Product data sheet

1. General description

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

2. Features and benefits

- Fast switching
- Isolated plastic package
- · Low forward voltage drop
- Soft recovery characteristic

3. Applications

- Discontinuous Current Mode (DCM) Power Factor Correction (PFC)
- · High frequency switched-mode power supplies

4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | | Min | Тур | Max | Unit |
|--------------------|---------------------------------|--|-----|-----|------|------|------|
| V _R | reverse voltage | DC | | - | - | 600 | V |
| I _{F(AV)} | average forward current | $δ = 0.5 ; T_h \le 73 °C; SQW; Fig. 1; Fig. 2; Fig. 3$ | [1] | - | - | 8 | Α |
| I _{FRM} | repetitive peak forward current | $\delta = 0.5 \; ; t_p = 25 \; \mu s; T_h \le 73 \; ^{\circ}C; \; SQW$ | | - | - | 16 | Α |
| I _{FSM} | non-repetitive peak | t _p = 10 ms; T _{j(init)} = 25 °C; SIN | | - | - | 60 | Α |
| | forward current | $t_p = 8.3 \text{ ms}; T_{j(init)} = 25 \text{ °C}; SIN$ | | - | - | 66 | Α |
| Static chara | cteristics | | | | | | |
| V _F | forward voltage | I _F = 20 A; T _j = 25 °C; <u>Fig. 5</u> | | - | 1.75 | 1.95 | V |
| | | I _F = 8 A; T _j = 150 °C; <u>Fig. 5</u> | | - | 1.07 | 1.5 | V |
| | | I _F = 8 A; T _j = 25 °C; <u>Fig. 5</u> | | - | - | 1.7 | V |
| Dynamic ch | aracteristics | | | ' | | | , |
| t _{rr} | reverse recovery time | $I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A/}\mu\text{s};$ $T_j = 25 \text{ °C}; Fig. 6; Fig. 7$ | | - | 60 | 75 | ns |

^[1] Neglecting switching and reverse current losses

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5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------------------|--------------------|----------------|
| 1 | K | cathode | mb | K — A |
| 2 | Α | anode | | 001aaa020 |
| mb | n.c. | mounting base; isolated | TO-220F (SOD113) | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|---|---------|
| | Name | Description | Version |
| BYR29X-600 | TO-220F | plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack" | SOD113 |

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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 | $δ = 0.5 ; T_h \le 73 °C; SQW; Fig. 1; Fig. 2; Fig. 3$ | [1] | - | 8 | Α |
| I _{FRM} | repetitive peak forward current | $\delta = 0.5 \; ; t_p = 25 \; \mu s; T_h \le 73 \; ^{\circ}C; \; SQW$ | | - | 16 | Α |
| I _{FSM} | non-repetitive peak | t _p = 10 ms; T _{j(init)} = 25 °C; SIN | | - | 60 | Α |
| | forward current | $t_p = 8.3 \text{ ms}; T_{j(init)} = 25 \text{ °C}; SIN$ | | - | 66 | Α |
| T _{stg} | storage temperature | | | -40 | 150 | °C |
| T _j | junction temperature | | | - | 150 | °C |

[1] Neglecting switching and reverse current losses

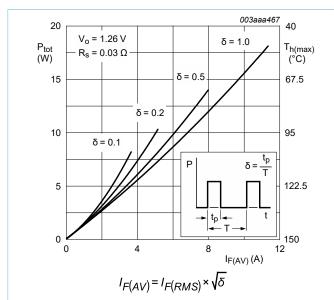


Fig. 1. Forward power dissipation and permissible heatsink temperature as a function of average forward current; square waveform; maximum values

