

## 1. General description

Silicon Carbide Schottky diode in a TO220F-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
- Insulated package rated at 2500V RMS

## 3. Applications

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

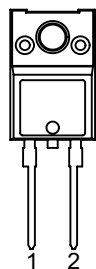
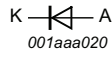
## 4. Quick reference data

Table 1. Quick reference data

| Symbol                         | Parameter                       | Conditions  | Values |     |     | Unit |
|--------------------------------|---------------------------------|---|--------|-----|-----|------|
| <b>Absolute maximum rating</b> |                                 |   |        |     |     |      |
| $V_{RRM}$                      | repetitive peak reverse voltage |   | 650    |     |     | V    |
| $I_{F(AV)}$                    | average forward current         | $\delta = 0.5$ ; square-wave pulse; $T_n \leq 22\text{ }^\circ\text{C}$ ;<br><a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a> | 10     |     |     | A    |
| Symbol                         | Parameter                       | Conditions  | Min    | Typ | Max | Unit |
| <b>Static characteristics</b>  |                                 |   |        |     |     |      |
| $V_F$                          | forward voltage                 | $I_F = 10\text{ A}$ ; $T_j = 25\text{ }^\circ\text{C}$ ; <a href="#">Fig. 5</a>   | -      | 1.5 | 1.7 | V    |
|                                |                                 | $I_F = 10\text{ A}$ ; $T_j = 150\text{ }^\circ\text{C}$ ; <a href="#">Fig. 5</a>  | -      | 1.8 | 2.2 | V    |

## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description             | Simplified outline  | Graphic symbol  |
|-----|--------|-------------------------|---|---|
| 1   | K      | cathode                 |  |  |
| 2   | A      | anode                   |   |   |
| mb  | n.c.   | mounting base; isolated |   |   |

## 6. Ordering information

Table 3. Ordering information

| Type number  | Package name | Orderable part number | Packing method | Small packing quantity | Package version | Package issue date |
|--------------|--------------|-----------------------|----------------|------------------------|-----------------|--------------------|
| WNSC2D10650X | TO220F-2L    | WNSC2D10650XQ         | Tube           | 50                     | TO220FN-2L      | 20-July-2016       |

## 7. Marking

Table 4. Marking codes

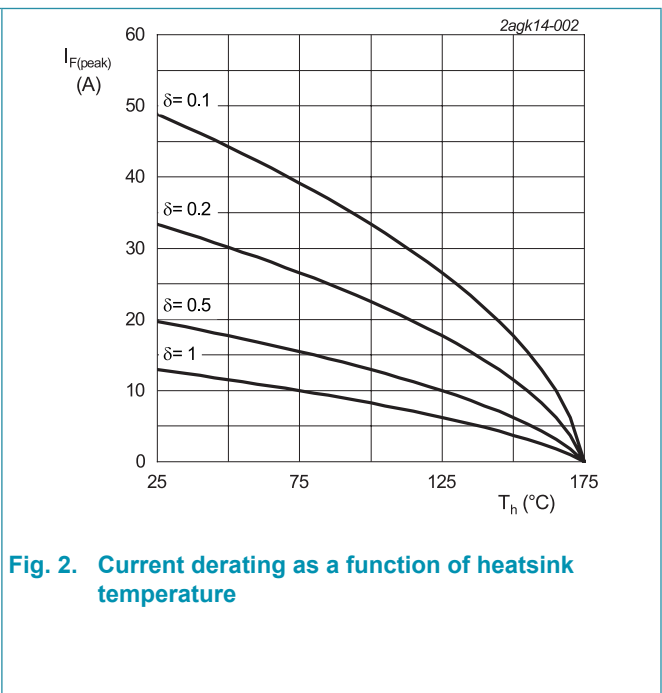
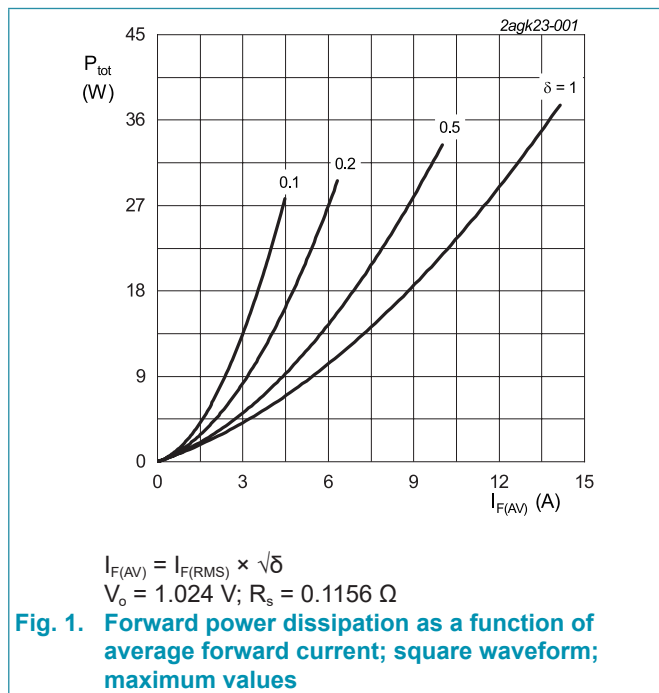
| Type number  | Marking codes    |
|--------------|------------------|
| WNSC2D10650X | WNSC2D<br>10650X |

