

1. General description

Hyperfast, epitaxial rectifier diode in a SOD113 (TO-220F) plastic package.

2. Features and benefits

- Extremely fast switching
- Low thermal resistance
- Low reverse recovery current
- Isolated package
- Reduces switching loss in associated MOSFET

3. Applications

- Half-bridge or full-bridge switched-mode power supplies
- Continuous Current Mode (CCM) Power Factor Correction (PFC)
- 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 | $\delta = 0.5$; square-wave pulse; $T_n \leq 25\text{ °C}$; Fig. 1 ; Fig. 2 | 15 | | | A |
| I_{FRM} | repetitive peak forward current | $\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_n \leq 25\text{ °C}$; square-wave pulse | 30 | | | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; sine-wave pulse | 200 | | | A |
| | | $t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; sine-wave pulse | 220 | | | A |
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 15\text{ A}$; $T_j = 25\text{ °C}$; Fig. 4 | - | 1.89 | 2.9 | V |
| | | $I_F = 15\text{ A}$; $T_j = 150\text{ °C}$; Fig. 4 | - | 1.32 | 2.03 | V |
| | | $I_F = 30\text{ A}$; $T_j = 150\text{ °C}$; Fig. 4 | - | 1.64 | 2.34 | V |
| 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. 5 | - | 35 | 55 | ns |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------------------|--------------------------------|----------------|
| 1 | K | cathode | <p>SOD113 (2-lead TO-220F)</p> | |
| 2 | A | anode | | |
| mb | n.c. | mounting base; isolated | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|---|---------|
| | Name | Description | Version |
| BYC15X-600 | TO-220F | plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack" | SOD113 |

7. Marking

Table 4. Marking codes

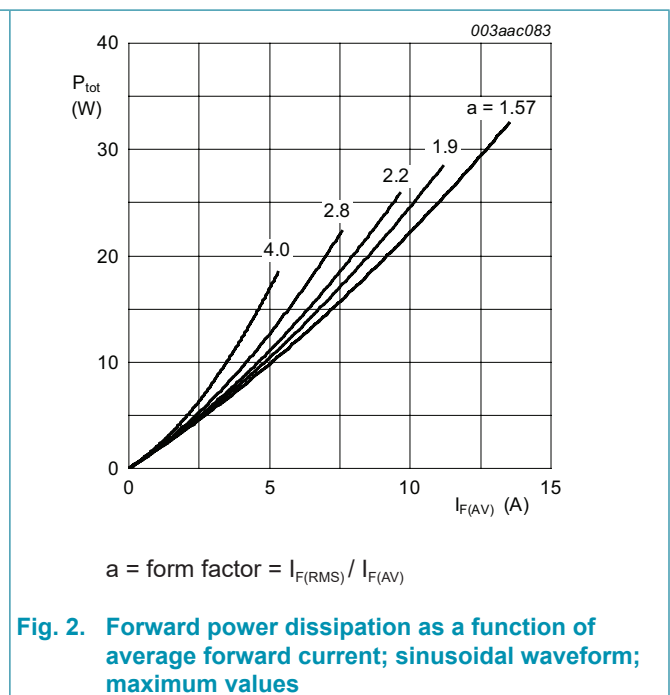
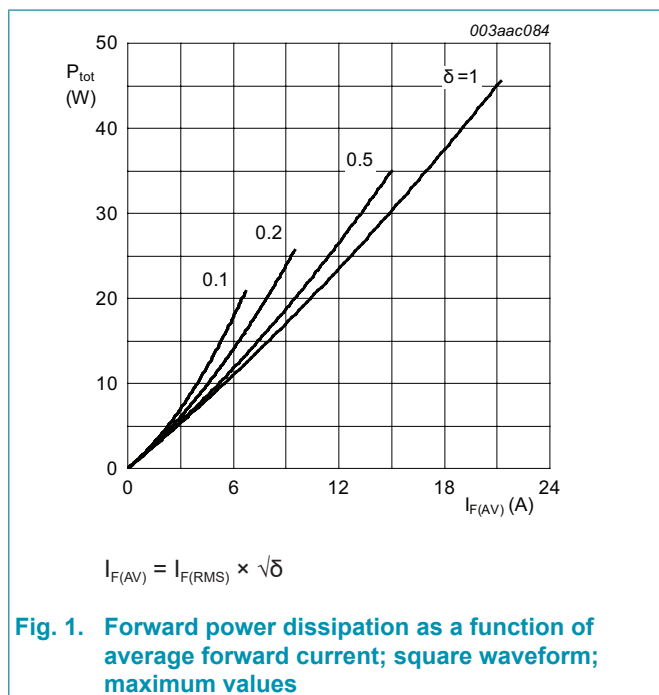
| Type number | Marking codes |
|-------------|---------------|
| BYC15X-600 | BYC15X-600 |

