

## 1. General description

Silicon Carbide Schottky diode designed for high frequency switched mode power supplies in a TO252 (DPAK) plastic package.

## 2. Features and benefits

- Highly stable switching performance
- High forward surge capability  $I_{FSM}$
- Extremely fast reverse recovery time
- Superior in efficiency to Silicon Diode alternatives
- Reduced losses in associated MOSFET
- Reduced EMI
- Reduced cooling requirements
- RoHS compliant

## 3. Applications

- Power factor correction
- Telecom/Server SMPS
- UPS
- PV inverter
- PC Silverbox
- LED/OLED TV
- Motor Drives

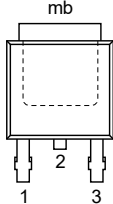
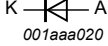
## 4. Quick reference data

Table 1. Quick reference data

| Symbol                         | Parameter                       | Conditions  | Min | Typ | Max | Unit |
|--------------------------------|---------------------------------|---|-----|-----|-----|------|
| $V_{RRM}$                      | repetitive peak reverse voltage |   | -   | -   | 650 | V    |
| $I_{F(AV)}$                    | average forward current         | $\delta = 0.5$ ; $T_{mb} \leq 119$ °C; square-wave pulse; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a> ; <a href="#">Fig. 4</a> | -   | -   | 8   | A    |
| $T_j$                          | junction temperature            |   | -   | -   | 175 | °C   |
| <b>Static characteristics</b>  |                                 |   |     |     |     |      |
| $V_F$                          | forward voltage                 | $I_F = 8$ A; $T_j = 25$ °C; <a href="#">Fig. 6</a>  | -   | 1.5 | 1.7 | V    |
|                                |                                 | $I_F = 8$ A; $T_j = 150$ °C; <a href="#">Fig. 6</a>   | -   | 1.8 | 2.1 | V    |
| <b>Dynamic characteristics</b> |                                 |   |     |     |     |      |
| $Q_r$                          | recovered charge                | $I_F = 8$ A; $di_F/dt = 500$ A/ $\mu$ s; $V_R = 400$ V; $T_j = 25$ °C; <a href="#">Fig. 7</a>   | -   | 13  | -   | nC   |

## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description                         | Simplified outline   | Graphic symbol  |
|-----|--------|-------------------------------------|--|---|
| 1   | n.c.   | not connected                       |  <p style="text-align: center;"><b>DPAK (TO252NS)</b></p> |  |
| 2   | K      | cathode <sup>[1]</sup>              |  |   |
| 3   | A      | anode                               |  |   |
| mb  | K      | mounting base; connected to cathode |  |   |

[1] It is not possible to connect to pin 2 of the TO252 package.

## 6. Ordering information

Table 3. Ordering information

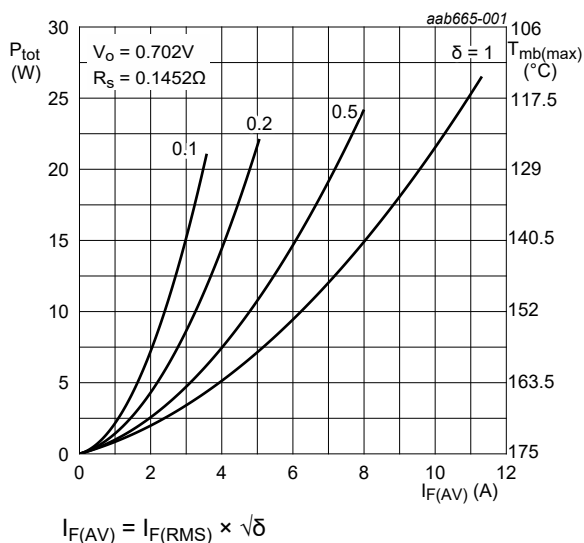
| Type number | Package |   | Version |
|-------------|---------|---|---------|
|             | Name    | Description   |         |
| NXPSC08650D | DPAK    | plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped) | TO252NS |

