

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 Factor Correction (PFC)
- Half-bridge/full-bridge switched-mode power supplies
- 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 | $\delta = 0.5$; $T_{mb} \leq 78$ °C; square-wave pulse; Fig. 1 ; Fig. 2 | 10 | | | A |
| I_{FRM} | repetitive peak forward current | $\delta = 0.5$; $T_{mb} \leq 78$ °C; square-wave pulse | 20 | | | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse | 65 | | | A |
| | | $t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse | 71 | | | A |
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 10$ A; $T_j = 150$ °C; Fig. 4 | - | 1.4 | 1.8 | V |
| Dynamic characteristics | | | | | | |
| t_{rr} | reverse recovery time | $I_F = 10$ A; $V_R = 400$ V; $di_F/dt = 500$ A/ μ s; $T_j = 25$ °C; Fig. 6 | - | 19 | - | ns |

5. 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 | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|----------|--|---------|
| | Name | Description | Version |
| BYC10-600 | TO-220AC | plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC | SOD59 |

7. Marking

Table 4. Marking codes

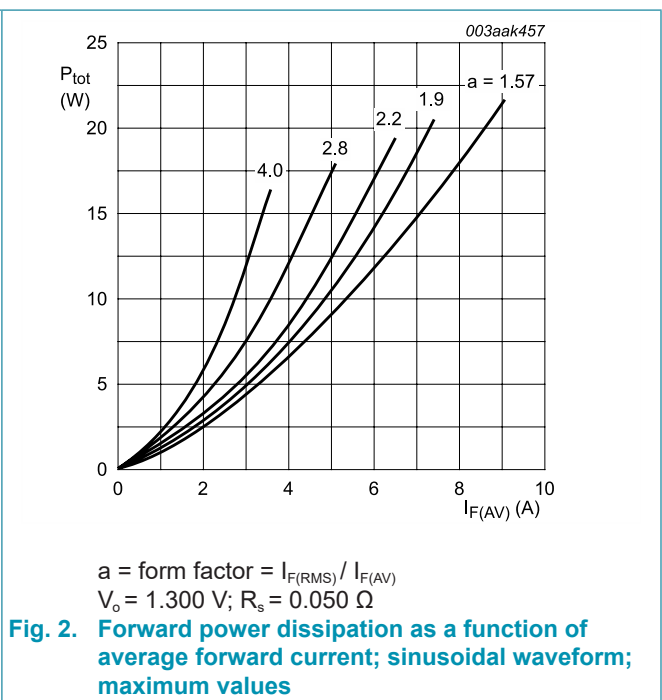
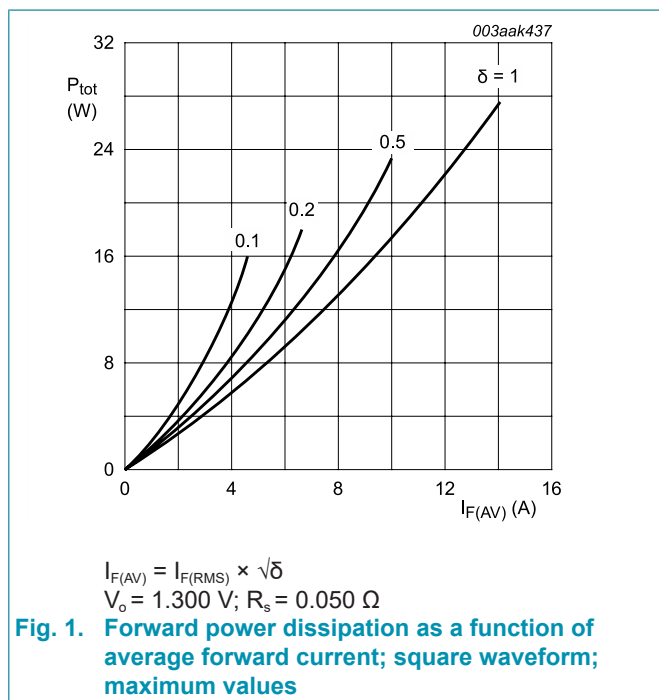
| Type number | Marking codes |
|-------------|---------------|
| BYC10-600 | BYC10-600 |

