

1. General description

Enhanced ultrafast power diode in a SOD59 (2-lead TO-220AC) plastic package.

2. Features and benefits

- High thermal cycling performance
- Low thermal resistance
- Low on-state losses
- Soft recovery characteristic

3. Applications

- Dual Mode (DCM and CCM) PFC
- Power Factor Correction (PFC) for Interleaved Topology

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; $T_{mb} \leq 126$ °C; Fig. 1 ; Fig. 2 | 5 | | | A |
| I_{FRM} | repetitive peak forward current | $\delta = 0.5$; $t_p = 25$ μ s; $T_{mb} \leq 126$ °C; square-wave pulse | 10 | | | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; Fig. 3 | 60 | | | A |
| | | $t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; Fig. 3 | 66 | | | A |
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 5$ A; $T_j = 25$ °C; Fig. 5 | - | 1.3 | 1.9 | V |
| | | $I_F = 5$ A; $T_j = 150$ °C; Fig. 5 | - | 1.1 | 1.7 | V |
| Dynamic characteristics | | | | | | |
| t_{rr} | reverse recovery time | $I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 100$ A/ μ s; $T_j = 25$ °C; Fig. 6 | - | 17.5 | 35 | ns |

5. Pinning information

Table 2. Pinning information

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

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|----------|--|---------|
| | Name | Description | Version |
| BYV25F-600 | TO-220AC | plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC | SOD59 |

7. Marking

Table 4. Marking codes

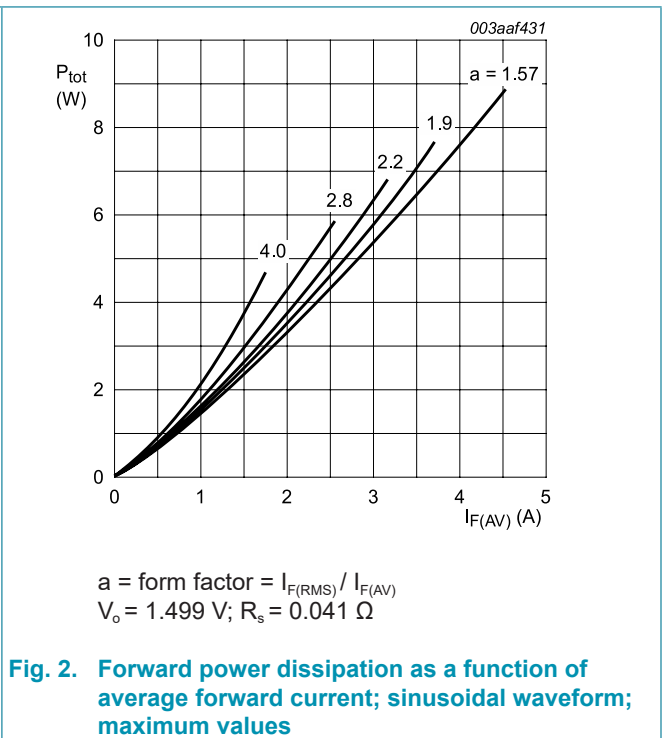
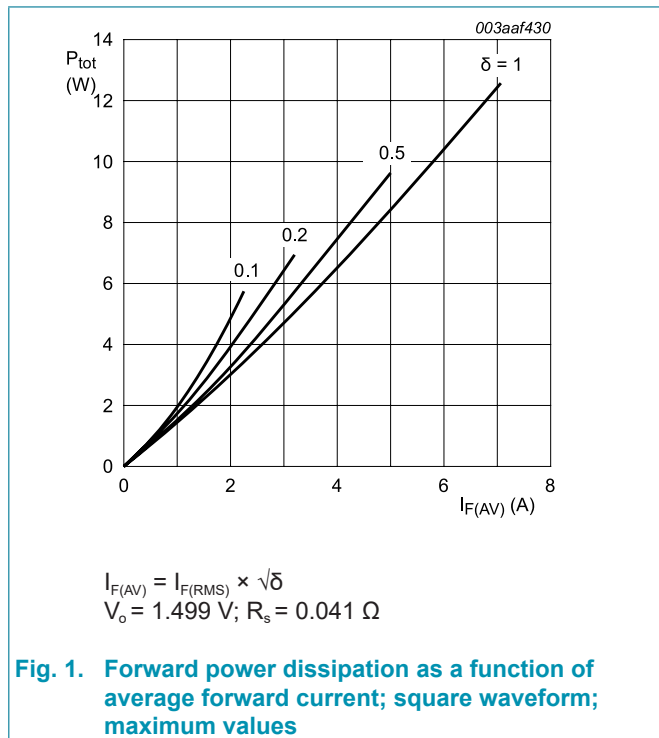
| Type number | Marking codes |
|-------------|---------------|
| BYV25F-600 | BYV25F-600 |

