

1. General description

Enhanced ultrafast power diode in a SOT404 (D2PAK) plastic package

2. Features and benefits

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

3. Applications

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

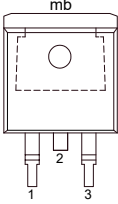
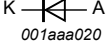
4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|-------------------------------------|--|-----|------|-----|------|
| V_R | reverse voltage | DC | - | - | 600 | V |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; $T_{mb} \leq 126$ °C; SQW; 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; SQW | - | - | 10 | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 10$ ms; $T_{j(init)} = 25$ °C; SIN; Fig. 3 | - | - | 60 | A |
| | | $t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; SIN; Fig. 3 | - | - | 66 | A |
| 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 | n.c. | not connected |  <p>D2PAK (SOT404)</p> |  |
| 2 | K | cathode ^[1] | | |
| 3 | A | anode | | |
| mb | mb | mounting base; cathode | | |

[1] It is not possible to connect to pin 2 of the SOT404 package.

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| BYV25FB-600 | D2PAK | plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped) | SOT404 |

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 | $\delta = 0.5$; $T_{mb} \leq 126\text{ }^\circ\text{C}$; SQW; Fig. 1 ; Fig. 2 | - | 5 | A |
| I_{FRM} | repetitive peak forward current | $\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 126\text{ }^\circ\text{C}$; SQW | - | 10 | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; SIN; Fig. 3 | - | 60 | A |
| | | $t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; SIN; Fig. 3 | - | 66 | A |
| T_{stg} | storage temperature | | -40 | 150 | $^\circ\text{C}$ |
| T_j | junction temperature | | - | 150 | $^\circ\text{C}$ |

