

## 1. General description

Dual Silicon Carbide Schottky diode in a 3-lead TO-247 plastic package, designed for high frequency switched-mode power supplies.

## 2. Features and benefits

- Highly stable switching performance
- High forward surge capability IFSM
- 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
- Electrical Vehicle Charger
- Motor Drives

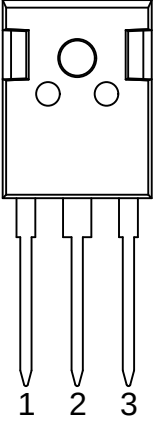
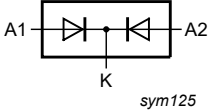
## 4. Quick reference data

Table 1. Quick reference data

| Symbol                  | Parameter                       | Conditions                                                                                                                                                                                        |  | Min | Typ  | Max  | Unit |
|-------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----|------|------|------|
| V <sub>RRM</sub>        | repetitive peak reverse voltage |                                                                                                                                                                                                   |  | -   | -    | 650  | V    |
| I <sub>O(AV)</sub>      | limiting average output current | T <sub>mb</sub> ≤ 74 °C; δ <sub>factor</sub> = 0.5 ; square-wave pulse; both diodes conducting; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a> ; <a href="#">Fig. 4</a> |  | -   | -    | 20   | 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>                                                                                                                             |  | -   | 1.65 | 1.85 | V    |
|                         |                                 | I <sub>F</sub> = 10 A; T <sub>j</sub> = 150 °C; <a href="#">Fig. 6</a>                                                                                                                            |  | -   | 2.1  | 2.5  | 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>                                                                     |  | -   | 11   | -    | nC   |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description                         | Simplified outline                                                                                        | Graphic symbol                                                                      |
|-----|--------|-------------------------------------|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 1   | A1     | anode                               |  <p>TO-247 (SOT429N)</p> |  |
| 2   | K      | cathode                             |                                                                                                           |                                                                                     |
| 3   | A2     | anode                               |                                                                                                           |                                                                                     |
| mb  | mb     | mounting base; connected to cathode |                                                                                                           |                                                                                     |

6. Ordering information

Table 3. Ordering information

| Type number   | Package |                                                                                             |         |
|---------------|---------|---------------------------------------------------------------------------------------------|---------|
|               | Name    | Description                                                                                 | Version |
| NXPLQSC20650W | TO-247  | Plastic single-ended through-hole package; heatsink mounted; 1 mounting hole; 3-lead TO-247 | SOT429N |

7. Marking

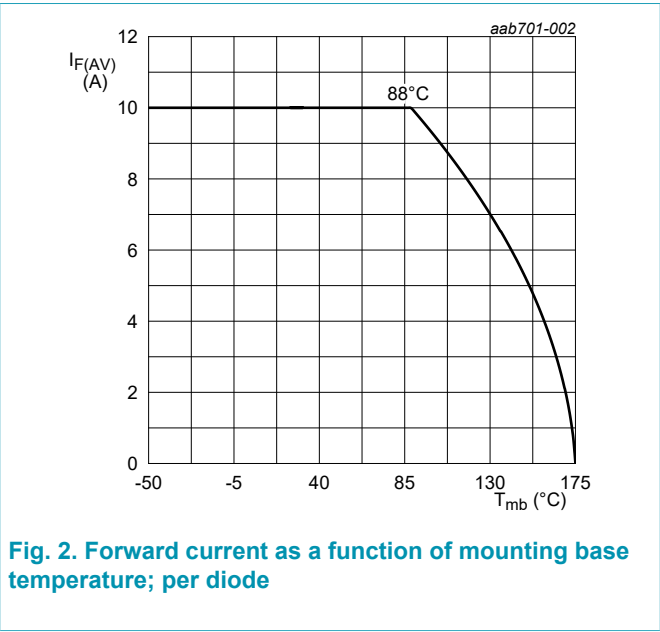
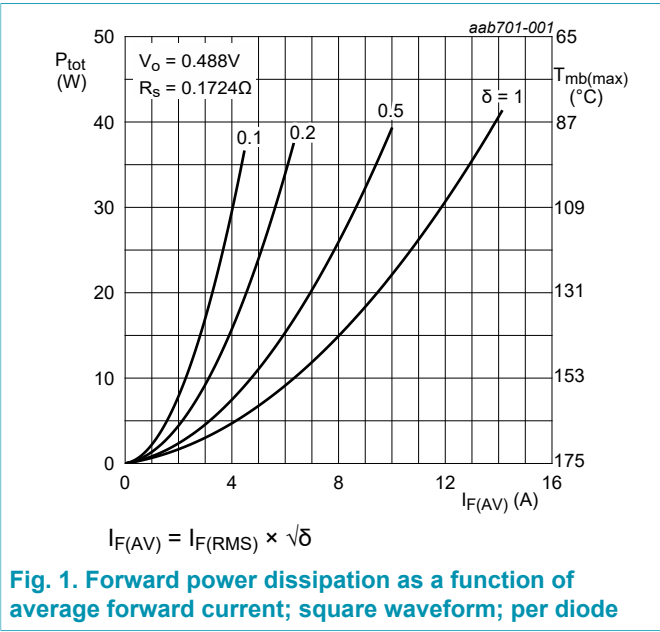
Table 4. Marking codes

| Type number   | Marking code  |
|---------------|---------------|
| NXPLQSC20650W | NXPLQSC20650W |

