

## 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

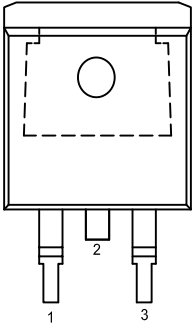
## 4. Quick reference data

Table 1. Quick reference data

| Symbol                  | Parameter                       | Conditions                                                                                                                                               |  | Min | Typ | Max | Unit |
|-------------------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----|-----|-----|------|
| V <sub>RRM</sub>        | repetitive peak reverse voltage |                                                                                                                                                          |  | -   | -   | 650 | V    |
| I <sub>F(AV)</sub>      | average forward current         | δ = 0.5 ; T <sub>mb</sub> ≤ 113 °C; square-wave pulse; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a> ; <a href="#">Fig. 4</a> |  | -   | -   | 10  | 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>                                                                                    |  | -   | 1.5 | 1.7 | V    |
|                         |                                 | I <sub>F</sub> = 10 A; T <sub>j</sub> = 150 °C; <a href="#">Fig. 6</a>                                                                                   |  | -   | 1.8 | 2.1 | 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. 8</a> ; <a href="#">Fig. 9</a>   |  | -   | 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 <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>F(AV)</sub> | average forward current             | δ = 0.5 ; T <sub>mb</sub> ≤ 113 °C; square-wave pulse; Fig. 1; Fig. 2; Fig. 3; Fig. 4 | -   | 10   | A                |
| I <sub>FRM</sub>   | repetitive peak forward current     | δ = 0.5 ; t <sub>p</sub> = 25 μs; square-wave pulse                                   | -   | 20   | A                |
| I <sub>FSM</sub>   | non-repetitive peak forward current | t <sub>p</sub> = 10 ms; T <sub>j(init)</sub> = 25 °C; sine-wave pulse                 | -   | 50   | A                |
|                    |                                     | t <sub>p</sub> = 10 μs; T <sub>j(init)</sub> = 25 °C; square-wave pulse               | -   | 450  | A                |
| I <sup>2</sup> t   | I <sup>2</sup> t for fusing         | sine-wave pulse; T <sub>j(init)</sub> = 25 °C; t <sub>p</sub> = 10 ms                 | -   | 12.5 | A <sup>2</sup> s |
| T <sub>stg</sub>   | storage temperature                 |                                                                                       | -55 | 175  | °C               |
| T <sub>j</sub>     | junction temperature                |                                                                                       | -   | 175  | °C               |

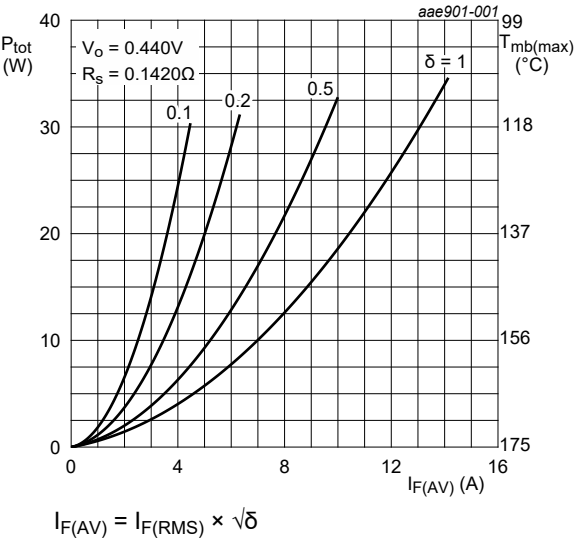


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

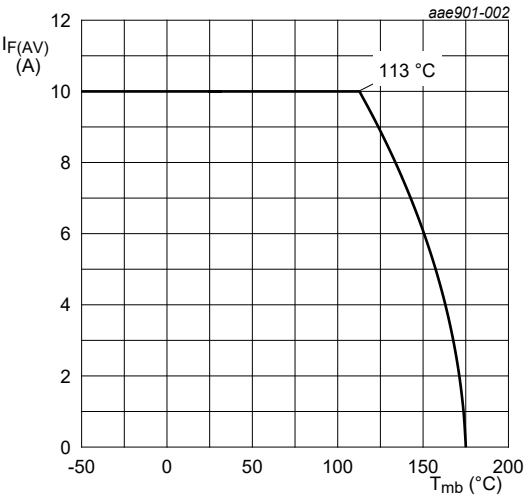


Fig. 2. Forward current as a function of mounting base temperature; maximum values

