

## 1. General description

Hyperfast power diode in a SOD142 (2-lead TO247) plastic package.

## 2. Features and benefits

- Fast switching and soft reverse recovery characteristics
- Low forward voltage drop
- Low leakage current
- Low reverse recovery current
- Reduces switching losses in associated MOSFET or IGBT

## 3. Applications

- UPS
- EV Charger
- Welding Machine
- Air Conditioner

## 4. Quick reference data

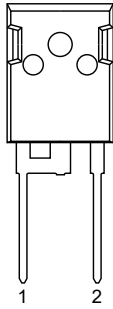
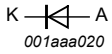
Table 1. Quick reference data

| Symbol                         | Parameter                           | Conditions  | Min | Typ  | Max | Unit |
|--------------------------------|-------------------------------------|---|-----|------|-----|------|
| $V_R$                          | reverse voltage                     | DC  | -   | -    | 600 | V    |
| $I_{F(AV)}$                    | average forward current             | $\delta = 0.5$ ; $T_{mb} \leq 41$ °C; square-wave pulse; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a> | -   | -    | 60  | A    |
| $I_{FRM}$                      | repetitive peak forward current     | $\delta = 0.5$ ; $t_p = 25$ $\mu$ s; $T_{mb} \leq 41$ °C; square-wave pulse   | -   | -    | 120 | A    |
| $I_{FSM}$                      | non-repetitive peak forward current | $t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; <a href="#">Fig. 4</a>   | -   | -    | 600 | A    |
|                                |                                     | $t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; <a href="#">Fig. 4</a>  | -   | -    | 660 | A    |
| <b>Static characteristics</b>  |                                     |   |     |      |     |      |
| $V_F$                          | forward voltage                     | $I_F = 60$ A; $T_j = 25$ °C; <a href="#">Fig. 6</a>   | -   | 2    | 2.6 | V    |
|                                |                                     | $I_F = 60$ A; $T_j = 150$ °C; <a href="#">Fig. 6</a>  | -   | 1.55 | 2   | V    |
| <b>Dynamic characteristics</b> |                                     |   |     |      |     |      |
| $t_{rr}$                       | reverse recovery time               | $I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 50$ A/ $\mu$ s; $T_j = 25$ °C; <a href="#">Fig. 7</a>                                       | -   | -    | 50  | ns   |
|                                |                                     | $I_F = 60$ A; $V_R = 400$ V; $dI_F/dt = 200$ A/ $\mu$ s; $T_j = 25$ °C; <a href="#">Fig. 7</a>                                    | -   | 40   | -   | ns   |

| Symbol | Parameter | Conditions   | Min | Typ | Max | Unit |
|--------|-----------|--|-----|-----|-----|------|
|        |           | $I_F = 60\text{ A}$ ; $V_R = 400\text{ V}$ ; $di_F/dt = 200\text{ A}/\mu\text{s}$ ; $T_j = 125\text{ }^\circ\text{C}$ ; <a href="#">Fig. 7</a> | -   | 101 | -   | ns   |

## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description                         | Simplified outline   | Graphic symbol  |
|-----|--------|-------------------------------------|--|---|
| 1   | K      | cathode                             |  <p style="text-align: center;">TO-247 (SOD142)</p> |  |
| 2   | A      | anode                               |  |   |
| mb  | mb     | mounting base; connected to cathode |  |   |

## 6. Ordering information

Table 3. Ordering information

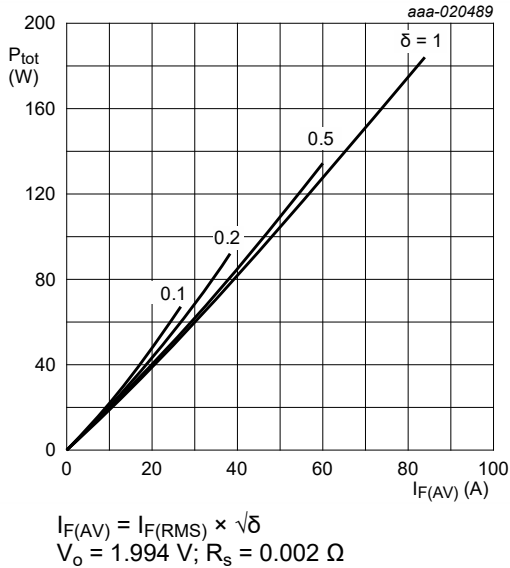
| Type number | Package |   |         |
|-------------|---------|---|---------|
|             | Name    | Description   | Version |
| BYC60W-600P | TO-247  | Plastic Single-ended through-hole package; Heatsink mounted; 1 mounting hole; 2-lead TO-247 | SOD142  |