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 | $\delta = 1.0$; square-wave pulse; $T_h \leq 100$ °C; | 500 | V |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; square-wave pulse; $T_h \leq 25$ °C; Fig. 1 ; Fig. 2 | 15 | A |
| I_{FRM} | repetitive peak forward current | $\delta = 0.5$; $t_p = 25$ μ s; $T_h \leq 25$ °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 |



9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---------------|--|---|-----|-----|-----|------|
| $R_{th(j-h)}$ | thermal resistance from junction to heatsink | with heatsink compound; Fig 3 | - | - | 3.6 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | in free air | - | 55 | - | K/W |

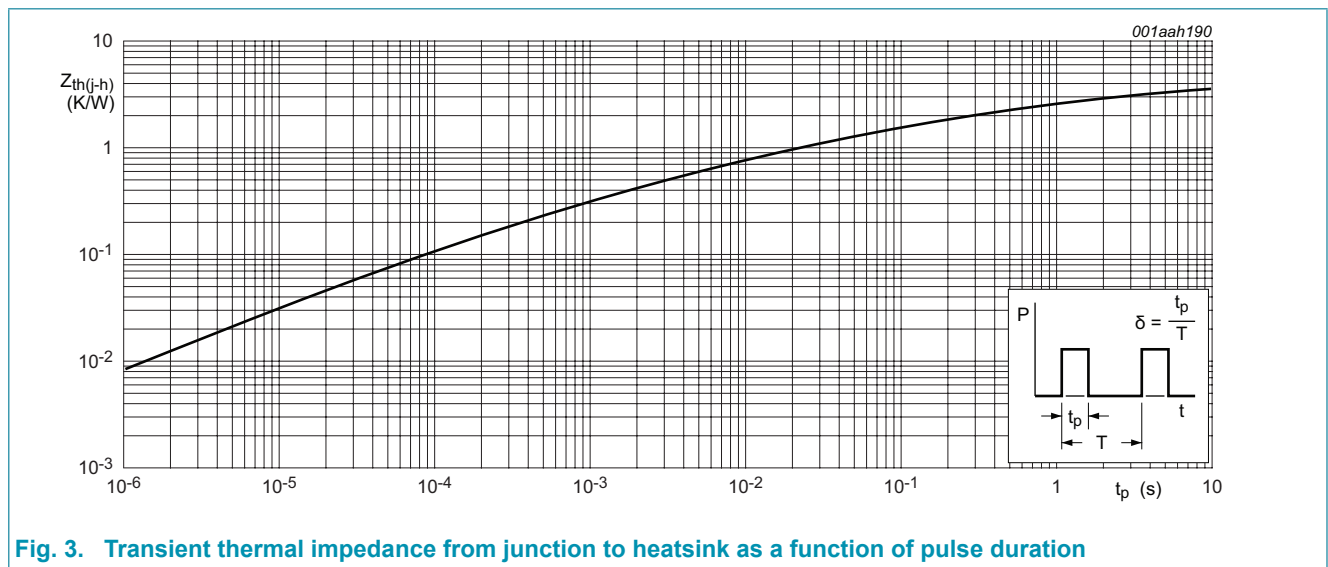


Fig. 3. Transient thermal impedance from junction to heatsink as a function of pulse duration

