

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
- 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

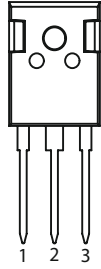
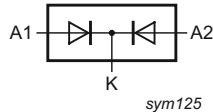
4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Values | | | Unit |
|--------------------------------|---------------------------------|--|--------|-----|-----|------|
| Absolute maximum rating | | | | | | |
| V_{RRM} | repetitive peak reverse voltage | | 650 | | | V |
| $I_{O(AV)}$ | average forward current | $\delta = 0.5$; square-wave pulse; $T_{mb} \leq 124$ °C; both diodes conducting; Fig. 1 ; Fig. 2 ; Fig. 3 | 16 | | | 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; per diode; Fig. 5 | - | 1.5 | 1.7 | V |
| | | $I_F = 8$ A; $T_j = 150$ °C; per diode; Fig. 5 | - | 1.8 | 2.2 | V |
| Dynamic characteristics | | | | | | |
| Q_r | recovered charge | $I_F = 8$ A; $dI_F/dt = 500$ A/ μ s; $V_R = 400$ V; $T_j = 25$ °C; per diode; Fig. 7 | - | 13 | - | nC |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------------------------------|---|---|
| 1 | A1 | anode |  |  sym125 |
| 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 |
|---------------|--------------|-----------------------|----------------|------------------------|-----------------|--------------------|
| WNSC2D16650CW | TO247 | WNSC2D16650CWQ | Tube | 30 | TO247N | 20-July-2016 |

7. Marking

Table 4. Marking codes

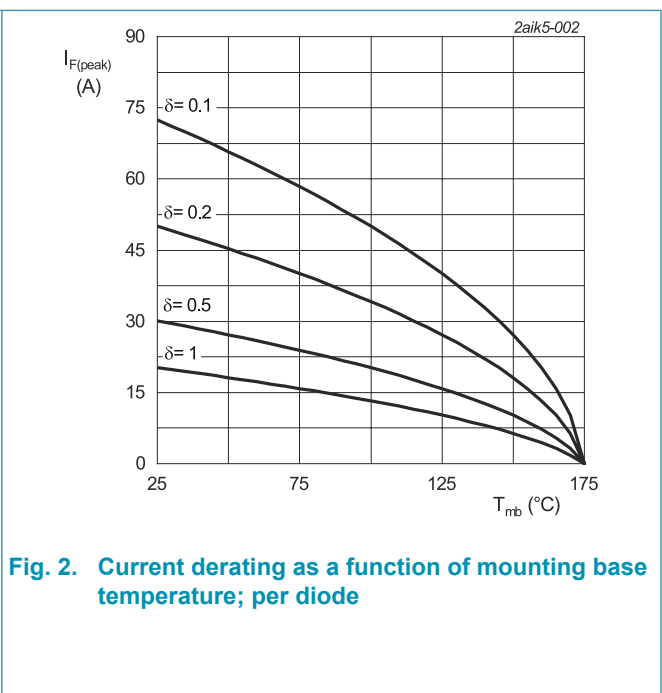
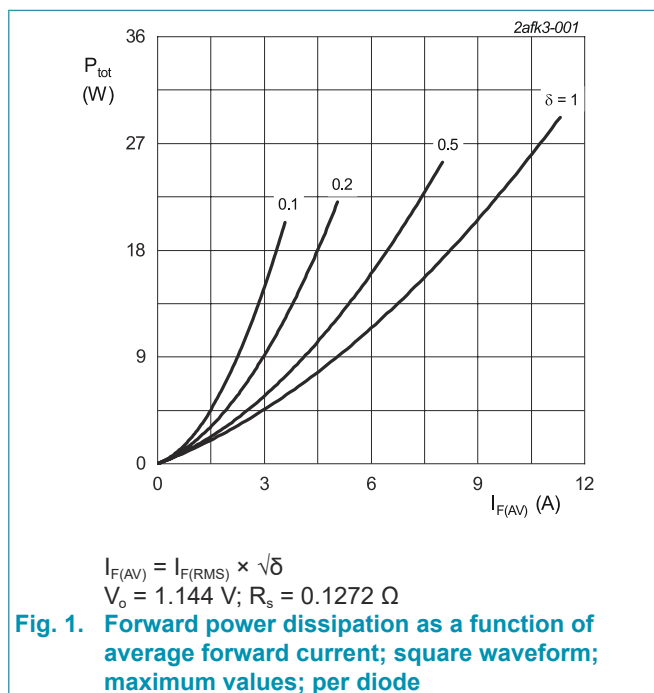
| Type number | Marking codes |
|---------------|-------------------|
| WNSC2D16650CW | WNSC2D 16650CW |

