

## 1. General description

Dual Silicon Carbide Schottky diode in a 3-lead TO247 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

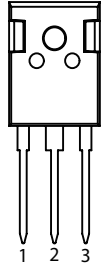
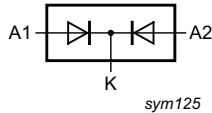
## 4. Quick reference data

Table 1. Quick reference data

| Symbol                  | Parameter                       | Conditions                                                                                                                                              | Values |     |      |      | Unit |
|-------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-----|------|------|------|
| Absolute maximum rating |                                 |                                                                                                                                                         |        |     |      |      |      |
| V <sub>RRM</sub>        | repetitive peak reverse voltage |                                                                                                                                                         | 1200   |     |      |      | V    |
| I <sub>O(AV)</sub>      | average forward current         | δ = 0.5 ; square-wave pulse; T <sub>mb</sub> ≤ 110 °C; both diodes conducting; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a> | 40     |     |      |      | A    |
| T <sub>j</sub>          | junction temperature            |                                                                                                                                                         | 175    |     |      |      | °C   |
| Symbol                  | Parameter                       | Conditions                                                                                                                                              |        | Min | Typ  | Max  | Unit |
| Static characteristics  |                                 |                                                                                                                                                         |        |     |      |      |      |
| V <sub>F</sub>          | forward voltage                 | I <sub>F</sub> = 20 A; T <sub>j</sub> = 25 °C; per diode; <a href="#">Fig. 5</a>                                                                        |        | -   | 1.52 | 1.75 | V    |
|                         |                                 | I <sub>F</sub> = 20 A; T <sub>j</sub> = 150 °C; per diode; <a href="#">Fig. 5</a>                                                                       |        | -   | 2.15 |      | V    |
|                         |                                 | I <sub>F</sub> = 20 A; T <sub>j</sub> = 175 °C; per diode; <a href="#">Fig. 5</a>                                                                       |        | -   | 2.25 |      | V    |
| Dynamic characteristics |                                 |                                                                                                                                                         |        |     |      |      |      |
| Q <sub>r</sub>          | recovered charge                | I <sub>F</sub> = 20 A; dI <sub>F</sub> /dt = 500 A/μs; V <sub>R</sub> = 400 V; T <sub>i</sub> = 25 °C; per diode; <a href="#">Fig. 7</a>                |        | -   | 86   | -    | nC   |

## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description                         | Simplified outline                                                                | Graphic symbol                                                                      |
|-----|--------|-------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 1   | A1     | anode                               |  |  |
| 2   | K      | cathode                             |                                                                                   |                                                                                     |
| 3   | A2     | 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 |
|--------------|--------------|-----------------------|----------------|------------------------|-----------------|--------------------|
| WNSC401200CW | TO247        | WNSC401200CWQ         | Tube           | 30                     | TO247N          | 20-July-2016       |

## 7. Marking

Table 4. Marking codes

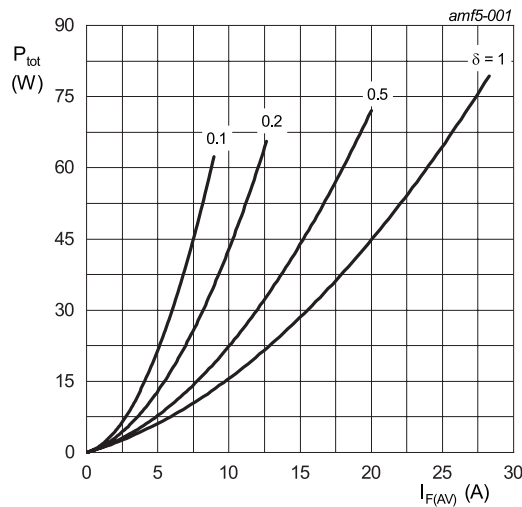
| Type number  | Marking codes |
|--------------|---------------|
| WNSC401200CW | WNSC401200CW  |

