

1. General description

Hyperfast power diode in a SOD113 (2-lead TO-220F) plastic package.

2. Features and benefits

- Fast switching
- Isolated plastic package
- Low leakage current
- 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

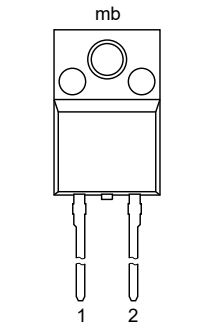
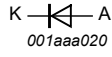
4. Quick reference data

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 | $\delta = 0.5$; $T_h \leq 75$ °C; square-wave pulse; Fig. 1 ; Fig. 2 ; Fig. 3 | - | - | 8 | A |
| I_{FRM} | repetitive peak forward current | $\delta = 0.5$; $t_p = 25$ μ s; $T_h \leq 75$ °C; square-wave pulse | - | - | 16 | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; Fig. 4 | - | - | 91 | A |
| | | $t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse | - | - | 100 | A |
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 8$ A; $T_j = 25$ °C; Fig. 6 | - | - | 3.4 | V |
| | | $I_F = 8$ A; $T_j = 125$ °C; Fig. 6 | - | 1.5 | 1.9 | V |
| | | $I_F = 8$ A; $T_j = 150$ °C | - | 1.4 | - | V |
| Dynamic characteristics | | | | | | |
| t_{rr} | reverse recovery time | $I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 200$ A/ μ s; $T_j = 25$ °C; Fig. 7 | - | 12 | 18 | ns |
| | | $I_F = 8$ A; $V_R = 400$ V; $di_F/dt = 500$ A/ μ s; $T_j = 25$ °C; Fig. 7 | - | 19 | - | ns |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------------------|---|---|
| 1 | K | cathode |  |  |
| 2 | A | anode | | |
| mb | n.c. | mounting base; isolated | | |

6. Ordering information

Table 3. Ordering information

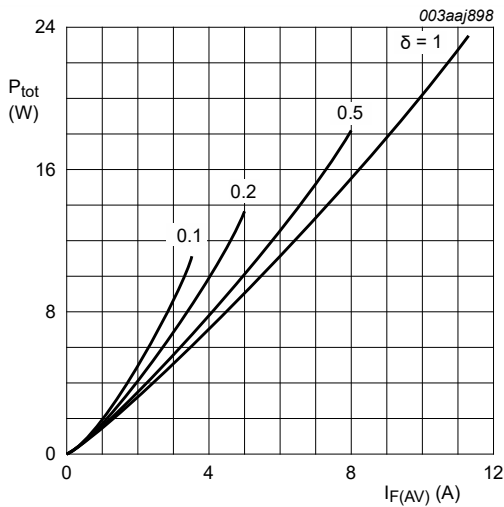
| Type number | Package | | |
|-------------|---------|---|---------|
| | Name | Description | Version |
| BYC8X-600P | TO-220F | plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack" | SOD113 |

7. Limiting values

Table 4. Limiting values

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

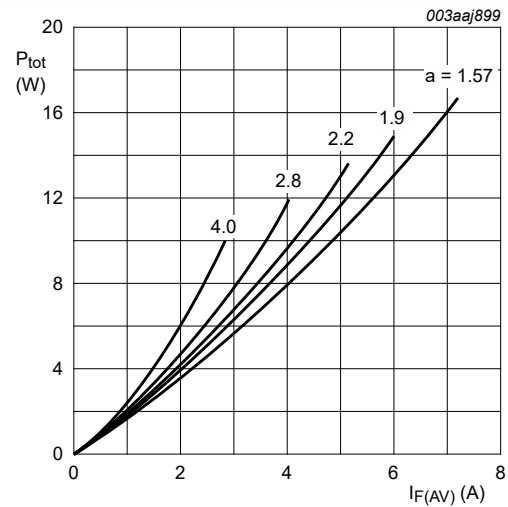
| Symbol | Parameter | Conditions | Min | Max | Unit |
|-------------|-------------------------------------|--|-----|-----|------------------|
| V_{RRM} | repetitive peak reverse voltage | | - | 600 | V |
| V_{RWM} | crest working reverse voltage | | - | 600 | V |
| V_R | reverse voltage | DC | - | 600 | V |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; $T_h \leq 75^\circ\text{C}$; square-wave pulse; Fig. 1 ; Fig. 2 ; Fig. 3 | - | 8 | A |
| I_{FRM} | repetitive peak forward current | $\delta = 0.5$; $t_p = 25\ \mu\text{s}$; $T_h \leq 75^\circ\text{C}$; square-wave pulse | - | 16 | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 10\ \text{ms}$; $T_{j(\text{init})} = 25^\circ\text{C}$; sine-wave pulse; Fig. 4 | - | 91 | A |
| | | $t_p = 8.3\ \text{ms}$; $T_{j(\text{init})} = 25^\circ\text{C}$; sine-wave pulse | - | 100 | A |
| T_{stg} | storage temperature | | -65 | 175 | $^\circ\text{C}$ |
| T_j | junction temperature | | - | 175 | $^\circ\text{C}$ |



