



PZUxB series

Single Zener diodes in a SOD323F package

Rev. 01 — 7 March 2006

Product data sheet

1. Product profile

1.1 General description

General-purpose Zener diodes in a SOD323F (SC-90) very small and flat lead Surface Mounted Device (SMD) plastic package.

1.2 Features

- Total power dissipation: ≤ 310 mW
- Tolerance series: B: approximately ± 5 %; B1, B2, B3: sequential, approximately ± 2 %
- Small plastic package suitable for surface mounted design
- Wide working voltage range: nominal 2.4 V to 36 V

1.3 Applications

- General regulation functions

1.4 Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|-------------------------|----------------------|-------|-----|-----|------|
| V_F | forward voltage | $I_F = 100$ mA | [1] - | - | 1.1 | V |
| P_{tot} | total power dissipation | $T_{amb} \leq 25$ °C | [2] - | - | 310 | mW |
| | | | [3] - | - | 550 | mW |

[1] Pulse test: $t_p \leq 300$ μ s; $\delta \leq 0.02$.

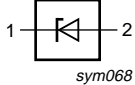

[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

PHILIPS

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Symbol |
|-----|-------------|---|---|
| 1 | cathode | [1] |  sym068 |
| 2 | anode |  | |

[1] The marking bar indicates the cathode.

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|----------------------|---------|--|---------|
| | Name | Description | Version |
| PZU2.4B to PZU36B[1] | SC-90 | plastic surface mounted package; 2 leads | SOD323F |

[1] The series consists of 97 types with nominal working voltages from 2.4 V to 36 V.

4. Marking

Table 4. Marking codes

| Type number | Marking code | | | | Type number | Marking code | | | |
|-------------|--------------|----|----|----|-------------|--------------|----|----|----|
| | B | B1 | B2 | B3 | | B | B1 | B2 | B3 |
| PZU2.4 | G3 | - | - | - | PZU10 | GJ | FH | HF | KB |
| PZU2.7 | G4 | F3 | H1 | - | PZU11 | GK | FJ | HG | KC |
| PZU3.0 | G5 | F4 | H2 | - | PZU12 | GL | FK | HH | KD |
| PZU3.3 | G6 | F5 | H3 | - | PZU13 | GM | FL | HJ | KE |
| PZU3.6 | G7 | F6 | H4 | - | PZU14 | - | - | HK | - |
| PZU3.9 | G8 | F7 | H5 | - | PZU15 | GN | FM | HL | KF |
| PZU4.3 | G9 | F8 | H6 | HS | PZU16 | GP | FN | HM | KG |
| PZU4.7 | GA | F9 | H7 | HT | PZU18 | GQ | FP | HN | KH |
| PZU5.1 | GB | FA | H8 | HU | PZU20 | GR | FQ | HP | KJ |
| PZU5.6 | GC | FB | H9 | HV | PZU22 | GS | FR | HQ | KK |
| PZU6.2 | GD | FC | HA | HW | PZU24 | GT | FS | HR | KL |
| PZU6.8 | GE | FD | HB | HX | PZU27 | GU | - | - | - |
| PZU7.5 | GF | FE | HC | HY | PZU30 | GV | - | - | - |
| PZU8.2 | GG | FF | HD | HZ | PZU33 | GW | - | - | - |
| PZU9.1 | GH | FG | HE | KA | PZU36 | GX | - | - | - |

5. Limiting values

Table 5. Limiting values

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

| Symbol | Parameter | Conditions | Min | Max | Unit |
|-----------|---|-----------------------------|-------|---|------|
| I_F | forward current | | - | 200 | mA |
| I_{ZSM} | non-repetitive peak reverse current | | - | see Table 8 and 9 | |
| P_{ZSM} | non-repetitive peak reverse power dissipation | | [1] - | 40 | W |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [2] - | 310 | mW |
| | | | [3] - | 550 | mW |
| T_j | junction temperature | | - | 150 | °C |
| T_{amb} | ambient temperature | | -65 | +150 | °C |
| T_{stg} | storage temperature | | -65 | +150 | °C |

[1] $t_p = 100\text{ }\mu\text{s}$; square wave; $T_j = 25\text{ °C}$ prior to surge

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2 .

6. Thermal characteristics

Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------|--|-------------|-------|-----|-----|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] - | - | 400 | K/W |
| | | | [2] - | - | 230 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | [3] - | - | 55 | K/W |

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2 .