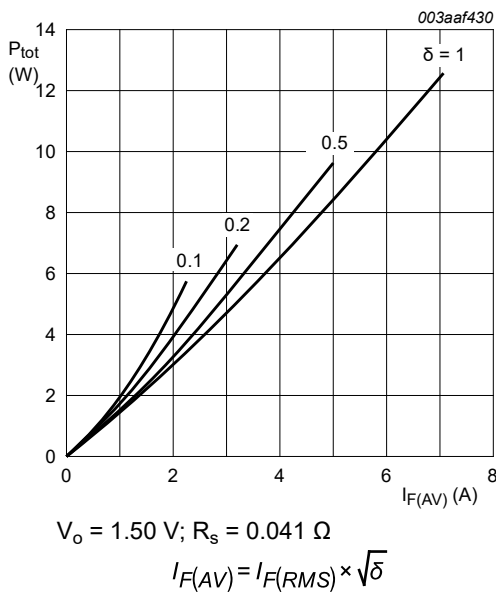


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

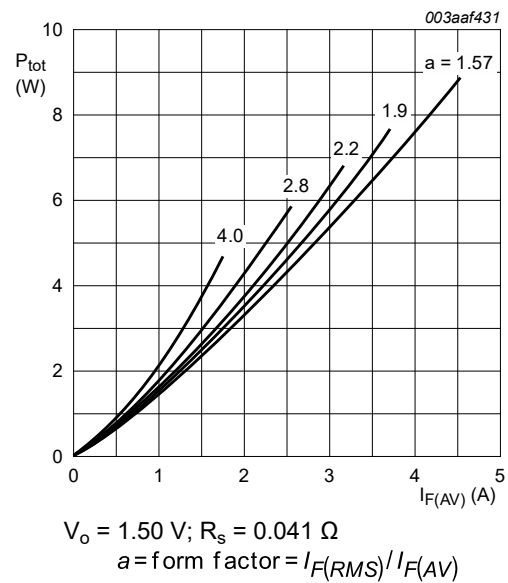
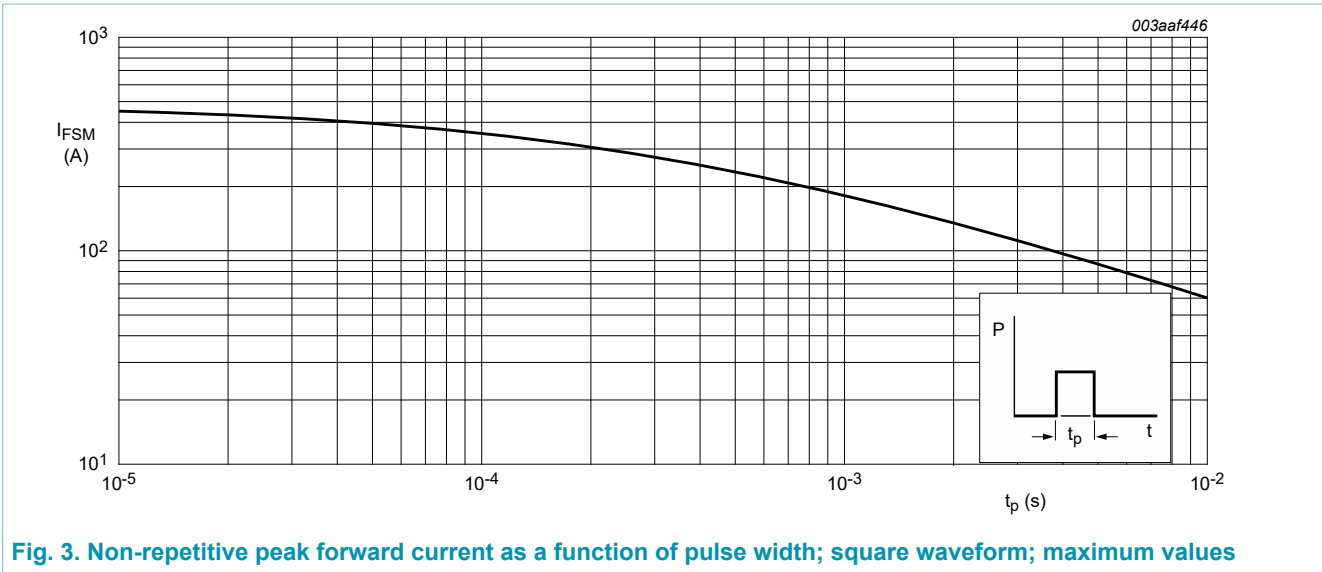


Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values



8. Thermal characteristics

