

1. General description

Silicon Carbide Schottky diode in a TO220-2L plastic package, designed for high frequency switched-mode power supplies.



2. Features and benefits

- Highly stable switching performance
- 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

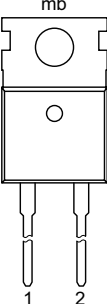
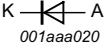
4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Values | | | | Unit |
|-------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------|--------|-----|-----|-----|------|
| Absolute maximum rating | | | | | | | |
| V _{RRM} | repetitive peak reverse voltage | | 650 | | | | V |
| I _{F(AV)} | average forward current | δ = 0.5 ; square-wave pulse; T _{mb} ≤ 124 °C; Fig. 1 ; Fig. 2 ; Fig. 3 | 8 | | | | A |
| T _j | junction temperature | | 175 | | | | °C |
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
| Static characteristics | | | | | | | |
| V _F | forward voltage | I _F = 8 A; T _j = 25 °C; Fig. 5 | | - | 1.5 | 1.7 | V |
| | | I _F = 8 A; T _j = 150 °C; Fig. 5 | | - | 1.8 | 2.2 | V |
| Dynamic characteristics | | | | | | | |
| Q _r | recovered charge | I _F = 8 A; dI _F /dt = 500 A/μs; V _R = 400 V; T _j = 25 °C; Fig. 7 | | - | 13 | - | nC |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 1 | K | cathode |  |  |
| 2 | A | anode | | |
| mb | mb | 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 |
|-------------|--------------|-----------------------|----------------|------------------------|-----------------|--------------------|
| WNSC2D08650 | TO220-2L | WNSC2D08650Q | Tube | 50 | SOD59A | 30-Mar-2015 |

7. Marking

Table 4. Marking codes

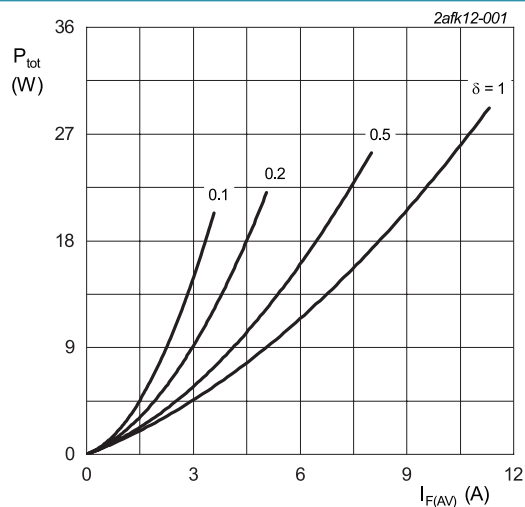
| Type number | Marking codes |
|-------------|-----------------|
| WNSC2D08650 | WNSC2D 08650 |

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 | | 650 | V |
| V_{RWM} | crest working reverse voltage | | 650 | V |
| V_R | reverse voltage | DC | 650 | V |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; square-wave pulse; $T_{mb} \leq 124\text{ }^{\circ}\text{C}$; Fig. 1; Fig. 2; Fig. 3 | 8 | A |
| I_{FRM} | repetitive peak forward current | $\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 124\text{ }^{\circ}\text{C}$; 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 |
| I^2t | I^2t for fusing | sine-wave pulse; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; $t_p = 10\text{ ms}$ | 11.5 | A^2s |
| T_{stg} | storage temperature | | -55 to 175 | $^{\circ}\text{C}$ |
| T_j | junction temperature | | 175 | $^{\circ}\text{C}$ |