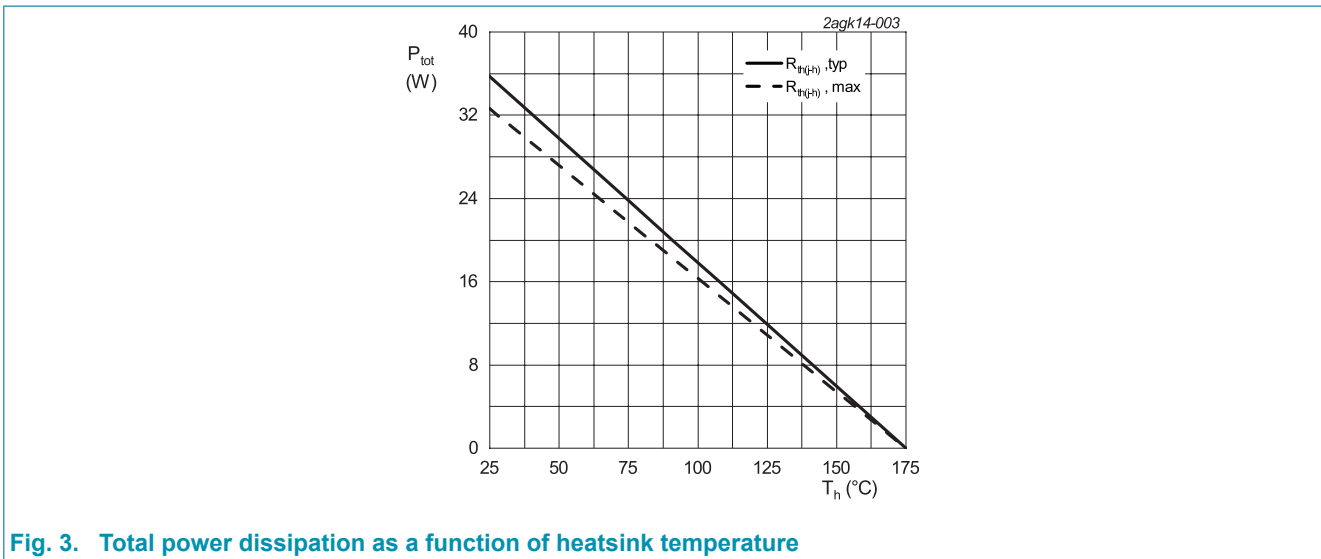
### 8. Limiting values

**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; $T_h \leq 22\text{ }^\circ\text{C}$ ;<br><a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a> | 10         | A                    |
| $I_{FRM}$   | repetitive peak forward current     | $\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_h \leq 22\text{ }^\circ\text{C}$ ;<br>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  | 50         | A                    |
|             |                                     | $t_p = 10\text{ }\mu\text{s}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; square-wave pulse   | 450        | A                    |
| $I^2t$      | $I^2t$ for fusing                   | $t_p = 10\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; sine-wave pulse  | 12.5       | $\text{A}^2\text{s}$ |
| $T_{stg}$   | storage temperature                 |   | -55 to 175 | $^\circ\text{C}$     |
| $T_j$       | junction temperature                |   | 175        | $^\circ\text{C}$     |





