

1. General description

Hyperfast power diode in a TO263 (D2PAK) plastic package.

2. Features and benefits

- Fast switching
- Low leakage current
- Low reverse recovery current
- Reduces switching losses in associated MOSFET

3. Applications

- Server power supplies
- Telecom power supplies
- EV charger
- Air conditioner
- Continuous Current Mode (CCM) Power Factor Correction (PFC)

4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|-------------------------------------|--|-----|------|------|------|
| V_R | reverse voltage | DC | - | - | 600 | V |
| $I_{F(AV)}$ | average forward current | $\delta = 0.5$; $T_{mb} \leq 101$ °C; square-wave pulse; Fig. 1 ; Fig. 2 ; Fig. 3 | - | - | 30 | A |
| I_{FRM} | repetitive peak forward current | $\delta = 0.5$; $t_p = 25$ μ s; $T_{mb} \leq 101$ °C; square-wave pulse | - | - | 60 | A |
| I_{FSM} | non-repetitive peak forward current | $t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; Fig. 4 | - | - | 270 | A |
| | | $t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse | - | - | 300 | A |
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 30$ A; $T_j = 25$ °C; Fig. 6 | - | 2 | 2.75 | V |
| | | $I_F = 30$ A; $T_j = 150$ °C; Fig. 6 | - | 1.38 | - | V |
| Dynamic characteristics | | | | | | |
| t_{rr} | reverse recovery time | $I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 50$ A/ μ s; $T_j = 25$ °C; Fig. 7 | - | 26 | 35 | ns |
| | | $I_F = 30$ A; $V_R = 200$ V; $dI_F/dt = 200$ A/ μ s; $T_j = 25$ °C; Fig. 7 | - | 35 | - | ns |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------------------------------|--------------------|----------------|
| 1 | n.c. | not connected | | |
| 2 | K | cathode | | |
| 3 | A | anode | | |
| mb | K | mounting base; connected to cathode | | |

[1] it is not possible to make connection to Pin 2 of the TO263 package.

6. Ordering information

Table 3. Ordering information

| Type number | Package name | Orderable part number | Packing method | Small packing quantity | Package version | Package issue date |
|-------------|--------------|-----------------------|----------------|------------------------|-----------------|--------------------|
| BYC30B-600P | TO263 | BYC30B-600PJ | Reel | 800 | TO263N (N) | 26-Sep-2016 |
| | | | | | TO263P (P) | 12-Jun-2023 |

7. Marking

Table 4. Marking codes

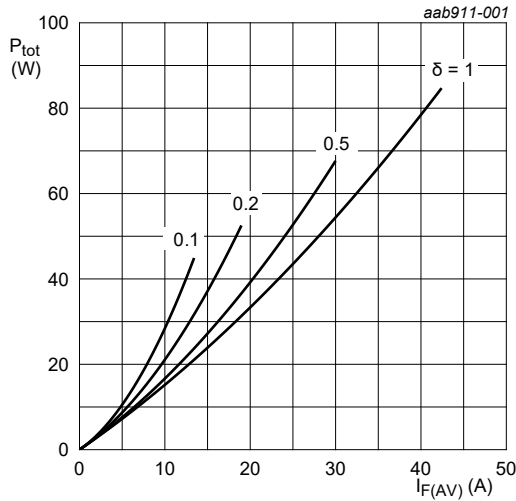
| Type number | Marking codes | |
|-------------|------------------------------|------------------------------|
| | Assembly factory: N | Assembly factory: P |
| BYC30B-600P | BYC30B 600P PJNxxxx xx | BYC30B 600P PJPxxxx xx |