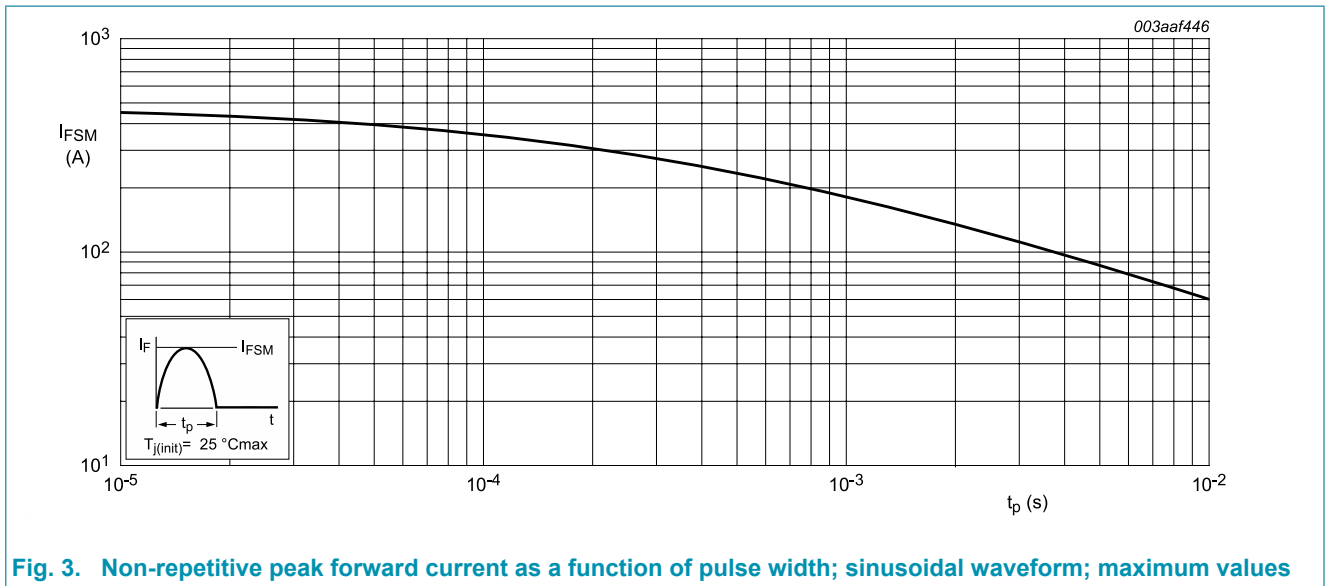
8. Limiting values

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 | DC | 600 | V |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; square-wave pulse; $T_{mb} \leq 126\text{ }^\circ\text{C}$; Fig. 1 ; Fig. 2 | 5 | A |
| I_{FRM} | repetitive peak forward current | $\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 126\text{ }^\circ\text{C}$; square-wave pulse | 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; Fig. 3 | 60 | A |
| | | $t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; sine-wave pulse; Fig. 3 | 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 |
|----------------|---|-----------------------|-----|-----|-----|------|
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base | Fig 4 | - | - | 2.5 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | - | 60 | - | K/W |

