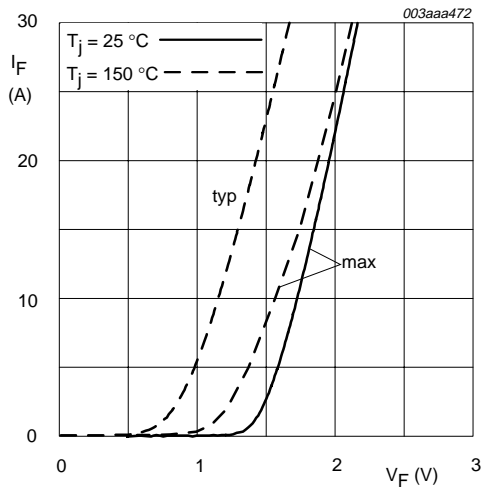| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static characteristics** | | | | | | |
| $V_F$ | forward voltage | $I_F$ = 8 A | | | | |
| | | $T_j$ = 150 °C; Figure 5 | - | 1.07 | 1.5 | V |
| | | $T_j$ = 25 °C; Figure 5 | - | - | 1.7 | V |
| | | $I_F$ =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



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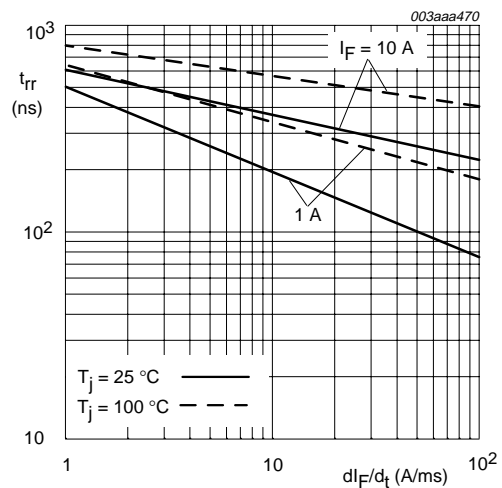


**Fig 6.  Maximum reverse recovery time as a function of rate of change of forward current.**
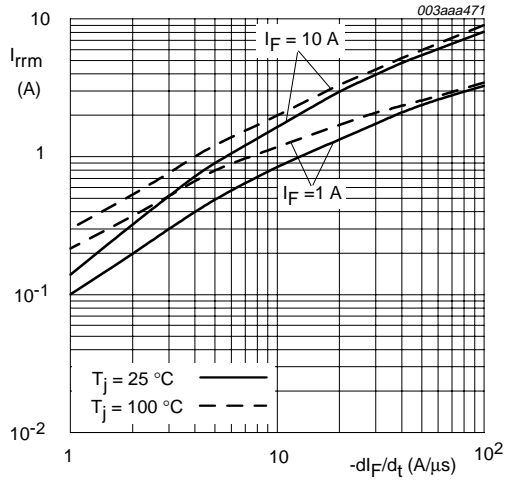
**Fig 7.  Maximum reverse current as a function of rate of change of forward current.**
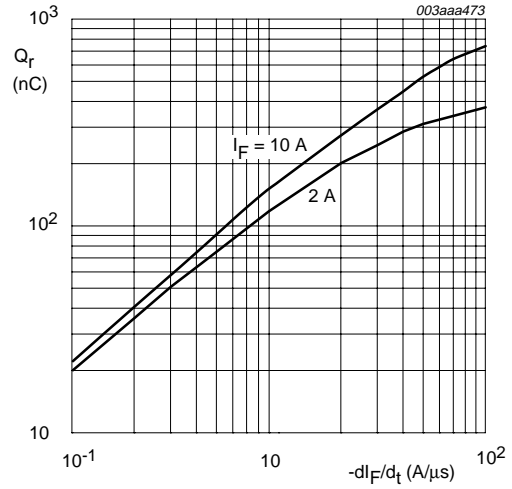


