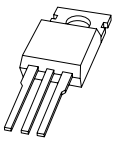


# BYT28 series

## Dual rectifier diodes ultrafast

Rev. 04 — 22 November 2004 Product data sheet

## 1. Product profile

### 1.1 General description

Dual, common cathode, ultrafast, epitaxial rectifier diodes in the SOT78 (TO-220AB) leaded package.

### 1.2 Features

- Low forward voltage drop
- Soft recovery characteristics
- Low thermal resistance.
- Fast switching
- High thermal cycling performance

### 1.3 Applications

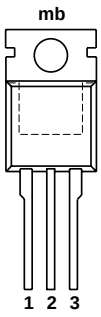
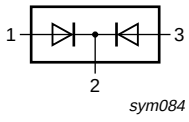
- Output rectifiers in high frequency switched-mode power supplies.

### 1.4 Quick reference data

- $V_R \leq 300$ V (BYT28-300)
- $V_R \leq 500$ V (BYT28-500)
- $V_F \leq 1.05$ V.
- $I_{O(AV)} \leq 10$ A
- $t_{rr} \leq 60$ ns

## 2. Pinning information

**Table 1: Pinning**

| Pin | Description | Simplified outline | Symbol |
|---|---|---|---|
| 1 | anode 1 |  |  |
| 2 | cathode | | |
| 3 | anode 2 | | |
| mb | mounting base; connected to cathode | | |



SOT78



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## 3. Ordering information

**Table 2: Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| BYT28-300 | TO-220AB | plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB | SOT78 |
| BYT28-500 | | | |

## 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 | | | | | |
| | BYT28-300 | | | - | 300 | V |
| | BYT28-500 | | | - | 500 | V |
| $V_R$ | continuous reverse voltage | | | | | |
| | BYT28-300 | $T_{mb} \leq 147$ °C | | - | 300 | V |
| | BYT28-500 | $T_{mb} \leq 147$ °C | | - | 500 | V |
| $I_{O(AV)}$ | average rectified output current | both diodes conducting; square wave; $\delta = 0.5$; $T_{mb} \leq 115$ °C | [1] | - | 10 | A |
| $I_{FSM}$ | non-repetitive peak forward current per diode | t = 10 ms | | - | 50 | A |
| | | t = 8.3 ms sinusoidal; with reapplied $V_{RRM(max)}$ | | - | 55 | A |
| $T_{stg}$ | storage temperature | | | –40 | +150 | °C |
| $T_j$ | junction temperature | | | - | 150 | °C |

[1] Neglecting switching and reverse current losses.

## 5. Thermal characteristics

**Table 4: Characteristics**

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base | per diode; see Figure 1 | - | - | 4.5 | K/W |
| | | both diodes conducting | - | - | 3 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | - | 60 | - | K/W |