8. Limiting values

Table 5. 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>FRM</sub>   | repetitive peak forward current     | δ = 0.5 ; t <sub>p</sub> = 25 μs; T <sub>mb</sub> ≤ 88 °C; square-wave pulse; per diode                                        | -   | 20  | A    |
| I <sub>O(AV)</sub> | limiting average output current     | T <sub>mb</sub> ≤ 74 °C; δ <sub>factor</sub> = 0.5 ; square-wave pulse; both diodes conducting; Fig. 1; Fig. 2; Fig. 3; Fig. 4 | -   | 20  | A    |
| I <sub>FSM</sub>   | non-repetitive peak forward current | t <sub>p</sub> = 8.3 ms; T <sub>J(init)</sub> = 25 °C; sine-wave pulse; per diode                                              | -   | 52  | A    |
|                    |                                     | t <sub>p</sub> = 10 μs; T <sub>J(init)</sub> = 25 °C; square-wave pulse; per diode                                             | -   | 385 | A    |
| T <sub>stg</sub>   | storage temperature                 |                                                                                                                                | -55 | 175 | °C   |
| T <sub>j</sub>     | junction temperature                |                                                                                                                                | -   | 175 | °C   |



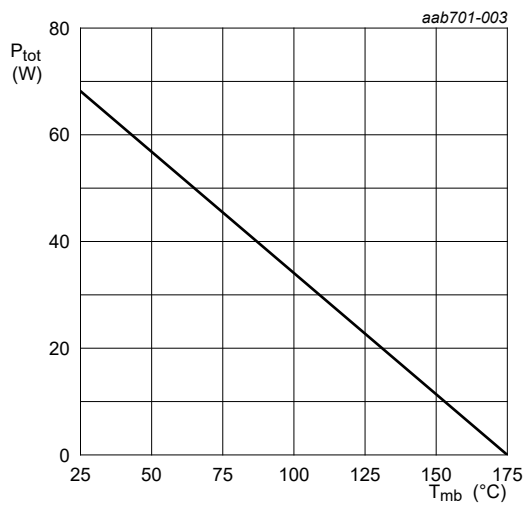


Fig. 3. Total power dissipation as a function of mounting base temperature; per diode

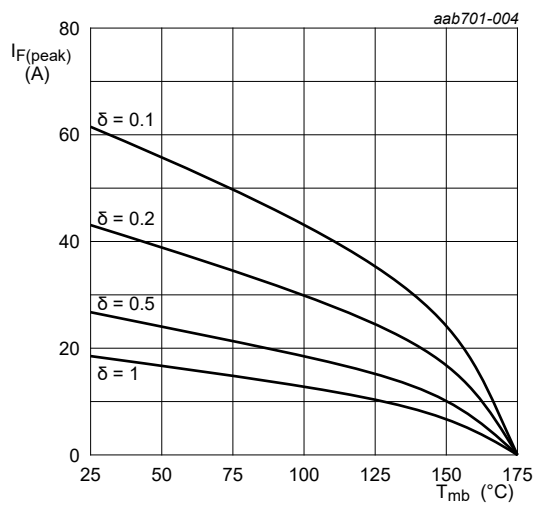


Fig. 4. Current derating as a function of mounting base temperature; per diode

9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol                | Parameter                                            | Conditions             | Min | Typ | Max | Unit |
|-----------------------|------------------------------------------------------|------------------------|-----|-----|-----|------|
| R <sub>th(j-mb)</sub> | thermal resistance from junction to mounting base    | per diode; Fig. 5      | -   | -   | 2.2 | K/W  |
|                       |                                                      | both diodes conducting | -   | -   | 1.3 | K/W  |
| R <sub>th(j-a)</sub>  | thermal resistance from junction to ambient free air | in free air            | -   | 45  | -   | K/W  |

