

## 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

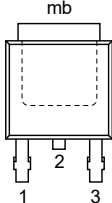
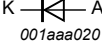
## 4. Quick reference data

Table 1. Quick reference data

| Symbol                  | Parameter                       | Conditions                                                                                                                                               |  | Min | Typ | Max | Unit |
|-------------------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----|-----|-----|------|
| V <sub>RRM</sub>        | repetitive peak reverse voltage |                                                                                                                                                          |  | -   | -   | 650 | V    |
| I <sub>F(AV)</sub>      | average forward current         | δ = 0.5 ; T <sub>mb</sub> ≤ 113 °C; square-wave pulse; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a> ; <a href="#">Fig. 4</a> |  | -   | -   | 10  | A    |
| T <sub>j</sub>          | junction temperature            |                                                                                                                                                          |  | -   | -   | 175 | °C   |
| Static characteristics  |                                 |                                                                                                                                                          |  |     |     |     |      |
| V <sub>F</sub>          | forward voltage                 | I <sub>F</sub> = 10 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 6</a>                                                                                    |  | -   | 1.5 | 1.7 | V    |
|                         |                                 | I <sub>F</sub> = 10 A; T <sub>j</sub> = 150 °C; <a href="#">Fig. 6</a>                                                                                   |  | -   | 1.8 | 2.1 | V    |
| Dynamic characteristics |                                 |                                                                                                                                                          |  |     |     |     |      |
| Q <sub>r</sub>          | recovered charge                | I <sub>F</sub> = 10 A; dI <sub>F</sub> /dt = 500 A/μs; V <sub>R</sub> = 400 V; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>                            |  | -   | 15  | -   | nC   |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description                         | Simplified outline                                                                                  | Graphic symbol                                                                      |
|-----|--------|-------------------------------------|-----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 1   | n.c.   | not connected                       | <br>DPAK (TO252NS) |  |
| 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 |                                                                                 |         |
|-------------|---------|---------------------------------------------------------------------------------|---------|
|             | Name    | Description                                                                     | Version |
| NXPSC10650D | 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 <sub>RRM</sub>   | repetitive peak reverse voltage     |                                                                                       | -   | 650 | V    |
| V <sub>RWM</sub>   | crest working reverse voltage       |                                                                                       | -   | 650 | V    |
| V <sub>R</sub>     | reverse voltage                     | DC                                                                                    | -   | 650 | V    |
| I <sub>F(AV)</sub> | average forward current             | δ = 0.5 ; T <sub>mb</sub> ≤ 113 °C; square-wave pulse; Fig. 1; Fig. 2; Fig. 3; Fig. 4 | -   | 10  | A    |
| I <sub>FRM</sub>   | repetitive peak forward current     | δ = 0.5 ; t <sub>p</sub> = 25 μs; square-wave pulse                                   | -   | 20  | 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                 | -   | 50  | A    |
|                    |                                     | t <sub>p</sub> = 10 μs; T <sub>j(init)</sub> = 25 °C; square-wave pulse               | -   | 450 | A    |
| T <sub>stg</sub>   | storage temperature                 |                                                                                       | -55 | 175 | °C   |
| T <sub>j</sub>     | junction temperature                |                                                                                       | -   | 175 | °C   |