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 | $T_{mb} \leq 114\text{ °C}$ | 500 | V |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; $T_{mb} \leq 78\text{ °C}$; square-wave pulse; Fig. 1 ; Fig. 2 | 10 | A |
| I_{FRM} | repetitive peak forward current | $\delta = 0.5$; $T_{mb} \leq 78\text{ °C}$; square-wave pulse | 20 | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; sine-wave pulse | 65 | A |
| | | $t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; sine-wave pulse | 71 | A |
| T_{stg} | storage temperature | | -40 to 150 | °C |
| T_j | junction temperature | | 150 | °C |



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 | Fig. 3 | - | - | 2 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | in free air | - | 60 | - | K/W |

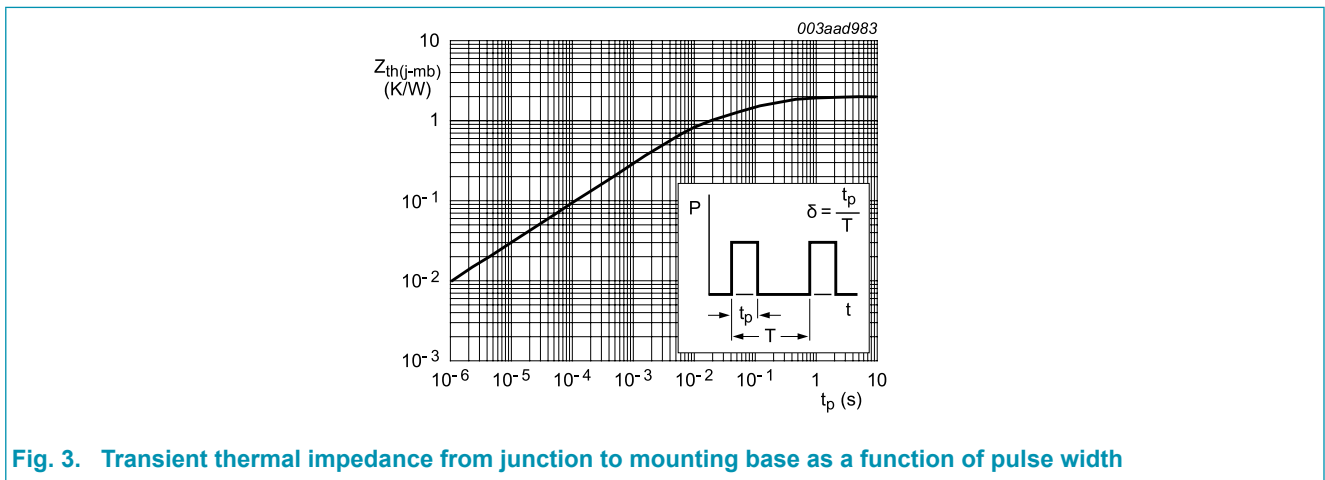
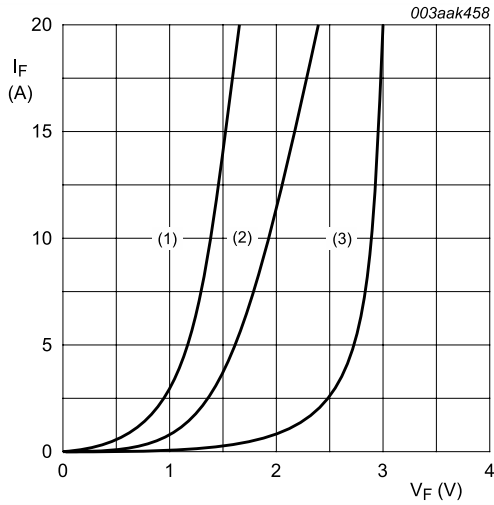