8. Limiting values

Table 4. Limiting values

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

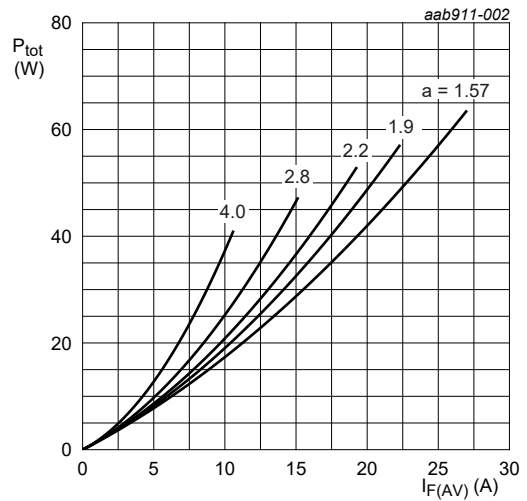
| Symbol | Parameter | Conditions | Min | Max | Unit |
|--------------------|-------------------------------------|--|-----|-----|------|
| V _{RRM} | repetitive peak reverse voltage | | - | 600 | V |
| V _{RWM} | crest working reverse voltage | | - | 600 | V |
| V _R | reverse voltage | DC | - | 600 | V |
| I _{F(AV)} | average forward current | $\delta = 0.5$; T _{mb} ≤ 101 °C; square-wave pulse; Fig. 1; Fig. 2; Fig. 3 | - | 30 | A |
| I _{FRM} | repetitive peak forward current | $\delta = 0.5$; t _p = 25 μs; T _{mb} ≤ 101 °C; square-wave pulse | - | 60 | A |
| I _{FSM} | non-repetitive peak forward current | t _p = 10 ms; T _{j(init)} = 25 °C; sine-wave pulse; Fig. 4 | - | 270 | A |
| | | t _p = 8.3 ms; T _{j(init)} = 25 °C; sine-wave pulse | - | 300 | A |
| T _{stg} | storage temperature | | -55 | 175 | °C |
| T _j | junction temperature | | - | 175 | °C |



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

$$V_o = 1.371 \text{ V}; R_s = 0.0147 \text{ } \Omega$$

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



$$a = \text{form factor} = I_{F(RMS)} / I_{F(AV)}$$

$$V_o = 1.371 \text{ V}; R_s = 0.0147 \text{ } \Omega$$

Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

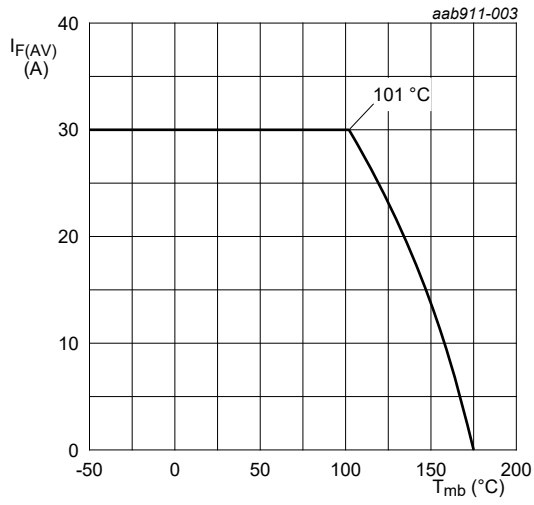


Fig. 3. Forward current as a function of mounting base temperature; maximum values

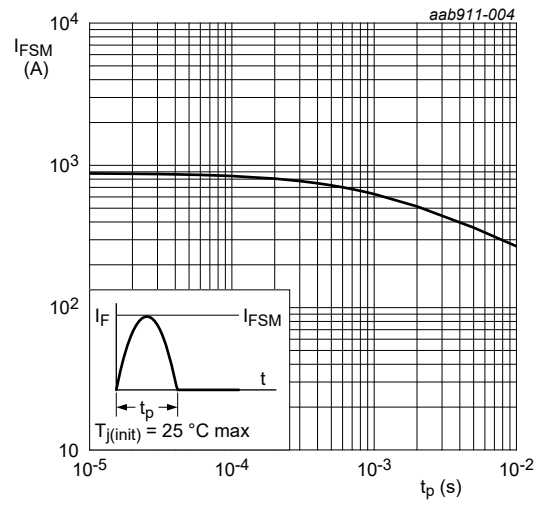


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

9. Thermal characteristics

Table 5. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------|--|------------------------|-----|-----|-----|------|
| $R_{th(j-mb)}$ | thermal resistance from junction to mounting base | Fig. 5 | - | - | 1.1 | K/W |
| $R_{th(j-a)}$ | thermal resistance from junction to ambient free air | in free air | - | 50 | - | K/W |