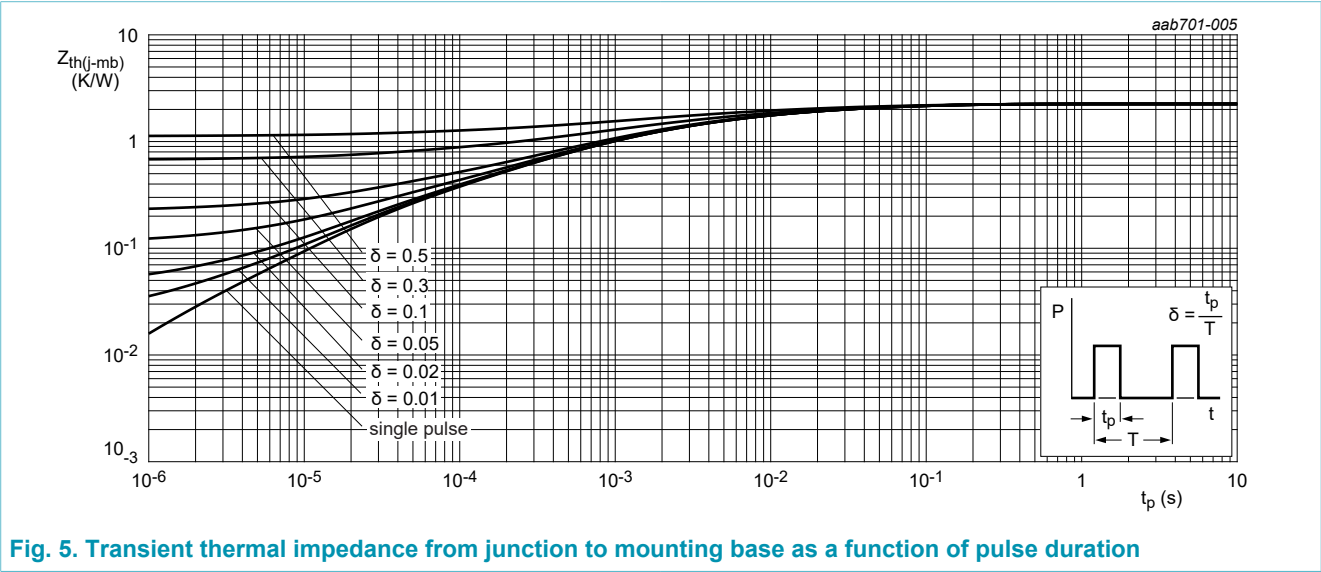
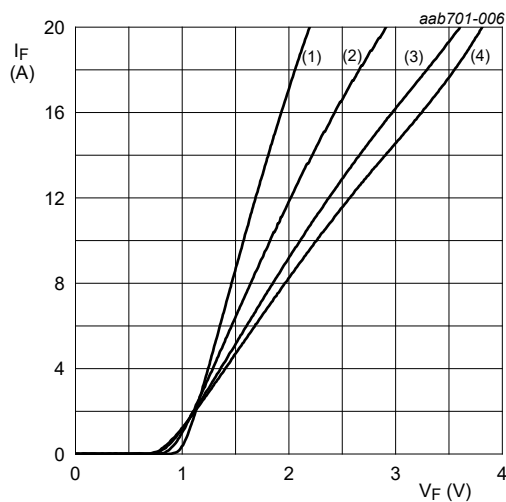


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

| Symbol                  | Parameter         | Conditions                                                                                                                       |  | Min | Typ  | Max  | Unit |
|-------------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------|--|-----|------|------|------|
| Static characteristics  |                   |                                                                                                                                  |  |     |      |      |      |
| V <sub>F</sub>          | forward voltage   | I <sub>F</sub> = 10 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 6</a>                                                            |  | -   | 1.65 | 1.85 | V    |
|                         |                   | I <sub>F</sub> = 10 A; T <sub>j</sub> = 150 °C; <a href="#">Fig. 6</a>                                                           |  | -   | 2.1  | 2.5  | V    |
| I <sub>R</sub>          | reverse current   | V <sub>R</sub> = 650 V; T <sub>j</sub> = 25 °C                                                                                   |  | -   | -    | 230  | μA   |
|                         |                   | V <sub>R</sub> = 650 V; T <sub>j</sub> = 150 °C                                                                                  |  | -   | -    | 700  | 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> |  | -   | 11   | -    | nC   |
| C <sub>d</sub>          | diode capacitance | f = 1 MHz; V <sub>R</sub> = 1 V; T <sub>j</sub> = 25 °C                                                                          |  | -   | 250  | -    | pF   |
|                         |                   | f = 1 MHz; V <sub>R</sub> = 300 V; T <sub>j</sub> = 25 °C                                                                        |  | -   | 26   | -    | pF   |
|                         |                   | f = 1 MHz; V <sub>R</sub> = 600 V; T <sub>j</sub> = 25 °C                                                                        |  | -   | 21   | -    | 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; per diode