$$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$$

$$V_o = 1.144\text{ V}; R_s = 0.1272\text{ }\Omega$$

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

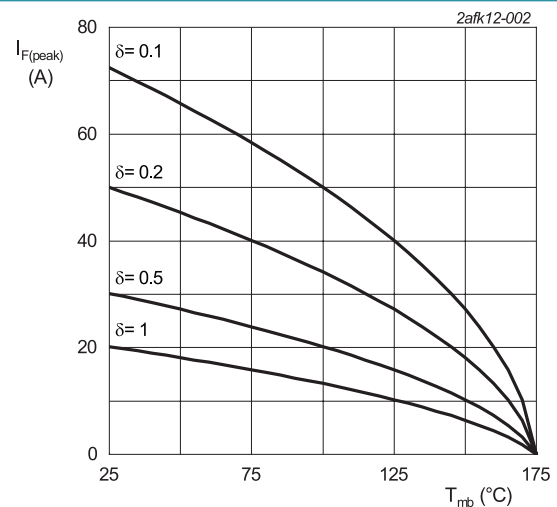


Fig. 2. Current derating as a function of mounting base temperature

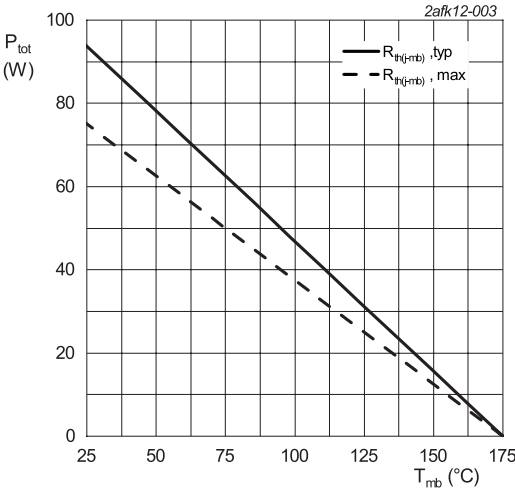


Fig. 3. Total power dissipation as a function of mounting base temperature

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. 4 | | - | - | 2 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | in free air | | - | 60 | - | K/W |

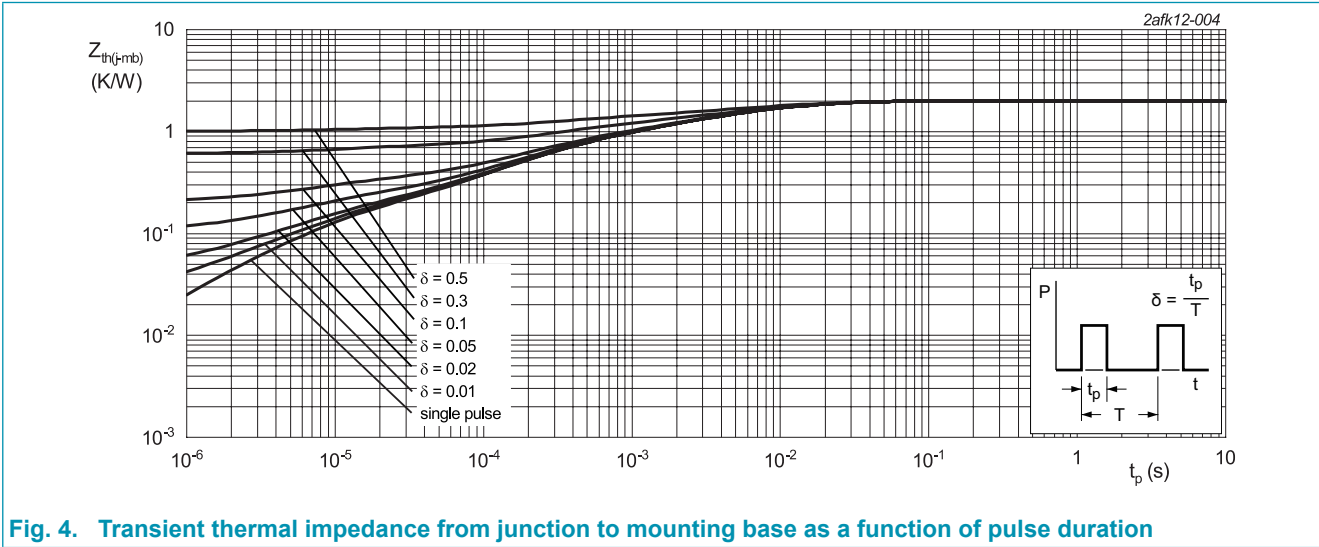
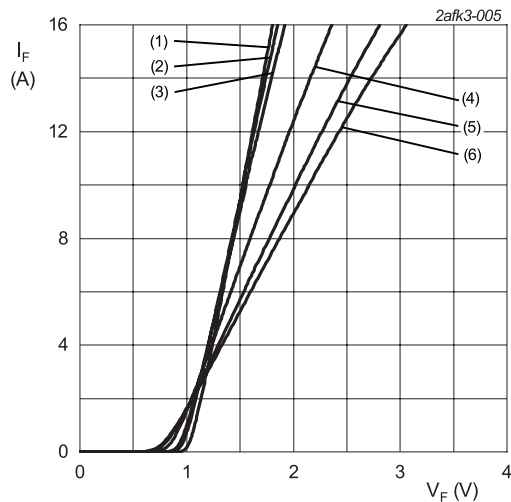