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

$$V_o = 1.581\ \text{V}; R_s = 0.043\ \Omega$$

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



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

$$V_o = 1.581\ \text{V}; R_s = 0.043\ \Omega$$

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

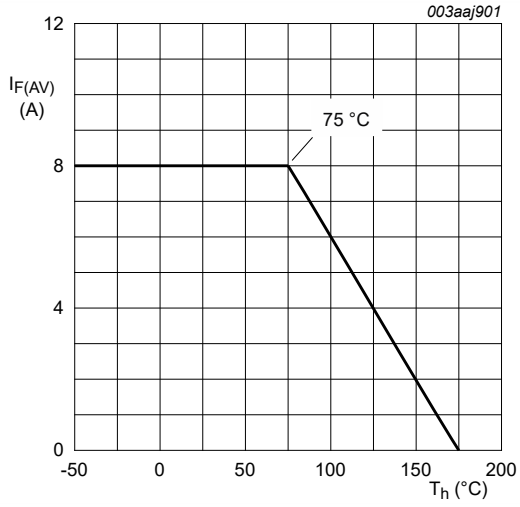


Fig. 3. Average forward current as a function of heatsink temperature; maximum values

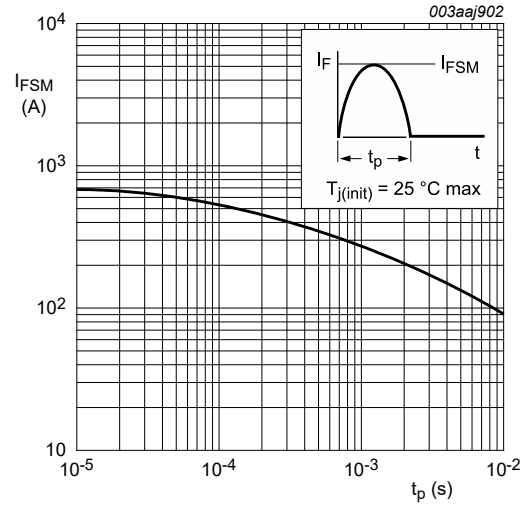


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

8. Thermal characteristics

Table 5. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------|--|--------------------------------|-----|-----|-----|------|
| $R_{th(j-h)}$ | thermal resistance from junction to heatsink | without heatsink compound | - | - | 7.2 | K/W |
| | | with heatsink compound; Fig. 5 | - | - | 5.5 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | | - | 60 | - | K/W |

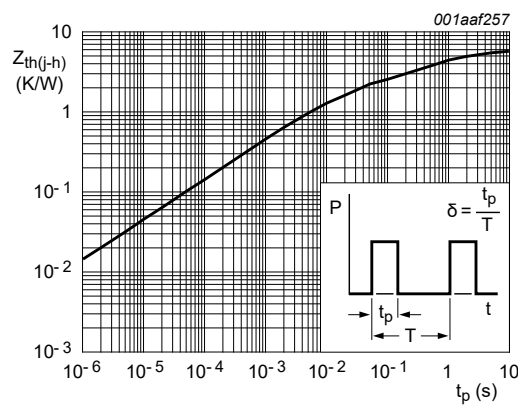


Fig. 5. Transient thermal impedance from junction to heatsink as a function of pulse width

9. Isolation characteristics

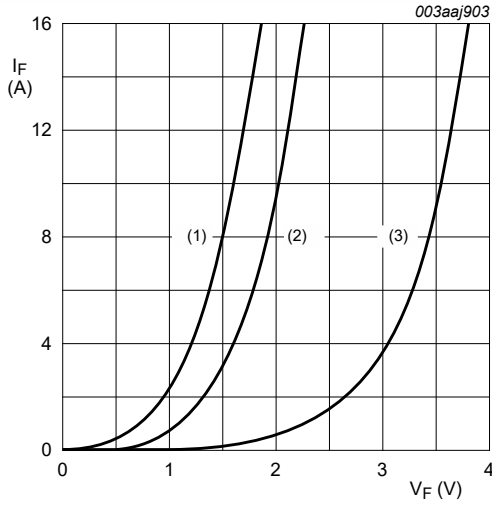
Table 6. Isolation characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------------|-----------------------|--|-----|-----|------|------|
| $V_{isol(RMS)}$ | RMS isolation voltage | 50 Hz ≤ f ≤ 60 Hz; RH ≤ 65 %; from all pins to external heatsink; sinusoidal waveform; clean and dust free | - | - | 2500 | V |
| C_{isol} | isolation capacitance | from cathode to external heatsink | - | 10 | - | pF |