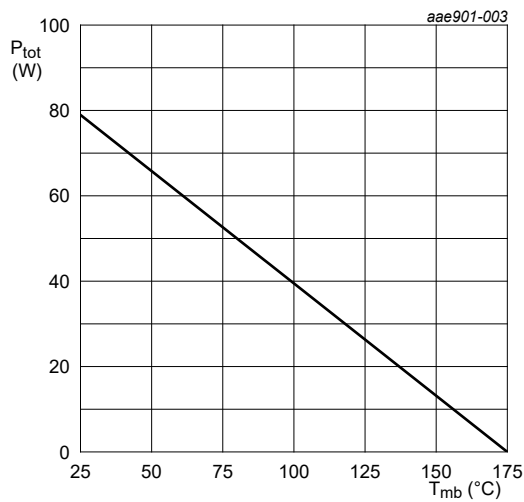


Fig. 3. Total power dissipation as a function of mounting base temperature

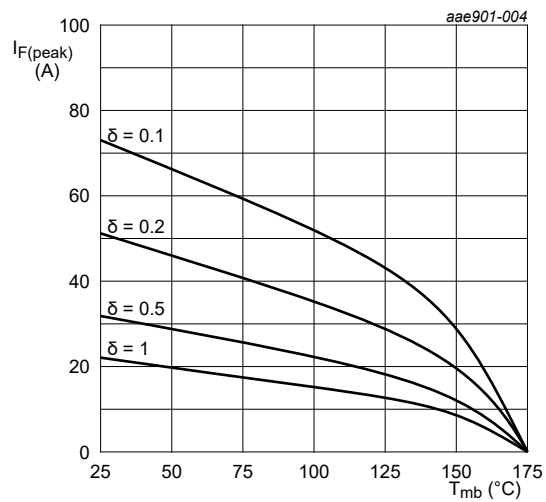


Fig. 4. Current derating as a function of mounting base temperature

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    | <a href="#">Fig. 5</a>                               | -   | -   | 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  |

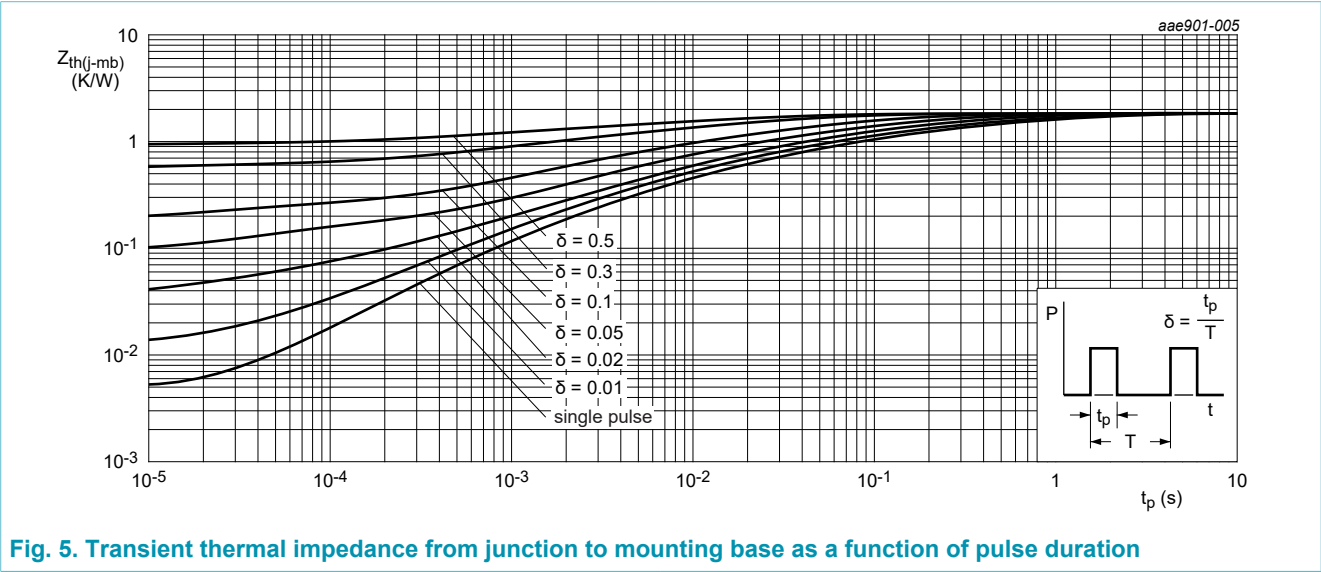
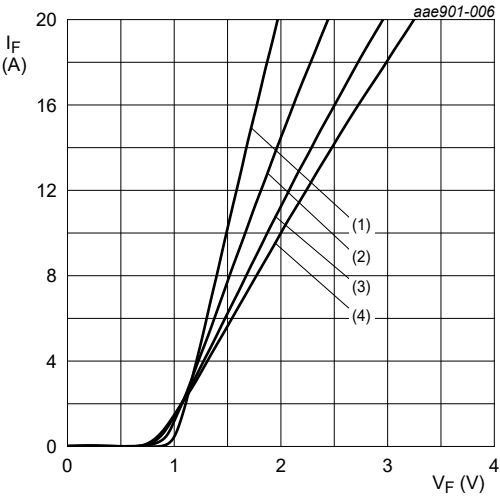


