

1. General description

Silicon Carbide Schottky diode in a TO263 (D2PAK) plastic package, designed for high frequency switched-mode power supplies.

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

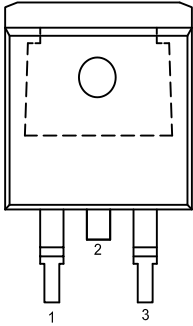
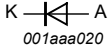
4. Quick reference data

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 | $\delta = 0.5$; $T_{mb} \leq 113$ °C; square-wave pulse; Fig. 1 ; Fig. 2 ; Fig. 3 ; Fig. 4 | - | - | 10 | A |
| T_j | junction temperature | | - | - | 175 | °C |
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 10$ A; $T_j = 25$ °C; Fig. 6 | - | 1.5 | 1.7 | V |
| | | $I_F = 10$ A; $T_j = 150$ °C; Fig. 6 | - | 1.8 | 2.1 | V |
| Dynamic characteristics | | | | | | |
| Q_r | recovered charge | $I_F = 10$ A; $di_F/dt = 500$ A/ μ s; $V_R = 400$ V; $T_j = 25$ °C; Fig. 8 ; Fig. 9 | - | 15 | 22 | nC |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------------------------------|--|---|
| 1 | n.c. | not connected |  <p>D2PAK (TO263N)</p> |  |
| 2 | K | cathode[1] | | |
| 3 | A | anode | | |
| mb | K | mounting base; connected to cathode | | |

[1] It is not possible to connect to pin 2 of the TO263 package.

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| NXPSC10650B | D2PAK | plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped) | TO263N |

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 | $\delta = 0.5$; $T_{mb} \leq 113\text{ }^\circ\text{C}$; square-wave pulse; Fig. 1; Fig. 2; Fig. 3; Fig. 4 | - | 10 | A |
| I_{FRM} | repetitive peak forward current | $\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; square-wave pulse | - | 20 | 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 | - | 50 | A |
| | | $t_p = 10\text{ }\mu\text{s}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; square-wave pulse | - | 450 | A |
| I^2t | I^2t for fusing | sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; $t_p = 10\text{ ms}$ | - | 12.5 | A ² s |
| T_{stg} | storage temperature | | -55 | 175 | $^\circ\text{C}$ |
| T_j | junction temperature | | - | 175 | $^\circ\text{C}$ |