## 7. Limiting values

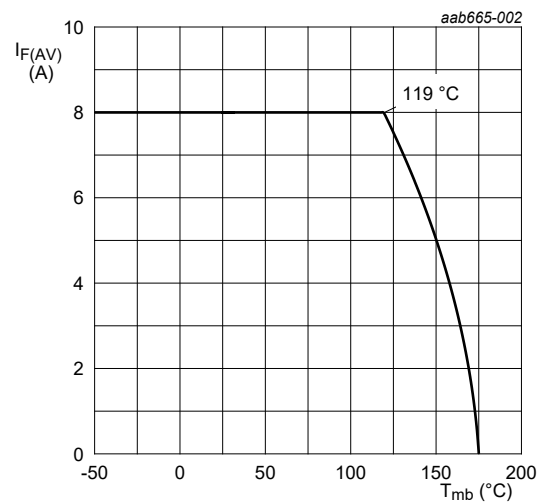
**Table 4. Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol      | Parameter                           | Conditions   | Min | Max | Unit             |
|-------------|-------------------------------------|--|-----|-----|------------------|
| $V_{RRM}$   | repetitive peak reverse voltage     |  | -   | 650 | V                |
| $V_{RWM}$   | crest working reverse voltage       |  | -   | 650 | V                |
| $V_R$       | reverse voltage                     | DC   | -   | 650 | V                |
| $I_{F(AV)}$ | average forward current             | $\delta = 0.5$ ; $T_{mb} \leq 119\text{ }^\circ\text{C}$ ; square-wave pulse; Fig. 1; Fig. 2; Fig. 3; Fig. 4 | -   | 8   | A                |
| $I_{FRM}$   | repetitive peak forward current     | $\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; square-wave pulse   | -   | 16  | 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                     | -   | 48  | A                |
|             |                                     | $t_p = 10\text{ }\mu\text{s}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; square-wave pulse          | -   | 385 | A                |
| $T_{stg}$   | storage temperature                 |  | -55 | 175 | $^\circ\text{C}$ |
| $T_j$       | junction temperature                |  | -   | 175 | $^\circ\text{C}$ |



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



**Fig. 2. Forward current as a function of mounting base temperature; maximum values**

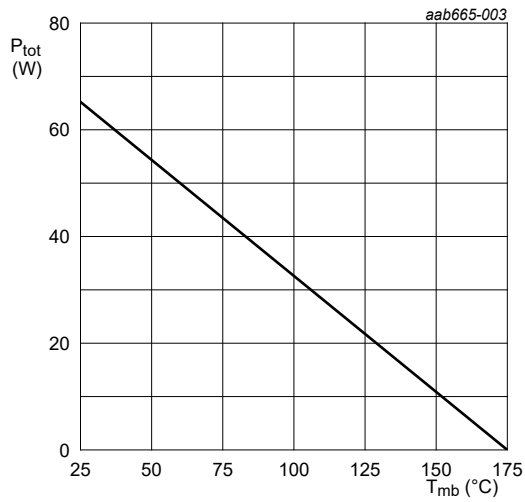


Fig. 3. Total power dissipation as a function of mounting base temperature

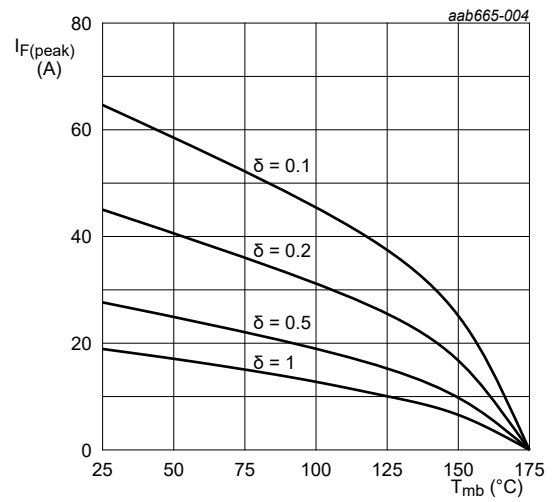
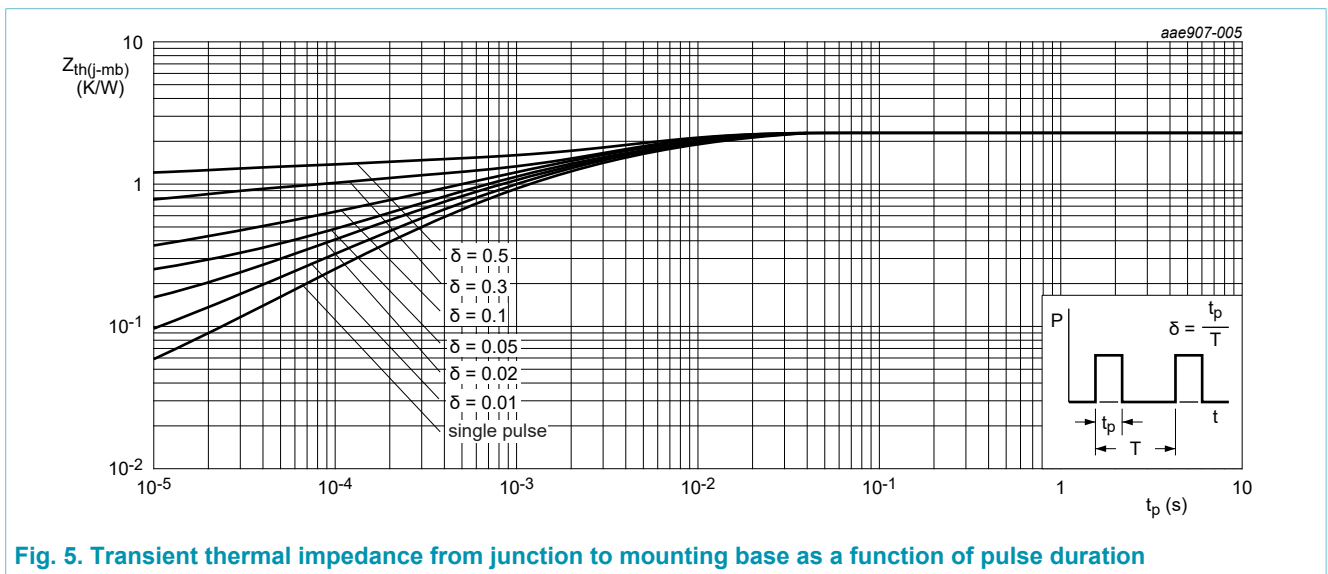


