

## 1. General description

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

## 2. Features and benefits

- Fast switching
- Isolated package
- Low forward voltage drop
- Low thermal resistance
- Soft recovery characteristic

## 3. Applications

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

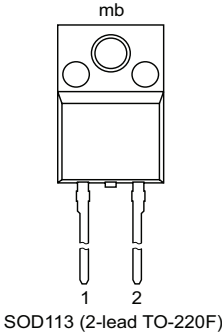
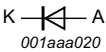
## 4. Quick reference data

Table 1. Quick reference data

| Symbol                  | Parameter                           | Conditions                                                                                                                  | Values |     |      |      | Unit |
|-------------------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|--------|-----|------|------|------|
| Absolute maximum rating |                                     |                                                                                                                             |        |     |      |      |      |
| V <sub>RRM</sub>        | repetitive peak reverse voltage     |                                                                                                                             | 600    |     |      |      | V    |
| I <sub>F(AV)</sub>      | average forward current             | δ = 0.5; square-wave pulse; T <sub>h</sub> ≤ 115 °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a>                        | 5      |     |      |      | A    |
| I <sub>FRM</sub>        | repetitive peak forward current     | δ = 0.5; square-wave pulse; T <sub>h</sub> ≤ 115 °C                                                                         | 10     |     |      |      | A    |
| I <sub>FSM</sub>        | non-repetitive peak forward current | t <sub>p</sub> = 10 ms; T <sub>j(init)</sub> = 25 °C; sine-wave pulse                                                       | 60     |     |      |      | A    |
|                         |                                     | t <sub>p</sub> = 8.3 ms; T <sub>j(init)</sub> = 25 °C; sine-wave pulse                                                      | 66     |     |      |      | A    |
| Symbol                  | Parameter                           | Conditions                                                                                                                  |        | Min | Typ  | Max  | Unit |
| Static characteristics  |                                     |                                                                                                                             |        |     |      |      |      |
| V <sub>F</sub>          | forward voltage                     | I <sub>F</sub> = 5 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 4</a>                                                        |        | -   | 1.12 | 1.30 | V    |
|                         |                                     | I <sub>F</sub> = 5 A; T <sub>j</sub> = 150 °C; <a href="#">Fig. 4</a>                                                       |        | -   | 0.97 | 1.11 | V    |
| Dynamic characteristics |                                     |                                                                                                                             |        |     |      |      |      |
| t <sub>rr</sub>         | reverse recovery time               | I <sub>F</sub> = 1 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 100 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 5</a> |        | -   | 50   | 60   | 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 |
| BYV25X-600  | TO-220F | plastic single-ended package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220 "full pack" | SOD113  |