## 7. Limiting values

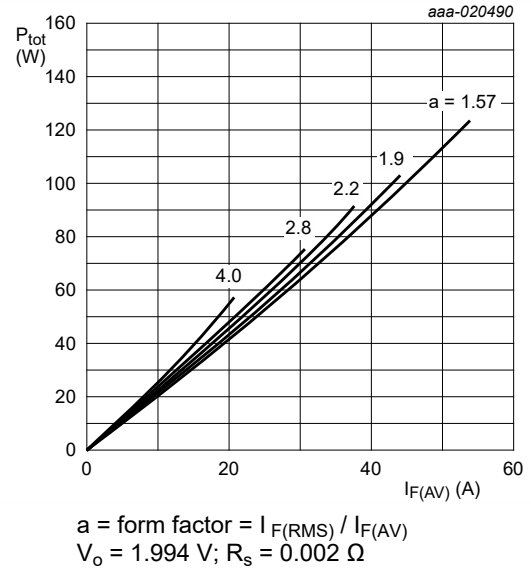
**Table 4. Limiting values**

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  | -   | 600 | V                |
| $I_{F(AV)}$ | average forward current             | $\delta = 0.5$ ; $T_{mb} \leq 41\text{ }^\circ\text{C}$ ; square-wave pulse; Fig. 1; Fig. 2; Fig. 3         | -   | 60  | A                |
| $I_{FRM}$   | repetitive peak forward current     | $\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 41\text{ }^\circ\text{C}$ ; square-wave pulse | -   | 120 | A                |
| $I_{FSM}$   | non-repetitive peak forward current | $t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; sine-wave pulse; Fig. 4            | -   | 600 | A                |
|             |                                     | $t_p = 8.3\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; sine-wave pulse; Fig. 4           | -   | 660 | A                |
| $T_{stg}$   | storage temperature                 |   | -55 | 175 | $^\circ\text{C}$ |
| $T_j$       | junction temperature                |   | -   | 175 | $^\circ\text{C}$ |