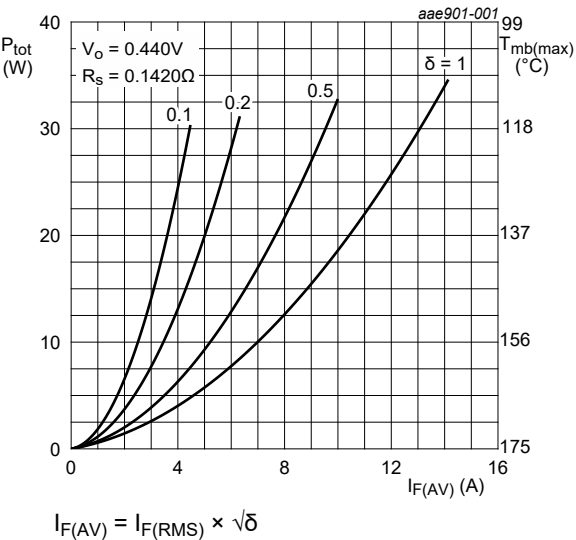


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

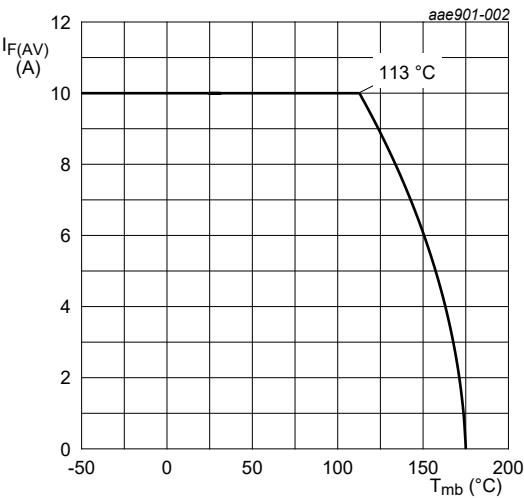


Fig. 2. Forward current as a function of mounting base temperature; maximum values

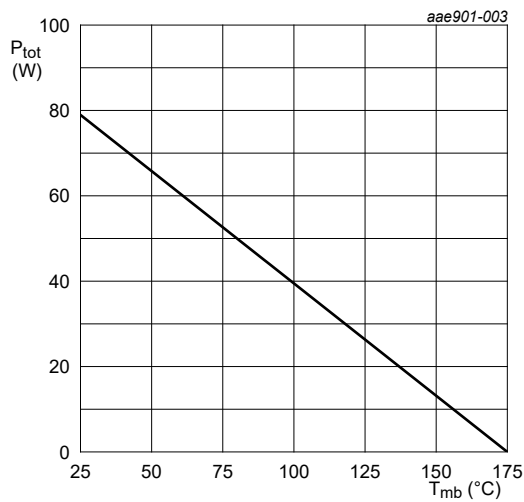


Fig. 3. Total power dissipation as a function of mounting base temperature

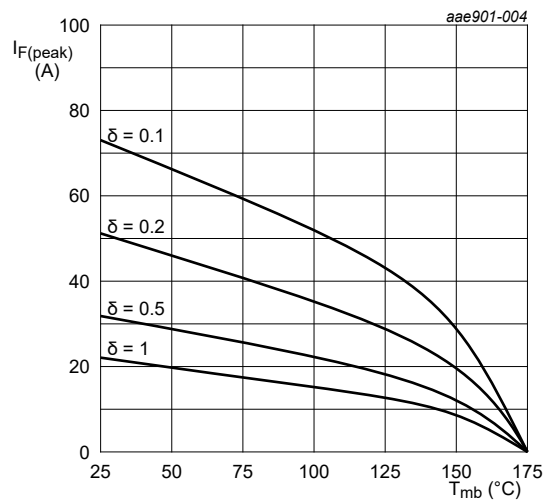
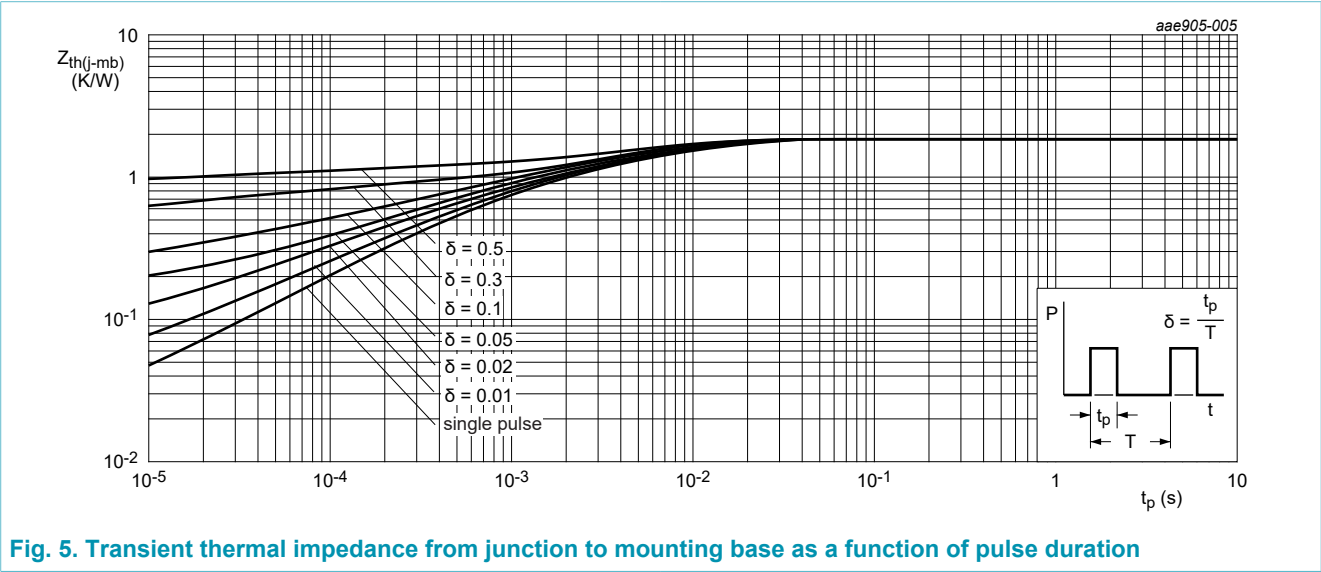