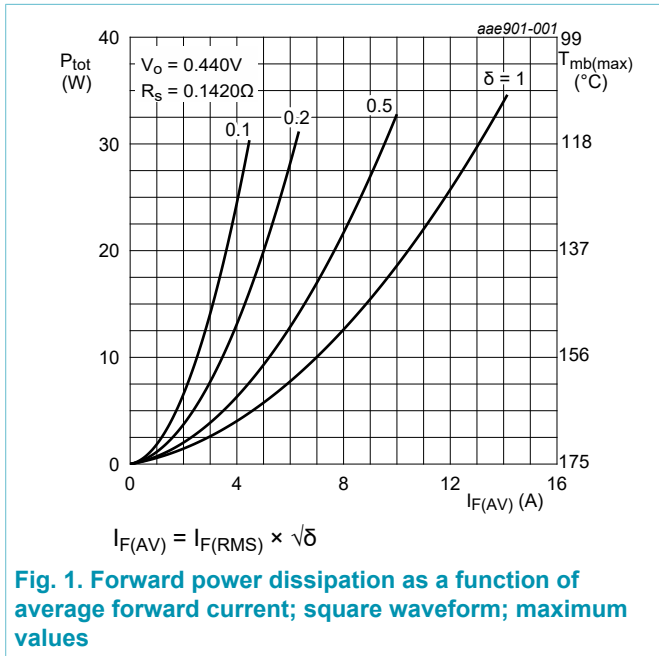


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

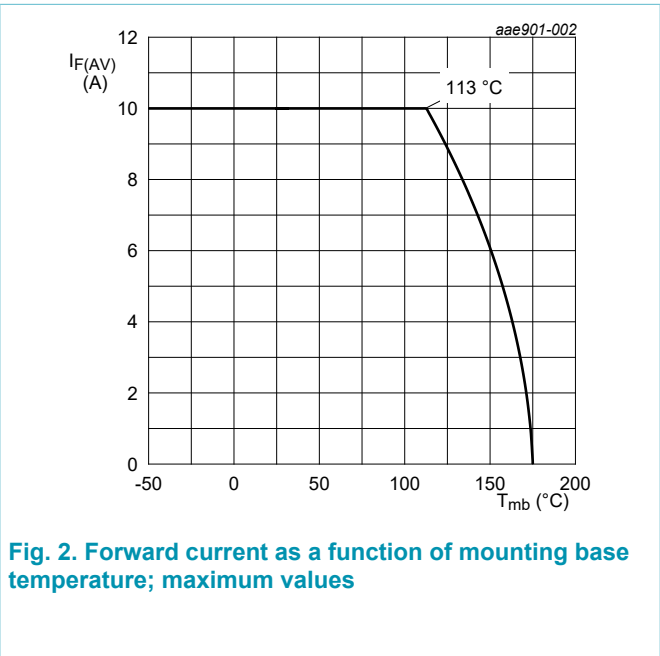


Fig. 2. Forward current as a function of mounting base temperature; maximum values

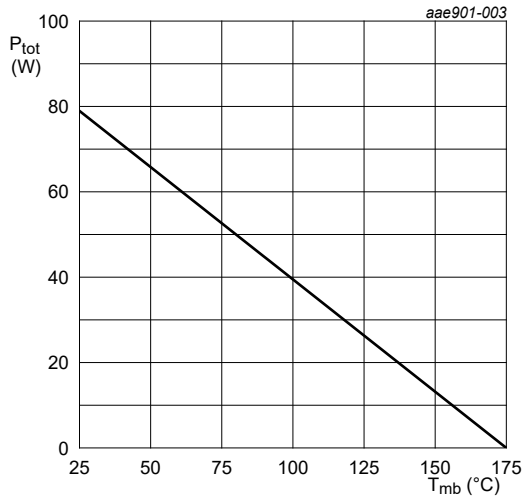


Fig. 3. Total power dissipation as a function of mounting base temperature

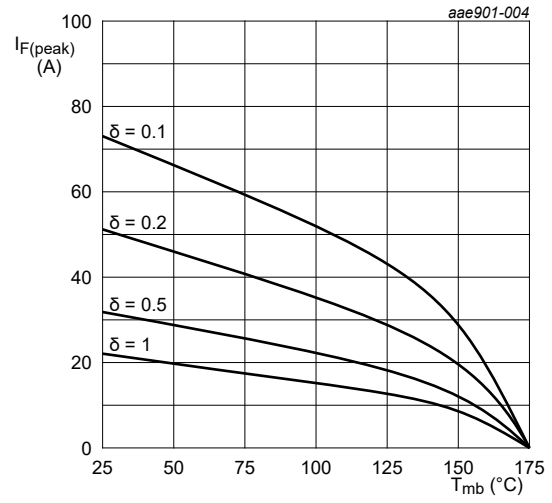


Fig. 4. Current derating as a function of mounting base temperature

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 | 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 (PCB) | - | 50 | - | K/W |