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

9. Characteristics

Table 6. Characteristics

| Symbol                  | Parameter         | Conditions                                                                                                                                                |  | Min | Typ | Max | Unit |
|-------------------------|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----|-----|-----|------|
| Static characteristics  |                   |                                                                                                                                                           |  |     |     |     |      |
| V <sub>F</sub>          | forward voltage   | I <sub>F</sub> = 10 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 6</a>                                                                                     |  | -   | 1.5 | 1.7 | V    |
|                         |                   | I <sub>F</sub> = 10 A; T <sub>j</sub> = 150 °C; <a href="#">Fig. 6</a>                                                                                    |  | -   | 1.8 | 2.1 | V    |
| I <sub>R</sub>          | reverse current   | V <sub>R</sub> = 650 V; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>                                                                                    |  | -   | 12  | 250 | μA   |
|                         |                   | V <sub>R</sub> = 650 V; T <sub>j</sub> = 150 °C; <a href="#">Fig. 7</a>                                                                                   |  | -   | -   | 800 | μA   |
|                         |                   | V <sub>R</sub> = 600 V; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>                                                                                    |  | -   | 6   | 100 | μA   |
|                         |                   | V <sub>R</sub> = 600 V; T <sub>j</sub> = 150 °C; <a href="#">Fig. 7</a>                                                                                   |  | -   | -   | 450 | 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. 8</a> ; <a href="#">Fig. 9</a> |  | -   | 15  | 22  | nC   |
| C <sub>d</sub>          | diode capacitance | f = 1 MHz; V <sub>R</sub> = 1 V; T <sub>j</sub> = 25 °C                                                                                                   |  | -   | 300 | -   | pF   |
|                         |                   | f = 1 MHz; V <sub>R</sub> = 300 V; T <sub>j</sub> = 25 °C                                                                                                 |  | -   | 34  | -   | pF   |
|                         |                   | f = 1 MHz; V <sub>R</sub> = 600 V; T <sub>j</sub> = 25 °C                                                                                                 |  | -   | 28  | 40  | pF   |



- (1) T<sub>j</sub> = 25 °C; typical values
- (2) T<sub>j</sub> = 100 °C; typical values
- (3) T<sub>j</sub> = 150 °C; typical values
- (4) T<sub>j</sub> = 175 °C; typical values