7. Marking

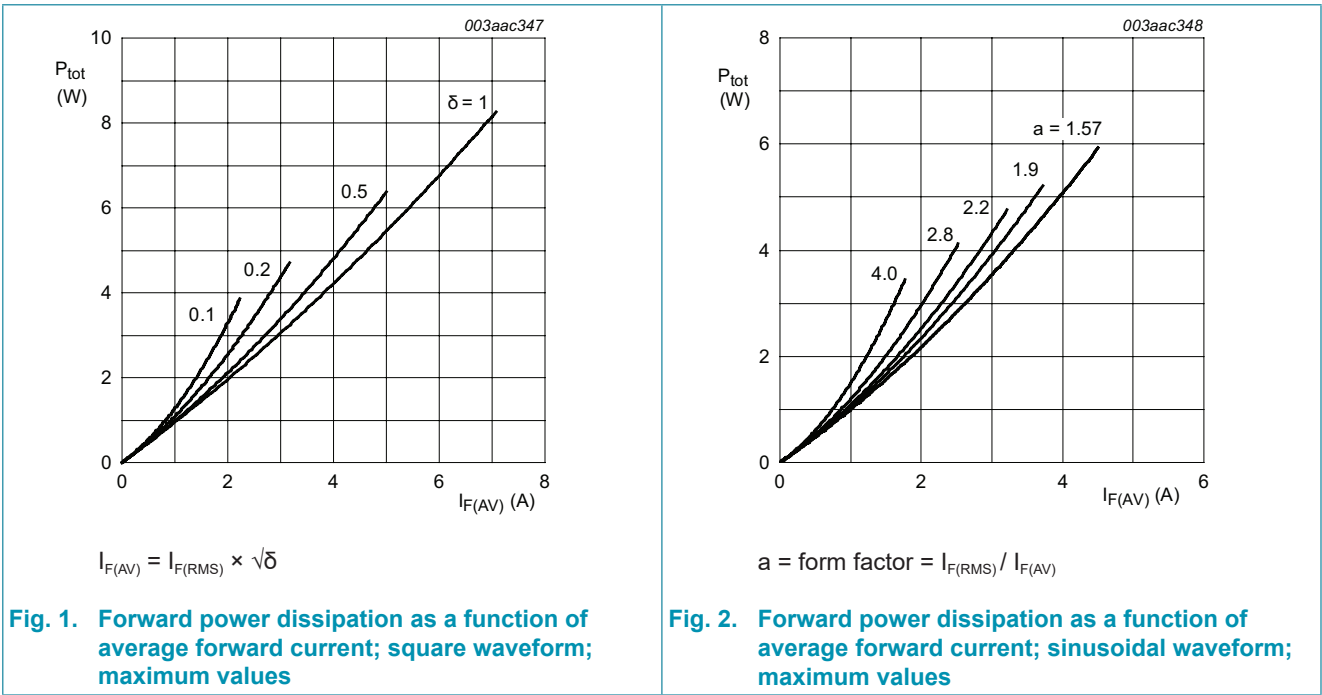
Table 4. Marking codes

| Type number | Marking codes |
|-------------|---------------|
| BYV25X-600  | BYV25X-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; $T_h \leq 100\text{ }^{\circ}\text{C}$                                                   | 600        | V                  |
| $I_{F(AV)}$ | average forward current             | $\delta = 0.5$ ; square-wave pulse; $T_h \leq 115\text{ }^{\circ}\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> | 5          | A                  |
| $I_{FRM}$   | repetitive peak forward current     | $\delta = 0.5$ ; square-wave pulse; $T_h \leq 115\text{ }^{\circ}\text{C}$                                                   | 10         | 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                                   | 60         | A                  |
|             |                                     | $t_p = 8.3\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$ ; sine-wave pulse                                  | 66         | A                  |
| $T_{stg}$   | storage temperature                 |                                                                                                                              | -40 to 150 | $^{\circ}\text{C}$ |
| $T_j$       | junction temperature                |                                                                                                                              | 150        | $^{\circ}\text{C}$ |



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 |  | -   | -   | 5.5 | K/W  |
|               |                                              | without heatsink compound     |  | -   | -   | 5.9 | K/W  |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient  | in free air                   |  | -   | 60  | -   | K/W  |

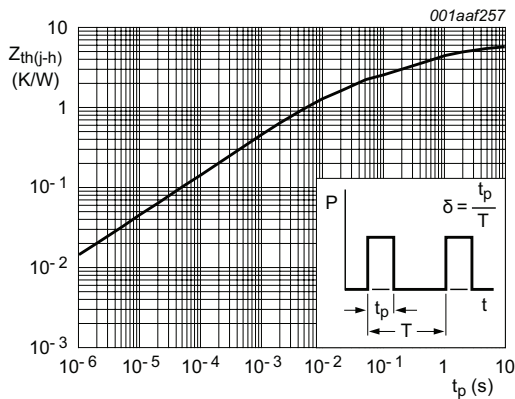


Fig. 3. Transient thermal impedance from junction to heatsink as a function of pulse duration