**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**

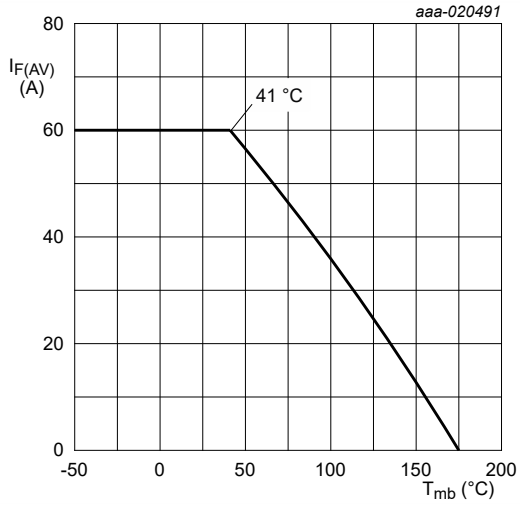


Fig. 3. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

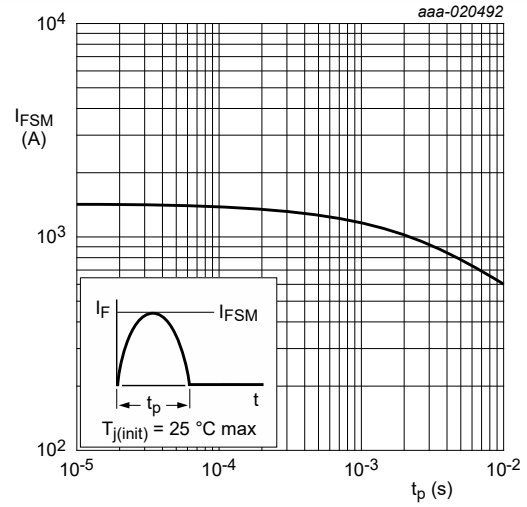
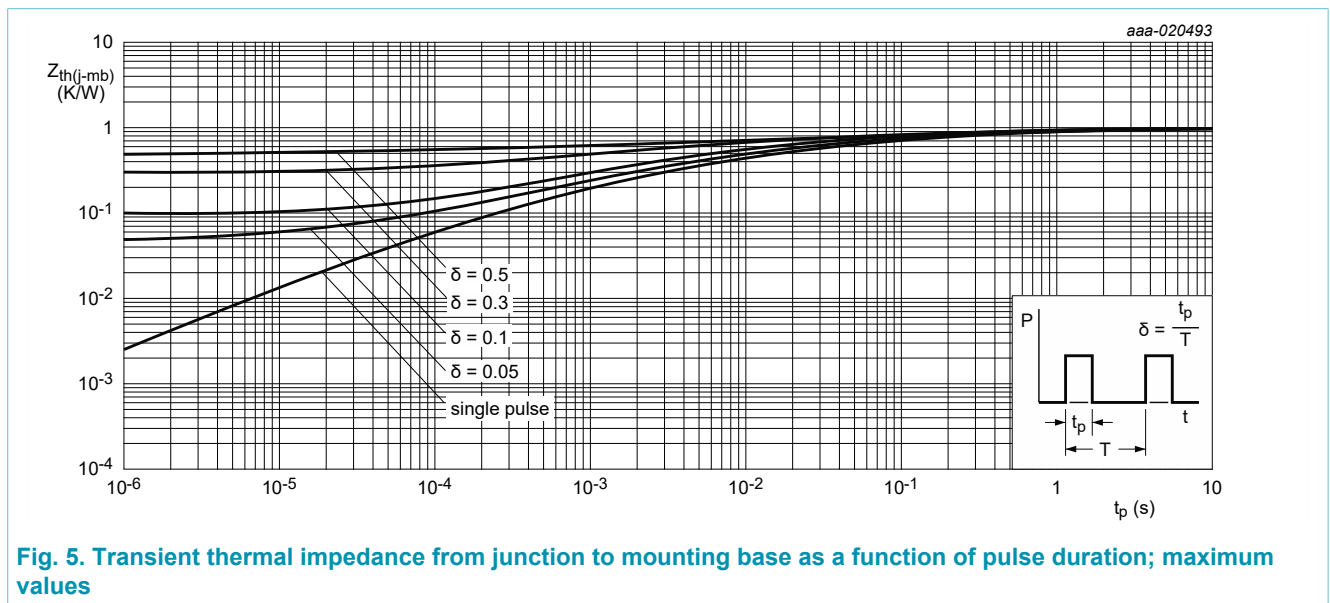


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

### 8. Thermal characteristics

Table 5. Thermal characteristics

| Symbol         | Parameter  | Conditions                                     | Min | Typ | Max | Unit |
|----------------|--|--|-----|-----|-----|------|
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base    | with heatsink compound; <a href="#">Fig. 5</a> | -   | -   | 1   | K/W  |
| $R_{th(j-a)}$  | thermal resistance from junction to ambient free air | in free air                                    | -   | 45  | -   | K/W  |



## 9. Characteristics

Table 6. Characteristics

| Symbol                         | Parameter                     | Conditions   | Min | Typ  | Max | Unit          |
|--------------------------------|-------------------------------|--|-----|------|-----|---------------|
| <b>Static characteristics</b>  |                               |  |     |      |     |               |
| $V_F$                          | forward voltage               | $I_F = 60 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 6}$  | -   | 2    | 2.6 | V             |
|                                |                               | $I_F = 60 \text{ A}; T_j = 150 \text{ }^\circ\text{C}; \text{ Fig. 6}$   | -   | 1.55 | 2   | V             |
| $I_R$                          | reverse current               | $V_R = 600 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$   | -   | 2    | 10  | $\mu\text{A}$ |
|                                |                               | $V_R = 600 \text{ V}; T_j = 125 \text{ }^\circ\text{C}$  | -   | -    | 500 | $\mu\text{A}$ |
| <b>Dynamic characteristics</b> |                               |  |     |      |     |               |
| $t_{rr}$                       | reverse recovery time         | $I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 50 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$     | -   | -    | 50  | ns            |
|                                |                               | $I_F = 60 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$  | -   | 40   | -   | ns            |
|                                |                               | $I_F = 60 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 125 \text{ }^\circ\text{C}; \text{ Fig. 7}$ | -   | 101  | -   | ns            |
| $I_{RM}$                       | peak reverse recovery current | $I_F = 60 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$  | -   | 3.7  | -   | A             |
|                                |                               | $I_F = 60 \text{ A}; V_R = 200 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 125 \text{ }^\circ\text{C}; \text{ Fig. 7}$ | -   | 11   | -   | A             |
| $Q_r$                          | recovered charge              | $I_F = 60 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$  | -   | 74   | -   | nC            |
|                                |                               | $I_F = 60 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 125 \text{ }^\circ\text{C}; \text{ Fig. 7}$ | -   | 559  | -   | nC            |