Fig. 4. Current derating as a function of mounting base temperature

## 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    | <a href="#">Fig. 5</a>                         | -   | -   | 2.3 | K/W  |
| $R_{th(j-a)}$  | thermal resistance from junction to ambient free air | Device mounted on an FR4 Printed-Circuit Board | -   | 50  | -   | K/W  |

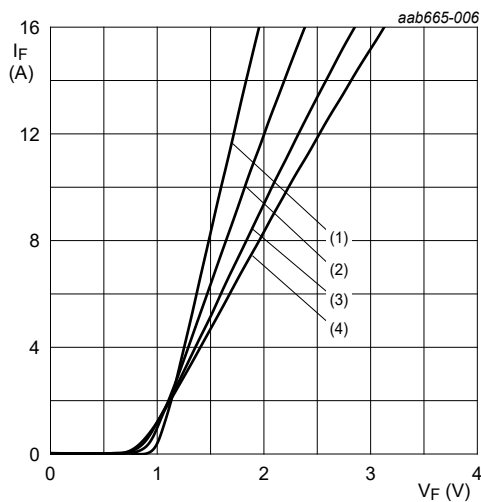


**Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration**

## 9. Characteristics

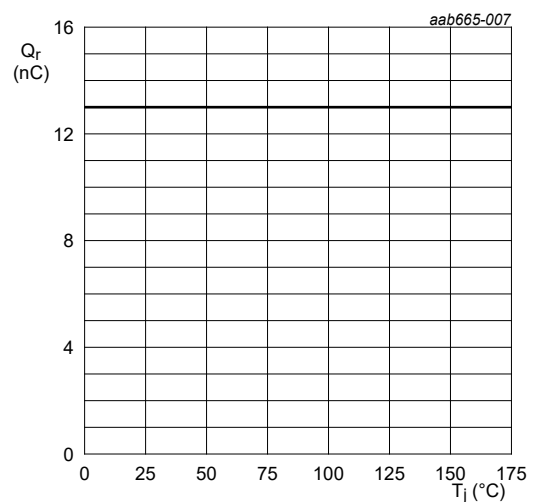
**Table 6. Characteristics**

| Symbol                         | Parameter         | Conditions  | Min | Typ | Max | Unit          |
|--------------------------------|-------------------|---|-----|-----|-----|---------------|
| <b>Static characteristics</b>  |                   |   |     |     |     |               |
| $V_F$                          | forward voltage   | $I_F = 8\text{ A}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 6}$   | -   | 1.5 | 1.7 | V             |
|                                |                   | $I_F = 8\text{ A}; T_j = 150\text{ }^\circ\text{C}; \text{Fig. 6}$  | -   | 1.8 | 2.1 | V             |
| $I_R$                          | reverse current   | $V_R = 650\text{ V}; T_j = 25\text{ }^\circ\text{C}$  | -   | -   | 230 | $\mu\text{A}$ |
|                                |                   | $V_R = 650\text{ V}; T_j = 150\text{ }^\circ\text{C}$   | -   | -   | 700 | $\mu\text{A}$ |
| <b>Dynamic characteristics</b> |                   |   |     |     |     |               |
| $Q_r$                          | recovered charge  | $I_F = 8\text{ A}; dI_F/dt = 500\text{ A}/\mu\text{s}; V_R = 400\text{ V}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$ | -   | 13  | -   | nC            |
| $C_d$                          | diode capacitance | $f = 1\text{ MHz}; V_R = 1\text{ V}; T_j = 25\text{ }^\circ\text{C}$  | -   | 260 | -   | pF            |
|                                |                   | $f = 1\text{ MHz}; V_R = 300\text{ V}; T_j = 25\text{ }^\circ\text{C}$  | -   | 30  | -   | pF            |
|                                |                   | $f = 1\text{ MHz}; V_R = 600\text{ V}; T_j = 25\text{ }^\circ\text{C}$  | -   | 24  | -   | pF            |