10. Isolation characteristics

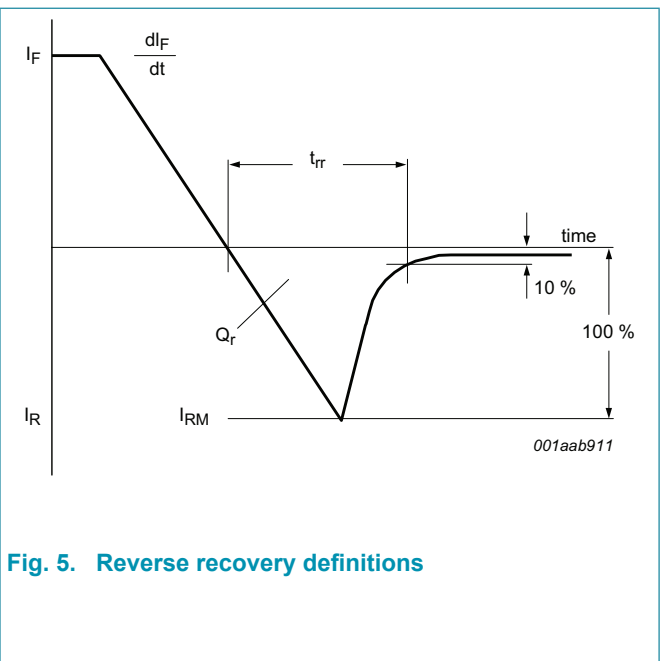
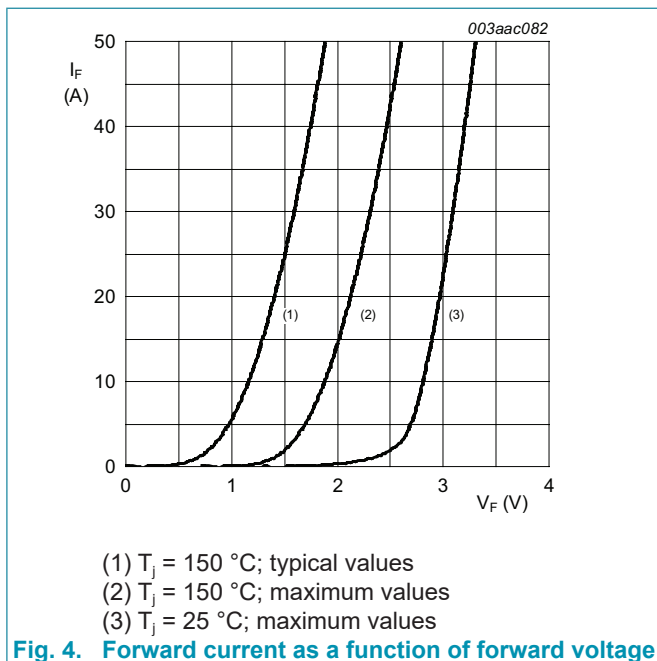
Table 7. Isolation characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------------|-----------------------|--|-----|-----|------|------|
| $V_{isol(RMS)}$ | RMS isolation voltage | $50 \text{ Hz} \leq f \leq 60 \text{ Hz}$; $RH \leq 65 \%$; from all pins to external heatsink; sinusoidal waveform; clean and dust free | - | - | 2500 | V |
| C_{isol} | isolation capacitance | from cathode to external heatsink; $f = 1 \text{ MHz}$ | - | 10 | - | PF |