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse width

10. Characteristics

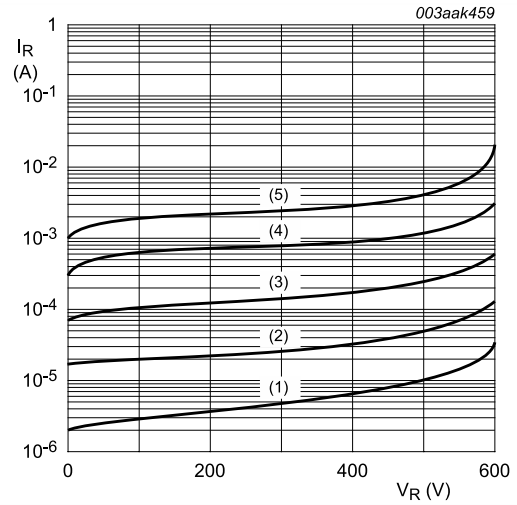
Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|-------------------------------|---|-----|-----|-----|---------------|
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 10\text{ A}; T_j = 25\text{ °C};$ Fig. 4 | - | 2 | 2.9 | V |
| | | $I_F = 10\text{ A}; T_j = 150\text{ °C};$ Fig. 4 | - | 1.4 | 1.8 | V |
| | | $I_F = 20\text{ A}; T_j = 150\text{ °C};$ Fig. 4 | - | 1.7 | 2.3 | V |
| I_R | reverse current | $V_R = 600\text{ V}; T_j = 25\text{ °C};$ Fig. 5 | - | 9 | 200 | μA |
| | | $V_R = 500\text{ V}; T_j = 100\text{ °C};$ Fig. 5 | - | 1.1 | 3 | mA |
| Dynamic characteristics | | | | | | |
| t_{rr} | reverse recovery time | $I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s};$ $T_j = 25\text{ °C};$ Fig. 6 | - | 35 | 55 | ns |
| | | $I_F = 10\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s};$ $T_j = 25\text{ °C};$ Fig. 6 | - | 19 | - | ns |
| | | $I_F = 10\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s};$ $T_j = 100\text{ °C};$ Fig. 6 | - | 32 | 40 | ns |
| I_{RM} | peak reverse recovery current | $I_F = 10\text{ A}; V_R = 400\text{ V}; dI_F/dt = 100\text{ A}/\mu\text{s};$ $T_j = 125\text{ °C};$ Fig. 6 | - | 3 | 7.5 | A |
| | | $I_F = 10\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s};$ $T_j = 125\text{ °C};$ Fig. 6 | - | 9.5 | 12 | A |
| V_{FRM} | forward recovery voltage | $I_F = 10\text{ A}; dI_F/dt = 100\text{ A}/\mu\text{s}; T_j = 25\text{ °C};$ Fig. 7 | - | 8 | 11 | V |



(1) $T_j = 150^\circ\text{C}$; typical values
 (2) $T_j = 150^\circ\text{C}$; maximum values
 (3) $T_j = 25^\circ\text{C}$; maximum values
 $V_o = 1.300\text{ V}$; $R_s = 0.050\ \Omega$

Fig. 4. Forward current as a function of forward voltage



(1) $T_j = 25^\circ\text{C}$; typical values;
 (2) $T_j = 50^\circ\text{C}$; typical values;
 (3) $T_j = 75^\circ\text{C}$; typical values;
 (4) $T_j = 100^\circ\text{C}$; typical values;
 (5) $T_j = 125^\circ\text{C}$; typical value