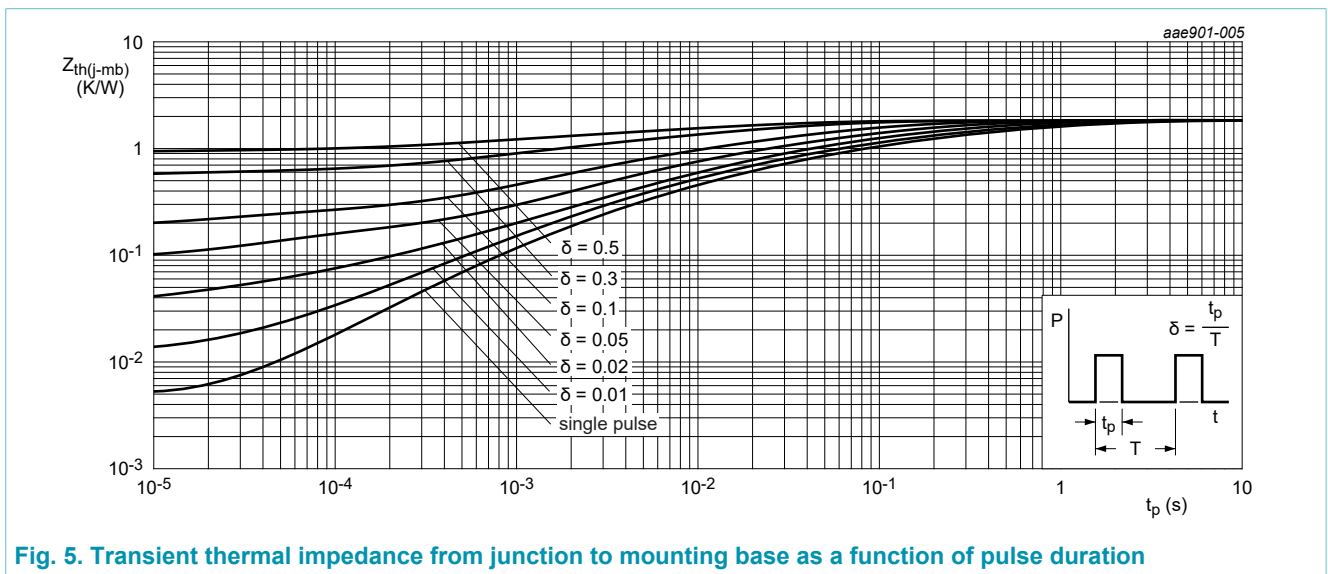
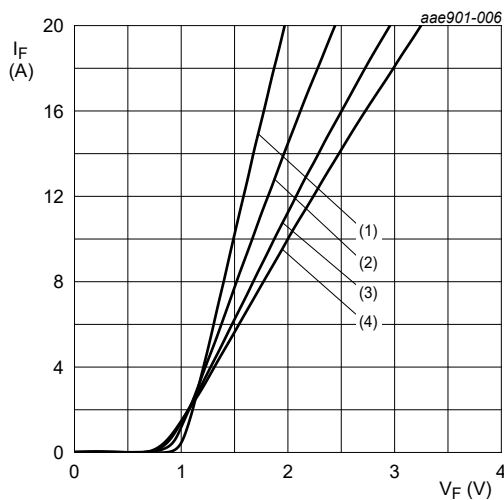


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

9. Characteristics

Table 6. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|-------------------|---|-----|-----|-----|---------------|
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 10\text{ A}; T_j = 25\text{ °C}; \text{Fig. 6}$ | - | 1.5 | 1.7 | V |
| | | $I_F = 10\text{ A}; T_j = 150\text{ °C}; \text{Fig. 6}$ | - | 1.8 | 2.1 | V |
| I_R | reverse current | $V_R = 650\text{ V}; T_j = 25\text{ °C}; \text{Fig. 7}$ | - | 12 | 250 | μA |
| | | $V_R = 650\text{ V}; T_j = 150\text{ °C}; \text{Fig. 7}$ | - | - | 800 | μA |
| | | $V_R = 600\text{ V}; T_j = 25\text{ °C}; \text{Fig. 7}$ | - | 6 | 100 | μA |
| | | $V_R = 600\text{ V}; T_j = 150\text{ °C}; \text{Fig. 7}$ | - | - | 450 | μA |
| Dynamic characteristics | | | | | | |
| Q_r | recovered charge | $I_F = 10\text{ A}; di_F/dt = 500\text{ A}/\mu\text{s}; V_R = 400\text{ V}; T_j = 25\text{ °C}; \text{Fig. 8}; \text{Fig. 9}$ | - | 15 | 22 | nC |
| C_d | diode capacitance | $f = 1\text{ MHz}; V_R = 1\text{ V}; T_j = 25\text{ °C}$ | - | 300 | - | pF |
| | | $f = 1\text{ MHz}; V_R = 300\text{ V}; T_j = 25\text{ °C}$ | - | 34 | - | pF |
| | | $f = 1\text{ MHz}; V_R = 600\text{ V}; T_j = 25\text{ °C}$ | - | 28 | 40 | 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