10. Isolation characteristics

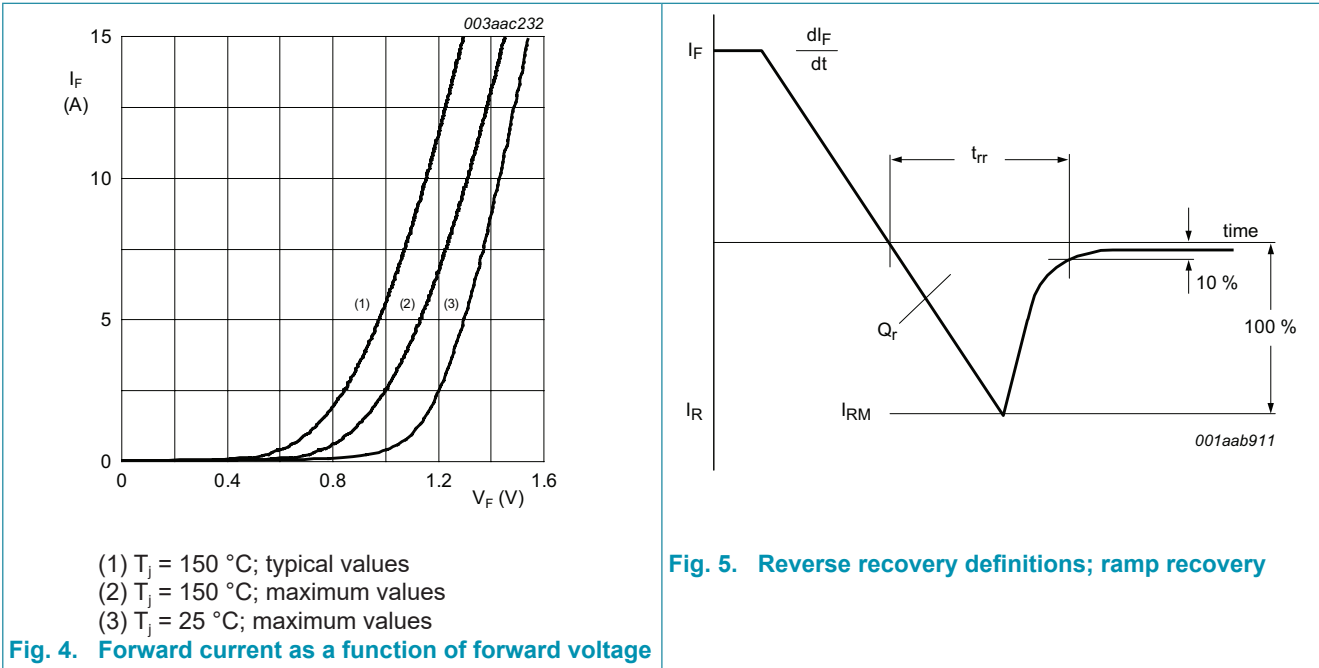
Table 7. Isolation characteristics

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

11. Characteristics

Table 8. Characteristics

| Symbol                  | Parameter                     | Conditions                                                                                                                   |  | Min | Typ  | Max  | Unit |
|-------------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------|--|-----|------|------|------|
| Static characteristics  |                               |                                                                                                                              |  |     |      |      |      |
| V <sub>F</sub>          | forward voltage               | I <sub>F</sub> = 5 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 4</a>                                                         |  | -   | 1.12 | 1.30 | V    |
|                         |                               | I <sub>F</sub> = 5 A; T <sub>j</sub> = 150 °C; <a href="#">Fig. 4</a>                                                        |  | -   | 0.97 | 1.11 | V    |
| I <sub>R</sub>          | reverse current               | V <sub>R</sub> = 600 V; T <sub>j</sub> = 25 °C                                                                               |  | -   | 2    | 50   | μA   |
|                         |                               | V <sub>R</sub> = 600 V; T <sub>j</sub> = 100 °C                                                                              |  | -   | 0.1  | 0.35 | mA   |
| Dynamic characteristics |                               |                                                                                                                              |  |     |      |      |      |
| Q <sub>r</sub>          | recovered charge              | I <sub>F</sub> = 2 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 20 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 5</a>   |  | -   | 40   | 70   | nC   |
| t <sub>rr</sub>         | reverse recovery time         | I <sub>F</sub> = 1 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 100 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 5</a>  |  | -   | 50   | 60   | ns   |
| I <sub>RM</sub>         | peak reverse recovery current | I <sub>F</sub> = 10 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 50 A/μs; T <sub>j</sub> = 100 °C; <a href="#">Fig. 5</a> |  | -   | 3    | 5.5  | A    |
| V <sub>FR</sub>         | forward recovery voltage      | I <sub>F</sub> = 10 A; dI <sub>F</sub> /dt = 100 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 6</a>                        |  | -   | 3.2  | -    | V    |