[3] Soldering point of cathode tab.

7. Characteristics

Table 7. Characteristics

$T_j = 25\text{ °C}$ unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------|-----------------|-----------------------|-------|-----|-----|------|
| V_F | forward voltage | $I_F = 10\text{ mA}$ | [1] - | - | 0.9 | V |
| | | $I_F = 100\text{ mA}$ | [1] - | - | 1.1 | V |

[1] Pulse test: $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$.

Table 8. Characteristics per type; PZU2.4B to PZU5.6B3

 $T_j = 25\text{ °C}$ unless otherwise specified.

| PZU xxx | Sel | Working voltage V_Z (V); $I_Z = 5\text{ mA}$ | | Maximum differential resistance r_{dif} (Ω) | | Reverse current I_R (μA) | | Temperature coefficient S_Z (mV/K); $I_Z = 5\text{ mA}$ | Diode capacitance C_d (pF) ^[1] | Non-repetitive peak reverse current I_{ZSM} (A) ^[2] |
|------------|-----|---|------|---|---------------------|---|-----------|--|---|--|
| | | Min | Max | $I_Z = 0.5\text{ mA}$ | $I_Z = 5\text{ mA}$ | Max | V_R (V) | Typ | Max | Max |
| 2.4 | B | 2.3 | 2.6 | 1000 | 100 | 50 | 1 | -1.6 | 450 | 8 |
| 2.7 | B | 2.5 | 2.9 | 1000 | 100 | 20 | 1 | -2.0 | 440 | 8 |
| | B1 | 2.5 | 2.75 | | | | | | | |
| | B2 | 2.65 | 2.9 | | | | | | | |
| 3.0 | B | 2.80 | 3.20 | 1000 | 95 | 10 | 1 | -2.1 | 425 | 8 |
| | B1 | 2.80 | 3.05 | | | | | | | |
| | B2 | 2.95 | 3.20 | | | | | | | |
| 3.3 | B | 3.10 | 3.50 | 1000 | 95 | 5 | 1 | -2.4 | 410 | 8 |
| | B1 | 3.10 | 3.35 | | | | | | | |
| | B2 | 3.25 | 3.50 | | | | | | | |
| 3.6 | B | 3.40 | 3.80 | 1000 | 90 | 5 | 1 | -2.4 | 390 | 8 |
| | B1 | 3.40 | 3.65 | | | | | | | |
| | B2 | 3.55 | 3.80 | | | | | | | |
| 3.9 | B | 3.70 | 4.10 | 1000 | 90 | 3 | 1 | -2.5 | 370 | 8 |
| | B1 | 3.70 | 3.97 | | | | | | | |
| | B2 | 3.87 | 4.10 | | | | | | | |
| 4.3 | B | 4.01 | 4.48 | 1000 | 90 | 3 | 1 | -2.5 | 350 | 8 |
| | B1 | 4.01 | 4.21 | | | | | | | |
| | B2 | 4.15 | 4.34 | | | | | | | |
| | B3 | 4.28 | 4.48 | | | | | | | |
| 4.7 | B | 4.42 | 4.90 | 800 | 80 | 2 | 1 | -1.4 | 325 | 8 |
| | B1 | 4.42 | 4.61 | | | | | | | |
| | B2 | 4.55 | 4.75 | | | | | | | |
| | B3 | 4.69 | 4.90 | | | | | | | |
| 5.1 | B | 4.84 | 5.37 | 250 | 60 | 2 | 1.5 | 0.3 | 300 | 5.5 |
| | B1 | 4.84 | 5.04 | | | | | | | |
| | B2 | 4.98 | 5.20 | | | | | | | |
| | B3 | 5.14 | 5.37 | | | | | | | |
| 5.6 | B | 5.31 | 5.92 | 100 | 40 | 1 | 2.5 | 1.9 | 275 | 5.5 |
| | B1 | 5.31 | 5.55 | | | | | | | |
| | B2 | 5.49 | 5.73 | | | | | | | |
| | B3 | 5.67 | 5.92 | | | | | | | |

[1] $f = 1\text{ MHz}$; $V_R = 0\text{ V}$ [2] $t_p = 100\text{ }\mu\text{s}$; square wave; $T_j = 25\text{ °C}$ prior to surge