Table 5. 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 free air | in free air | [1] | 50 | - | K/W |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

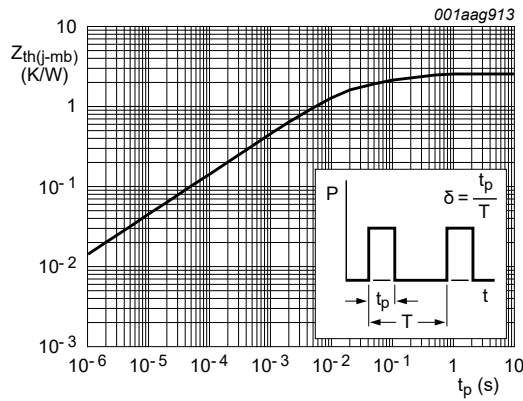
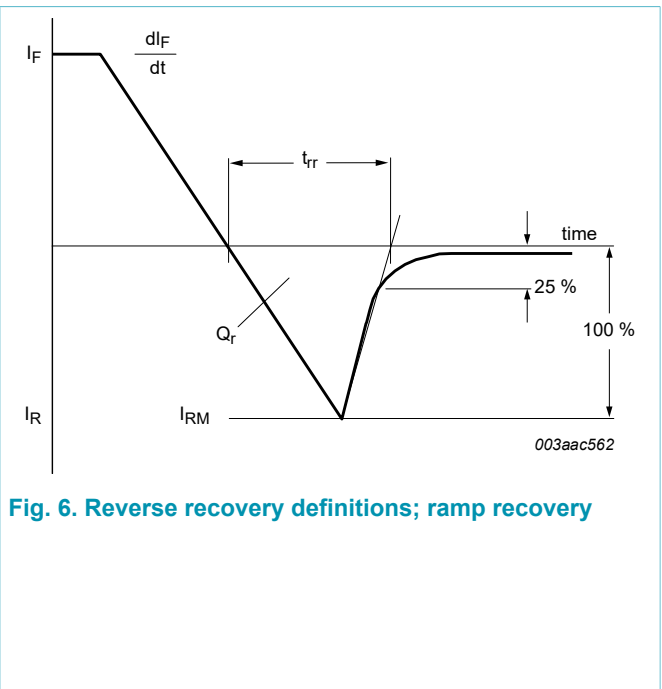
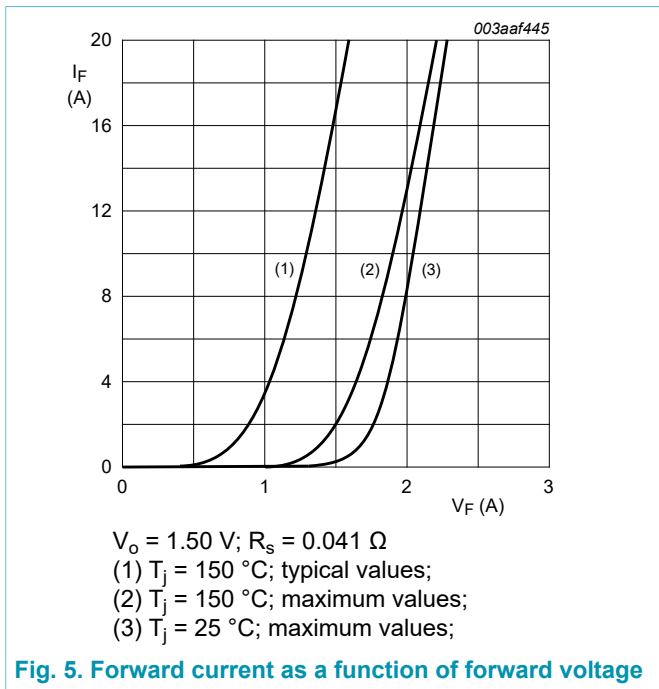


