# BYC15-600

## Hyperfast power diode

Rev.03 - 24 February 2018 Product data sheet

## 1. General description

Hyperfast power diode in a SOD59 (2-lead TO-220AC) plastic package.

## 2. Features and benefits

- Extremely fast switching
- Low reverse recovery current
- Low thermal resistance
- Reduces switching losses in associated MOSFET

## 3. Applications

- Continuous Current Mode (CCM) Power
- Half-bridge or full-bridge switched-mode
- Half-bridge lighting ballasts

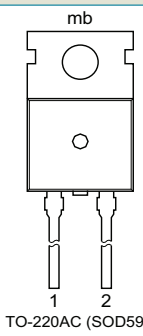
## 4. Quick reference data

**Table 1. Quick reference data**

| Symbol | Parameter | Conditions | Values | | | | Unit |
|---|---|---|---|---|---|---|---|
| **Absolute maximum rating** | | | | | | | |
| $V_{RRM}$ | repetitive peak reverse voltage | | 600 | | | | V |
| $I_{F(AV)}$ | average forward current | δ = 0.5 ; square-wave pulse; $T_{mb} \leq 98$ °C; Fig. 1; Fig. 2 | 15 | | | | A |
| $I_{FRM}$ | repetitive peak forward current | δ = 0.5 ; $t_p$ = 25 µs; $T_{mb} \leq 98$ °C; square-wave pulse | 30 | | | | A |
| $I_{FSM}$ | non-repetitive peak forward current | $t_p$ = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse | 200 | | | | A |
| | | $t_p$ = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse | 220 | | | | A |
| **Symbol** | **Parameter** | **Conditions** | | **Min** | **Typ** | **Max** | **Unit** |
| **Static characteristics** | | | | | | | |
| $V_F$ | forward voltage | $I_F$ = 15 A; $T_j$ = 150 °C; Fig. 3 | | - | 1.4 | 2 | V |
| **Dynamic characteristics** | | | | | | | |
| $t_{rr}$ | reverse recovery time | $I_F$ = 15 A; $V_R$ = 400 V; $dI_F/dt$ = 500 A/µs; $T_j$ = 25 °C; Fig. 4 | | - | 19 | - | ns |

## 5. Pinning information

**Table 2. Pinning information**

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|---|---|---|---|---|
| 1 | K | cathode |  TO-220AC (SOD59) |  *001aaa020* |
| 2 | A | anode | | |
| mb | mb | mounting base; cathode | | |

## 6. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| BYC15-600 | TO-220AC | plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC | SOD59 |

## 7. Marking

**Table 4. Marking codes**

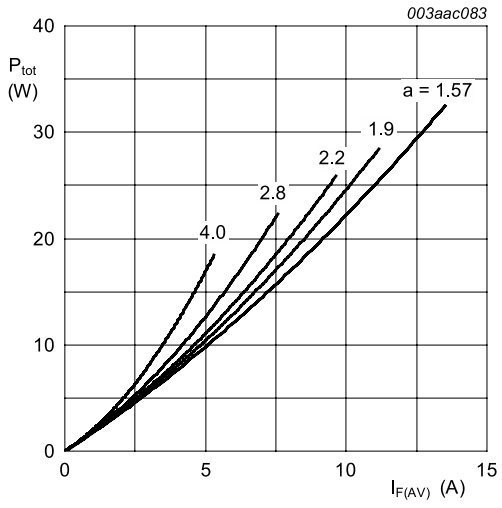
| Type number | Marking codes |
|---|---|
| BYC15-600 | BYC15-600 |

# 8. Limiting values

**Table 5. Limiting values**

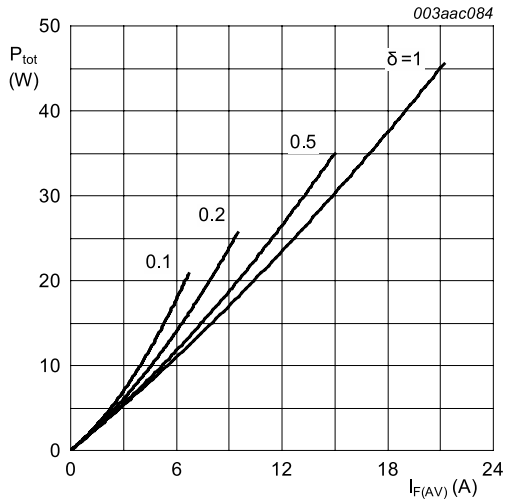
*In accordance with the Absolute Maximum Rating System (IEC 60134).*

| Symbol | Parameter | Conditions | Values | Unit |
|---|---|---|---|---|
| $V_{RRM}$ | repetitive peak reverse voltage | | 600 | V |
| $V_{RWM}$ | crest working reverse voltage | | 600 | V |
| $V_R$ | reverse voltage | $T_{mb} \leq 100$ °C; DC | 500 | V |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 98$ °C; Fig. 1; Fig. 2 | 15 | A |
| $I_{FRM}$ | repetitive peak forward current | $\delta = 0.5$ ; $t_p = 25$ µs; $T_{mb} \leq 98$ °C; square-wave pulse | 30 | A |
| $I_{FSM}$ | non-repetitive peak forward current | $t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse | 200 | A |
| | | $t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse | 220 | A |
| $T_{stg}$ | storage temperature | | -40 to 150 | °C |
| $T_j$ | junction temperature | | 150 | °C |