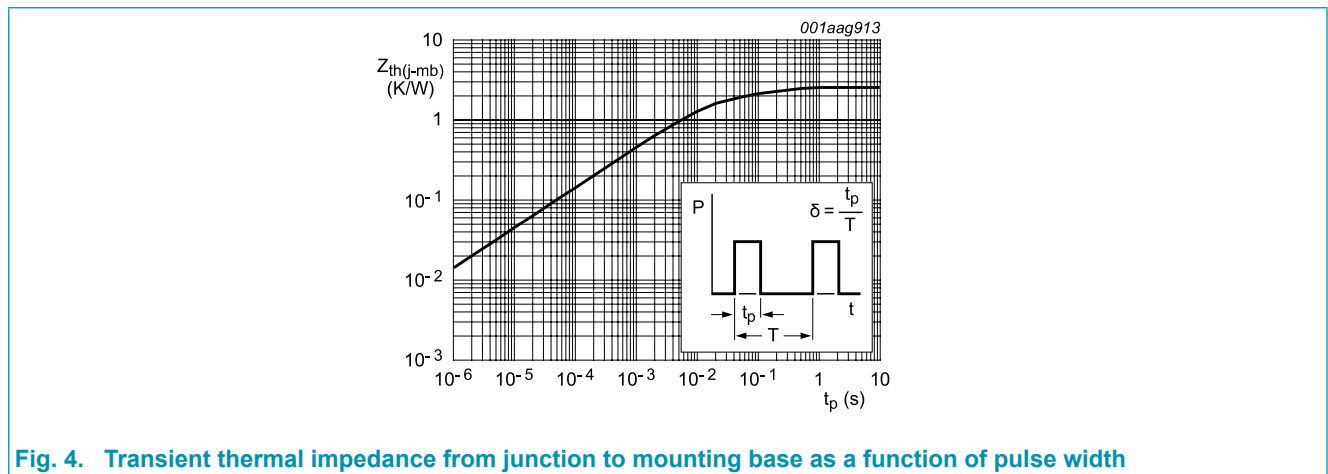
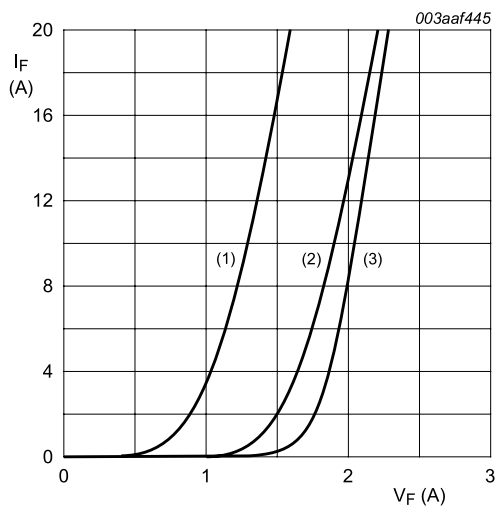


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse width

10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|-------------------------------|---|-----|------|-----|------|
| Static characteristics | | | | | | |
| V _F | forward voltage | I _F = 5 A; T _J = 25 °C; Fig. 5 | - | 1.3 | 1.9 | V |
| | | I _F = 5 A; T _J = 150 °C; Fig. 5 | - | 1.1 | 1.7 | V |
| I _R | reverse current | V _R = 600 V; T _J = 25 °C | - | - | 50 | μA |
| | | V _R = 600 V; T _J = 100 °C | - | - | 1.5 | mA |
| Dynamic characteristics | | | | | | |
| Q _r | recovered charge | I _F = 1 A; V _R = 30 V; dI _F /dt = 100 A/μs; T _J = 25 °C; Fig. 6 | - | 13 | - | nC |
| t _{rr} | reverse recovery time | I _F = 1 A; V _R = 30 V; dI _F /dt = 100 A/μs; T _J = 25 °C; Fig. 6 | - | 17.5 | 35 | ns |
| I _{RM} | peak reverse recovery current | I _F = 1 A; V _R = 30 V; dI _F /dt = 100 A/μs; T _J = 25 °C; Fig. 6 | - | 1.5 | - | A |
| V _{FRM} | forward recovery voltage | I _F = 1 A; dI _F /dt = 100 A/μs; T _J = 25 °C; Fig. 7 | - | 3.2 | - | V |