Fig. 5. Reverse leakage current as a function of reverse voltage; typical values

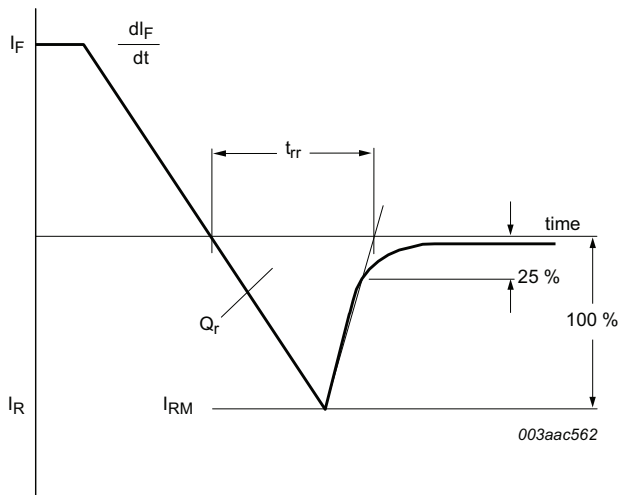


Fig. 6. Reverse recovery definitions; ramp recovery

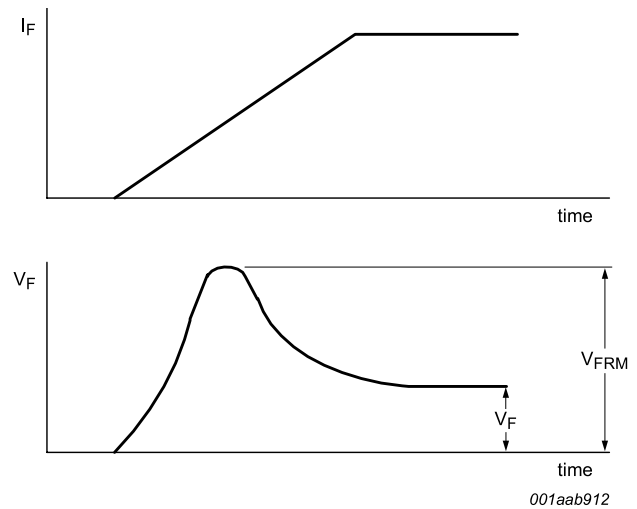
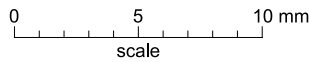
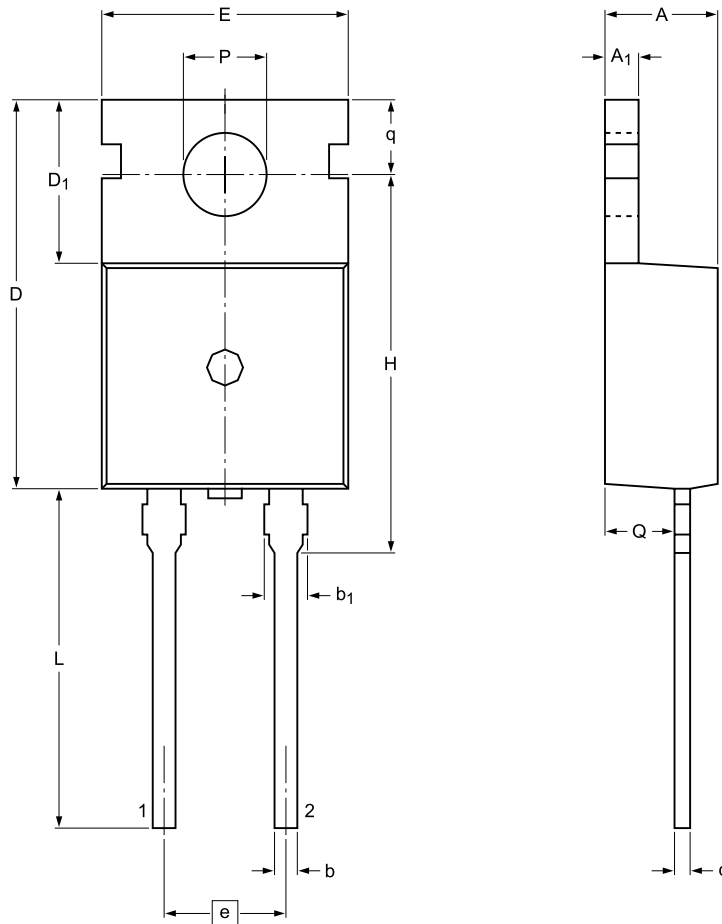


Fig. 7. Forward recovery definitions

11. Package outline

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

SOD59



Dimensions

| Unit | A | A ₁ | b | b ₁ (1) | c | D | D ₁ | E | e | H | L | P | Q | q |
|------|-----|----------------|------|--------------------|------|------|----------------|-------|-------|-------|------|------|-----|-----|
| max | 4.7 | 1.40 | 0.95 | 1.7 | 0.65 | 15.8 | 6.8 | 10.30 | 5.08 | 16.25 | 15.0 | 3.80 | 2.6 | 2.9 |
| nom | | | | | | | | | (REF) | | | | | |
| 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. 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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- [2] The term 'short data sheet' is explained in section "Definitions".
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