Fig. 4. Current derating as a function of mounting base temperature

8. Thermal characteristics

Table 5. Thermal characteristics

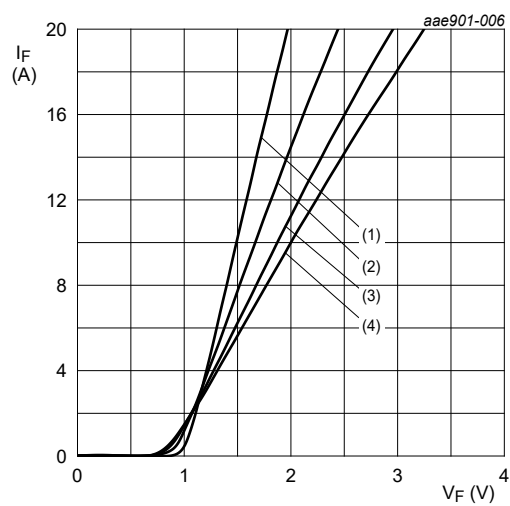
| Symbol         | Parameter                                            | Conditions                                     | Min | Typ | Max | Unit |
|----------------|------------------------------------------------------|------------------------------------------------|-----|-----|-----|------|
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base    | Fig. 5                                         | -   | -   | 1.9 | 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  |



9. Characteristics

Table 6. Characteristics

| Symbol                  | Parameter         | Conditions                                                                                                                       |  | Min | Typ | Max | Unit |
|-------------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------|--|-----|-----|-----|------|
| Static characteristics  |                   |                                                                                                                                  |  |     |     |     |      |
| V <sub>F</sub>          | forward voltage   | I <sub>F</sub> = 10 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 6</a>                                                            |  | -   | 1.5 | 1.7 | V    |
|                         |                   | I <sub>F</sub> = 10 A; T <sub>j</sub> = 150 °C; <a href="#">Fig. 6</a>                                                           |  | -   | 1.8 | 2.1 | V    |
| I <sub>R</sub>          | reverse current   | V <sub>R</sub> = 650 V; T <sub>j</sub> = 25 °C                                                                                   |  | -   | -   | 250 | μA   |
|                         |                   | V <sub>R</sub> = 650 V; T <sub>j</sub> = 150 °C                                                                                  |  | -   | -   | 800 | μA   |
| Dynamic characteristics |                   |                                                                                                                                  |  |     |     |     |      |
| Q <sub>r</sub>          | recovered charge  | I <sub>F</sub> = 10 A; dI <sub>F</sub> /dt = 500 A/μs;<br>V <sub>R</sub> = 400 V; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a> |  | -   | 15  | -   | nC   |
| C <sub>d</sub>          | diode capacitance | f = 1 MHz; V <sub>R</sub> = 1 V; T <sub>j</sub> = 25 °C                                                                          |  | -   | 300 | -   | pF   |
|                         |                   | f = 1 MHz; V <sub>R</sub> = 300 V; T <sub>j</sub> = 25 °C                                                                        |  | -   | 34  | -   | pF   |
|                         |                   | f = 1 MHz; V <sub>R</sub> = 600 V; T <sub>j</sub> = 25 °C                                                                        |  | -   | 28  | -   | pF   |