Table 9. Characteristics per type; PZU6.2B to PZU36B

 $T_J = 25^\circ\text{C}$ unless otherwise specified.

| PZU xxx | Sel | Working voltage V_Z (V); $I_Z = 5\text{ mA}$ | | Maximum differential resistance r_{dif} (Ω) | | Reverse current I_R (nA) | | Temperature coefficient S_Z (mV/K); $I_Z = 5\text{ mA}$ | Diode capacitance C_d (pF) ^[1] | Non-repetitive peak reverse current I_{ZSM} (A) ^[2] |
|------------|-----|---|-------|---|---------------------|----------------------------------|-----------|--|---|--|
| | | Min | Max | $I_Z = 0.5\text{ mA}$ | $I_Z = 5\text{ mA}$ | Max | V_R (V) | Typ | Max | Max |
| 6.2 | B | 5.86 | 6.53 | 80 | 30 | 500 | 3 | 2.7 | 250 | 5.5 |
| | B1 | 5.86 | 6.12 | | | | | | | |
| | B2 | 6.06 | 6.33 | | | | | | | |
| | B3 | 6.26 | 6.53 | | | | | | | |
| 6.8 | B | 6.47 | 7.14 | 60 | 20 | 500 | 3.5 | 3.4 | 215 | 5.5 |
| | B1 | 6.47 | 6.73 | | | | | | | |
| | B2 | 6.65 | 6.93 | | | | | | | |
| | B3 | 6.86 | 7.14 | | | | | | | |
| 7.5 | B | 7.06 | 7.84 | 60 | 10 | 500 | 4 | 4.0 | 170 | 3.5 |
| | B1 | 7.06 | 7.36 | | | | | | | |
| | B2 | 7.28 | 7.60 | | | | | | | |
| | B3 | 7.52 | 7.84 | | | | | | | |
| 8.2 | B | 7.76 | 8.64 | 60 | 10 | 500 | 5 | 4.6 | 150 | 3.5 |
| | B1 | 7.76 | 8.10 | | | | | | | |
| | B2 | 8.02 | 8.36 | | | | | | | |
| | B3 | 8.28 | 8.64 | | | | | | | |
| 9.1 | B | 8.56 | 9.55 | 60 | 10 | 500 | 6 | 5.5 | 120 | 3.5 |
| | B1 | 8.56 | 8.93 | | | | | | | |
| | B2 | 8.85 | 9.23 | | | | | | | |
| | B3 | 9.15 | 9.55 | | | | | | | |
| 10 | B | 9.45 | 10.55 | 60 | 10 | 100 | 7 | 6.4 | 110 | 3.5 |
| | B1 | 9.45 | 9.87 | | | | | | | |
| | B2 | 9.77 | 10.21 | | | | | | | |
| | B3 | 10.11 | 10.55 | | | | | | | |
| 11 | B | 10.44 | 11.56 | 60 | 10 | 100 | 8 | 7.4 | 108 | 3 |
| | B1 | 10.44 | 10.88 | | | | | | | |
| | B2 | 10.76 | 11.22 | | | | | | | |
| | B3 | 11.10 | 11.56 | | | | | | | |
| 12 | B | 11.42 | 12.60 | 80 | 10 | 100 | 9 | 8.4 | 105 | 3 |
| | B1 | 11.42 | 11.90 | | | | | | | |
| | B2 | 11.74 | 12.24 | | | | | | | |
| | B3 | 12.08 | 12.60 | | | | | | | |
| 13 | B | 12.47 | 13.96 | 80 | 10 | 100 | 10 | 9.4 | 103 | 2.5 |
| | B1 | 12.47 | 13.03 | | | | | | | |
| | B2 | 12.91 | 13.49 | | | | | | | |
| | B3 | 13.37 | 13.96 | | | | | | | |
| 14 | B2 | 13.70 | 14.30 | 80 | 10 | 100 | 11 | 10.4 | 101 | 2 |

Table 9. Characteristics per type; PZU6.2B to PZU36B ...continued

 $T_j = 25\text{ °C}$ unless otherwise specified.