## 9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol        | Parameter  | Conditions                                     | Min | Typ | Max | Unit |
|---------------|--|--|-----|-----|-----|------|
| $R_{th(j-h)}$ | thermal resistance from junction to heatsink         | with heatsink compound; <a href="#">Fig. 4</a> | -   | -   | 4.6 | K/W  |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | in free air                                    | -   | 55  | -   | K/W  |

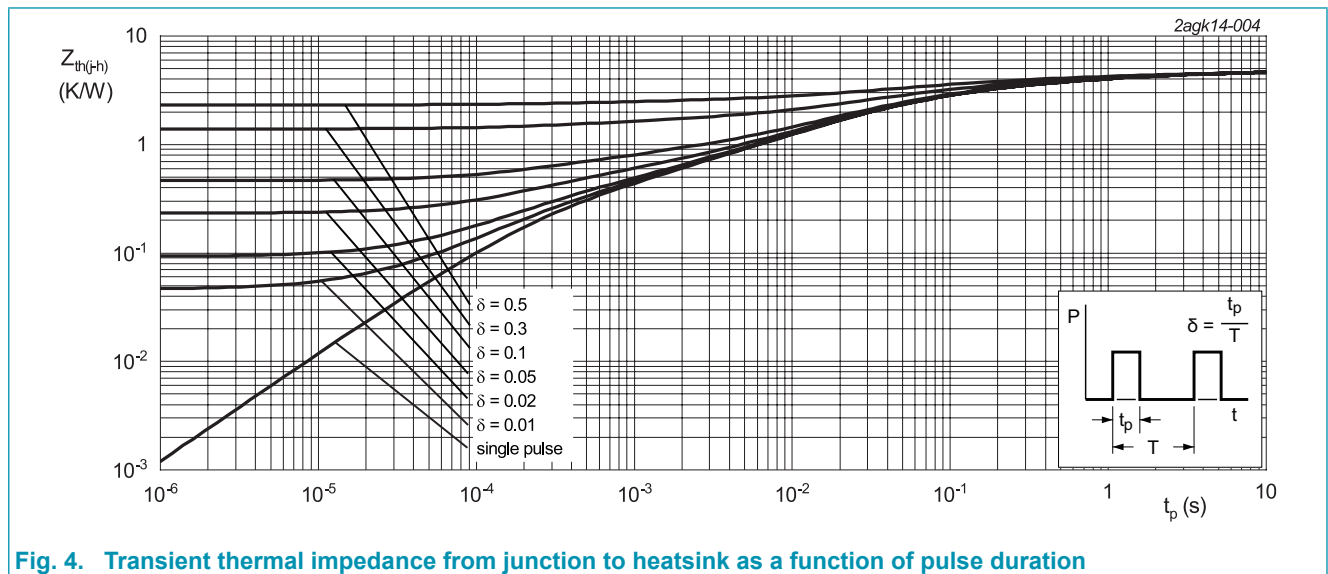


Fig. 4. Transient thermal impedance from junction to heatsink as a function of pulse duration