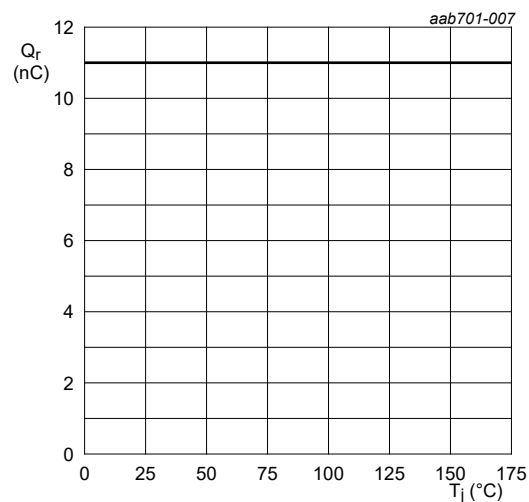


Fig. 7. Recovered charge as a function of junction temperature; per diode

11. Package outline

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

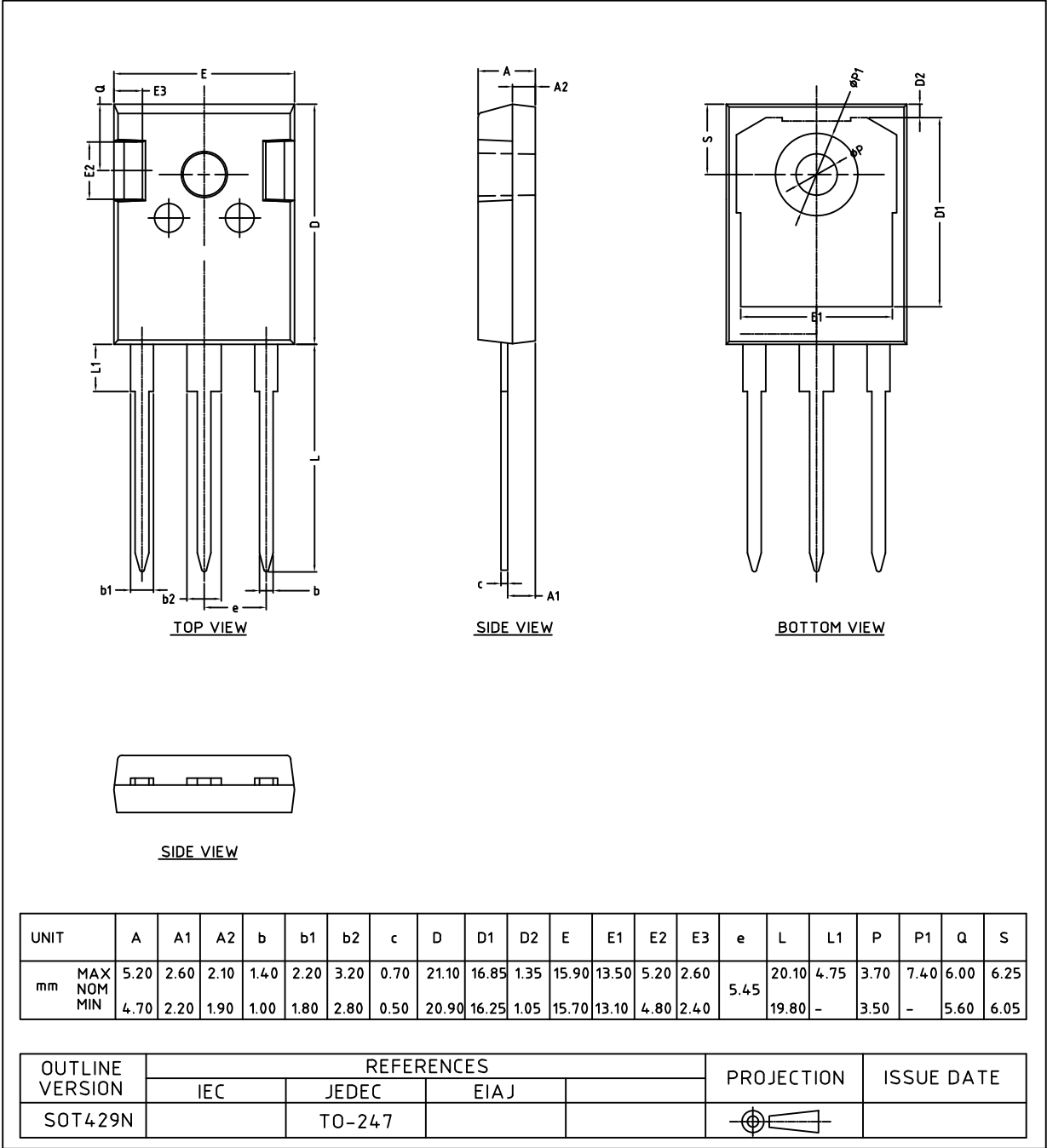


Fig. 8. Package outline TO-247 (SOT429N)

## 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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Date of release: 22 November 2016

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