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse width

9. Characteristics

Table 6. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|-------------------------------|---|-----|------|-----|---------------|
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 5 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 5}$ | - | 1.3 | 1.9 | V |
| | | $I_F = 5 \text{ A}; T_j = 150 \text{ }^\circ\text{C}; \text{ Fig. 5}$ | - | 1.1 | 1.7 | V |
| I_R | reverse current | $V_R = 600 \text{ V}; T_j = 100 \text{ }^\circ\text{C}$ | - | - | 1.5 | mA |
| | | $V_R = 600 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | - | - | 50 | μA |
| Dynamic characteristics | | | | | | |
| t_{rr} | reverse recovery time | $I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 6}$ | - | 17.5 | 35 | ns |
| I_{RM} | peak reverse recovery current | $I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}$ | - | 1.5 | - | A |
| Q_r | recovered charge | | - | 13 | - | nC |
| V_{FR} | forward recovery voltage | $I_F = 1 \text{ A}; dI_F/dt = 100 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$ | - | 3.2 | - | V |



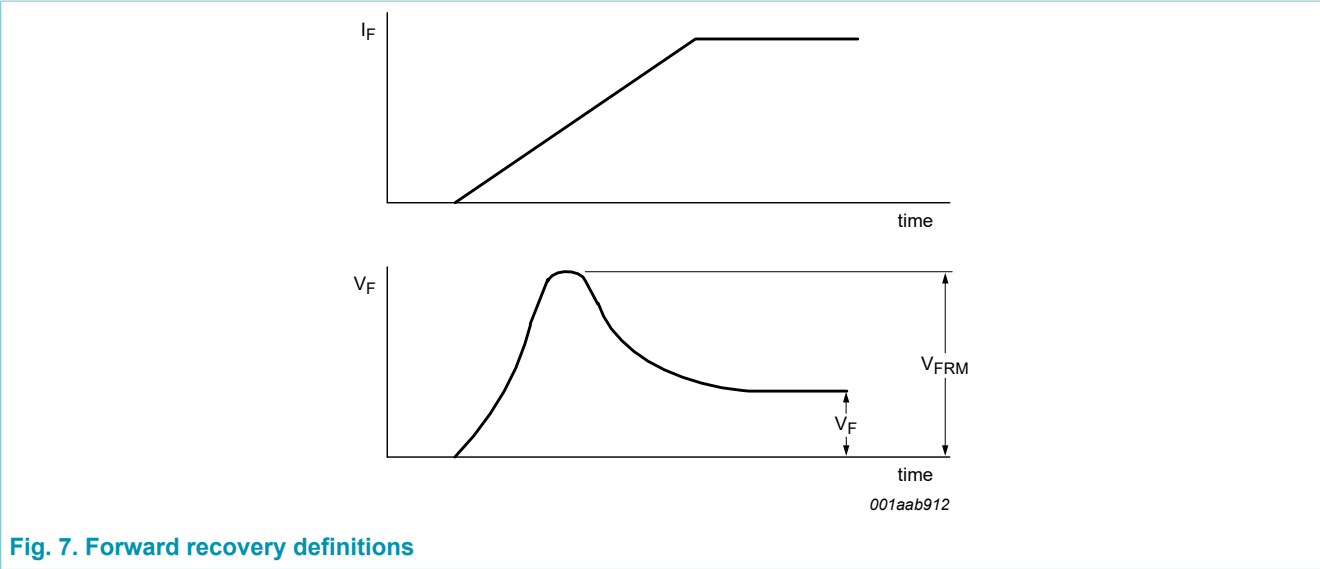


Fig. 7. Forward recovery definitions

10. Package outline

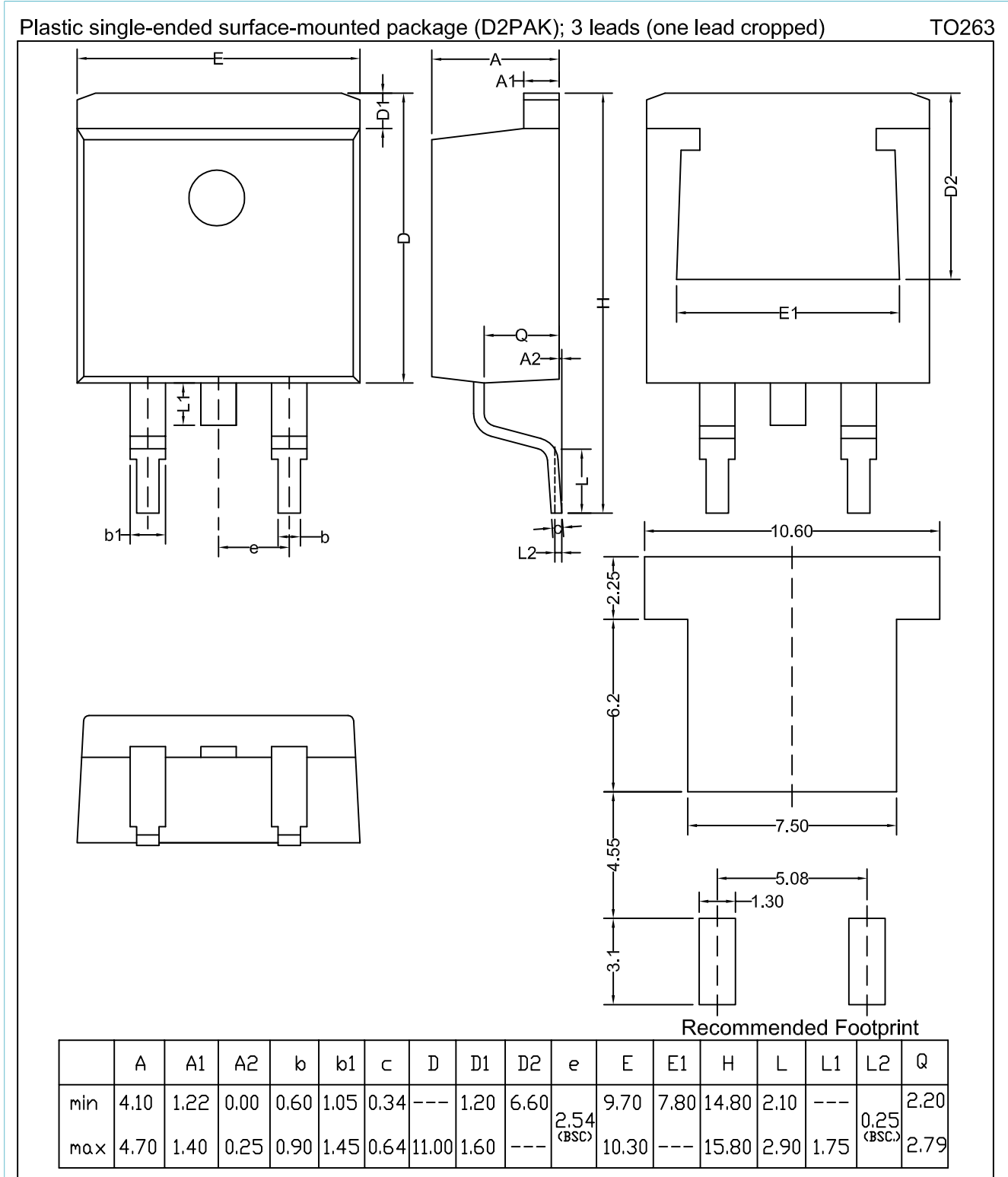


Fig. 8. Package outline D2PAK (SOT404)

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