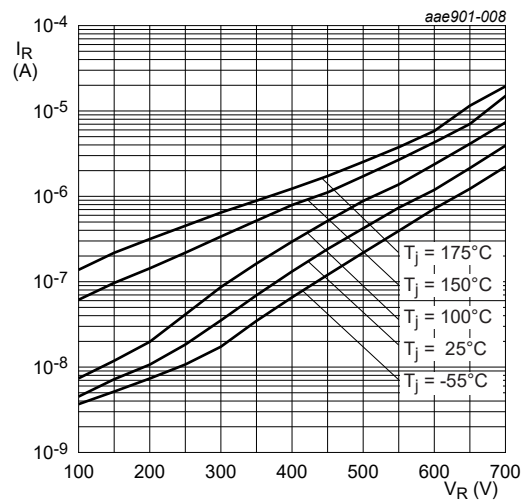


Fig. 7. Reverse current as a function of reverse voltage; typical values

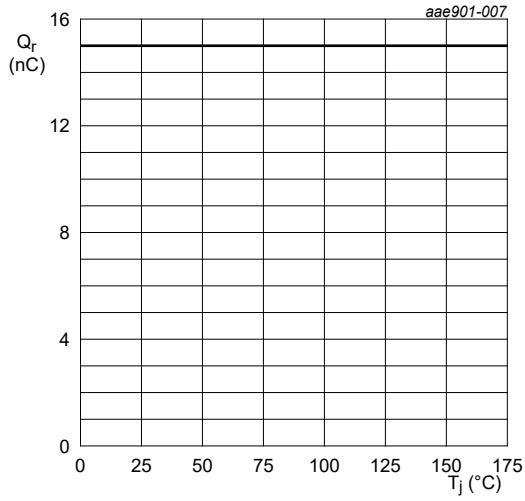


Fig. 8. Recovered charge as a function of junction temperature

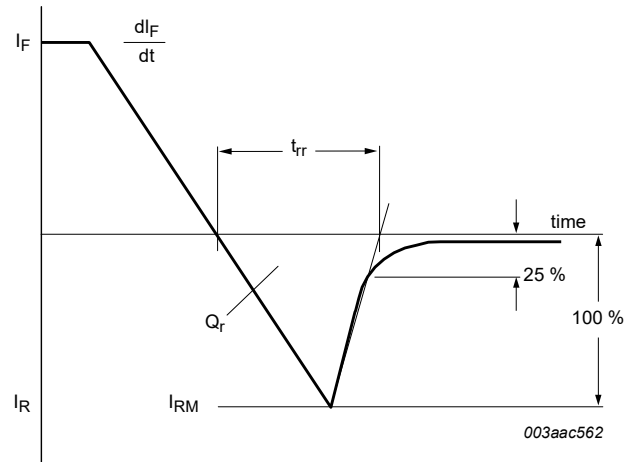