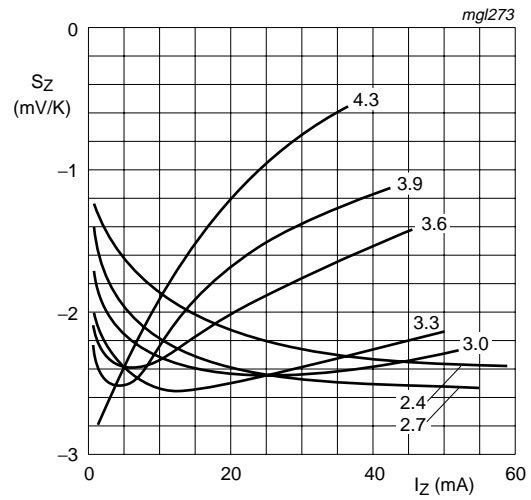
| PZU xxx | Sel | Working voltage V_Z (V); $I_Z = 5\text{ mA}$ | | Maximum differential resistance r_{dif} (Ω) | | Reverse current I_R (nA) | | Temperature coefficient S_Z (mV/K); $I_Z = 5\text{ mA}$ | Diode capacitance C_d (pF) ^[1] | Non-repetitive peak reverse current I_{ZSM} (A) ^[2] |
|------------|-----|---|-------|---|---------------------|----------------------------------|-----------|--|---|--|
| | | Min | Max | $I_Z = 0.5\text{ mA}$ | $I_Z = 5\text{ mA}$ | Max | V_R (V) | Typ | Max | Max |
| 15 | B | 13.84 | 15.52 | 80 | 15 | 50 | 11 | 11.4 | 99 | 2 |
| | B1 | 13.84 | 14.46 | | | | | | | |
| | B2 | 14.34 | 14.98 | | | | | | | |
| | B3 | 14.85 | 15.52 | | | | | | | |
| 16 | B | 15.37 | 17.09 | 80 | 20 | 50 | 12 | 12.4 | 97 | 1.5 |
| | B1 | 15.37 | 16.01 | | | | | | | |
| | B2 | 15.85 | 16.51 | | | | | | | |
| | B3 | 16.35 | 17.09 | | | | | | | |
| 18 | B | 16.94 | 19.03 | 80 | 20 | 50 | 13 | 14.4 | 93 | 1.5 |
| | B1 | 16.94 | 17.70 | | | | | | | |
| | B2 | 17.56 | 18.35 | | | | | | | |
| | B3 | 18.21 | 19.03 | | | | | | | |
| 20 | B | 18.86 | 21.08 | 100 | 20 | 50 | 15 | 16.4 | 88 | 1.5 |
| | B1 | 18.86 | 19.70 | | | | | | | |
| | B2 | 19.52 | 20.39 | | | | | | | |
| | B3 | 20.21 | 21.08 | | | | | | | |
| 22 | B | 20.88 | 23.17 | 100 | 25 | 50 | 17 | 18.4 | 84 | 1.3 |
| | B1 | 20.88 | 21.77 | | | | | | | |
| | B2 | 21.54 | 22.47 | | | | | | | |
| | B3 | 22.23 | 23.17 | | | | | | | |
| 24 | B | 22.93 | 25.57 | 120 | 30 | 50 | 19 | 20.4 | 80 | 1.3 |
| | B1 | 22.93 | 23.96 | | | | | | | |
| | B2 | 23.72 | 24.78 | | | | | | | |
| | B3 | 24.54 | 25.57 | | | | | | | |
| 27 | B | 25.1 | 28.9 | 150 | 40 | 50 | 21 | 23.4 | 73 | 1 |
| 30 | B | 28 | 32 | 200 | 40 | 50 | 23 | 26.6 | 66 | 1 |
| 33 | B | 31 | 35 | 250 | 40 | 50 | 25 | 29.7 | 60 | 0.9 |
| 36 | B | 34 | 38 | 300 | 60 | 50 | 27 | 33.0 | 59 | 0.8 |

[1] $f = 1\text{ MHz}$; $V_R = 0\text{ V}$ [2] $t_p = 100\text{ }\mu\text{s}$; square wave; $T_j = 25\text{ °C}$ prior to surge