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 |
| $I_{O(AV)}$ | average forward current | $\delta = 0.5$; square-wave pulse; $T_{mb} \leq 124\text{ }^\circ\text{C}$; both diodes conducting; Fig. 1 ; Fig. 2 ; Fig. 3 | 16 | 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; per diode | 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; per diode | 48 | A |
| | | $t_p = 10\text{ }\mu\text{s}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; square-wave pulse; per diode | 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 | $^\circ\text{C}$ |



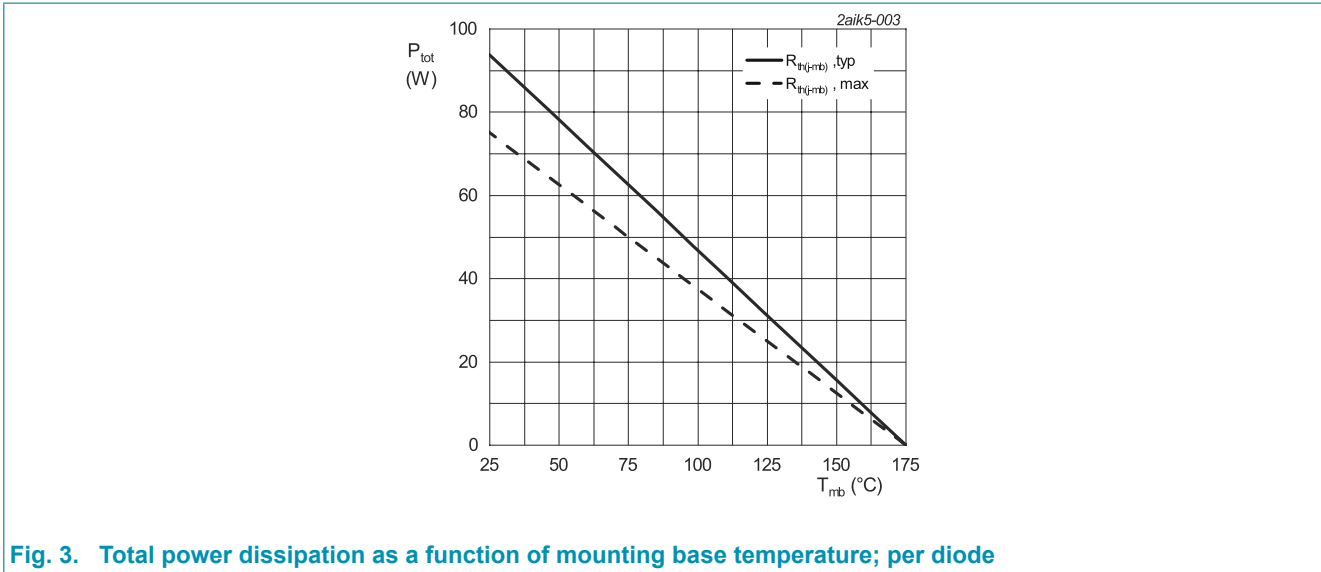


Fig. 3. Total power dissipation as a function of mounting base temperature; per diode

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 | per diode; Fig. 4 | - | - | 2 | K/W |
| | | both diodes conducting | - | - | 1 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | in free air | - | 40 | - | K/W |