## 8. Limiting values

**Table 5. Limiting values**

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

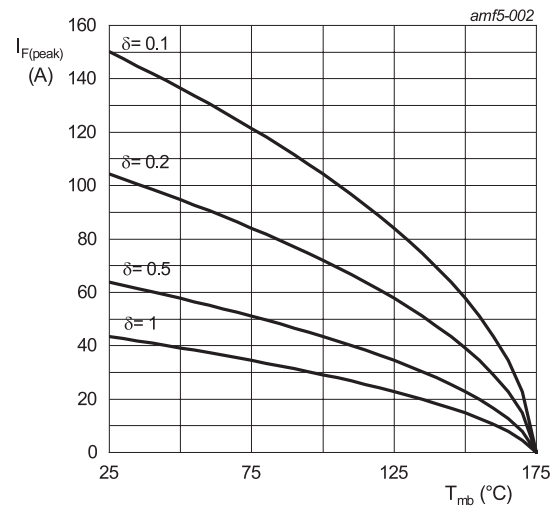
| Symbol      | Parameter                           | Conditions                                                                                                           | Values     | Unit                 |
|-------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------|----------------------|
| $V_{RRM}$   | repetitive peak reverse voltage     |                                                                                                                      | 1200       | V                    |
| $V_{RWM}$   | crest working reverse voltage       |                                                                                                                      | 1200       | V                    |
| $V_R$       | reverse voltage                     | DC                                                                                                                   | 1200       | V                    |
| $I_{O(AV)}$ | average forward current             | $\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 110^\circ\text{C}$ ; both diodes conducting; Fig. 1; Fig. 2; Fig. 3 | 40         | A                    |
| $I_{FRM}$   | repetitive peak forward current     | $\delta = 0.5$ ; $t_p = 25\ \mu\text{s}$ ; $T_{mb} \leq 110^\circ\text{C}$ ; square-wave pulse; per diode            | 40         | A                    |
| $I_{FSM}$   | non-repetitive peak forward current | $t_p = 10\ \text{ms}$ ; $T_{j(\text{init})} = 25^\circ\text{C}$ ; sine-wave pulse; per diode                         | 200        | A                    |
|             |                                     | $t_p = 10\ \mu\text{s}$ ; $T_{j(\text{init})} = 25^\circ\text{C}$ ; square-wave pulse; per diode                     | 1200       | A                    |
| $I^2t$      | $I^2t$ for fusing                   | sine-wave pulse; $T_{j(\text{init})} = 25^\circ\text{C}$ ; $t_p = 10\ \text{ms}$                                     | 200        | $\text{A}^2\text{s}$ |
| $T_{stg}$   | storage temperature                 |                                                                                                                      | -55 to 175 | $^\circ\text{C}$     |
| $T_j$       | junction temperature                |                                                                                                                      | 175        | $^\circ\text{C}$     |



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

$$V_o = 0.875\ \text{V}; R_s = 0.0682\ \Omega$$

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



**Fig. 2. Current derating as a function of mounting base temperature; per diode**

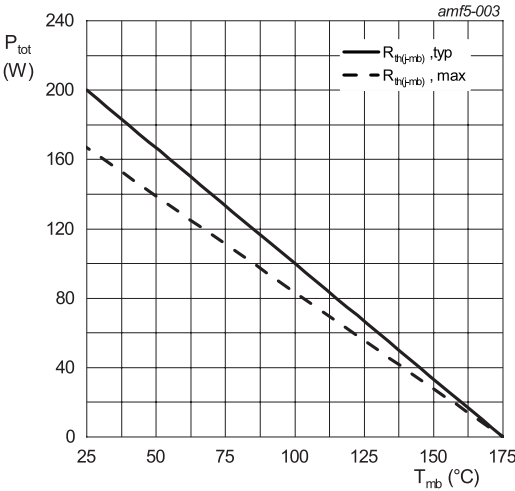


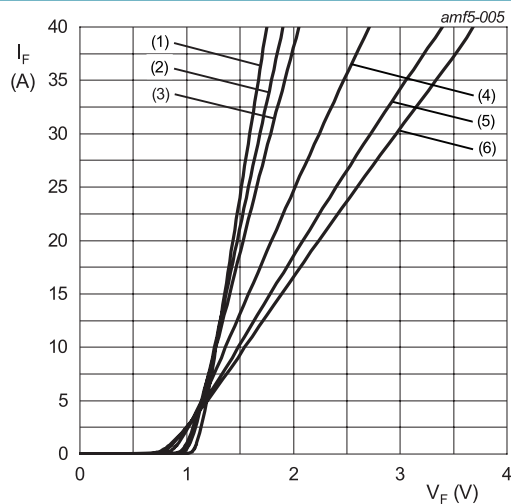
Fig. 3. Total power dissipation as a function of mounting base temperature; per diode



