



BYC10D-600

Hyperfast power diode

Rev. 1 — 28 June 2011

Product data sheet

1. Product profile

1.1 General description

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

1.2 Features and benefits

- Low reverse recovery current and low thermal resistance
- Reduces switching losses in associated MOSFET

1.3 Applications

- Continuous Current Mode (CCM) Power Factor Correction (PFC)
- Half-bridge/full-bridge switched-mode power supplies
- Half-bridge lighting ballasts

1.4 Quick reference data

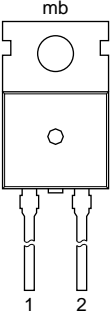

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|---------------------------------|---|-----|-----|-----|------|
| V_{RRM} | repetitive peak reverse voltage | | - | - | 600 | V |
| $I_{F(AV)}$ | average forward current | square-wave pulse; $\delta = 0.5$; $T_{mb} \leq 93\text{ }^{\circ}\text{C}$; see Figure 1 ; see Figure 2 | - | - | 10 | A |
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 10\text{ A}$; $T_j = 25\text{ }^{\circ}\text{C}$; see Figure 5 | - | 2 | 2.5 | V |
| | | $I_F = 10\text{ A}$; $T_j = 150\text{ }^{\circ}\text{C}$; see Figure 5 | - | 1.4 | 1.8 | V |
| Dynamic characteristics | | | | | | |
| t_{rr} | reverse recovery time | $I_F = 10\text{ A}$; $V_R = 400\text{ V}$; $di_F/dt = 500\text{ A}/\mu\text{s}$; $T_j = 25\text{ }^{\circ}\text{C}$; see Figure 6 | - | 18 | - | ns |



2. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------------------------------|--|---|
| 1 | K | cathode |  |  |
| 2 | A | anode | | |
| mb | mb | mounting base; connected to cathode | | |

SOD59 (TO-220AC)

3. Ordering information

Table 3. Ordering information

| Type number | Package | | Version |
|-------------|----------|--|---------|
| | Name | Description | |
| BYC10D-600 | TO-220AC | plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC | SOD59 |

4. Limiting values

Table 4. 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 | DC | - | 500 | V |
| $I_{F(AV)}$ | average forward current | square-wave pulse; $\delta = 0.5$; $T_{mb} \leq 93\text{ }^{\circ}\text{C}$; see Figure 1 ; see Figure 2 | - | 10 | A |
| I_{FRM} | repetitive peak forward current | square-wave pulse; $\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 93\text{ }^{\circ}\text{C}$ | - | 20 | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 8.3\text{ ms}$; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; see Figure 3 | - | 71 | A |
| | | $t_p = 10\text{ ms}$; sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; see Figure 3 | - | 65 | A |
| T_{stg} | storage temperature | | -40 | 150 | $^{\circ}\text{C}$ |
| T_j | junction temperature | | - | 150 | $^{\circ}\text{C}$ |