(1) T_J = 150 °C; typical values
 (2) T_J = 150 °C; maximum values
 (3) T_J = 25 °C; maximum values
 V₀ = 1.499 V; R_s = 0.041 Ω

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

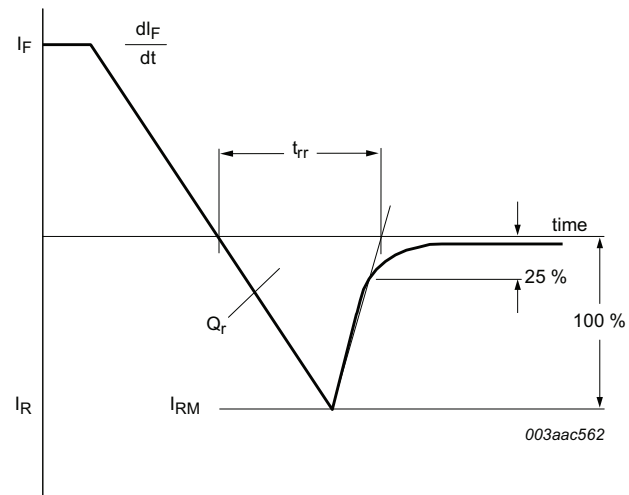


Fig. 6. Reverse recovery definitions; ramp recovery

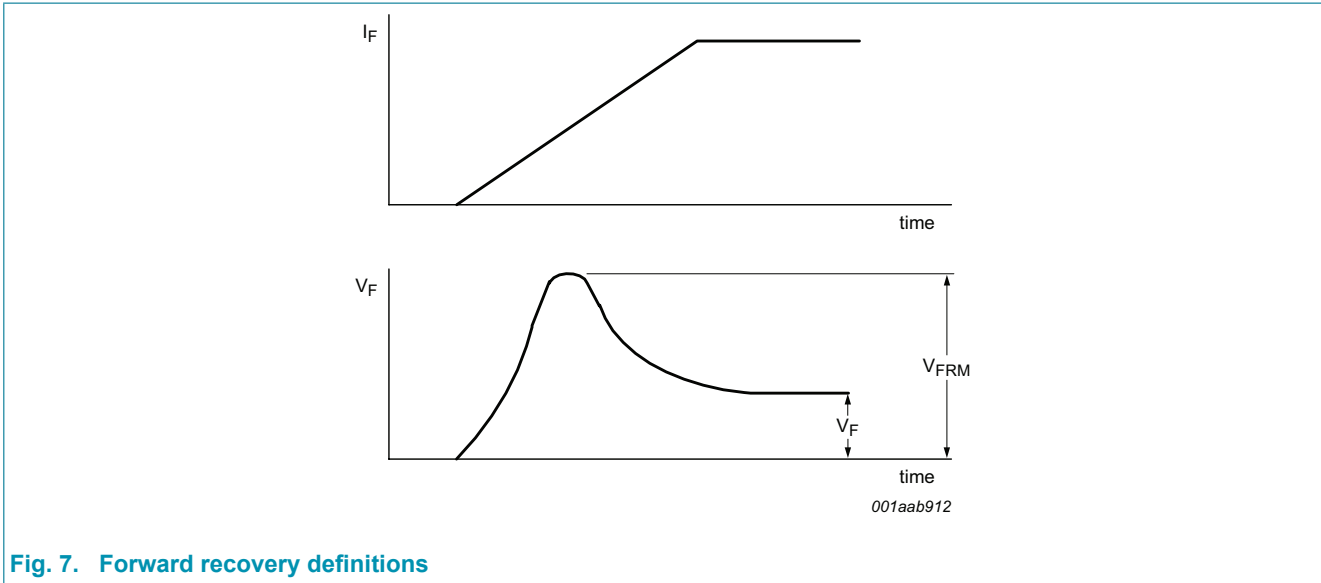
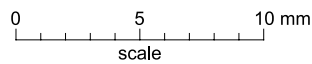
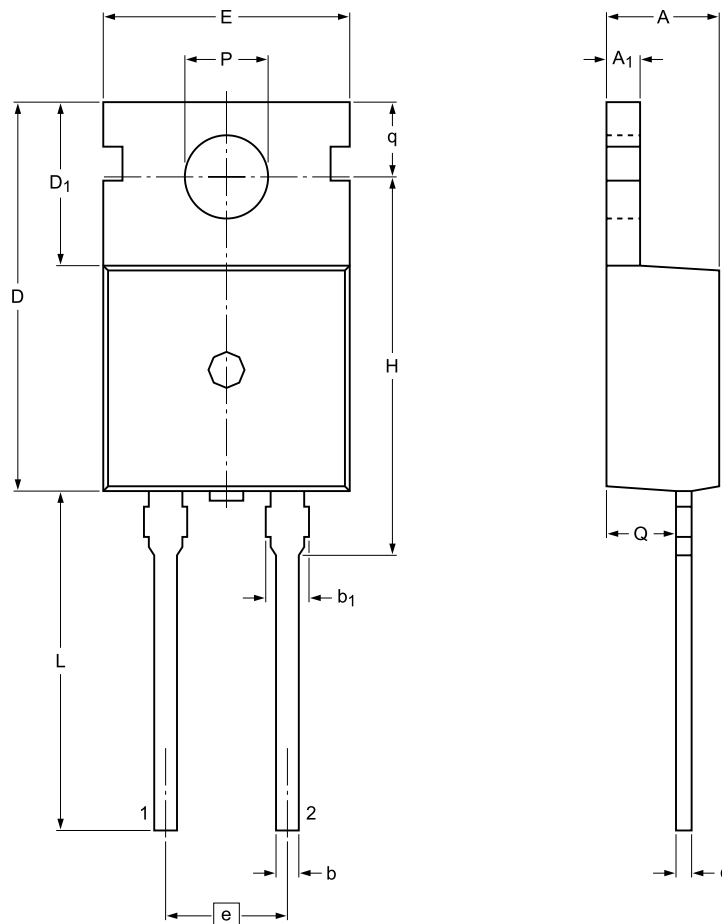