**Fig 8.  Maximum recovered charge as a function of rate of change of forward current.**

## 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;**
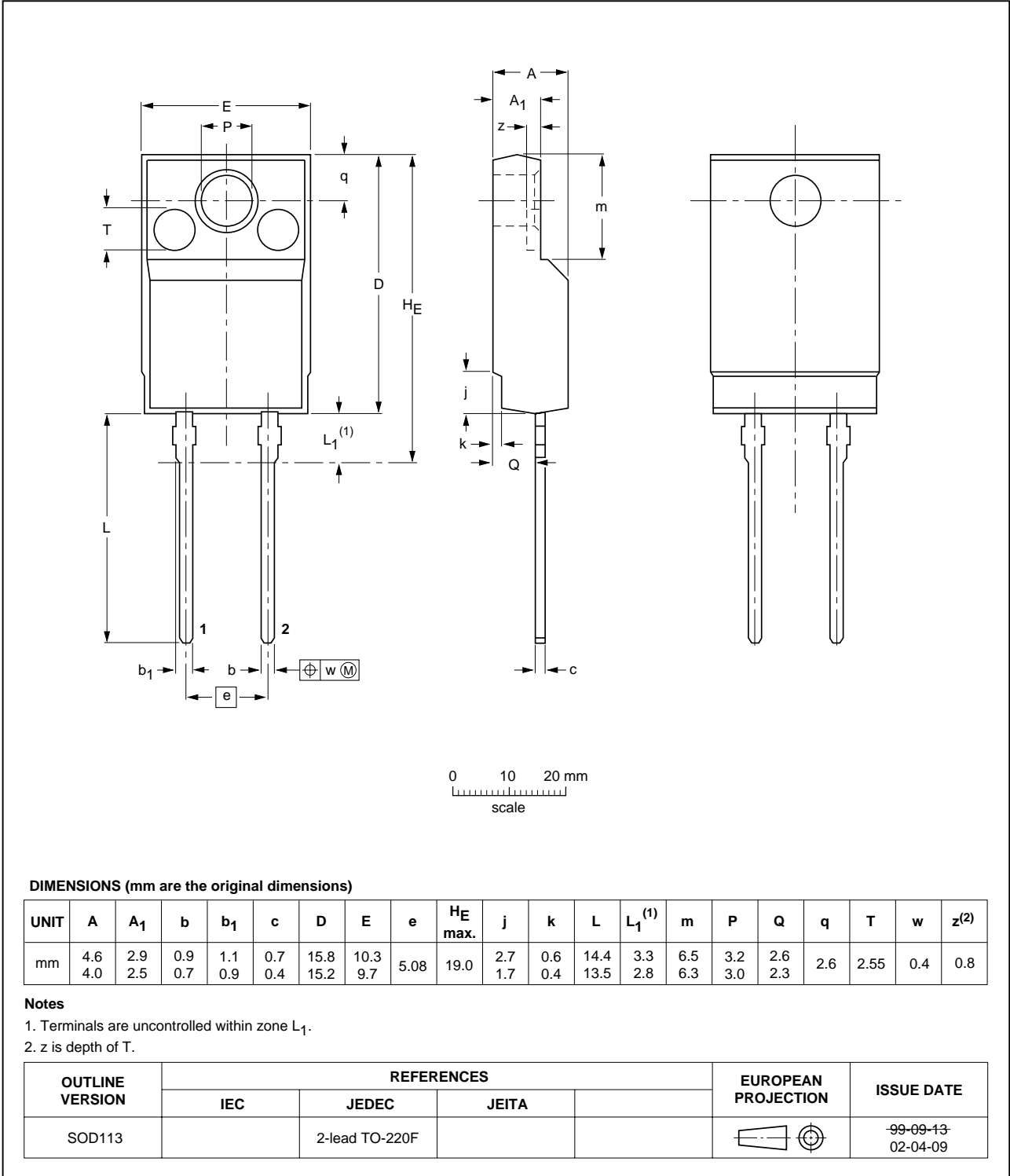**1 mounting hole; 2-lead TO-220 'full pack'**                                    **SOD113**



**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | A$_1$ | b | b$_1$ | c | D | E | e | H$_E$ max. | j | k | L | L$_1$(1) | m | P | Q | q | T | w | z(2) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 4.6 4.0 | 2.9 2.5 | 0.9 0.7 | 1.1 0.9 | 0.7 0.4 | 15.8 15.2 | 10.3 9.7 | 5.08 | 19.0 | 2.7 1.7 | 0.6 0.4 | 14.4 13.5 | 3.3 2.8 | 6.5 6.3 | 3.2 3.0 | 2.6 2.3 | 2.6 | 2.55 | 0.4 | 0.8 |

**Notes**

1. Terminals are uncontrolled within zone L$_1$.

2. z is depth of T.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOD113 | | 2-lead TO-220F | | | | ~~99-09-13~~ 02-04-09 |

**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 |
|---|---|---|---|
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