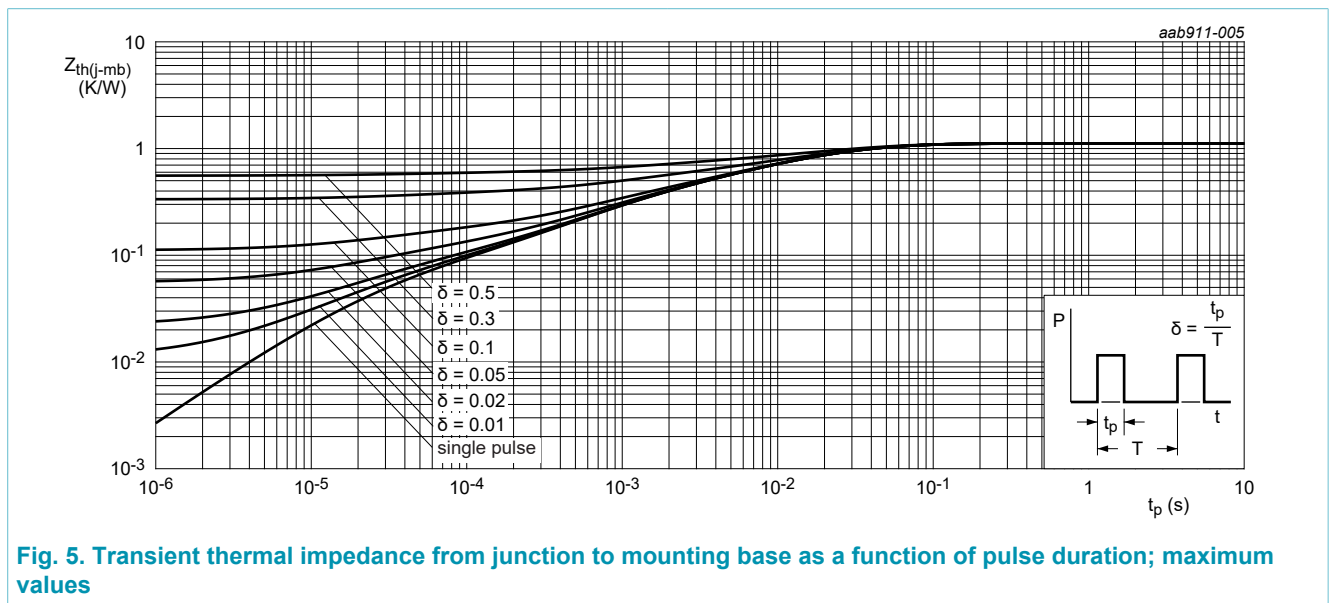
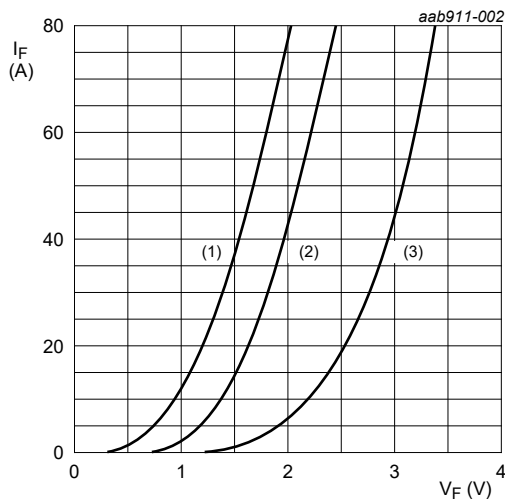


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration; maximum values

10. Characteristics

Table 6. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------------------------------|-------------------------------|---|-----|------|------|---------------|
| Static characteristics | | | | | | |
| V_F | forward voltage | $I_F = 30\text{ A}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 6}$ | - | 2 | 2.75 | V |
| | | $I_F = 30\text{ A}; T_j = 150\text{ }^\circ\text{C}; \text{Fig. 6}$ | - | 1.38 | - | V |
| I_R | reverse current | $V_R = 600\text{ V}; T_j = 25\text{ }^\circ\text{C}$ | - | - | 10 | μA |
| | | $V_R = 600\text{ V}; T_j = 125\text{ }^\circ\text{C}$ | - | - | 500 | μA |
| Dynamic characteristics | | | | | | |
| t_{rr} | reverse recovery time | $I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 50\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$ | - | 26 | 35 | ns |
| | | $I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$ | - | 35 | - | ns |
| | | $I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ }^\circ\text{C}; \text{Fig. 7}$ | - | 70 | - | ns |
| I_{RM} | peak reverse recovery current | $I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}$ | - | 3.5 | - | A |
| | | $I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ }^\circ\text{C}$ | - | 7.6 | - | A |
| Q_r | recovered charge | $I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$ | - | 50 | - | nC |
| | | $I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ }^\circ\text{C}; \text{Fig. 7}$ | - | 280 | - | nC |