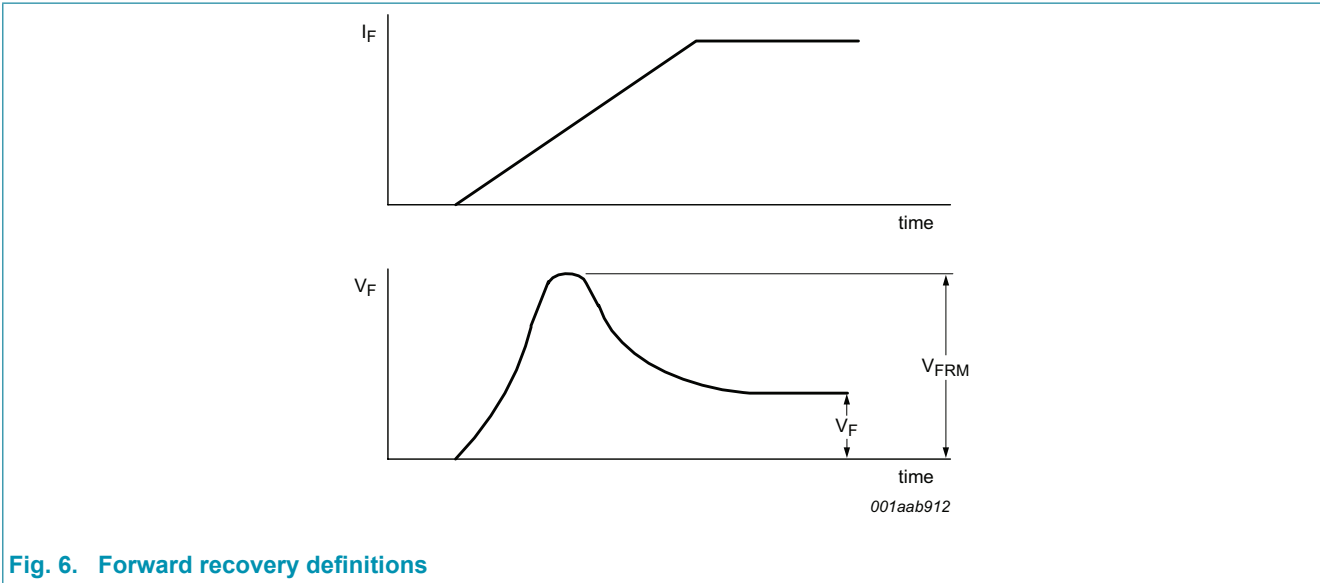
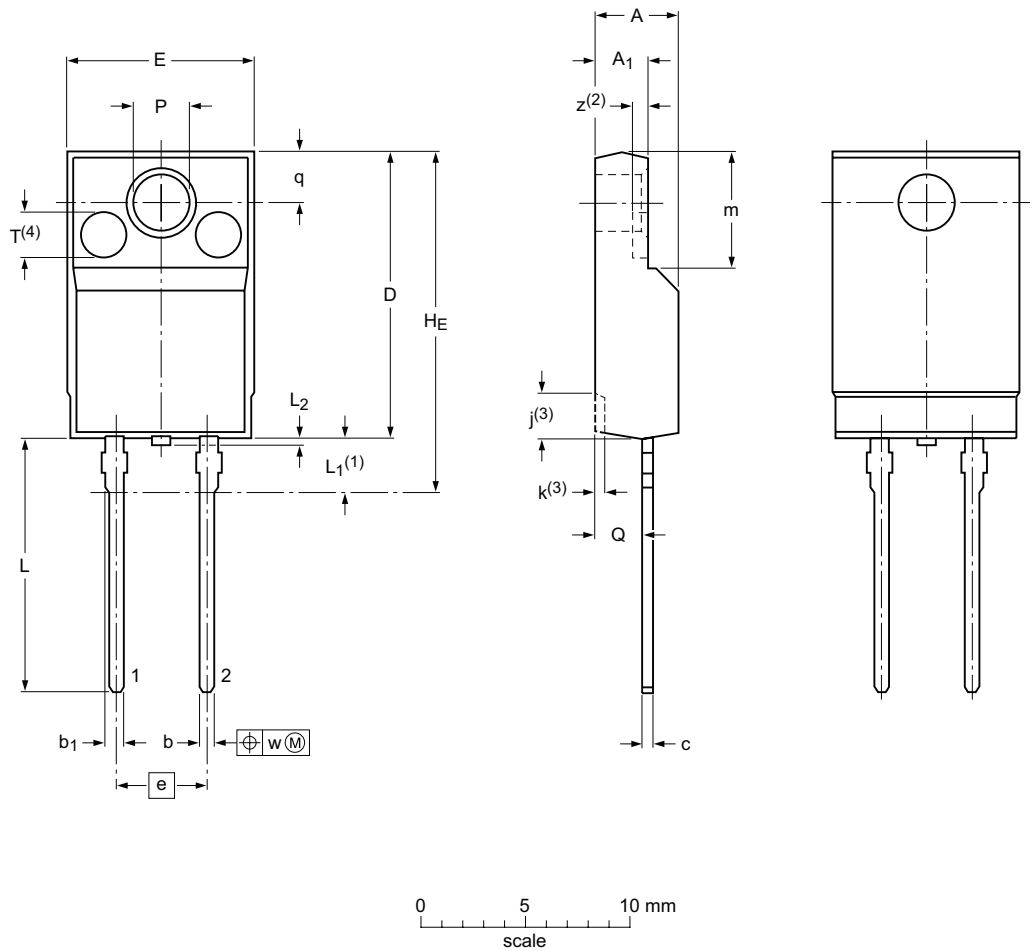


Fig. 6. Forward recovery definitions

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 <sub>1</sub> | b   | b <sub>1</sub> | c   | D   | E    | e    | H <sub>E</sub><br>max | j <sup>(3)</sup> | k <sup>(3)</sup> | L    | L <sub>1</sub> <sup>(1)</sup> | L <sub>2</sub><br>max | m   | P   | Q   | q   | T <sup>(4)</sup> | w   | z <sup>(2)</sup> |
|------|-----|----------------|-----|----------------|-----|-----|------|------|-----------------------|------------------|------------------|------|-------------------------------|-----------------------|-----|-----|-----|-----|------------------|-----|------------------|
| mm   | 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 |       |  |                     | <del>07-06-08</del><br>15-08-28 |

### 13. Revision history

Table 8. Revision history

| Document ID                                            | Release date | Data sheet status  | Change notice | Supersedes   |
|--------------------------------------------------------|--------------|--------------------|---------------|--------------|
| BYV25X-600 v.2                                         | 20180130     | Product data sheet | -             | BYV25X-600_1 |
| Modifications: Change from NXP version to WeEn version |              |                    |               |              |
| BYV25X-600_1                                           | 20080812     | Product data sheet | -             | -            |

## 14. 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".
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