10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|-------------------------------|---|-----|-----|-----|---------------|
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 8\text{ A}$; $T_j = 25\text{ °C}$; Fig. 6 | - | - | 3.4 | V |
| | | $I_F = 8\text{ A}$; $T_j = 125\text{ °C}$; Fig. 6 | - | 1.5 | 1.9 | V |
| | | $I_F = 8\text{ A}$; $T_j = 150\text{ °C}$ | - | 1.4 | - | V |
| I_R | reverse current | $V_R = 600\text{ V}$; $T_j = 25\text{ °C}$ | - | - | 20 | μA |
| | | $V_R = 600\text{ V}$; $T_j = 125\text{ °C}$ | - | - | 200 | μA |
| Dynamic characteristics | | | | | | |
| t_{rr} | reverse recovery time | $I_F = 1\text{ A}$; $V_R = 30\text{ V}$; $di_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; Fig. 7 | - | 12 | 18 | ns |
| | | $I_F = 8\text{ A}$; $V_R = 400\text{ V}$; $di_F/dt = 500\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; Fig. 7 | - | 19 | - | ns |
| I_{RM} | peak reverse recovery current | $I_F = 8\text{ A}$; $V_R = 200\text{ V}$; $di_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; Fig. 7 | - | - | 2.2 | A |
| | | $I_F = 8\text{ A}$; $V_R = 200\text{ V}$; $di_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 125\text{ °C}$; Fig. 7 | - | - | 6 | A |
| Q_r | recovered charge | $I_F = 8\text{ A}$; $V_R = 200\text{ V}$; $di_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; Fig. 7 | - | 17 | - | nC |
| | | $I_F = 8\text{ A}$; $V_R = 200\text{ V}$; $di_F/dt = 200\text{ A}/\mu\text{s}$; $T_j = 125\text{ °C}$; Fig. 7 | - | 90 | - | nC |



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$V_o = 1.581 \text{ V}; R_s = 0.043 \Omega$
 (1) $T_j = 125 \text{ }^\circ\text{C}$; typical values
 (2) $T_j = 125 \text{ }^\circ\text{C}$; maximum values
 (3) $T_j = 25 \text{ }^\circ\text{C}$; maximum values

