

1. General description

Silicon Carbide Schottky diode in a SOD59A (TO220-2L) 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
- High junction operating temperature capability ($T_{j(max)} = 175\text{ °C}$)

3. Applications

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

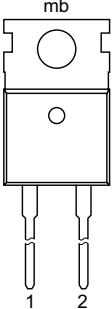
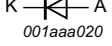
4. Quick reference data

Table 1. Quick reference data

| Table 1. Quick reference data | | | | | | | |
|-------------------------------|---------------------------------|--|--------|-----|------|-----|------|
| Symbol | Parameter | Conditions | Values | | | | Unit |
| Absolute maximum rating | | | | | | | |
| V _{RRM} | repetitive peak reverse voltage | | 1200 | | | | V |
| I _{F(AV)} | average forward current | δ = 0.5 ; square-wave pulse; T _{mb} ≤ 144 °C; Fig. 1 ; Fig. 2 ; Fig. 3 ; Fig. 4 | 10 | | | | A |
| T _j | junction temperature | | 175 | | | | °C |
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
| Static characteristics | | | | | | | |
| V _F | forward voltage | I _F = 10 A; T _j = 25 °C; Fig. 6 | | - | 1.4 | 1.6 | V |
| | | I _F = 10 A; T _j = 150 °C; Fig. 6 | | - | 1.85 | 2.3 | V |
| | | I _F = 10 A; T _j = 175 °C; Fig. 6 | | - | 2 | 2.6 | V |
| Dynamic characteristics | | | | | | | |
| Q _r | recovered charge | I _F = 10 A; V _R = 400 V; dI _F /dt = 500 A/μs; T _i = 25 °C; Fig. 8 | | - | 24 | - | nC |

5. Pinning information

Table 2. Pinning information

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

6. Ordering information

Table 3. Ordering information

| Type number | Package name | Orderable part number | Packing method | Small packing quantity | Package version | Package issue date |
|-------------|--------------|-----------------------|----------------|------------------------|-----------------|--------------------|
| WNSC101200 | TO220-2L | WNSC101200Q | Tube | 50 | SOD59A | 30-Mar-2015 |

7. Marking

Table 4. Marking codes

| Type number | Marking codes |
|-------------|---------------|
| WNSC101200 | WNSC101200 |

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 | | 1200 | V |
| V_{RWM} | crest working reverse voltage | | 1200 | V |
| V_R | reverse voltage | DC | 1200 | V |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; square-wave pulse; $T_{mb} \leq 144\text{ }^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3 ; Fig. 4 | 10 | A |
| I_{FRM} | repetitive peak forward current | $\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 144\text{ }^{\circ}\text{C}$; 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 | 110 | A |
| | | $t_p = 10\text{ }\mu\text{s}$; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; sine-wave pulse | 720 | A |
| T_{stg} | storage temperature | | -55 to 175 | $^{\circ}\text{C}$ |
| T_j | junction temperature | | 175 | $^{\circ}\text{C}$ |

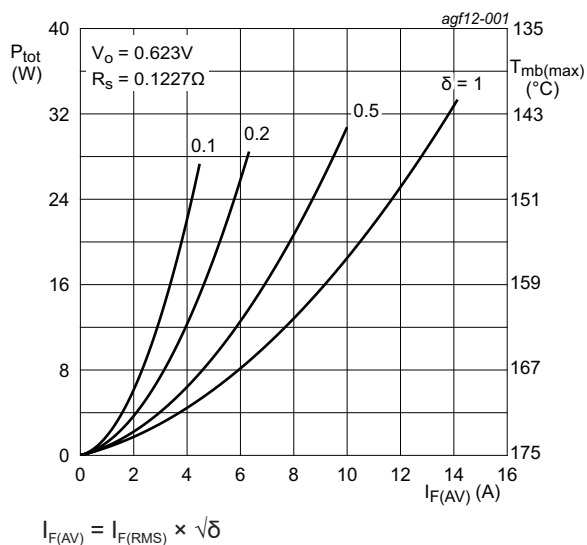


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; typical values

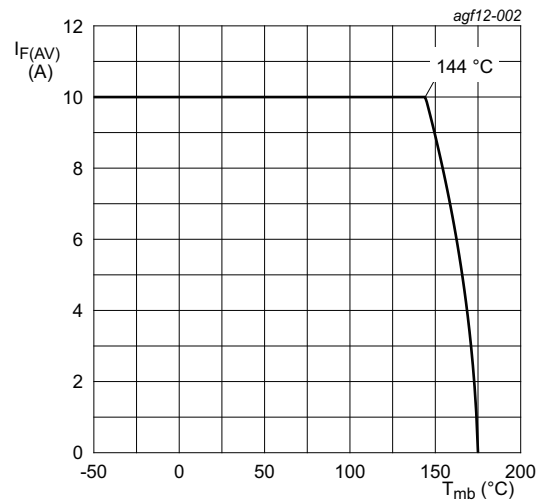


Fig. 2. Forward current as a function of mounting base temperature; typical values