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

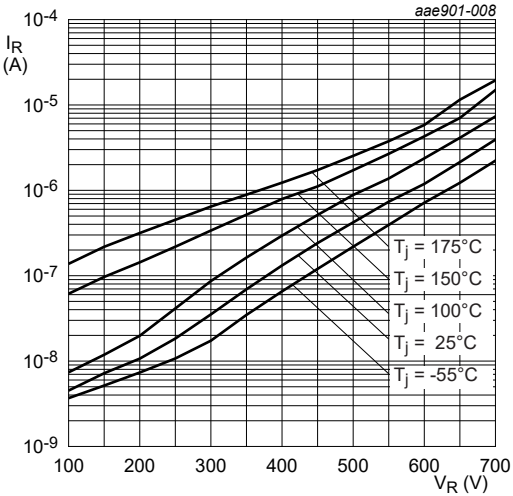


Fig. 7. Reverse current as a function of reverse voltage; typical values

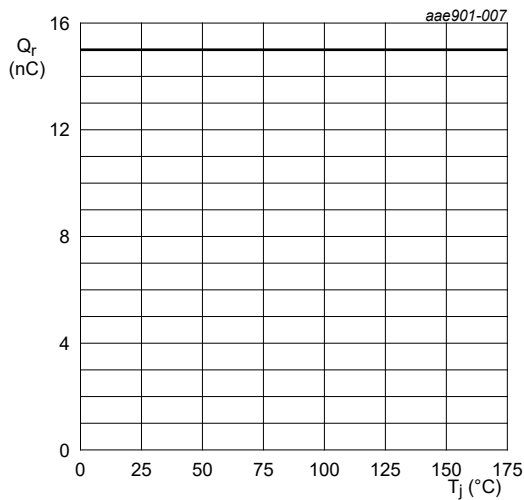


Fig. 8. Recovered charge as a function of junction temperature

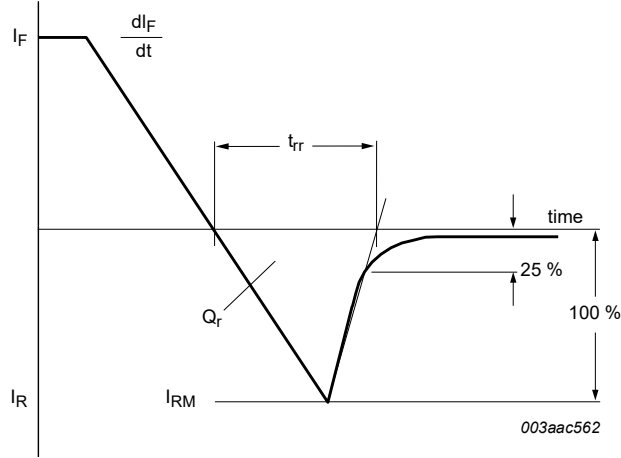


Fig. 9. Reverse recovery definitions; ramp recovery

10. Package outline

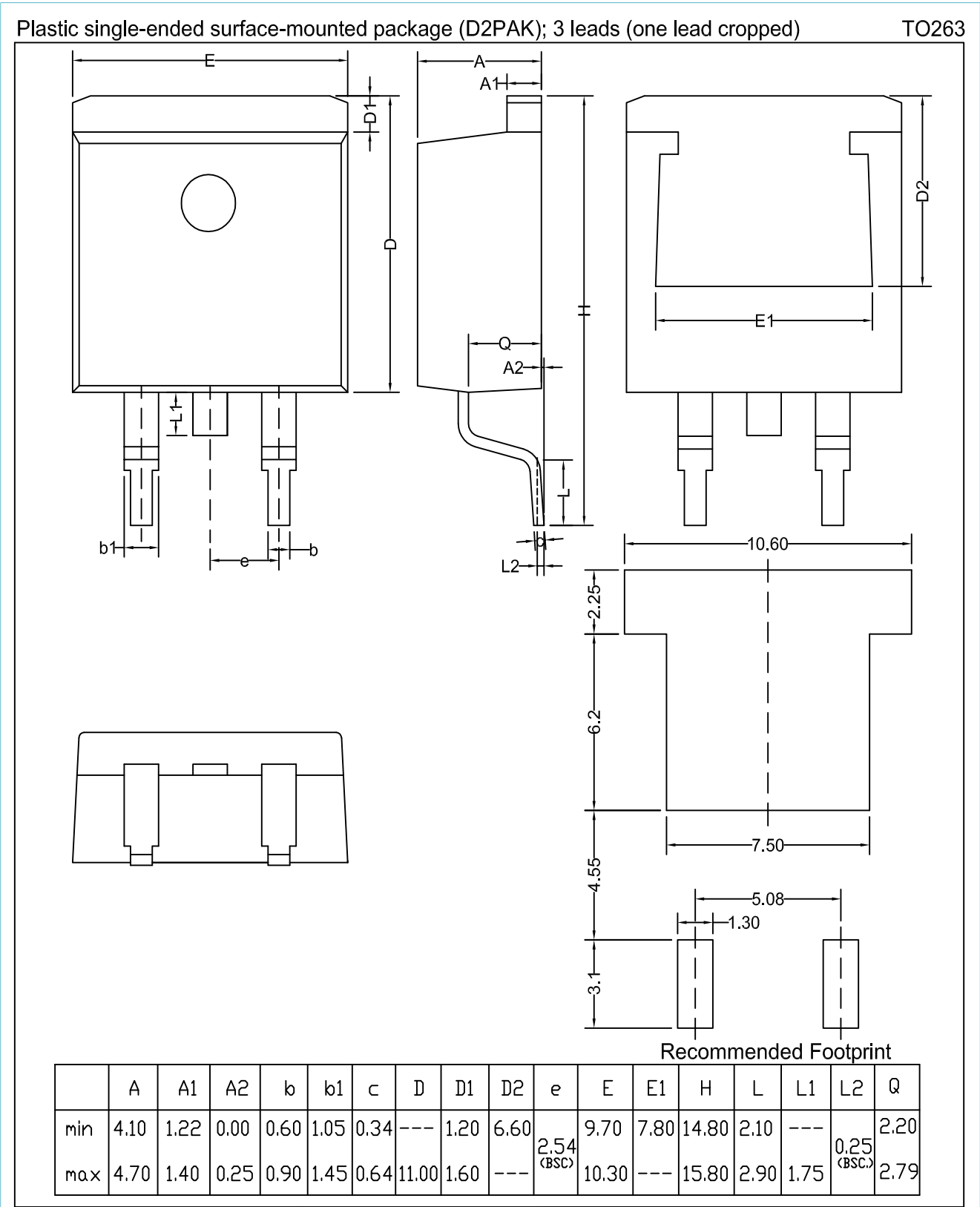


Fig. 10. Package outline D2PAK (TO263N)

## 11. 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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