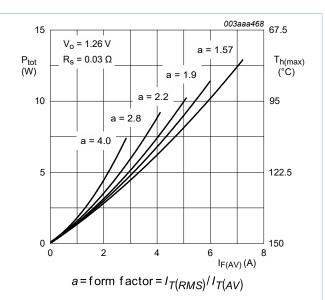
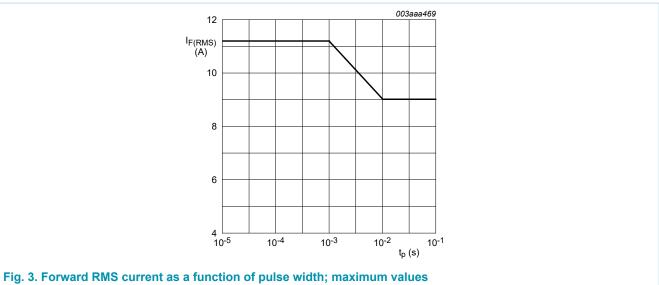


Fig. 2. Forward power dissipation and permissible heatsink temperature as a function of average forward current; sinusoidal waveform; maximum values

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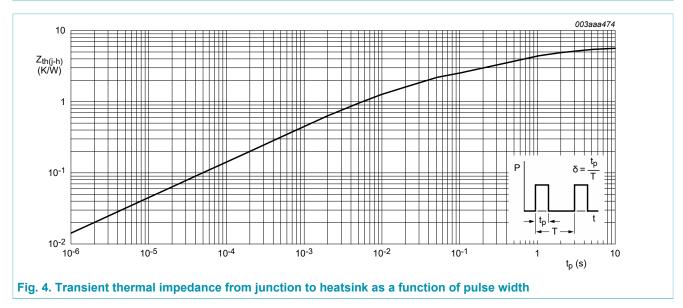


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8. Thermal characteristics

Table 5. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Тур | Max | Unit |
|----------------------|--|--------------------------------|-----|-----|-----|------|
| R _{th(j-h)} | thermal resistance from junction to heatsink | with heatsink compound; Fig. 4 | - | - | 5.5 | K/W |
| R _{th(j-a)} | thermal resistance from junction to ambient free air | in free air | - | 55 | - | K/W |



9. Isolation characteristics

Table 6. Isolation characteristics

| Symbol | Parameter | Conditions | Min | Тур | 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 |

Ultrafast power diode

10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Тур | Max | Unit |
|-----------------|-------------------------------|--|-----|------|------|------|
| Static charact | eristics | | | | | |
| V_{F} | forward voltage | I _F = 20 A; T _j = 25 °C; <u>Fig. 5</u> | - | 1.75 | 1.95 | V |
| | | I _F = 8 A; T _j = 150 °C; <u>Fig. 5</u> | - | 1.07 | 1.5 | V |
| | | I _F = 8 A; T _j = 25 °C; <u>Fig. 5</u> | - | - | 1.7 | V |
| I _R | reverse current | V _R = 600 V; T _j = 100 °C | - | 0.1 | 0.2 | mA |
| | | V _R = 600 V; T _j = 25 °C | - | 1 | 10 | μΑ |
| Dynamic char | acteristics | | | | | |
| t _{rr} | reverse recovery time | $I_F = 1 \text{ A; } V_R = 30 \text{ V; } dI_F/dt = 100 \text{ A/}\mu\text{s;}$ $T_j = 25 \text{ °C; } \frac{\text{Fig. 6; Fig. 7}}{\text{Fig. 7}}$ | - | 60 | 75 | ns |
| I _{RM} | peak reverse recovery current | $I_F = 10 \text{ A; } V_R = 30 \text{ V; } dI_F/dt = 50 \text{ A/}\mu\text{s;}$ $T_j = 100 \text{ °C; } \underline{\text{Fig. 6; Fig. 8}}$ | - | - | 6 | Α |
| Q _r | recovered charge | $I_F = 2 \text{ A}$; $V_R = 30 \text{ V}$; $dI_F/dt = 20 \text{ A/}\mu\text{s}$; $T_j = 25 \text{ °C}$; Fig. 9; Fig. 6 | - | 150 | 200 | nC |
| V_{FR} | forward recovery voltage | $I_F = 10 \text{ A}$; $dI_F/dt = 10 \text{ A}/\mu\text{s}$; $T_j = 25 \text{ °C}$; Fig. 10 | - | 5 | - | V |