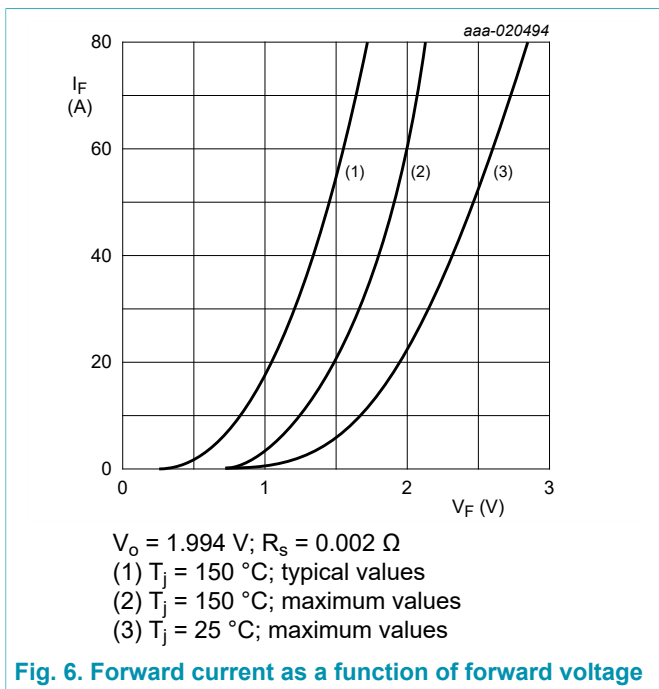


Fig. 6. Forward current as a function of forward voltage

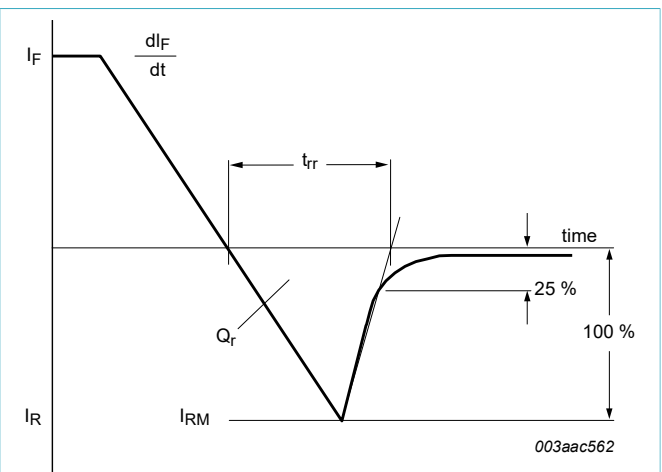
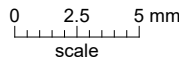
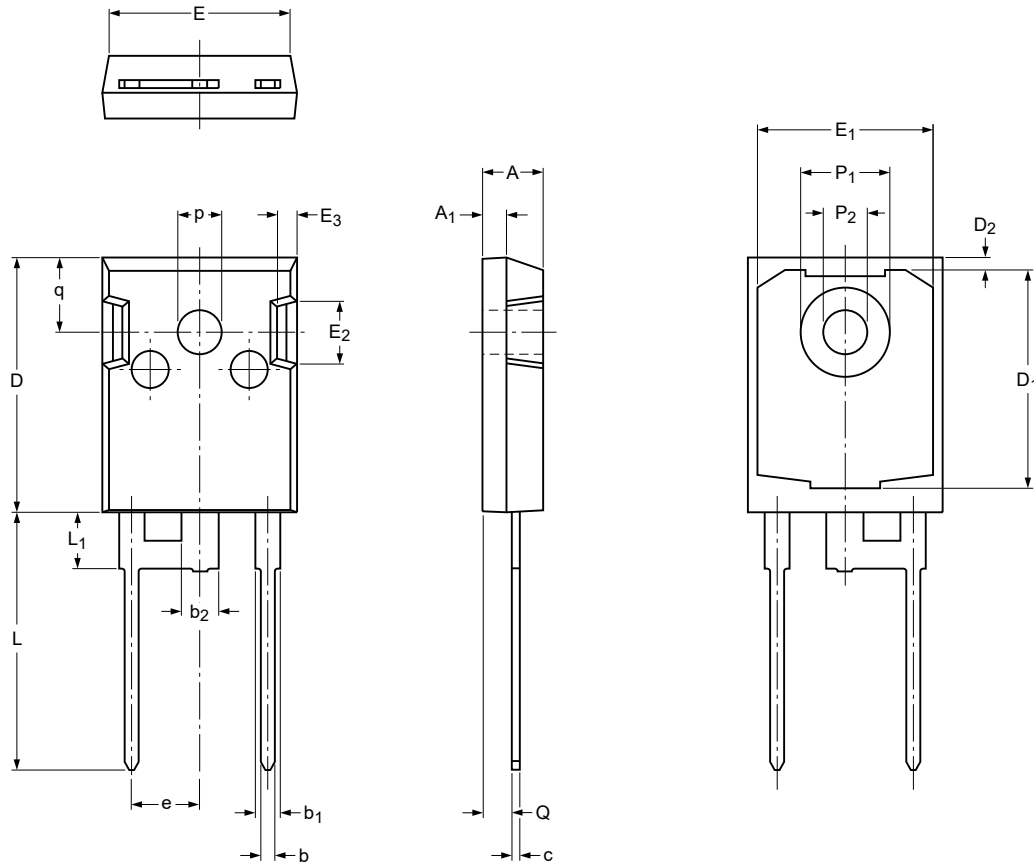