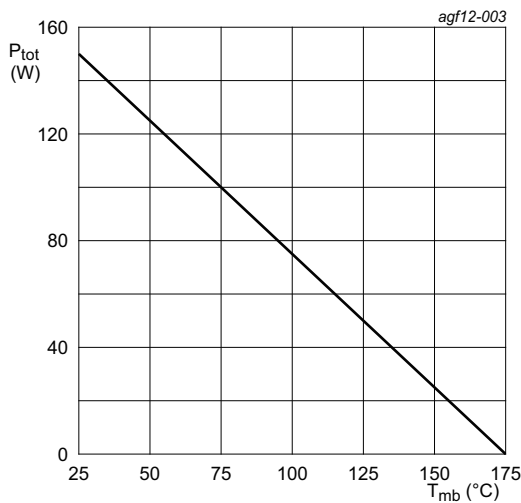


Fig. 3. Total power dissipation as a function of mounting base temperature

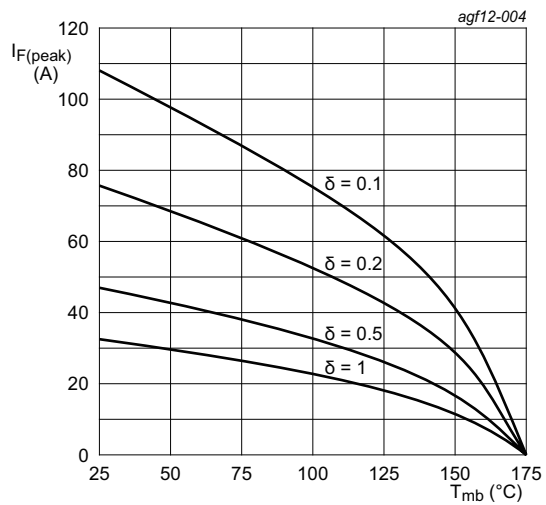


Fig. 4. Current derating as a function of mounting base temperature

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. 5 | - | - | 1 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | in free air | - | 60 | - | K/W |

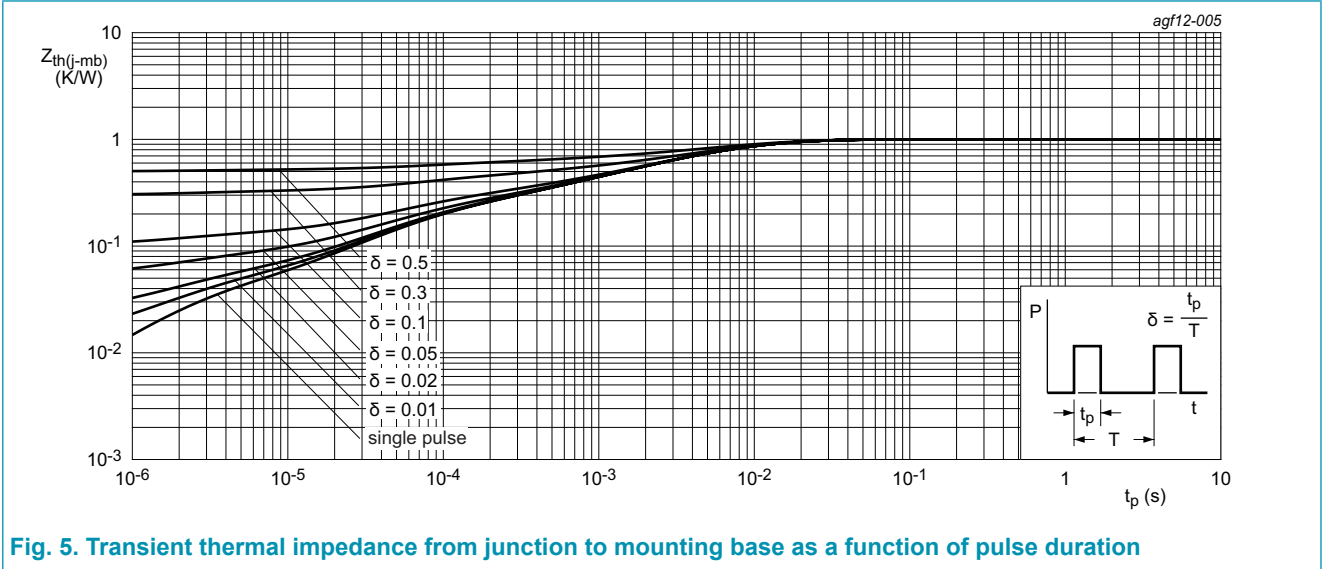
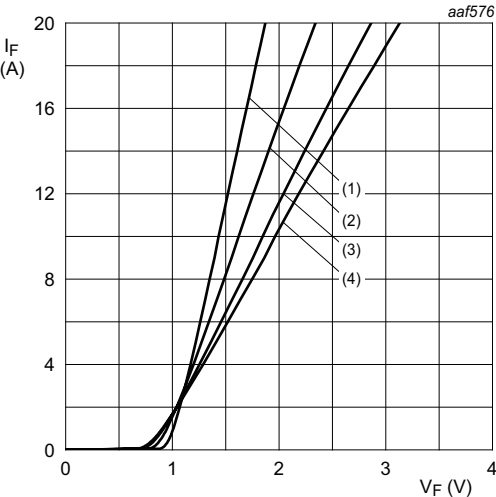