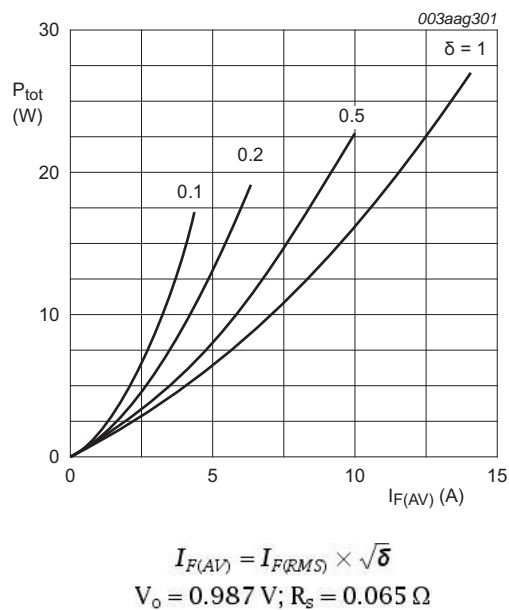


Fig 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

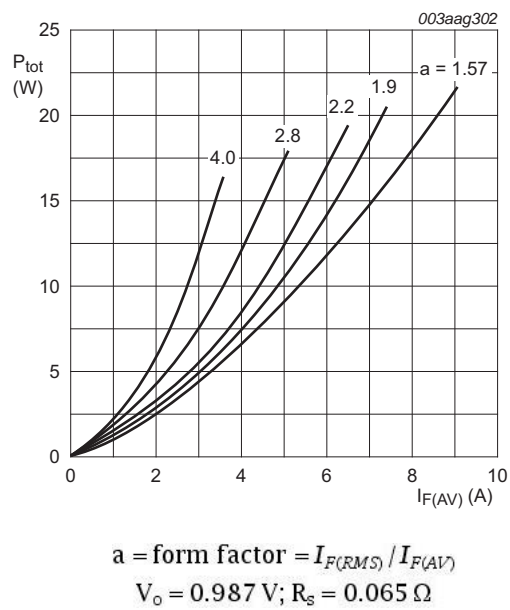


Fig 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

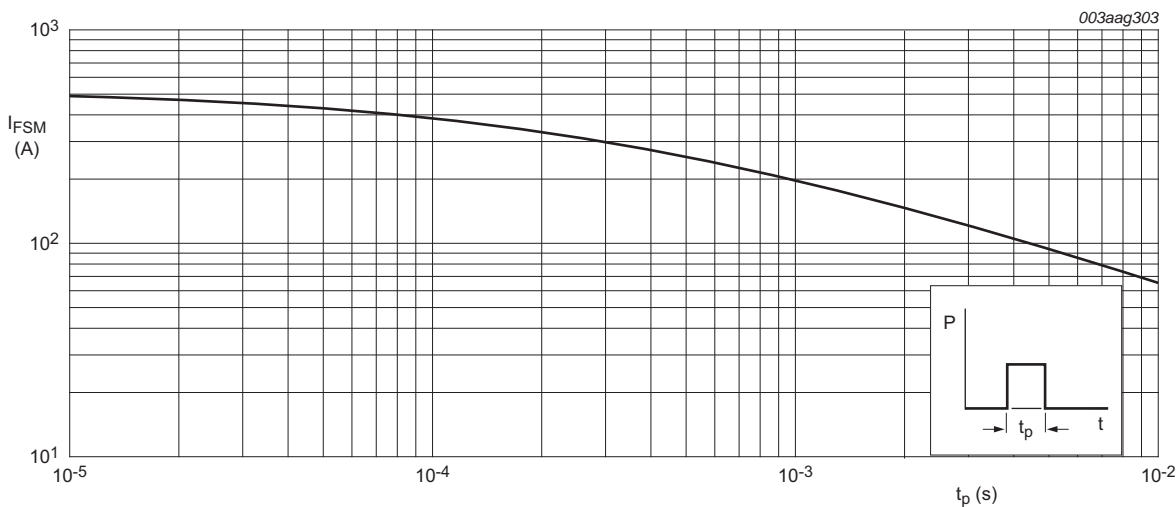


Fig 3. Non-repetitive peak forward current as a function of pulse width; square waveform; maximum values

5. Thermal characteristics

Table 5. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------|--|------------------------------|-----|-----|-----|------|
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base | see Figure 4 | - | - | 2.5 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | in free air | - | 60 | - | K/W |