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|-------------------------|---------------------------------|------------------------------------------------------------------------------------------------------------------------------|--|-----|-----|-----|------|
| Static characteristics | | | | | | | |
| V _F | forward current | I _F = 8 A; T _J = 25 °C; Fig. 5 | | - | 1.5 | 1.7 | V |
| | | I _F = 8 A; T _J = 150 °C; Fig. 5 | | - | 1.8 | 2.2 | V |
| | | I _F = 8 A; T _J = 175 °C; Fig. 5 | | - | 2 | 2.3 | V |
| I _R | reverse current | V _R = 650 V; T _J = 25 °C; Fig. 6 | | - | 0.4 | 40 | μA |
| | | V _R = 650 V; T _J = 175 °C; Fig. 6 | | - | 20 | 200 | μA |
| Dynamic characteristics | | | | | | | |
| Q _r | recovered charge | I _F = 8 A; V _R = 400 V; dI _F /dt = 500 A/μs; T _J = 25 °C; Fig. 7 | | - | 13 | - | nC |
| C _d | diode capacitance | f = 1 MHz; V _R = 1 V; T _J = 25 °C | | - | 260 | - | pF |
| | | f = 1 MHz; V _R = 300 V; T _J = 25 °C | | - | 31 | - | pF |
| | | f = 1 MHz; V _R = 600 V; T _J = 25 °C | | - | 27 | - | pF |
| E _{as} | non-repetitive avalanche energy | I _R = 4.9 A; L = 5 mH; T _J (init) = 25 °C | | 60 | - | - | mJ |



$V_o = 1.144 \text{ V}$; $R_s = 0.1272 \text{ } \Omega$

- (1) $T_J = -55 \text{ }^\circ\text{C}$; typical values
- (2) $T_J = 0 \text{ }^\circ\text{C}$; typical values
- (3) $T_J = 25 \text{ }^\circ\text{C}$; typical values
- (4) $T_J = 100 \text{ }^\circ\text{C}$; typical values
- (5) $T_J = 150 \text{ }^\circ\text{C}$; typical values
- (6) $T_J = 175 \text{ }^\circ\text{C}$; typical values