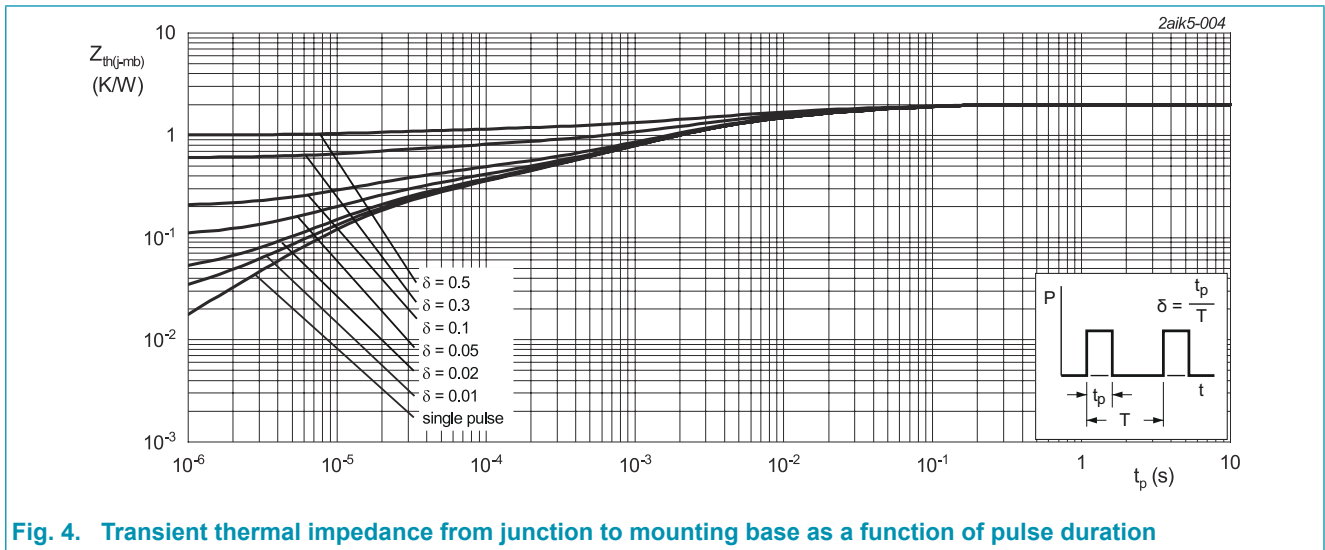
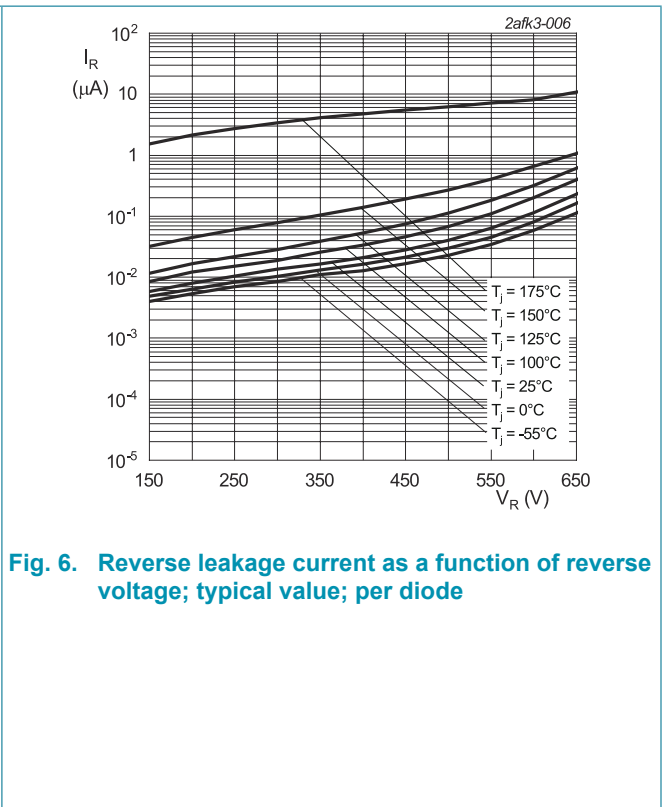
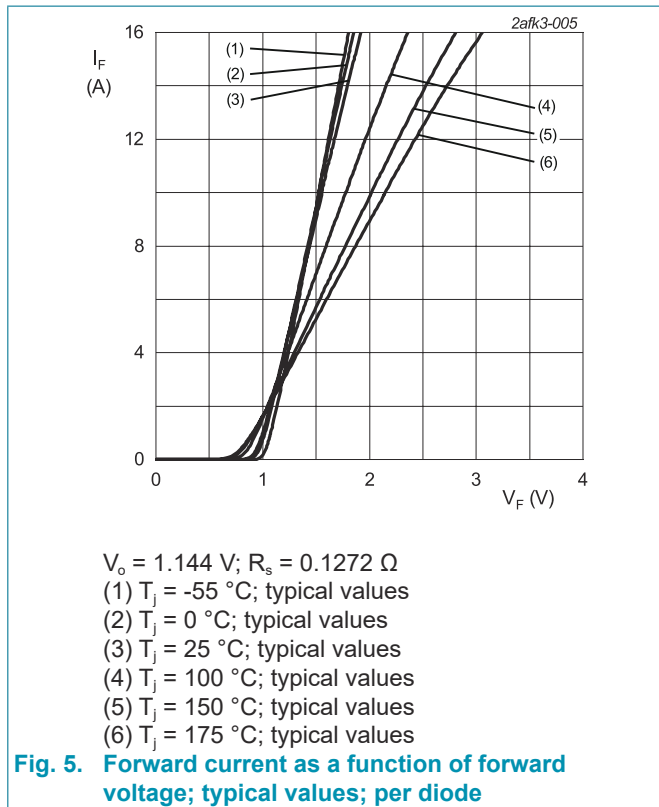