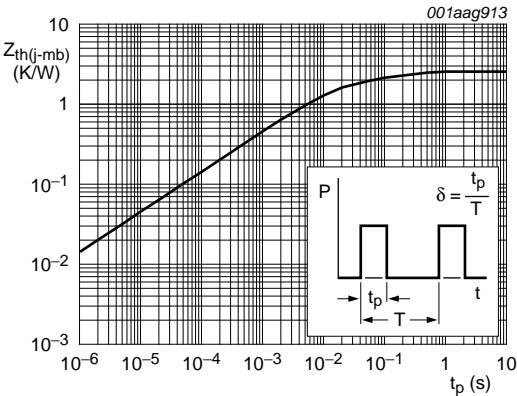
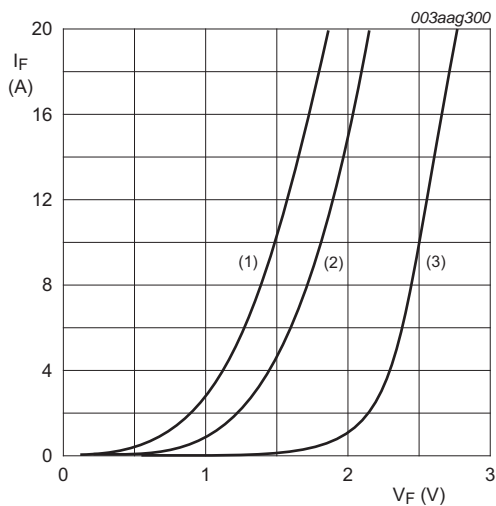


Fig 4. Transient thermal impedance from junction to mounting base as a function of pulse width

6. Characteristics

Table 6. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------------------|-------------------------------|--|-----|-----|-----|------|
| Static characteristics | | | | | | |
| V _F | forward voltage | I _F = 20 A; T _j = 150 °C; see Figure 5 | - | 1.7 | 2.2 | V |
| | | I _F = 10 A; T _j = 25 °C; see Figure 5 | - | 2 | 2.5 | V |
| | | I _F = 10 A; T _j = 150 °C; see Figure 5 | - | 1.4 | 1.8 | V |
| I _R | reverse current | V _R = 600 V | - | 9 | 200 | µA |
| | | V _R = 500 V; T _j = 100 °C | - | 1.1 | 3 | mA |
| Dynamic characteristics | | | | | | |
| t _{rr} | reverse recovery time | I _F = 1 A; V _R = 30 V; dI _F /dt = 50 A/µs; T _j = 25 °C; see Figure 6 | - | 15 | 30 | ns |
| | | I _F = 10 A; V _R = 400 V; dI _F /dt = 500 A/µs; T _j = 25 °C; see Figure 6 | - | 18 | - | ns |
| I _{RM} | peak reverse recovery current | I _F = 10 A; V _R = 400 V; dI _F /dt = 50 A/µs; T _j = 125 °C; see Figure 6 | - | 3 | 7.5 | A |
| | | I _F = 10 A; V _R = 400 V; dI _F /dt = 500 A/µs; T _j = 100 °C; see Figure 6 | - | 9.5 | 12 | A |
| V _{FR} | forward recovery voltage | I _F = 10 A; dI _F /dt = 100 A/µs; T _j = 25 °C; see Figure 7 | - | 8 | 11 | V |



- (1) $T_j = 150\text{ }^\circ\text{C}$; typical values;
 (2) $T_j = 150\text{ }^\circ\text{C}$; maximum values;
 (3) $T_j = 25\text{ }^\circ\text{C}$; maximum values;
 $V_o = 0.987\text{ V}$; $R_s = 0.065\text{ }\Omega$