Fig. 7. Reverse recovery definitions; ramp recovery

10. Package outline

Plastic Single-ended through-hole package; Heatsink mounted; 1 mounting hole; 2-lead TO-247 SOD142



Dimensions (mm are the original dimensions)

| Unit | A   | A <sub>1</sub> | b   | b <sub>1</sub> | b <sub>2</sub> | c   | D    | D <sub>1</sub> | D <sub>2</sub> | e    | E     | E <sub>1</sub> | E <sub>2</sub> | E <sub>3</sub> | L    | L <sub>1</sub> | p   | p <sub>1</sub> | p <sub>2</sub> | q    | Q   |  |
|------|-----|----------------|-----|----------------|----------------|-----|------|----------------|----------------|------|-------|----------------|----------------|----------------|------|----------------|-----|----------------|----------------|------|-----|--|
| max  | 5.2 | 2.1            | 1.4 | 2.2            | 3.2            | 0.7 | 20.6 | 17.68          | 1.2            |      | 15.75 | 14.22          | 5.2            | 1.8            | 20.9 | 4.75           | 3.7 | 7.3            | 3.6            | 6.18 | 2.6 |  |
| nom  |     |                |     |                |                |     |      |                |                | 5.45 |       |                |                |                |      |                |     |                |                |      |     |  |
| min  | 4.7 | 1.9            | 1.0 | 1.8            | 2.8            | 0.5 | 20.3 | 17.28          | 0.8            |      | 15.45 | 13.82          | 4.8            | 1.4            | 20.4 | 4.25           | 3.5 | 7.1            | 3.4            | 5.78 | 2.2 |  |

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|                 |            |       |       |                     |                        |
|-----------------|------------|-------|-------|---------------------|------------------------|
| Outline version | References |       |       | European projection | Issue date             |
|                 | IEC        | JEDEC | JEITA |                     |                        |
| SOD142          | TO247      |       |       |                     | -12-11-13-<br>12-11-27 |

Fig. 8. Package outline TO-247 (SOD142)

## 11. 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. |
| Preliminary [short] data sheet | Qualification      | This document contains data from the preliminary specification.                       |
| Product [short] data sheet     | Production         | This document contains the product specification.                                     |

- [1] Please consult the most recently issued document before initiating or completing a design.
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For sales office addresses, please send an email to: [salesaddresses@ween-semi.com](mailto:salesaddresses@ween-semi.com)  
Date of release: 16 September 2018

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