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|-------------------------|-------------------|---|--|-----|------|-----|------|
| Static characteristics | | | | | | | |
| V _F | forward current | I _F = 10 A; T _J = 25 °C; Fig. 6 | | - | 1.4 | 1.6 | V |
| | | I _F = 10 A; T _J = 150 °C; Fig. 6 | | - | 1.85 | 2.3 | V |
| | | I _F = 10 A; T _J = 175 °C; Fig. 6 | | - | 2 | 2.6 | V |
| I _R | reverse current | V _R = 1200 V; T _j = 25 °C; Fig. 7 | | - | - | 200 | μA |
| | | V _R = 1200 V; T _j = 175 °C; Fig. 7 | | - | - | 1 | mA |
| Dynamic characteristics | | | | | | | |
| Q _r | recovered charge | I _F = 10 A; V _R = 400 V; dI _F /dt = 500 A/μs; T _j = 25 °C; Fig. 8 | | - | 24 | - | nC |
| C _d | diode capacitance | f = 1 MHz; V _R = 1 V; T _j = 25 °C | | - | 510 | - | pF |
| | | f = 1 MHz; V _R = 400 V; T _j = 25 °C | | - | 48 | - | pF |
| | | f = 1 MHz; V _R = 800 V; T _j = 25 °C | | - | 41 | - | pF |



- (1) T_J = 25 °C; typical values
- (2) T_J = 100 °C; typical values
- (3) T_J = 150 °C; typical values
- (4) T_J = 175 °C; typical values

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

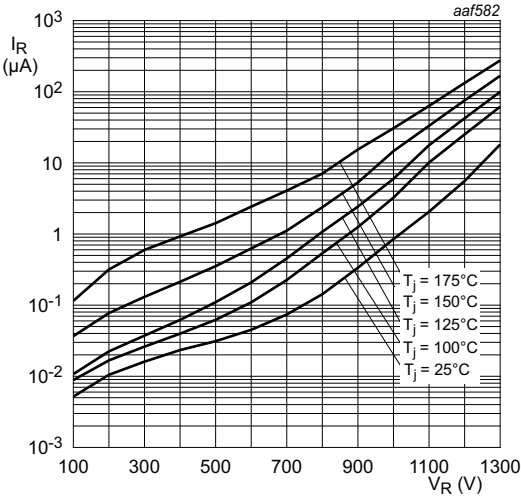


Fig. 7. Reverse leakage current as a function of reverse voltage; typical value

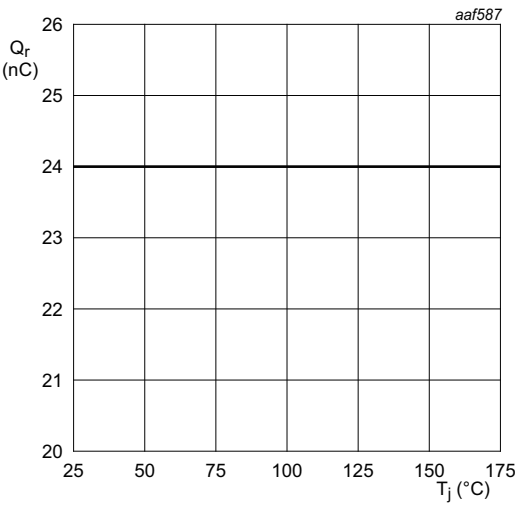


Fig. 8. Recovered charge as a function of junction temperature

11. Package outline

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

SOD59A

0 5 10 mm
scale

Dimensions: (mm are the original dimensions)

| Unit | A | A ₁ | b | b ₁ (¹) | c | D | D ₁ | E | e | H | L | P | Q | q | E ₁ | V |
|------|-----|----------------|------|---------------------------------|------|------|----------------|-----|-------|-------|-------|------|------|-----|----------------|-----|
| mm | max | 4.7 | 1.40 | 0.95 | 1.70 | 0.65 | 15.8 | 6.8 | 10.30 | 5.08 | 16.25 | 15.0 | 3.80 | 2.6 | 2.95 | 8.1 |
| | nom | | | | | | | | | (REF) | | | | | | 6.9 |
| | min | 4.3 | 1.15 | 0.70 | 1.17 | 0.45 | 15.6 | 6.4 | 9.65 | (REF) | 15.70 | 12.5 | 3.53 | 2.2 | 2.65 | 7.9 |

Note
1. Protruded dambar are included in the dimension.

Outline version

SOD59A

References

IEC

JEDEC

JEITA

TO-220AC (2-lead)

European projection

Issue date

~~15-03-24~~
15-03-30

sod059a_po

12. 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. |

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