## 10. Isolation characteristics

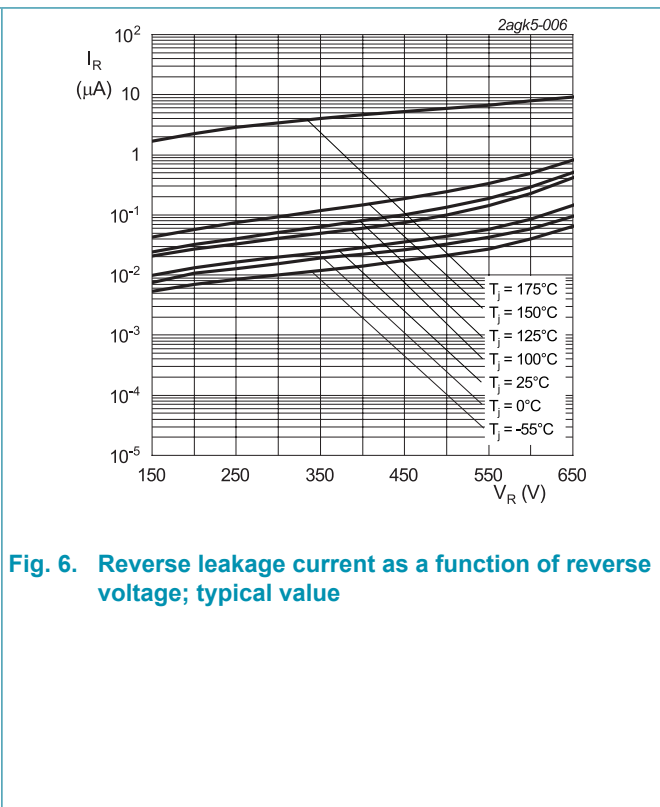
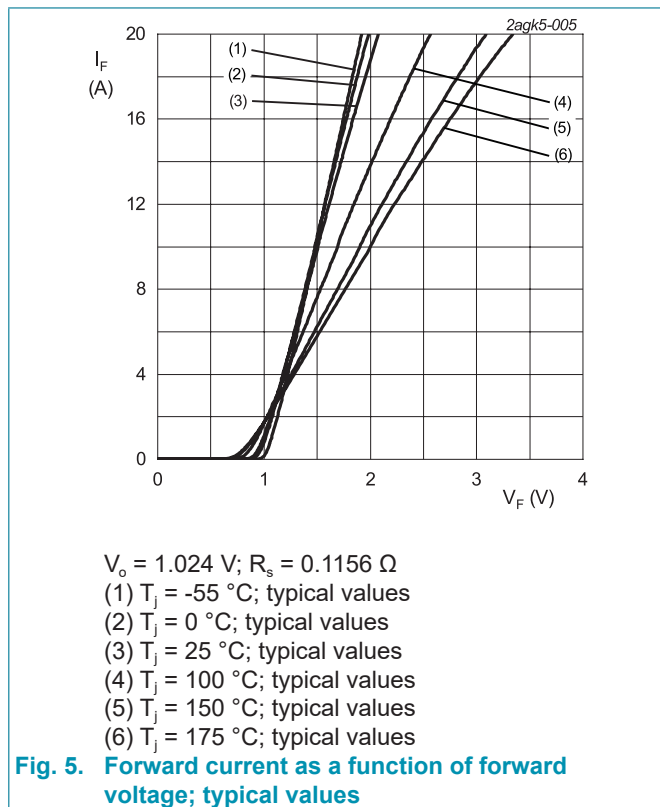
Table 7. Isolation characteristics

| Symbol          | Parameter             | Conditions   | Min | Typ | Max  | Unit |
|-----------------|-----------------------|--|-----|-----|------|------|
| $V_{isol(RMS)}$ | RMS isolation voltage | from all terminals to external heatsink; sinusoidal waveform; clean and dust free; $50\text{ Hz} \leq f \leq 60\text{ Hz}$ ; $T_h = 25\text{ }^\circ\text{C}$ ; $RH \leq 65\%$ | -   | -   | 2500 | V    |