Fig. 4. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|---------------------------------|---|-----|-----|-----|---------------|
| Static characteristics | | | | | | |
| I_F | forward current | $I_F = 8 \text{ A}; T_j = 25 \text{ }^\circ\text{C};$ per diode; Fig. 5 | - | 1.5 | 1.7 | V |
| | | $I_F = 8 \text{ A}; T_j = 150 \text{ }^\circ\text{C};$ per diode; Fig. 5 | - | 1.8 | 2.2 | V |
| | | $I_F = 8 \text{ A}; T_j = 175 \text{ }^\circ\text{C};$ per diode; Fig. 5 | - | 2 | 2.3 | V |
| I_R | reverse current | $V_R = 650 \text{ V}; T_j = 25 \text{ }^\circ\text{C};$ per diode; Fig. 6 | - | 0.4 | 40 | μA |
| | | $V_R = 650 \text{ V}; T_j = 175 \text{ }^\circ\text{C};$ per diode; Fig. 6 | - | 20 | 200 | μA |
| Dynamic characteristics | | | | | | |
| Q_r | recovered charge | $I_F = 8 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 500 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C};$ per diode; Fig. 7 | - | 13 | - | nC |
| C_d | diode capacitance | $f = 1 \text{ MHz}; V_R = 1 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | - | 260 | - | pF |
| | | $f = 1 \text{ MHz}; V_R = 300 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | - | 31 | - | pF |
| | | $f = 1 \text{ MHz}; V_R = 600 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$ | - | 27 | - | pF |
| E_{as} | non-repetitive avalanche energy | $I_R = 4.9 \text{ A}; L = 5 \text{ mH}; T_{j(\text{init})} = 25 \text{ }^\circ\text{C};$ per diode | 60 | - | - | mJ |