11. Characteristics

Table 8. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|-------------------------------|---|-----|------|------|---------------|
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 15\text{ A}; T_j = 25\text{ °C}; \text{Fig. 4}$ | - | 1.89 | 2.9 | V |
| | | $I_F = 15\text{ A}; T_j = 150\text{ °C}; \text{Fig. 4}$ | - | 1.32 | 2.03 | V |
| | | $I_F = 30\text{ A}; T_j = 150\text{ °C}; \text{Fig. 4}$ | - | 1.64 | 2.34 | V |
| I_R | reverse current | $V_R = 600\text{ V}; T_j = 25\text{ °C}$ | - | 12 | 200 | μA |
| | | $V_R = 500\text{ V}; T_j = 100\text{ °C}$ | - | 1.1 | 3 | mA |
| Dynamic characteristics | | | | | | |
| t_{rr} | reverse recovery time | $I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 5}$ | - | 35 | 55 | ns |
| | | $I_F = 15\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 5}$ | - | 19 | - | ns |
| | | $I_F = 15\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 100\text{ °C}; \text{Fig. 5}$ | - | 32 | 40 | ns |
| I_{RM} | peak reverse recovery current | $I_F = 15\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_j = 125\text{ °C}; \text{Fig. 5}$ | - | 9.5 | 12 | A |
| | | $I_F = 15\text{ A}; V_R = 400\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s}; T_j = 125\text{ °C}; \text{Fig. 5}$ | - | 3 | 7.5 | A |
| V_{FR} | forward recovery voltage | $I_F = 15\text{ A}; dI_F/dt = 100\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 6}$ | - | 8 | 11 | V |



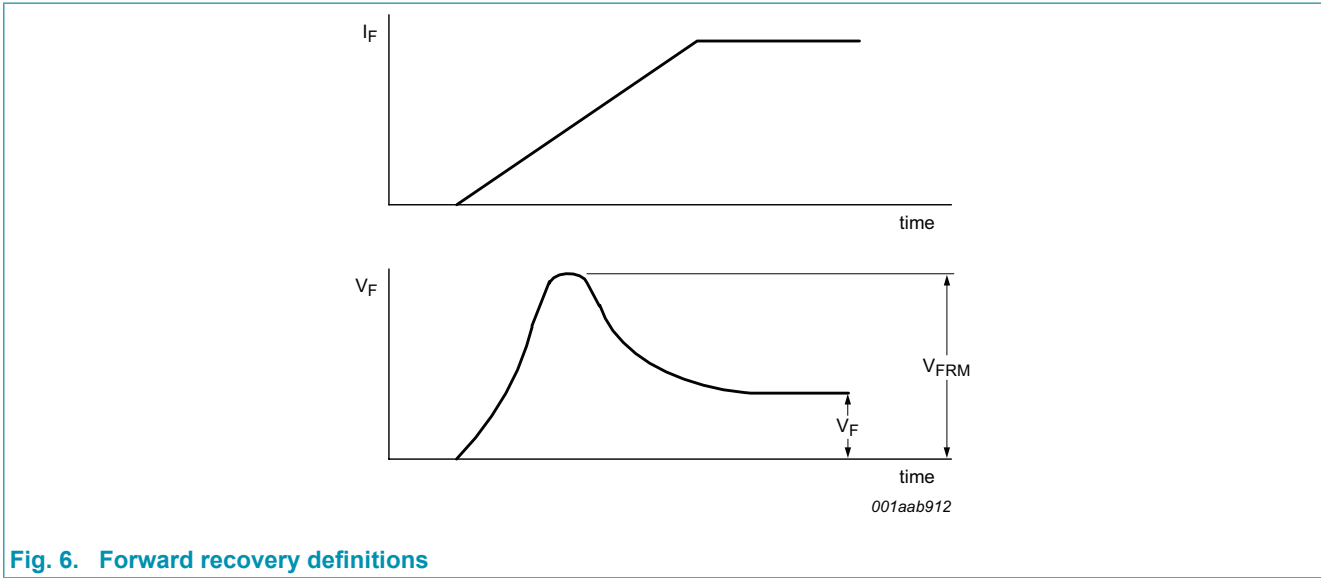
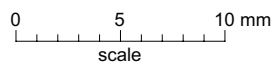
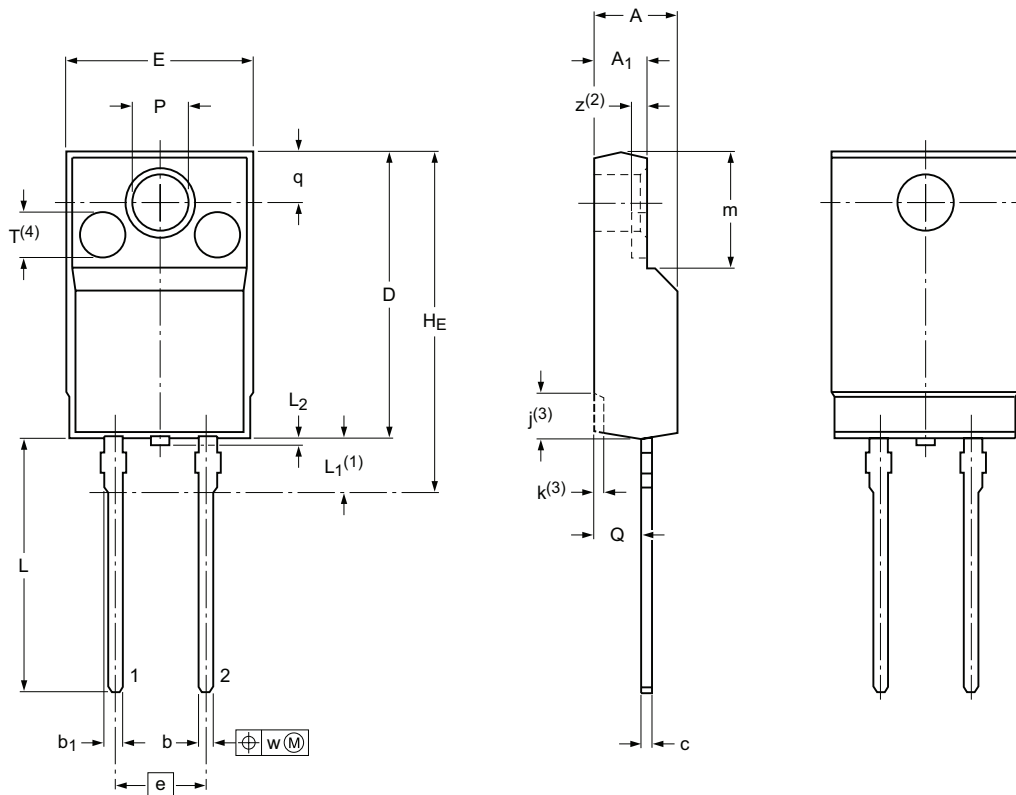