Fig 5. Forward current as a function of forward voltage

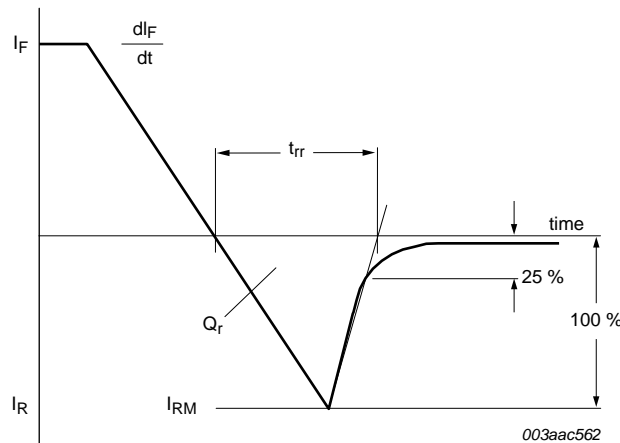
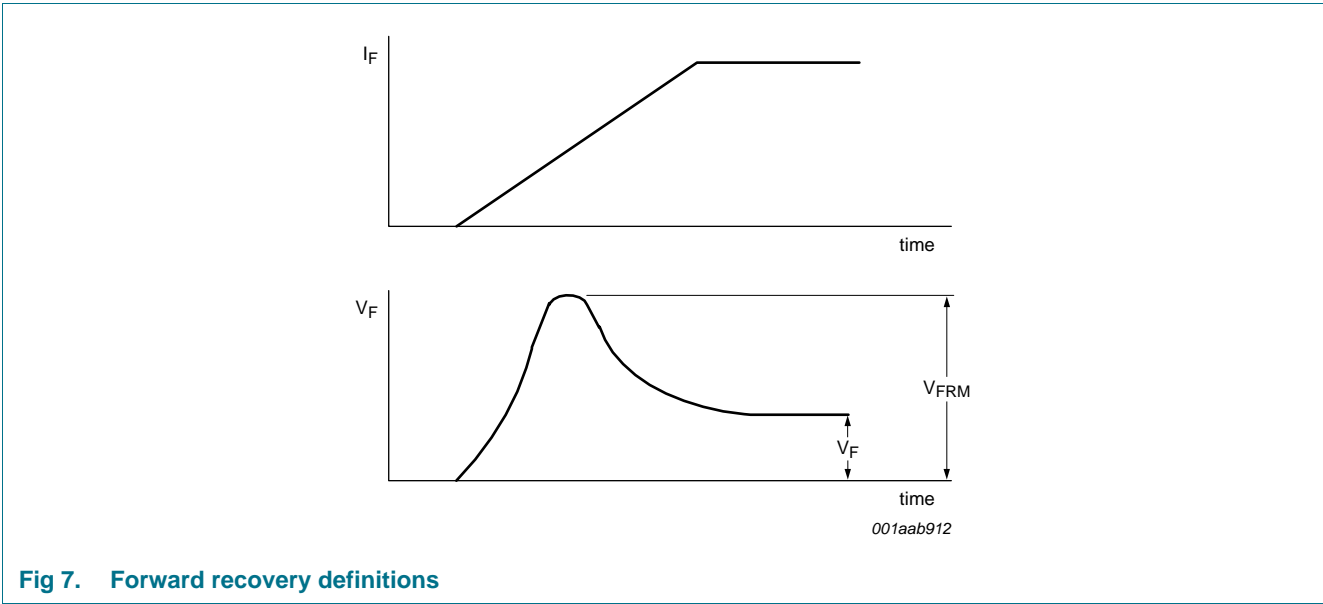