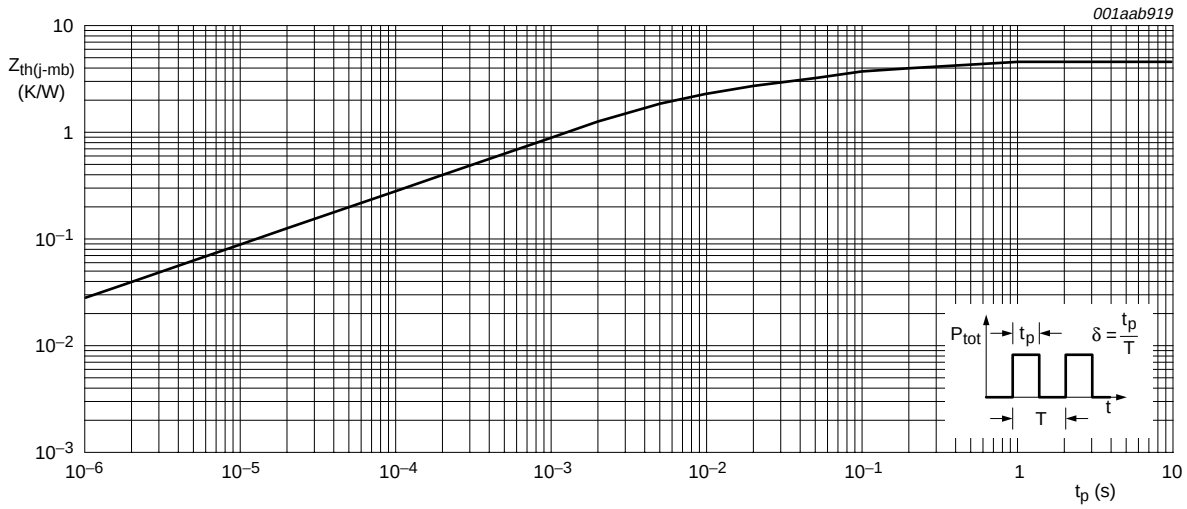



**Fig 1. Transient thermal impedance from junction to mounting base as a function of pulse duration**

## 6. Characteristics

**Table 5: Characteristics**

*$T_j$ = 25 °C; unless otherwise stated.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Characteristics are per diode** | | | | | | |
| $V_F$ | forward voltage | $I_F$ = 5 A; $T_j$ = 150 °C | - | 0.95 | 1.05 | V |
| | | $I_F$ = 10 A | - | 1.3 | 1.4 | V |
| $I_R$ | reverse current | $V_R = V_{RRM}$ | - | 2 | 10 | µA |
| | | $V_R = V_{RRM}$; $T_j$ = 100 °C | - | 10 | 200 | µA |
| $Q_S$ | reverse recovery charge | $I_F$ = 2 A; $V_R \geq$ 30 V; $-dI_F/dt$ = 20 A/µs; see Figure 9 | - | 50 | 60 | nC |
| $t_{rr}$ | reverse recovery time | $I_F$ = 1 A; $V_R \geq$ 30 V; $-dI_F/dt$ = 100 A/µs; see Figure 6 | - | 50 | 60 | ns |
| $I_{RRM}$ | repetitive peak reverse current | $I_F$ = 5 A; $V_R \geq$ 30 V; $-dI_F/dt$ = 50 A/µs; $T_j$ = 100 °C; see Figure 7 | - | 2 | 3 | A |
| $V_{fr}$ | forward recovery voltage | $I_F$ = 1 A; $dI_F/dt$ = 10 A/µs | - | 2.5 | - | V |

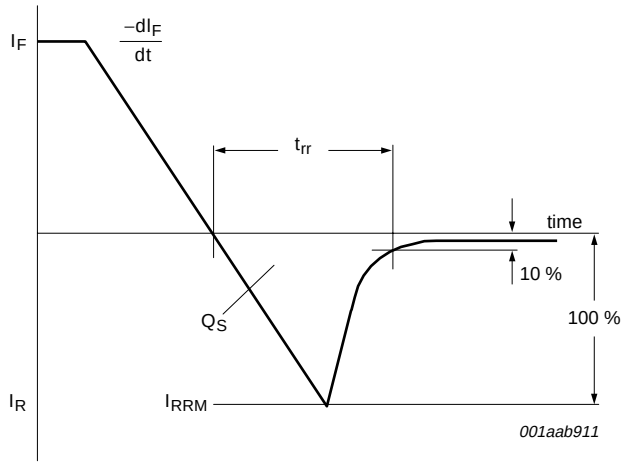



**Fig 2. Reverse recovery definitions**

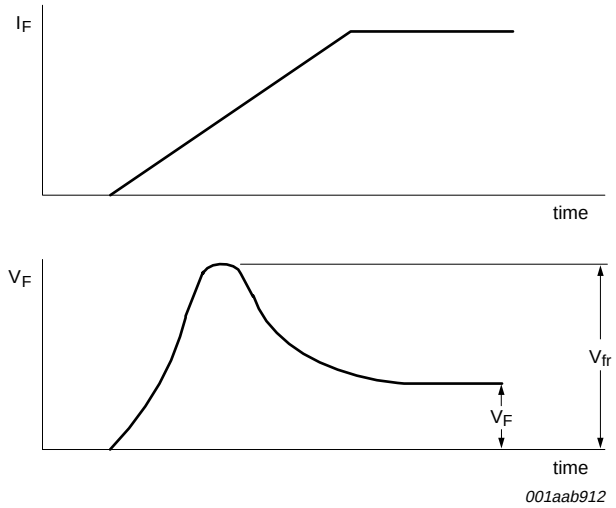
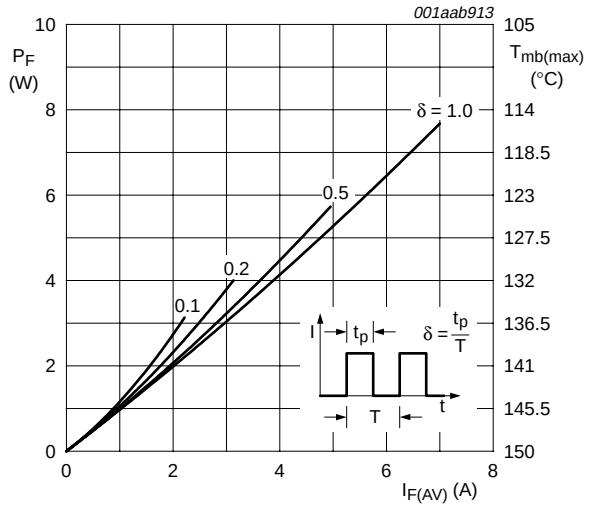