Fig. 6. Forward recovery definitions

12. 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 | H _E max | j ⁽³⁾ | k ⁽³⁾ | L | L ₁ ⁽¹⁾ | L ₂ max | m | P | Q | q | T ⁽⁴⁾ | w | z ⁽²⁾ | |
|------|-----|----------------|-----|----------------|-----|------|------|------|-----------------------|------------------|------------------|------|-------------------------------|-----------------------|-----|-----|-----|---|------------------|------|------------------|-----|
| max | 4.6 | 2.9 | 0.9 | 1.1 | 0.7 | 15.8 | 10.3 | | | 2.7 | 0.6 | 14.4 | 3.3 | | 6.5 | 3.2 | 2.6 | | | | | |
| nom | | | | | | | | 5.08 | 19.0 | | | | | 0.5 | | | | | 2.6 | 2.55 | 0.4 | 0.8 |
| 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 |

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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- [2] The term 'short data sheet' is explained in section "Definitions".
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14. Contents

| | |
|-------------------------------------|----|
| 1. General description..... | 1 |
| 2. Features and benefits | 1 |
| 3. Applications | 1 |
| 4. Quick reference data | 1 |
| 5. Pinning information..... | 2 |
| 6. Ordering information..... | 2 |
| 7. Marking..... | 2 |
| 8. Limiting values | 3 |
| 9. Thermal characteristics | 4 |
| 10. Isolation characteristics | 4 |
| 11. Characteristics..... | 5 |
| 12. Package outline | 7 |
| 13. Legal information | 8 |
| 14. Contents | 10 |

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