$V_o = 1.371\text{ V}; R_s = 0.0147\ \Omega$
 (1) $T_j = 150\text{ }^\circ\text{C};$ typical values
 (2) $T_j = 150\text{ }^\circ\text{C};$ maximum values
 (3) $T_j = 25\text{ }^\circ\text{C};$ maximum values

Fig. 6. Forward current as a function of forward voltage

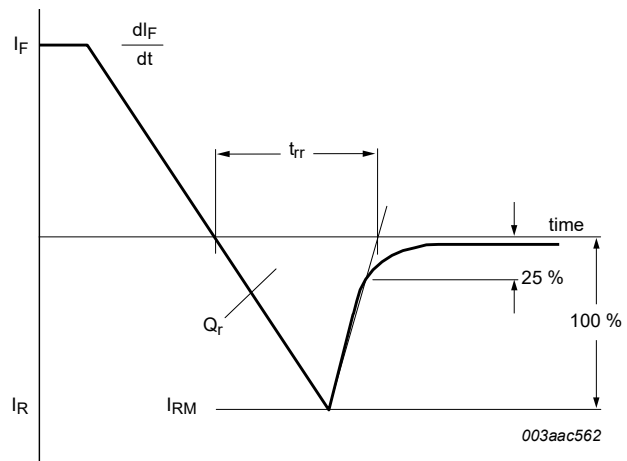
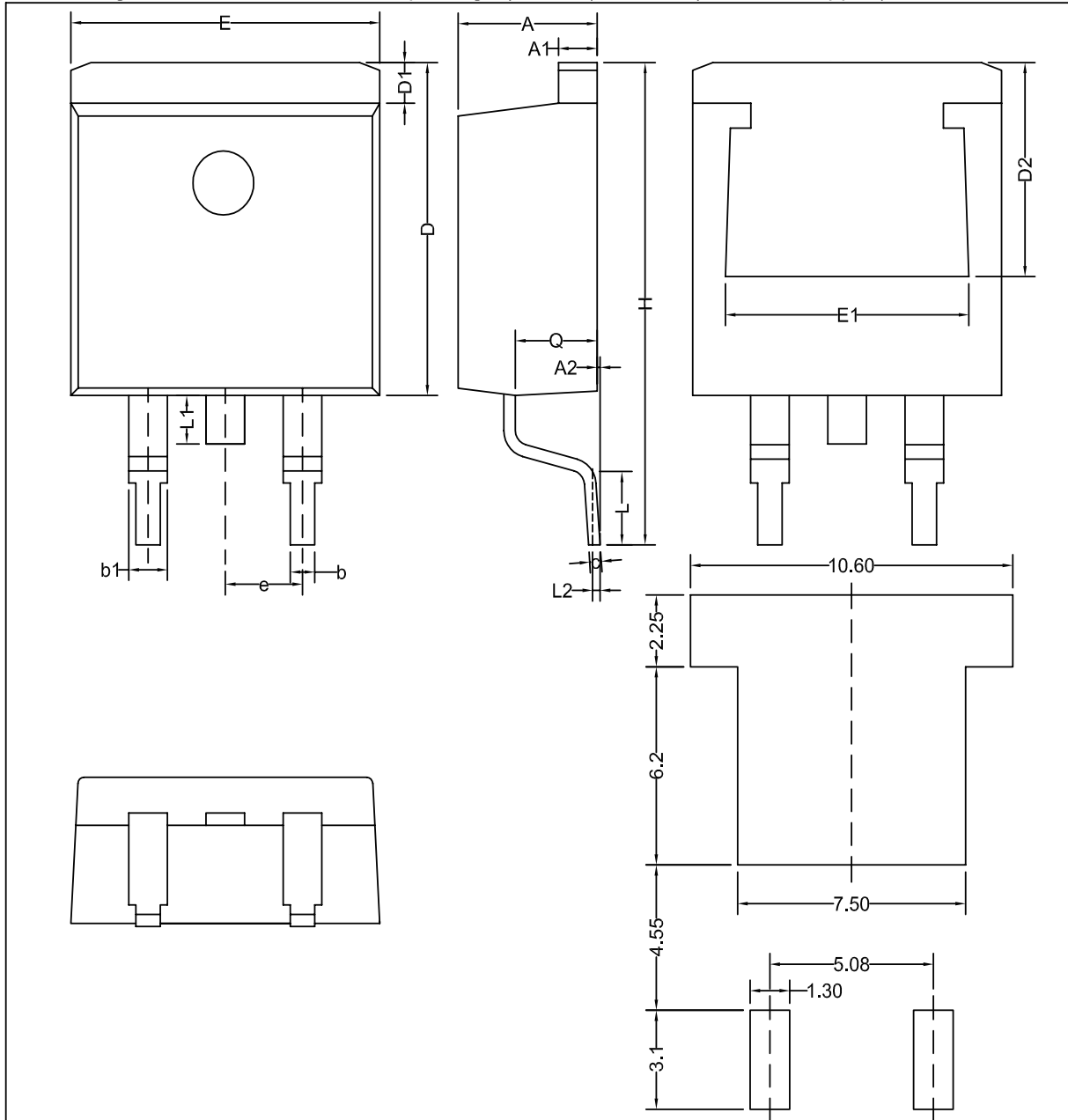