## 10. Characteristics

Table 7. Characteristics

| Symbol                  | Parameter         | Conditions                                                                                                                               |  | Min | Typ  | Max  | Unit |
|-------------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------|--|-----|------|------|------|
| Static characteristics  |                   |                                                                                                                                          |  |     |      |      |      |
| V <sub>F</sub>          | forward current   | I <sub>F</sub> = 20 A; T <sub>j</sub> = 25 °C; per diode; <a href="#">Fig. 5</a>                                                         |  | -   | 1.52 | 1.75 | V    |
|                         |                   | I <sub>F</sub> = 20 A; T <sub>j</sub> = 150 °C; per diode; <a href="#">Fig. 5</a>                                                        |  | -   | 2.15 |      | V    |
|                         |                   | I <sub>F</sub> = 20 A; T <sub>j</sub> = 175 °C; per diode; <a href="#">Fig. 5</a>                                                        |  | -   | 2.25 |      | V    |
| I <sub>R</sub>          | reverse current   | V <sub>R</sub> = 1200 V; T <sub>j</sub> = 25 °C; per diode; <a href="#">Fig. 6</a>                                                       |  | -   | 22   | 200  | μA   |
|                         |                   | V <sub>R</sub> = 1200 V; T <sub>j</sub> = 175 °C; per diode; <a href="#">Fig. 6</a>                                                      |  | -   | 500  |      | μA   |
| Dynamic characteristics |                   |                                                                                                                                          |  |     |      |      |      |
| Q <sub>r</sub>          | recovered charge  | I <sub>F</sub> = 20 A; V <sub>R</sub> = 400 V; dI <sub>F</sub> /dt = 500 A/μs; T <sub>j</sub> = 25 °C; per diode; <a href="#">Fig. 7</a> |  | -   | 86   | -    | nC   |
| C <sub>d</sub>          | diode capacitance | f = 1 MHz; V <sub>R</sub> = 1 V; T <sub>j</sub> = 25 °C                                                                                  |  | -   | 810  | -    | pF   |
|                         |                   | f = 1 MHz; V <sub>R</sub> = 400 V; T <sub>j</sub> = 25 °C                                                                                |  | -   | 75   | -    | pF   |
|                         |                   | f = 1 MHz; V <sub>R</sub> = 800 V; T <sub>j</sub> = 25 °C                                                                                |  | -   | 69   | -    | pF   |



$V_o = 0.875\text{ V}$ ;  $R_s = 0.0682\text{ }\Omega$

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

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

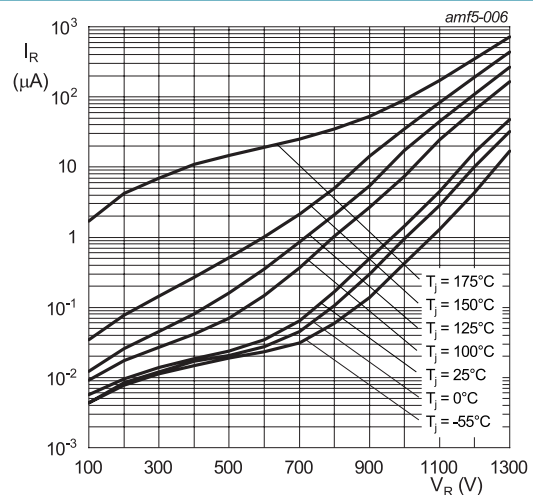


Fig. 6. Reverse leakage current as a function of reverse voltage; typical value; per diode