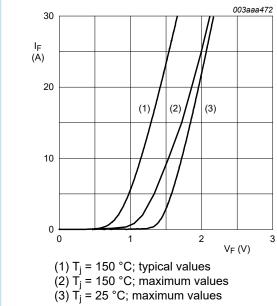


Fig. 5. Forward current as a function of forward voltage

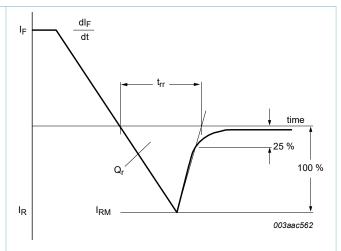


Fig. 6. Reverse recovery definitions; ramp recovery

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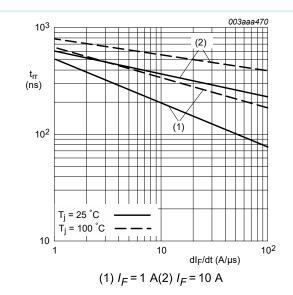


Fig. 7. Reverse recovery time as a function of rate of change of forward current at indicated temperatures; maximum values

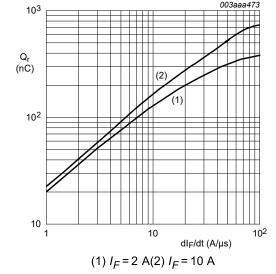


Fig. 9. Recovered charge as a function of rate of change of forward current

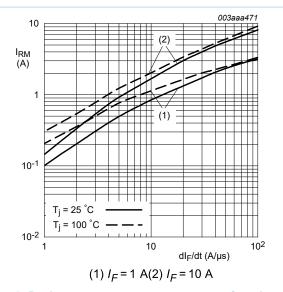


Fig. 8. Peak reverse recovery current as a function of rate of change of forward current at indicated temperatures

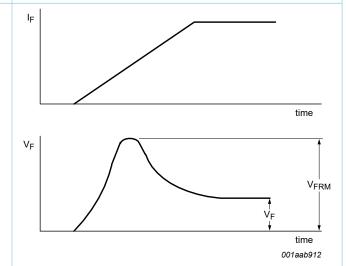


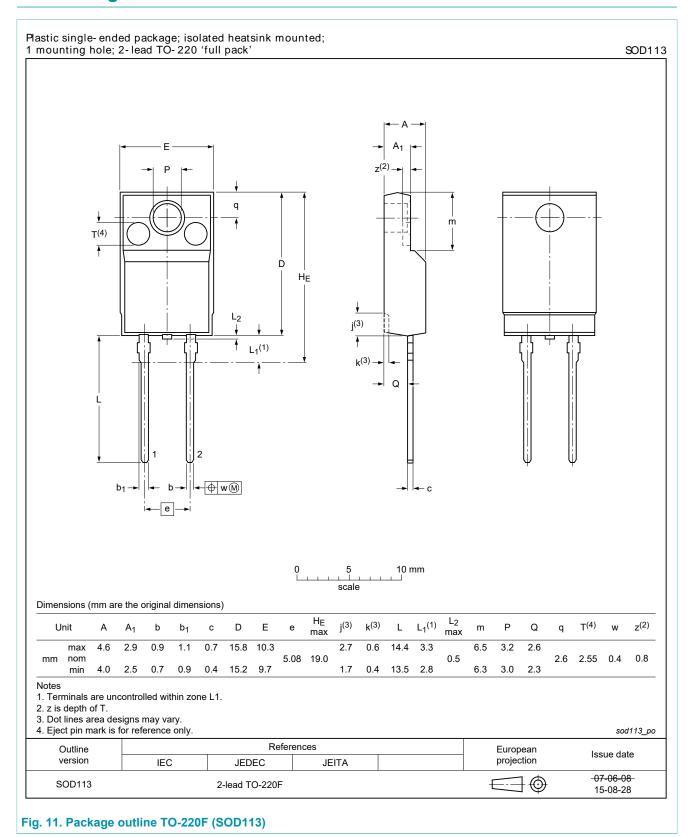
Fig. 10. Forward recovery definitions

WeEn Semiconductors

BYR29X-600

Ultrafast power diode

11. Package outline



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12. Legal information

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|--------------------------------------|--------------------|---|
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