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

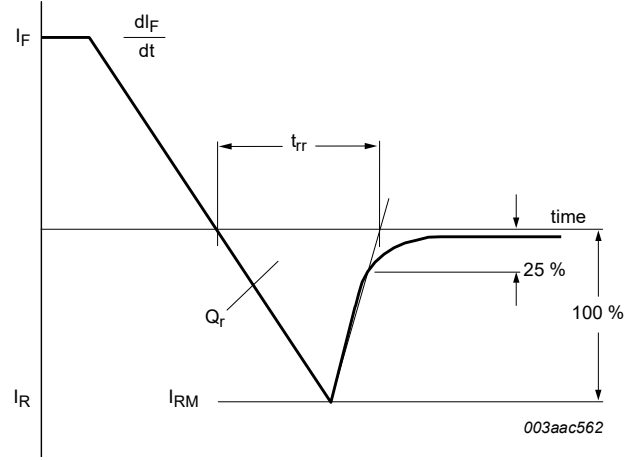
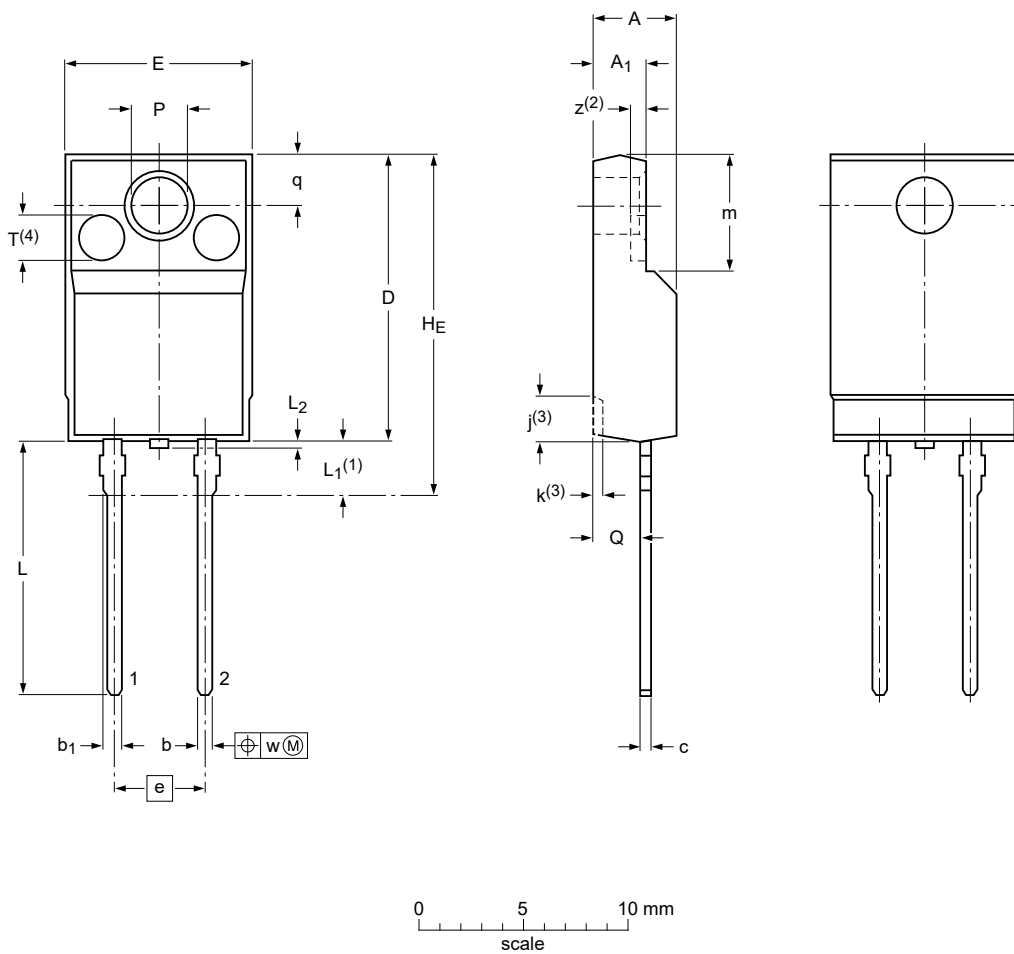


Fig. 7. Reverse recovery definitions; ramp recovery

11. Package outline

Plastic single-ended package; isolated heatsink mounted;
1 mounting hole; 2-lead TO-220 'full pack'

SOD113



Dimensions (mm are the original dimensions)

| Unit | A | A ₁ | b | b ₁ | c | D | E | e | HE _{max} | j ⁽³⁾ | k ⁽³⁾ | L | L ₁ ⁽¹⁾ | L ₂ _{max} | m | P | Q | q | T ⁽⁴⁾ | w | z ⁽²⁾ | |
|------|-----|----------------|-----|----------------|-----|-----|------|------|-------------------|------------------|------------------|------|-------------------------------|-------------------------------|-----|-----|-----|---|------------------|------|------------------|-----|
| mm | max | 4.6 | 2.9 | 0.9 | 1.1 | 0.7 | 15.8 | 10.3 | | 2.7 | 0.6 | 14.4 | 3.3 | 0.5 | 6.5 | 3.2 | 2.6 | | 2.6 | 2.55 | 0.4 | 0.8 |
| | nom | | | | | | | 5.08 | 19.0 | | | | | | | | | | | | | |
| | min | 4.0 | 2.5 | 0.7 | 0.9 | 0.4 | 15.2 | 9.7 | | 1.7 | 0.4 | 13.5 | 2.8 | | 6.3 | 3.0 | 2.3 | | | | | |

Notes

1. Terminals are uncontrolled within zone L1.
2. z is depth of T.
3. Dot lines area designs may vary.
4. Eject pin mark is for reference only.

sod113_po

| Outline version | References | | | European projection | Issue date |
|-----------------|----------------|-------|-------|---------------------|------------------------|
| | IEC | JEDEC | JEITA | | |
| SOD113 | 2-lead TO-220F | | | | -07-06-08- 15-08-28 |

Fig. 8. Package outline TO-220F (SOD113)

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. |
| 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.
- [2] The term 'short data sheet' is explained in section "Definitions".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.ween-semi.com>.

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Date of release: 16 September 2018

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