$T_j = 25\text{ }^\circ\text{C}$

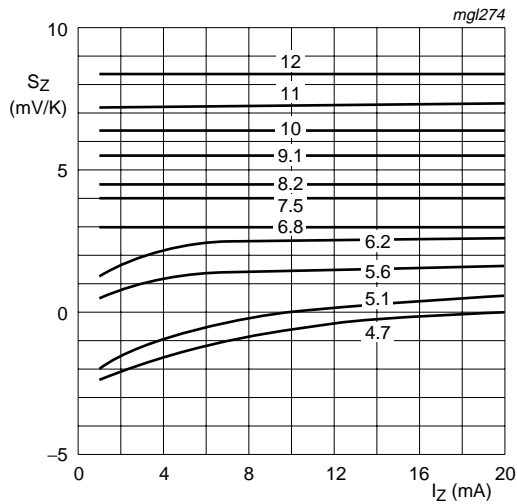
Fig 1. Forward current as a function of forward voltage; typical values



PZU2.4B to PZU4.3B

$T_j = 25\text{ }^\circ\text{C}$ to $150\text{ }^\circ\text{C}$

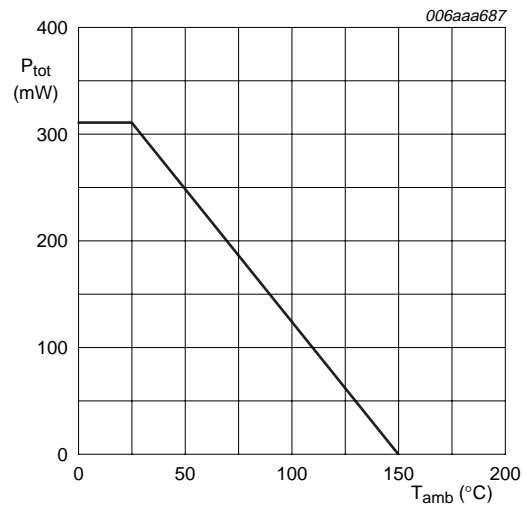
Fig 2. Temperature coefficient as a function of working current; typical values



PZU4.7B to PZU12B

$T_j = 25\text{ }^\circ\text{C}$ to $150\text{ }^\circ\text{C}$

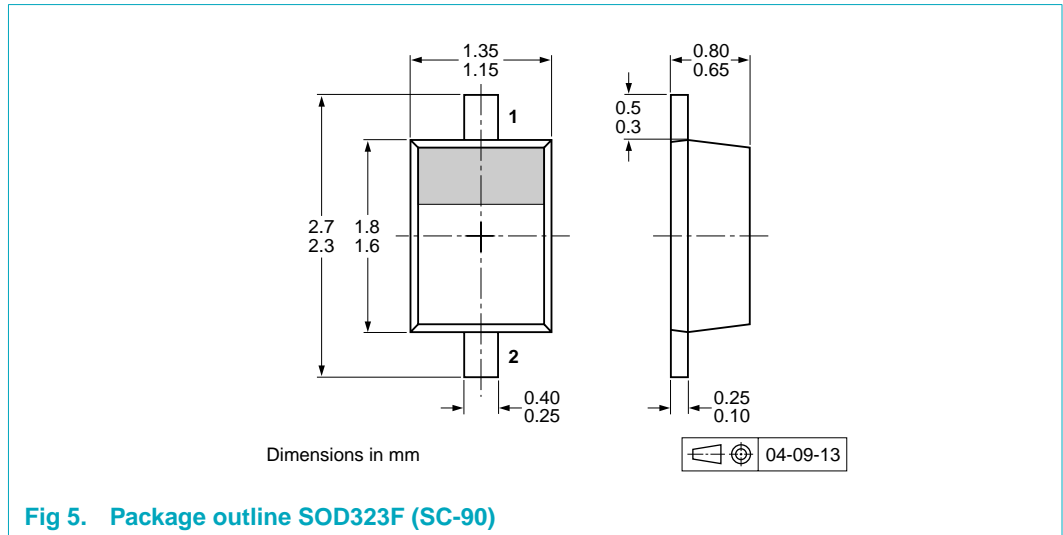
Fig 3. Temperature coefficient as a function of working current; typical values