### 11. Characteristics

Table 8. Characteristics

| Symbol                         | Parameter                       | Conditions   | Min | Typ | Max | Unit          |
|--------------------------------|---------------------------------|--|-----|-----|-----|---------------|
| <b>Static characteristics</b>  |                                 |  |     |     |     |               |
| $V_F$                          | forward voltage                 | $I_F = 10\text{ A}; T_J = 25\text{ °C}; \text{Fig. 5}$   | -   | 1.5 | 1.7 | V             |
|                                |                                 | $I_F = 10\text{ A}; T_J = 150\text{ °C}; \text{Fig. 5}$  | -   | 1.8 | 2.2 | V             |
|                                |                                 | $I_F = 10\text{ A}; T_J = 175\text{ °C}; \text{Fig. 5}$  | -   | 2   | 2.3 | V             |
| $I_R$                          | reverse current                 | $V_R = 650\text{ V}; T_J = 25\text{ °C}; \text{Fig. 6}$  | -   | 0.5 | 50  | $\mu\text{A}$ |
|                                |                                 | $V_R = 650\text{ V}; T_J = 175\text{ °C}; \text{Fig. 6}$   | -   | 25  | 250 | $\mu\text{A}$ |
| <b>Dynamic characteristics</b> |                                 |  |     |     |     |               |
| $Q_r$                          | recovered charge                | $I_F = 10\text{ A}; V_R = 400\text{ V}; dI_F/dt = 500\text{ A}/\mu\text{s}; T_J = 25\text{ °C}; \text{Fig. 7}$ | -   | 14  | -   | nC            |
| $C_d$                          | diode capacitance               | $f = 1\text{ MHz}; V_R = 1\text{ V}; T_J = 25\text{ °C}$   | -   | 310 | -   | pF            |
|                                |                                 | $f = 1\text{ MHz}; V_R = 300\text{ V}; T_J = 25\text{ °C}$   | -   | 36  | -   | pF            |
|                                |                                 | $f = 1\text{ MHz}; V_R = 600\text{ V}; T_J = 25\text{ °C}$   | -   | 32  | -   | pF            |
| $E_{as}$                       | non-repetitive avalanche energy | $I_R = 5.5\text{ A}; T_{j(\text{init})} = 25\text{ °C}; L = 5\text{ mH}$                                       | 75  | -   | -   | mJ            |



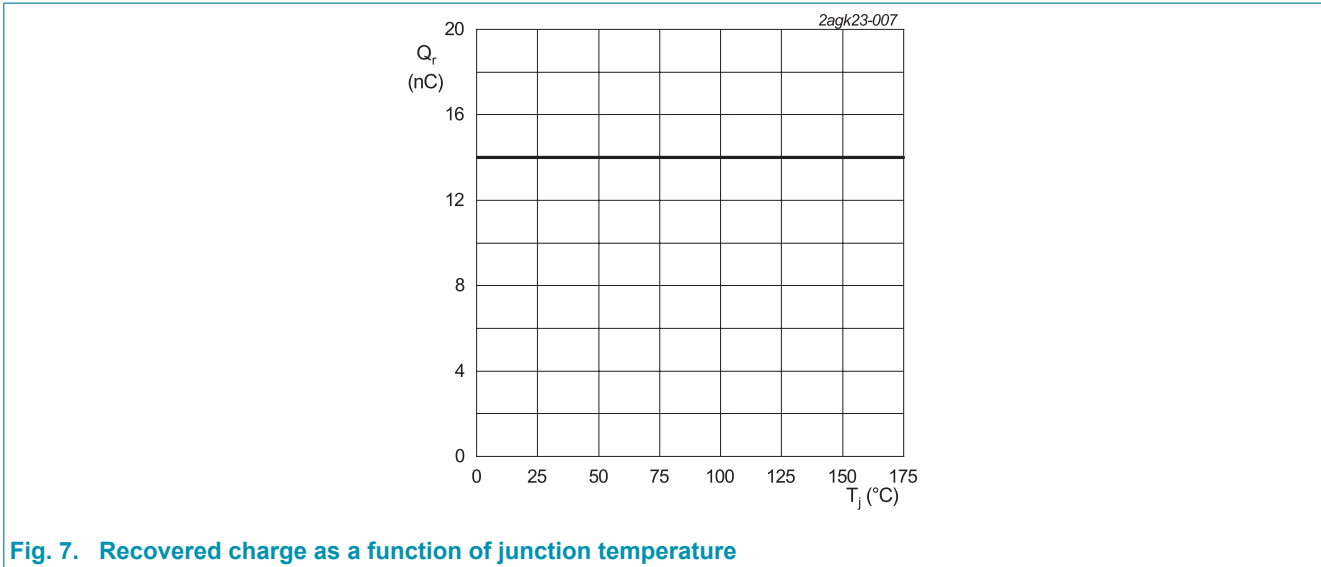
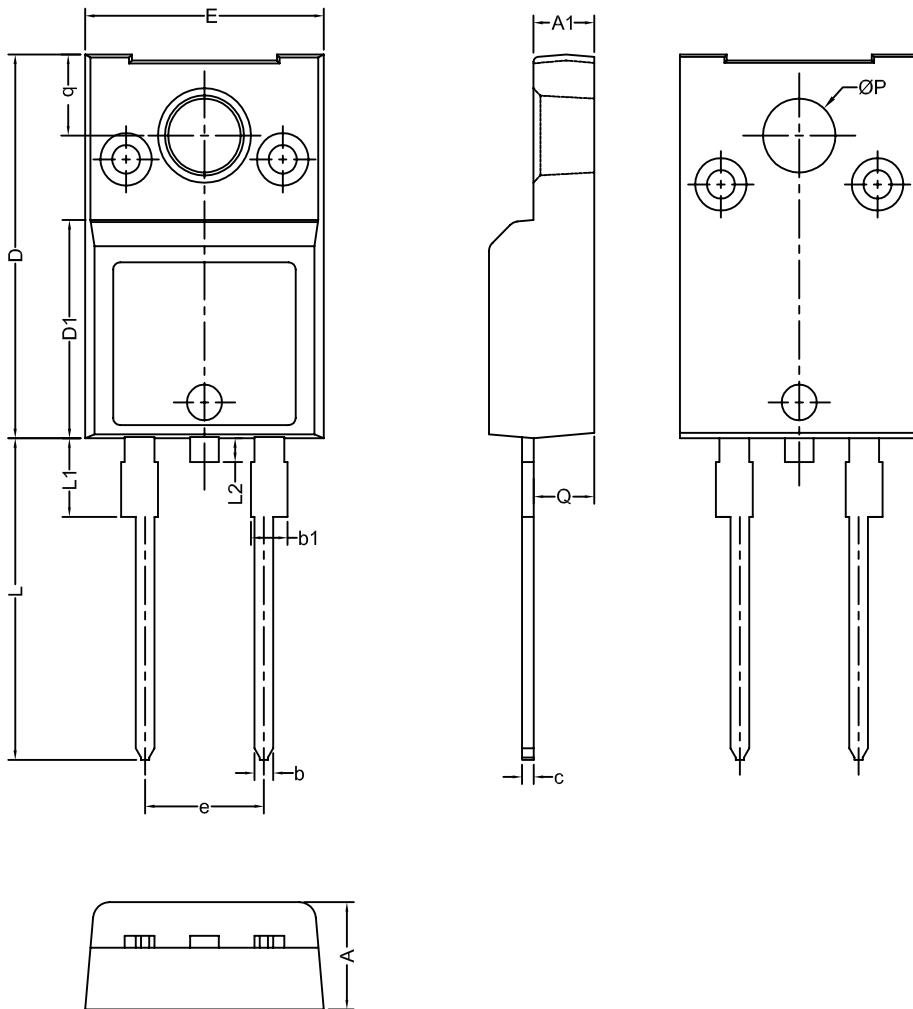