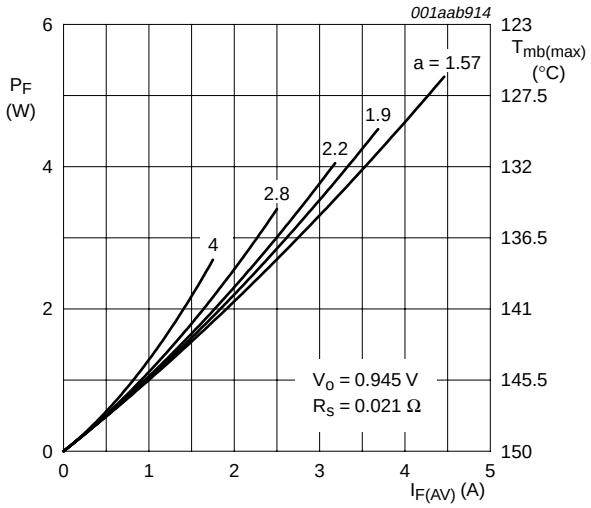

**Fig 3. Forward recovery definitions**




Per diode.

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

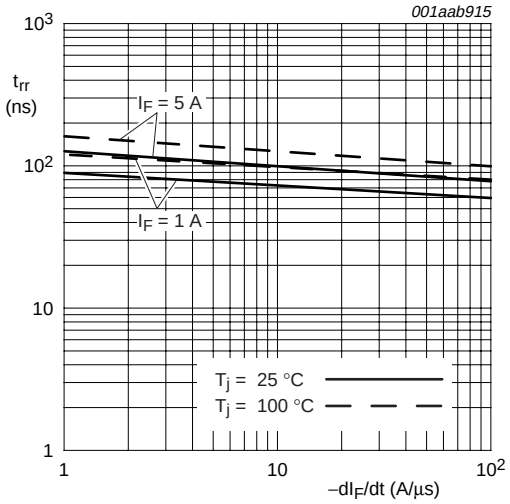
**Fig 4. Forward power dissipation as a function of average forward current; maximum values**




Per diode.

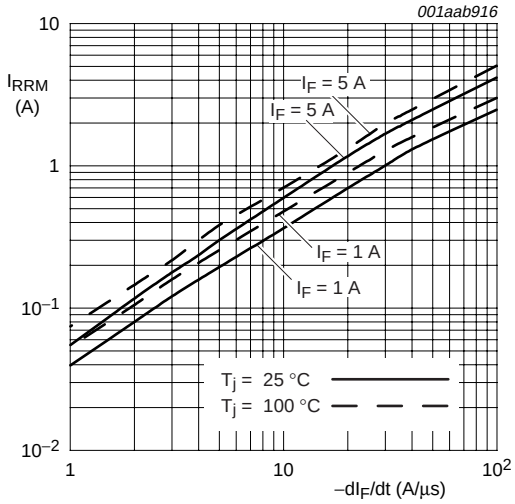
a = form factor = $I_{F(RMS)} / I_{F(AV)}$.

**Fig 5. Forward power dissipation as a function of average forward current; maximum values**




Per diode.

**Fig 6. Reverse recovery time as a function of time differential forward current; maximum values**




Per diode.

**Fig 7. Repetitive peak reverse current as a function of time differential forward current; maximum values**

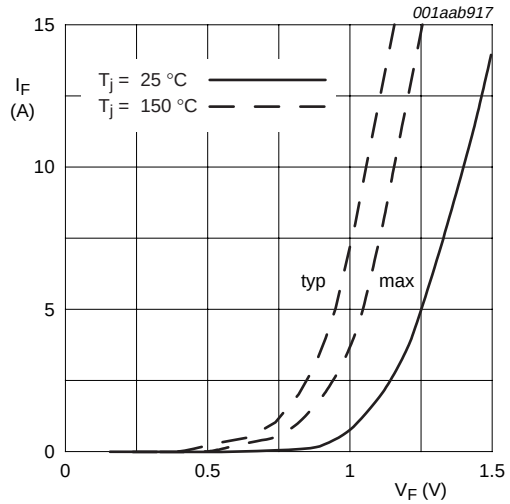
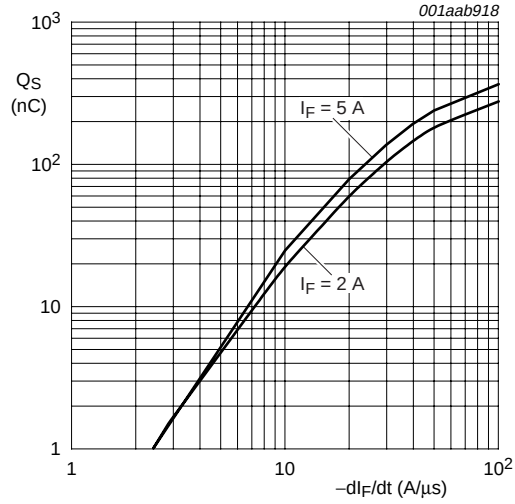



**Fig 8. Forward current as a function of forward voltage**




Per diode.