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

**Fig. 1. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values**




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

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

# 9. Thermal characteristics

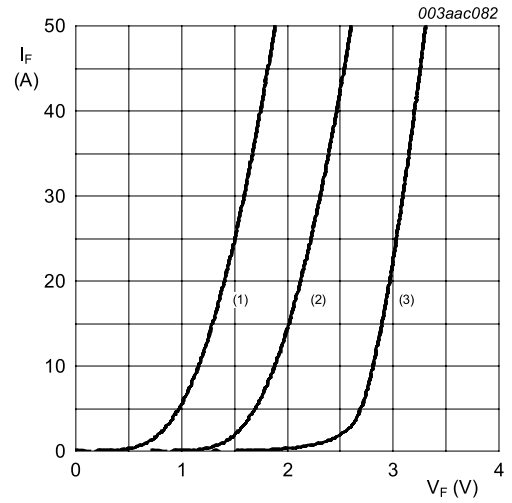
**Table 6. Thermal characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base | with heatsink compound | | - | - | 1.5 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | | - | 60 | - | K/W |

# 10. Characteristics

**Table 7. Characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **Static characteristics** | | | | | | | |
| $V_F$ | forward voltage | $I_F$ = 30A; $T_j$ = 150 °C; Fig. 3 | | - | 1.7 | 2.3 | V |
| | | $I_F$ = 15 A; $T_j$ = 25 °C; Fig. 3 | | - | 1.9 | 2.9 | V |
| | | $I_F$ = 15 A; $T_j$ = 150 °C; Fig. 3 | | - | 1.4 | 2 | V |
| $I_R$ | reverse current | $V_R$ = 600 V; $T_j$ = 25 °C | | - | 12 | 200 | µA |
| | | $V_R$ = 500 V; $T_j$ = 100 °C | | - | 1.1 | 3 | mA |
| **Dynamic characteristics** | | | | | | | |
| $t_{rr}$ | reverse recovery time | $I_F$ = 15 A; $V_R$ = 400 V; $dI_F/dt$ = 500 A/µs; $T_j$ = 100 °C; Fig. 4 | | - | 32 | 40 | ns |
| | | $I_F$ = 1 A; $V_R$ = 30 V; $dI_F/dt$ = 50 A/µs; $T_j$ = 25 °C; Fig. 4 | | - | 35 | 55 | ns |
| | | $I_F$ = 15 A; $V_R$ = 400 V; $dI_F/dt$ = 500 A/µs; $T_j$ = 25 °C; Fig. 4 | | - | 19 | - | ns |
| $I_{RM}$ | peak reverse recovery current | $I_F$ = 15 A; $V_R$ = 400 V; $dI_F/dt$ = 500 A/µs; $T_j$ = 125 °C; Fig. 4 | | - | 9.5 | 12 | A |
| | | $I_F$ = 15 A; $V_R$ = 400 V; $dI_F/dt$ = 50 A/µs; $T_j$ = 125 °C; Fig. 4 | | - | 3 | 7.5 | A |
| $v_{FR}$ | forward recovery voltage | $I_F$ = 15 A; $dI_F/dt$ = 100 A/µs; $T_j$ = 25 °C; Fig. 5 | | - | 8 | 11 | V |




(1) $T_j$ = 150 °C; typical values
(2) $T_j$ = 150 °C; maximum values
(3) $T_j$ = 25 °C; maximum values