Fig. 7. Recovered charge as a function of junction temperature

### 12. Package outline

Plastic single-ended through-hole package; isolated heatsink mounted; 1 mounting hole; 2-lead TO-220F TO220F-2L



| Unit | A    | A1   | b    | b1   | c    | D     | D1   | e              | E     | L     | L1   | L2   | P    | q              | Q    |
|------|------|------|------|------|------|-------|------|----------------|-------|-------|------|------|------|----------------|------|
| min  | 4.35 | 2.40 | 0.76 | 1.22 | 0.46 | 15.95 | 9.00 | 5.08<br>(typ.) | 10.05 | 13.15 | 3.15 | 0.50 | 2.95 | 3.40<br>(typ.) | 2.30 |
| max  | 4.65 | 2.80 | 0.89 | 1.60 | 0.59 | 16.25 | 9.30 |                | 10.35 | 13.85 | 3.45 | 1.00 | 3.25 |                | 2.80 |

| OUTLINE VERSION | REFERENCES |       |      |  | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|------|--|---------------------|------------|
|                 | IEC        | JEDEC | EIAJ |  |                     |            |
| TO220F-2L       |            | -     |      |  |                     |            |



## 13. 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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- [2] The term 'short data sheet' is explained in section "Definitions".
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## 14. Contents

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|                                     |    |
|-------------------------------------|----|
| 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. Isolation characteristics ..... | 5  |
| 11. Characteristics.....            | 6  |
| 12. Package outline .....           | 8  |
| 13. Legal information .....         | 9  |
| 14. Contents .....                  | 11 |

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