Fig. 7. Reverse recovery definitions; ramp recovery

11. Package outline

Assembly factory: N

Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped) TO263



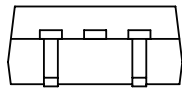
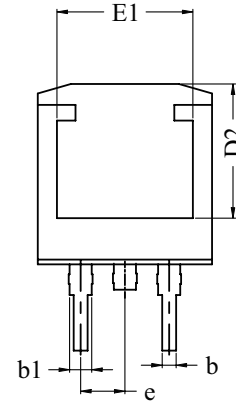
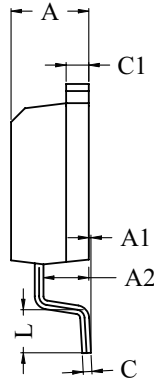
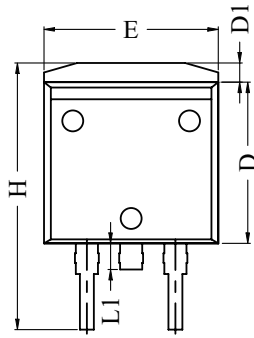
Recommended Footprint

| Unit | A | A1 | A2 | b | b1 | c | D | D1 | D2 | e | E | E1 | H | L | L1 | L2 | Q |
|------|------|------|------|------|------|------|-------|------|------|---------------|-------|------|-------|------|------|----------------|------|
| min | 4.10 | 1.22 | 0.00 | 0.60 | 1.05 | 0.34 | --- | 1.20 | 6.60 | 2.54 (BSC) | 9.70 | 7.80 | 14.80 | 2.10 | --- | 0.25 (BSC.) | 2.20 |
| max | 4.70 | 1.40 | 0.25 | 0.90 | 1.45 | 0.64 | 11.00 | 1.60 | --- | --- | 10.30 | --- | 15.80 | 2.90 | 1.75 | --- | 2.79 |

Assembly factory: P

Plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)

TO263



| Dim | All Dimensions in Millimeters | | |
|-----|-------------------------------|-------|-------|
| | Min | Typ | Max |
| A | 4.30 | 4.46 | 4.60 |
| A1 | 0 | 0.13 | 0.25 |
| A2 | 2.50 | 2.60 | 2.70 |
| b | 0.70 | 0.80 | 0.90 |
| b1 | 1.10 | 1.27 | 1.45 |
| C | 0.40 | 0.52 | 0.60 |
| C1 | 1.17 | 1.30 | 1.40 |
| D | 9.10 | 9.25 | 9.40 |
| D1 | 1.00 | 1.10 | 1.30 |
| D2 | 7.40 | 7.70 | 8.00 |
| E | 9.80 | 10.00 | 10.20 |
| E1 | 7.60 | 7.80 | 8.00 |
| e | 2.54 BSC | | |
| H | 14.80 | 15.30 | 15.80 |
| L | 2.10 | 2.47 | 2.80 |
| L1 | 1.30 | 1.50 | 1.70 |

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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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- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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