**Fig. 3. Forward current as a function of forward voltage**

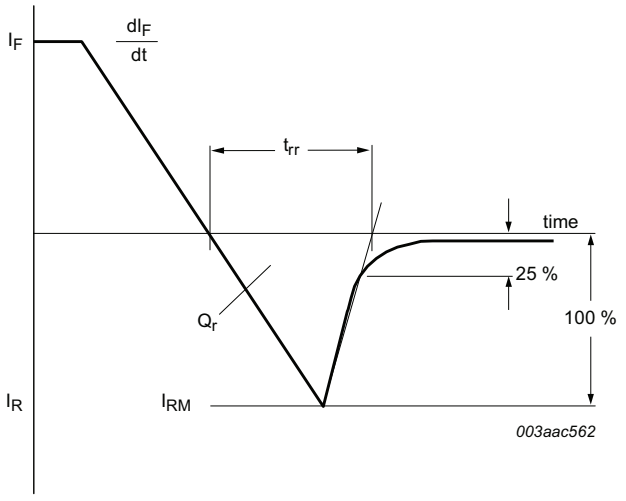



**Fig. 4. Reverse recovery definitions; ramp recovery**

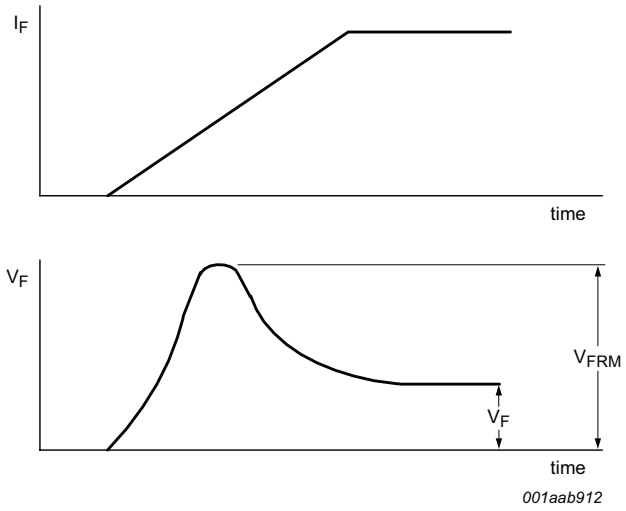
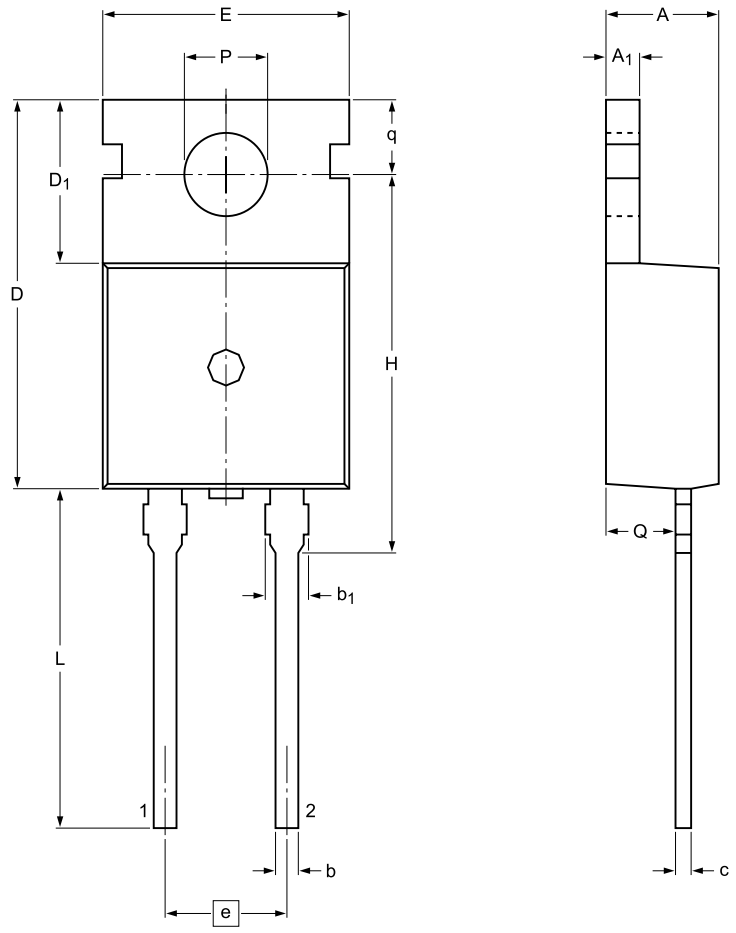



**Fig. 5. Forward recovery definitions**

## 11. Package outline

**Plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC** **SOD59**




0 5 10 mm

scale

Dimensions

| Unit | | A | $A_1$ | b | $b_1$ (1) | c | D | $D_1$ | E | e | H | L | P | Q | q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 4.7 | 1.40 | 0.95 | 1.7 | 0.65 | 15.8 | 6.8 | 10.30 | 5.08 (REF) | 16.25 | 15.0 | 3.80 | 2.6 | 2.9 |
| | nom | | | | | | | | | | | | | | |
| | min | 4.3 | 1.15 | 0.70 | 1.3 | 0.45 | 15.6 | 6.4 | 9.65 | | 15.70 | 12.5 | 3.65 | 2.2 | 2.7 |

Note

1. Protruded dambar are included in the dimension.

*sod059_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOD59 | 2-lead TO-220AC | | | | | ~~09-08-25~~ 12-11-27 |

## 12. Revision history

**Table 8. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| BYC15-600 v.3 | 20180224 | Product data sheet | - | BYC15-600 v.2 |
| Modifications: | Change from NXP version to WeEn version | | | |
| BYC15-600 v.2 | 20100729 | Product data sheet | - | BYC15-600 v.1 |
| Modifications: | Various changes to content. | | | |
| BYC15-600 v.1 | 20071129 | Product data sheet | - | - |

# 13. Legal information

## 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. |
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| Product [short] data sheet | Production | This document contains the product specification. |

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