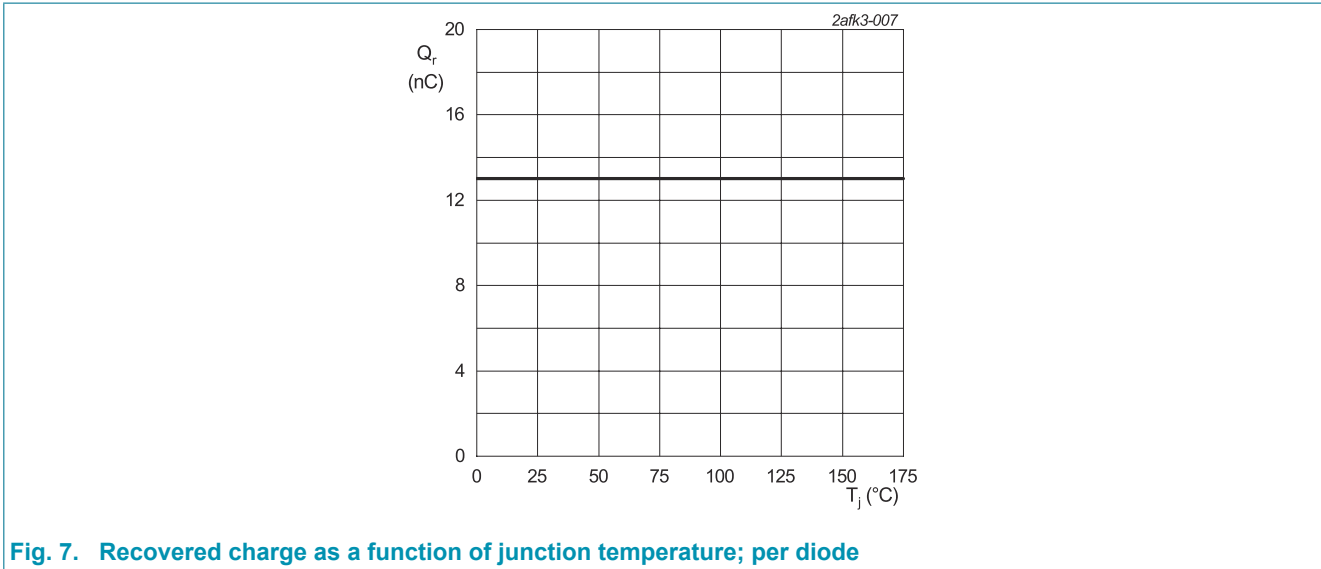
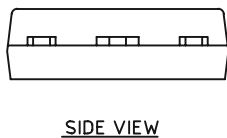
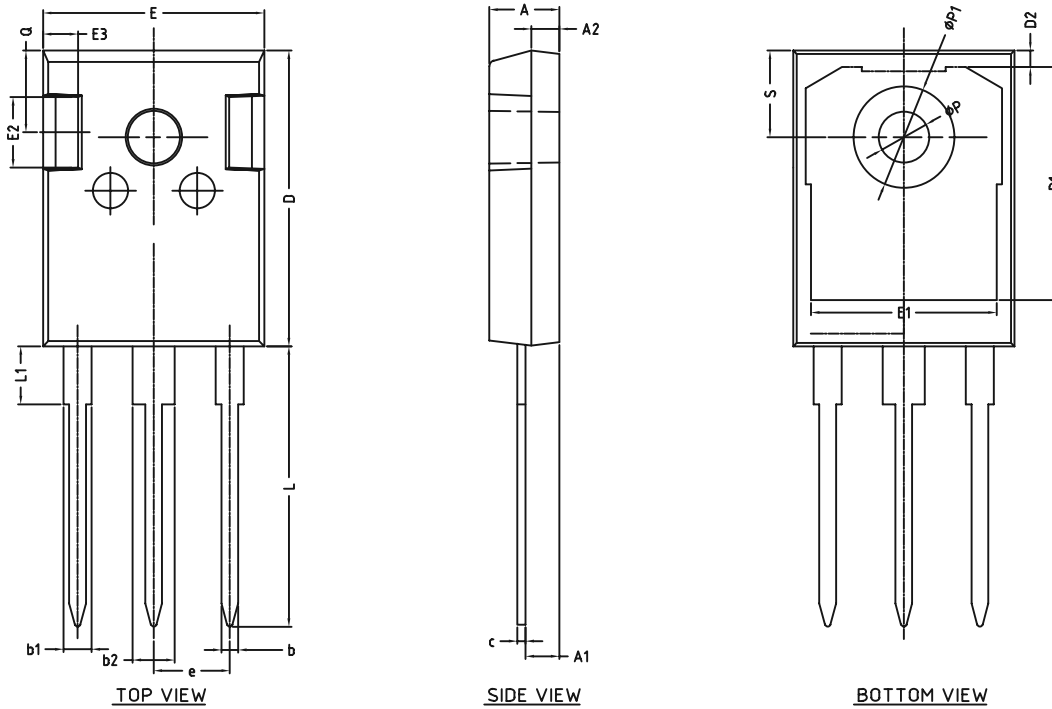


Fig. 7. Recovered charge as a function of junction temperature; per diode

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 | 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 VERSION | REFERENCES | | | PROJECTION | ISSUE DATE |
|-----------------|------------|--------|------|------------|------------|
| | IEC | JEDEC | EIAJ | | |
| SOT429N | | TO-247 | | | |

12. Legal information

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| 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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