Fig 6. Reverse recovery definitions; ramp recovery



7. Package outline

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

SOD59

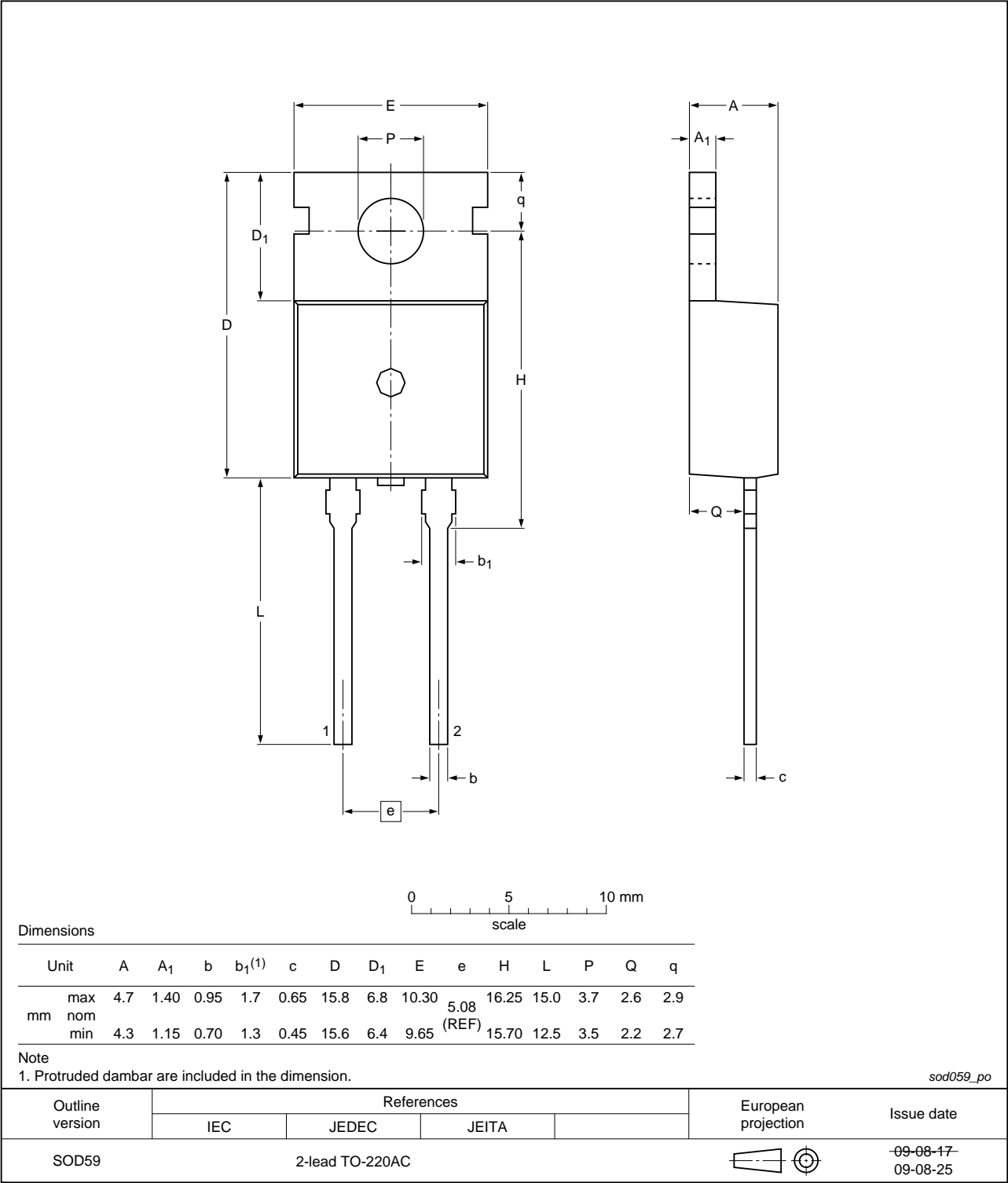


Fig 8. Package outline SOD59 (TO-220AC)

8. Revision history

Table 7. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--------------|--------------------|---------------|------------|
| BYC10D-600 v.1 | 20110628 | Product data sheet | - | - |

9. Legal information

9.1 Data sheet status

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|------------------------------------|-------------------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
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[2] The term 'short data sheet' is explained in section "Definitions".

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11. Contents

| | | |
|-----------|--|-----------|
| 1 | Product profile | 1 |
| 1.1 | General description | 1 |
| 1.2 | Features and benefits | 1 |
| 1.3 | Applications | 1 |
| 1.4 | Quick reference data | 1 |
| 2 | Pinning information | 2 |
| 3 | Ordering information | 2 |
| 4 | Limiting values | 2 |
| 5 | Thermal characteristics | 4 |
| 6 | Characteristics | 5 |
| 7 | Package outline | 7 |
| 8 | Revision history | 8 |
| 9 | Legal information | 9 |
| 9.1 | Data sheet status | 9 |
| 9.2 | Definitions | 9 |
| 9.3 | Disclaimers | 9 |
| 9.4 | Trademarks | 10 |
| 10 | Contact information | 10 |

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