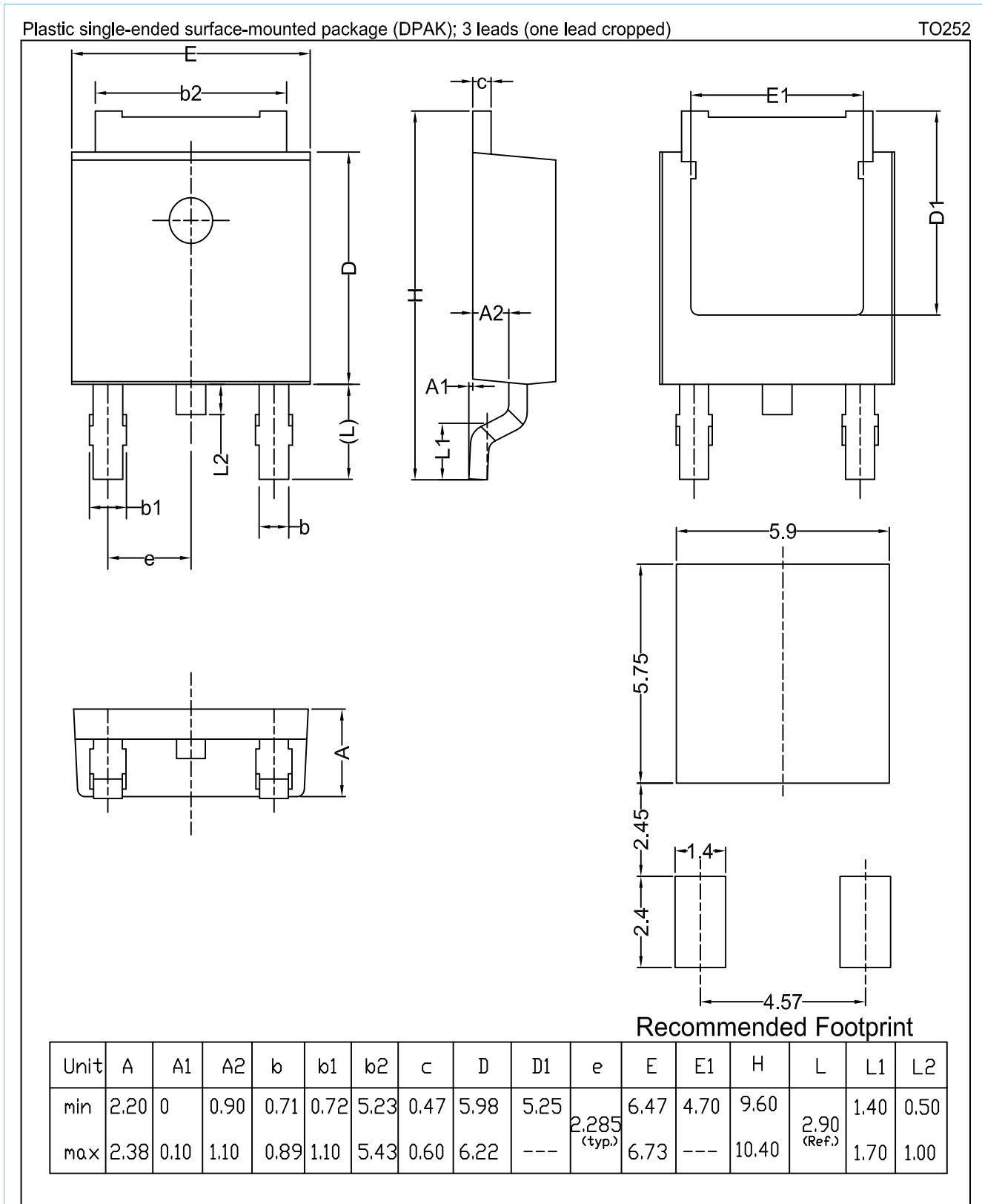
- (1)  $T_j = 25\text{ }^\circ\text{C}$ ; typical values
- (2)  $T_j = 100\text{ }^\circ\text{C}$ ; typical values
- (3)  $T_j = 150\text{ }^\circ\text{C}$ ; typical values
- (4)  $T_j = 175\text{ }^\circ\text{C}$ ; typical values

**Fig. 6. Forward current as a function of forward voltage; typical values**



**Fig. 7. Recovered charge as a function of junction temperature**

**10. Package outline**



**Fig. 8. Package outline DPAK (TO252NS)**

## 11. 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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- [1] Please consult the most recently issued document before initiating or completing a design.
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