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

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

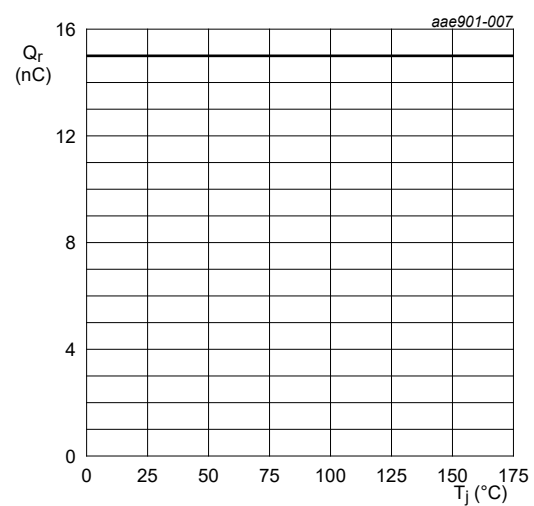


Fig. 7. Recovered charge as a function of junction temperature

10. Package outline

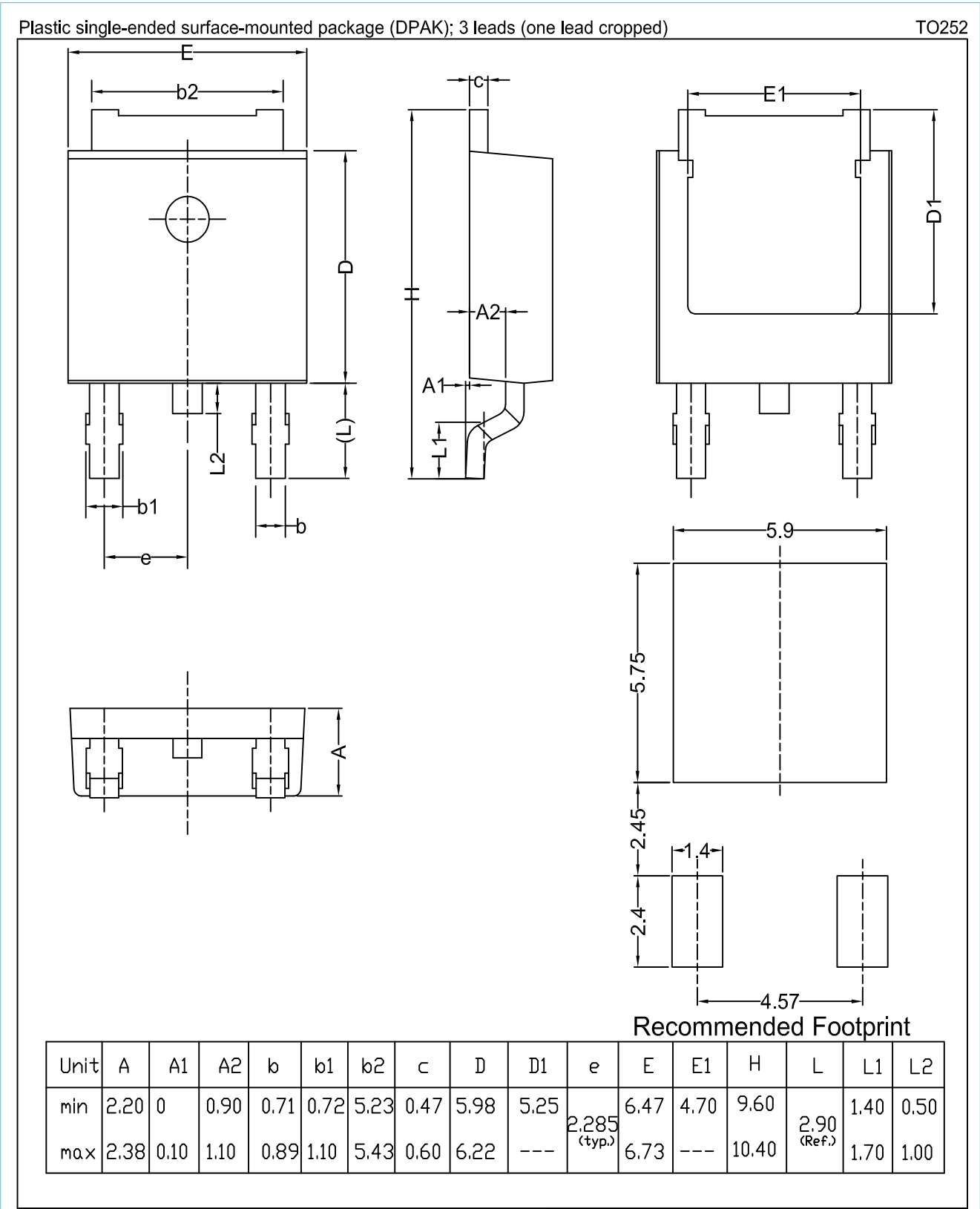


Fig. 8. Package outline DPAK (TO252NS)

## 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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| 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.
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Date of release: 4 January 2017