Fig. 7. Forward recovery definitions

11. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 2-lead TO-220AC

SOD59



Dimensions

| Unit | A | A ₁ | b | b ₁ (¹) | c | D | D ₁ | E | e | H | L | P | Q | q |
|------|-----|----------------|------|---------------------------------|------|------|----------------|-------|-------|-------|------|------|-----|-----|
| max | 4.7 | 1.40 | 0.95 | 1.7 | 0.65 | 15.8 | 6.8 | 10.30 | 5.08 | 16.25 | 15.0 | 3.80 | 2.6 | 2.9 |
| nom | | | | | | | | | (REF) | | | | | |
| min | 4.3 | 1.15 | 0.70 | 1.3 | 0.45 | 15.6 | 6.4 | 9.65 | | 15.70 | 12.5 | 3.65 | 2.2 | 2.7 |

Note

1. Protruded dambar are included in the dimension.

sod059_po

| Outline version | References | | | European projection | Issue date |
|-----------------|-----------------|-------|-------|---------------------|----------------------|
| | IEC | JEDEC | JEITA | | |
| SOD59 | 2-lead TO-220AC | | | | 09-08-25 12-11-27 |

12. Revision history

Table 8. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|---|--------------------|---------------|----------------|
| BYV25F-600 v.3 | 20180305 | Product data sheet | - | BYV25F-600 v.2 |
| Modifications: | Change from NXP version to WeEn version | | | |
| BYV25F-600 v.2 | 20110307 | Product data sheet | - | BYV25F-600 v.1 |
| Modifications: | Various changes to content. | | | |
| BYV25F-600 v.1 | 20101001 | Product data sheet | - | - |

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. |
| 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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