Fig. 5. Forward current as a function of forward voltage; typical values

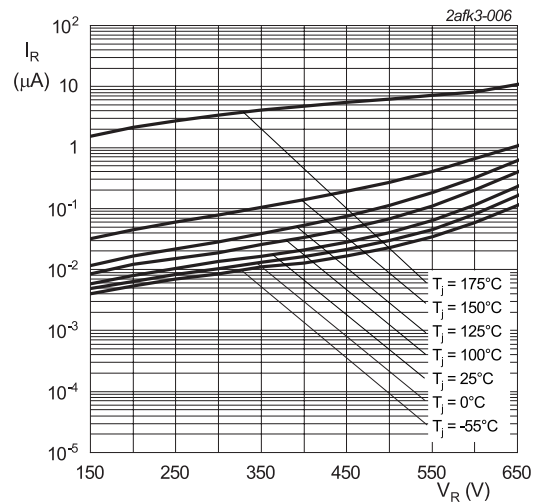


Fig. 6. Reverse leakage current as a function of reverse voltage; typical value

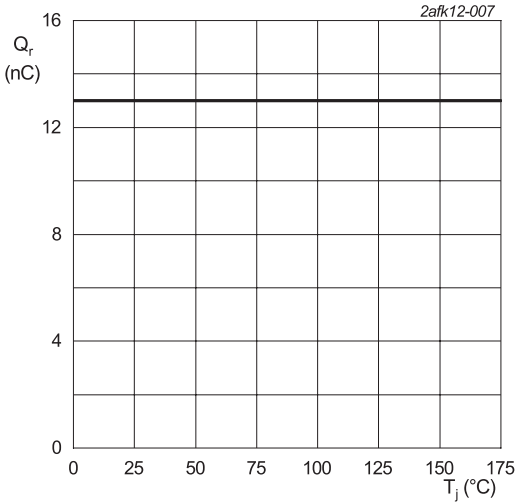
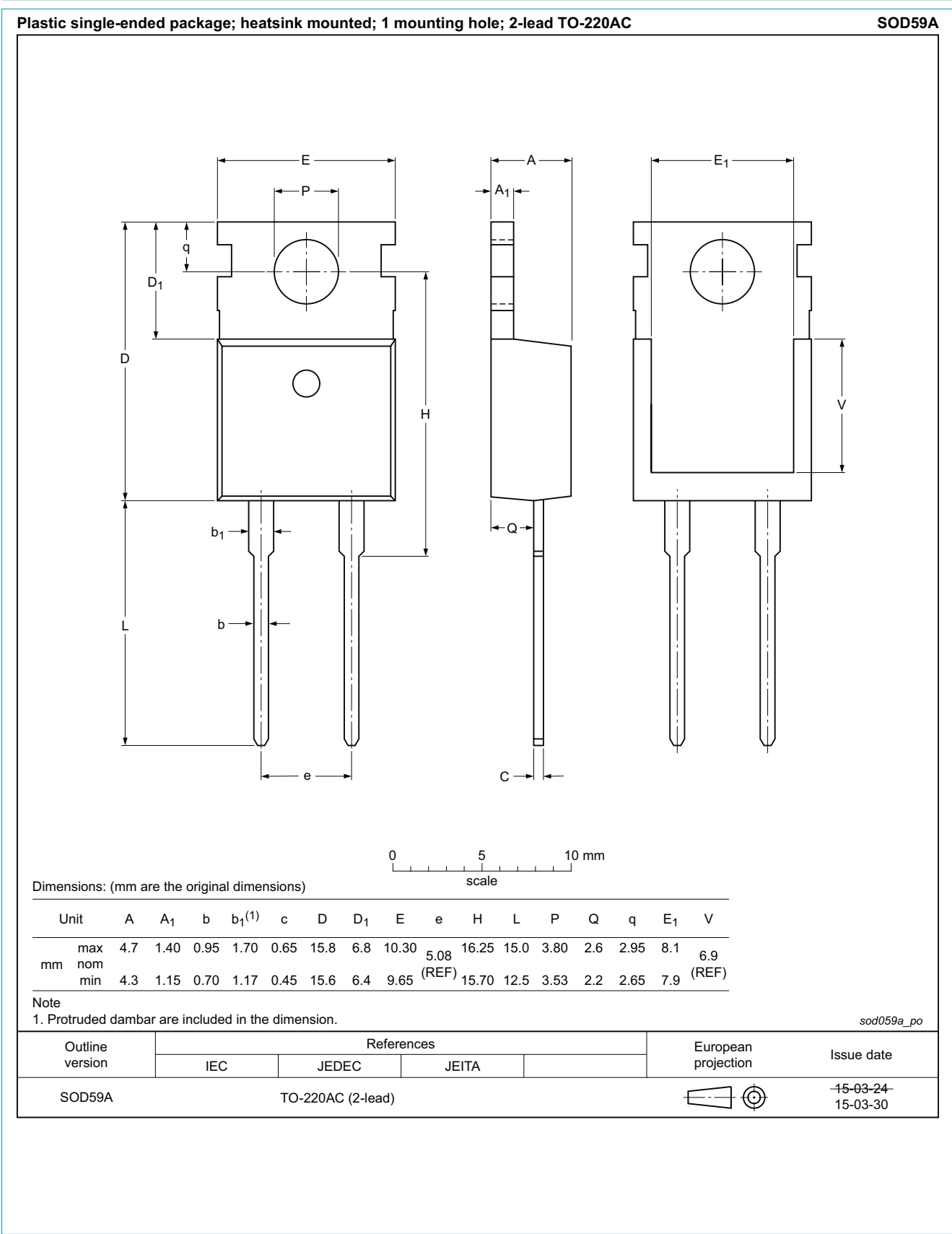


Fig. 7. Recovered charge as a function of junction temperature

11. Package outline

WNSC2D08650

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Product data sheet

22 June 2021

8 / 11

12. Legal information

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|--------------------------------|--------------------|---------------------------------------------------------------------------------------|
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13. Contents

| | |
|----------------------------------|----|
| 1. General description..... | 1 |
| 2. Features and benefits | 1 |
| 3. Applications | 1 |
| 4. Quick reference data..... | 1 |
| 5. Pinning information..... | 2 |
| 6. Ordering information..... | 2 |
| 7. Marking..... | 2 |
| 8. Limiting values | 3 |
| 9. Thermal characteristics | 5 |
| 10. Characteristics..... | 6 |
| 11. Package outline | 8 |
| 12. Legal information | 9 |
| 13. Contents | 11 |

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