$T_j$ = 25 °C.

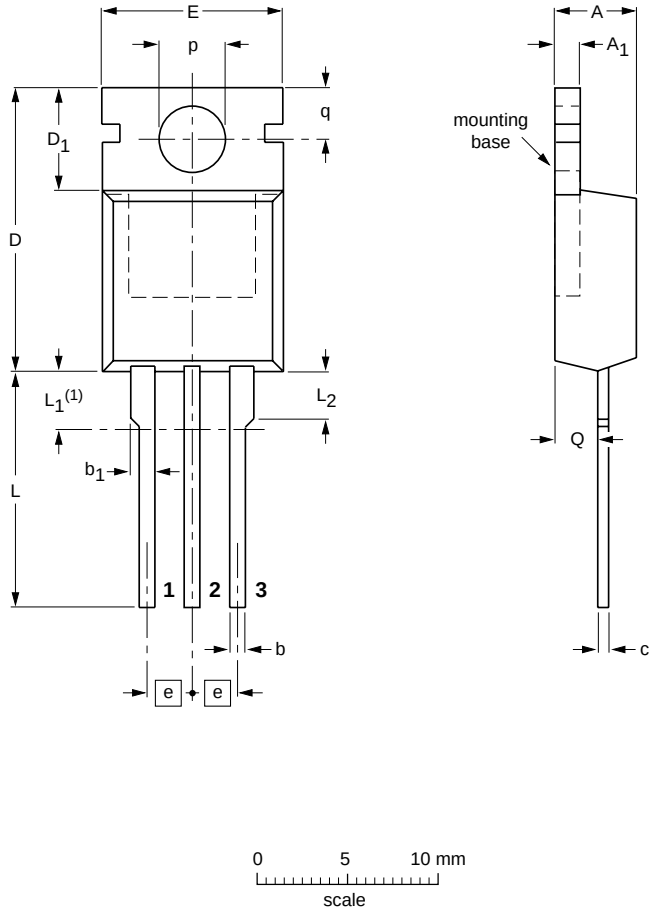
**Fig 9. Reverse recovery charge as a function of time differential forward current; maximum values**

## 7. Package information

Epoxy meets UL94 V0 at $\frac{1}{8}$ inch.

## 8. Package outline

**Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB** **SOT78**




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

| UNIT | A | $A_1$ | b | $b_1$ | c | D | $D_1$ | E | e | L | $L_1$(1) | $L_2$ max. | p | q | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 4.5<br>4.1 | 1.39<br>1.27 | 0.9<br>0.6 | 1.3<br>1.0 | 0.7<br>0.4 | 15.8<br>15.2 | 6.4<br>5.9 | 10.3<br>9.7 | 2.54 | 15.0<br>13.5 | 3.30<br>2.79 | 3.0 | 3.8<br>3.6 | 3.0<br>2.7 | 2.6<br>2.2 |

**Note**

1. Terminals in this zone are not tinned.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT78 | | 3-lead TO-220AB | SC-46 | | | ~~01-02-16~~<br>03-01-22 |

**Fig 10. Package outline SOT78 (SC-46)**

## 9. Revision history

**Table 6: Revision history**

| Document ID | Release date | Data sheet status | Change notice | Doc. number | Supersedes |
|---|---|---|---|---|---|
| BYT28_SER_4 | 20041122 | Product data sheet | - | 9397 750 14088 | BYT28_SERIES_3 |
| Modifications: | • The format of this data sheet has been redesigned to comply with the new presentation and information standard of Philips Semiconductors.<br>• Type number BYT28-400 removed<br>• Table 1: correction so the table corresponds to the device. | | | | |
| BYT28_SERIES_3 | 19981001 | Product specification | - | - | BYT28_SERIES_2 |
| BYT28_SERIES_2 | 19980901 | Product specification | - | - | BYT28_SERIES_1 |
| BYT28_SERIES_1 | 19960201 | Product specification | - | - | - |

## 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. |
| II | Preliminary data | Qualification | This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product. |
| III | Product data | Production | This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN). |

[1] Please consult the most recently issued data sheet before initiating or completing a design.

[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.

## 11. Definitions

**Short-form specification —** The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

**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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## 14. Contents





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