FR4 PCB, standard footprint

Fig 4. Power derating curve

8. Package outline



9. Packing information

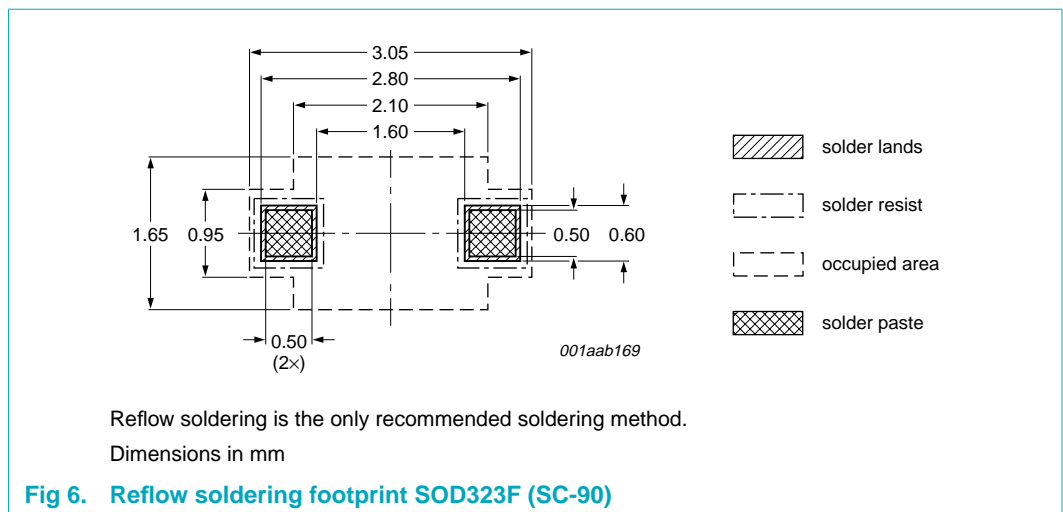
Table 10. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

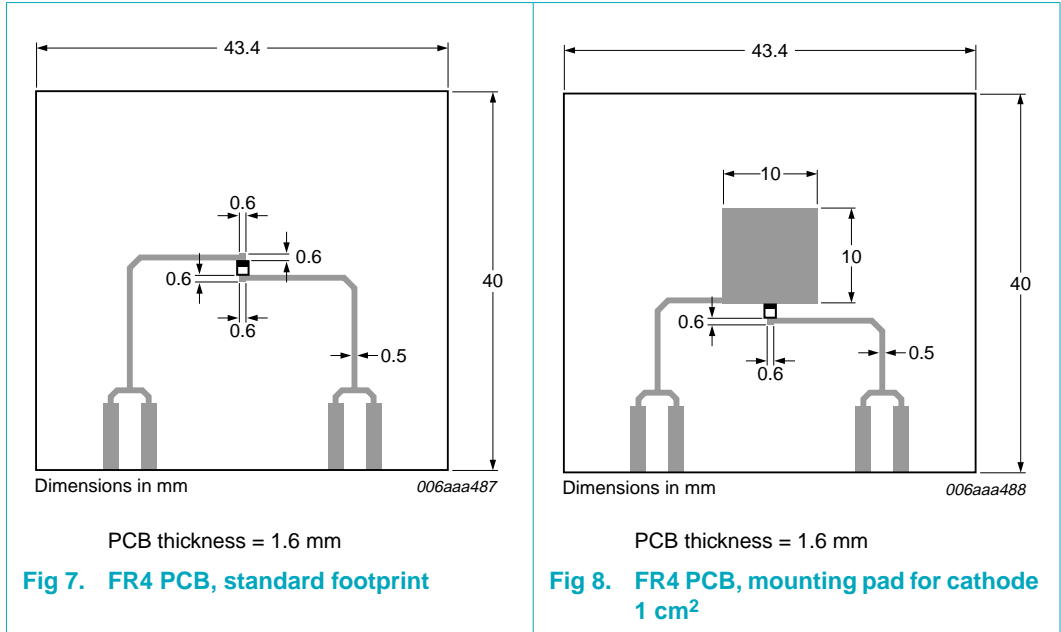
| Type number | Package | Description | Packing quantity | |
|-------------------|---------|--------------------------------|------------------|-------|
| | | | 3000 | 10000 |
| PZU2.4B to PZU36B | SOD323F | 4 mm pitch, 8 mm tape and reel | -115 | -135 |

[1] For further information and the availability of packing methods, see [Section 14](#).

10. Soldering



11. Mounting



12. Revision history

Table 11. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|-------------|--------------|--------------------|---------------|------------|
| PZUXB_SER_1 | 20060307 | Product data sheet | - | - |

13. Legal information

13.1 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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[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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