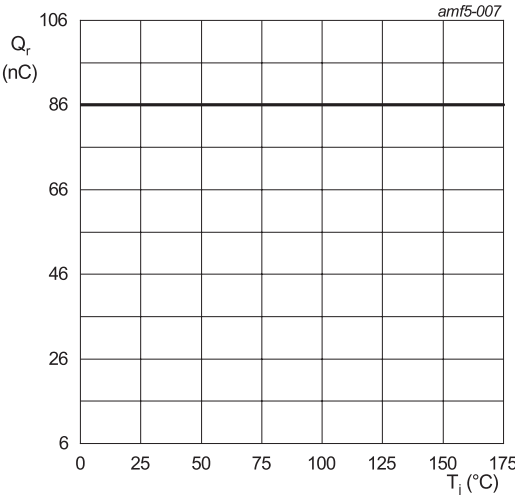
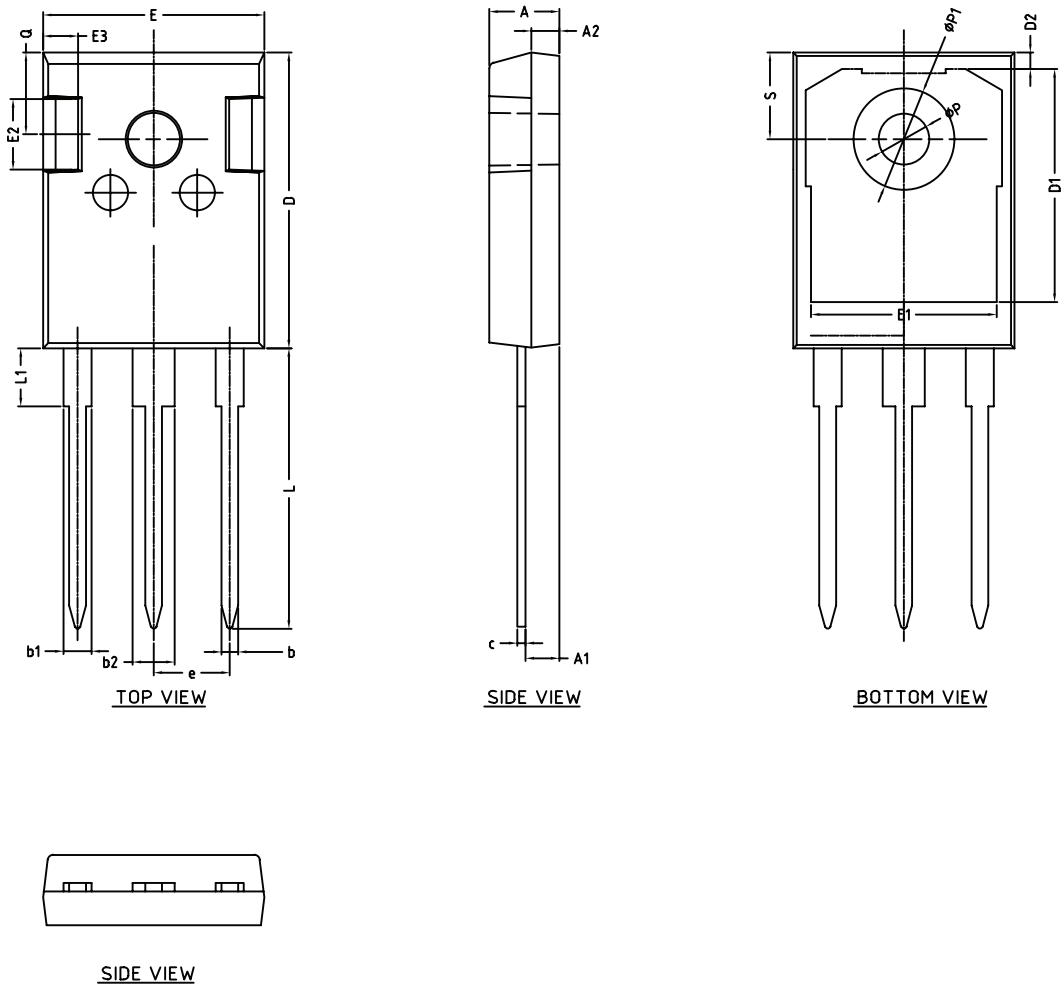


Fig. 7. Recovered charge as a function of junction temperature; per diode

11. Package outline

Plastic single-ended through-hole package; heatsink mounted; 1 mounting hole; 3-lead TO-247 SOT429N



| UNIT                 | A    | A1   | A2   | b    | b1   | b2   | c    | D     | D1    | D2   | E     | E1    | E2   | E3   | e    | L     | L1   | P    | P1   | Q    | S    |
|----------------------|------|------|------|------|------|------|------|-------|-------|------|-------|-------|------|------|------|-------|------|------|------|------|------|
| mm MAX<br>NOM<br>MIN | 5.20 | 2.60 | 2.10 | 1.40 | 2.20 | 3.20 | 0.70 | 21.10 | 16.85 | 1.35 | 15.90 | 13.50 | 5.20 | 2.60 | 5.45 | 20.10 | 4.75 | 3.70 | 7.40 | 6.00 | 6.25 |
|                      | 4.70 | 2.20 | 1.90 | 1.00 | 1.80 | 2.80 | 0.50 | 20.90 | 16.25 | 1.05 | 15.70 | 13.10 | 4.80 | 2.40 |      | 19.80 | -    | 3.50 | -    | 5.60 | 6.05 |

| OUTLINE<br>VERSION | REFERENCES |        |      |  | PROJECTION | ISSUE DATE |
|--------------------|------------|--------|------|--|------------|------------|
|                    | IEC        | JEDEC  | EIAJ |  |            |            |
| SOT429N            |            | TO-247 |      |  |            |            |



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