Fig. 9. Reverse recovery definitions; ramp recovery

10. Package outline

Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped) TO263

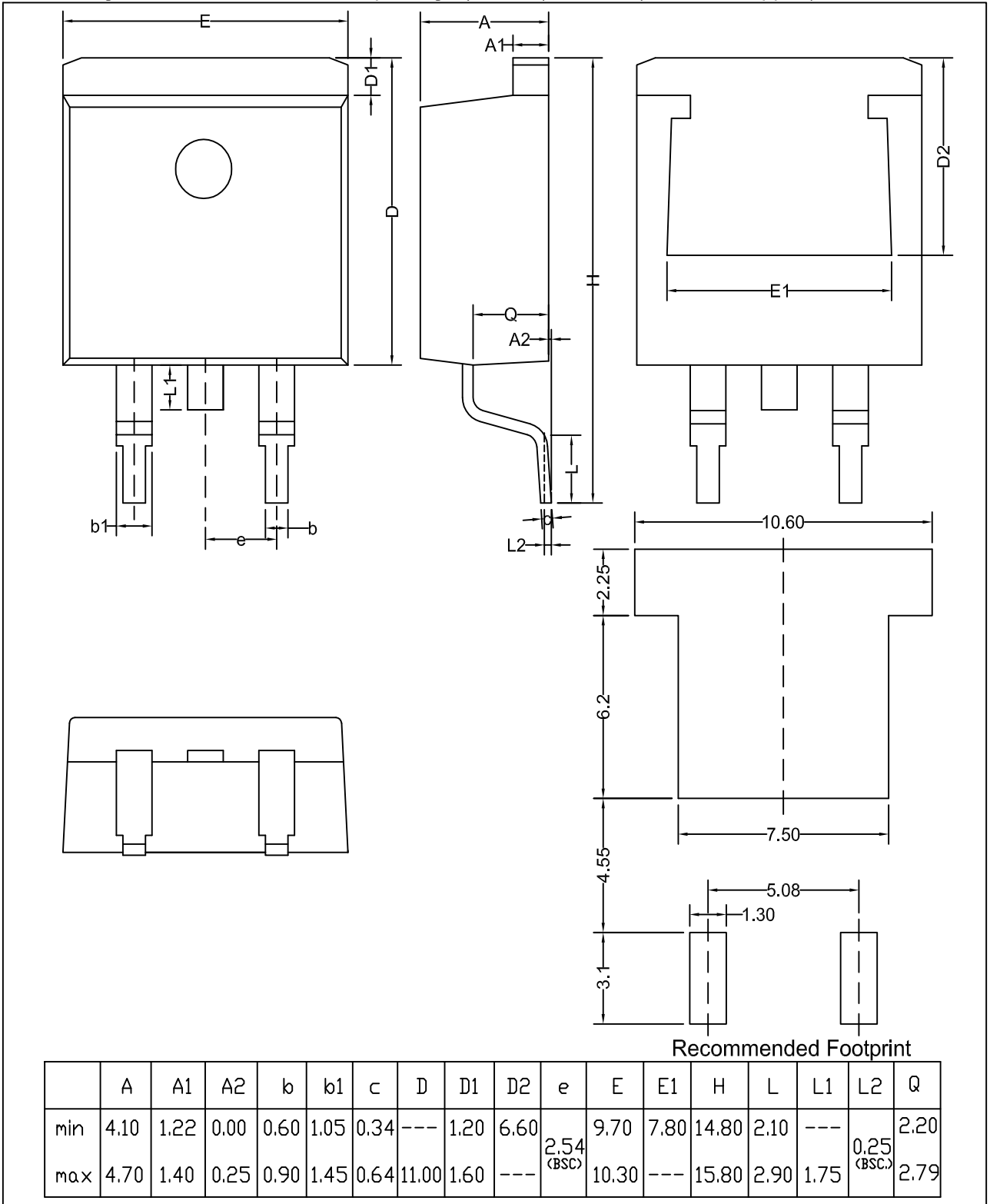


Fig. 10. Package outline D2PAK (TO263N)

11. Legal information

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