

# PZUxB series

## Single Zener diodes in a SOD323F package

Rev. 02 — 15 November 2009 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: $t_p \leq 300$ μs; $\delta \leq 0.02$

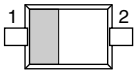
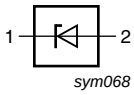
[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

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

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## 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 | - | - | - |



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## 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 | $T_{amb} \leq 25$ °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 μs; square wave; $T_j$ = 25 °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 1cm$^2$.

## 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 1cm$^2$.

[3] Soldering point of cathode tab

## 7. Characteristics

**Table 7. Characteristics**

*$T_j$ = 25 °C unless otherwise specified*

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

[1] Pulse test: $t_p \leq 300$ μs; $\delta \leq 0.02$



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

*$T_j$ = 25 °C unless otherwise specified*

| PZU xxx | Sel | Working voltage $V_Z$ (V); $I_Z$ = 5 mA | | Maximum differential resistance $r_{dif}$ (Ω) | | Reverse current $I_R$ (μA) | | Temperature coefficient $S_Z$ (mV/K); $I_Z$ = 5 mA | Diode capacitance $C_d$ (pF)[1] | Non-repetitive peak reverse current $I_{ZSM}$ (A)[2] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Max | $I_Z$ = 0.5 mA | $I_Z$ = 5 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 MHz; $V_R$ = 0 V

[2] $t_p$ = 100 μs; square wave; $T_j$ = 25 °C prior to surge



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

*$T_j$ = 25 °C unless otherwise specified*

| PZU xxx | Sel | Working voltage $V_Z$ (V); $I_Z$ = 5 mA | | Maximum differential resistance $r_{dif}$ (Ω) | | Reverse current $I_R$ (nA) | | Temperature coefficient $S_Z$ (mV/K); $I_Z$ = 5 mA | Diode capacitance $C_d$ (pF)[1] | Non-repetitive peak reverse current $I_{ZSM}$ (A)[2] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Max | $I_Z$ = 0.5 mA | $I_Z$ = 5 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 |



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

*$T_j$ = 25 °C unless otherwise specified*

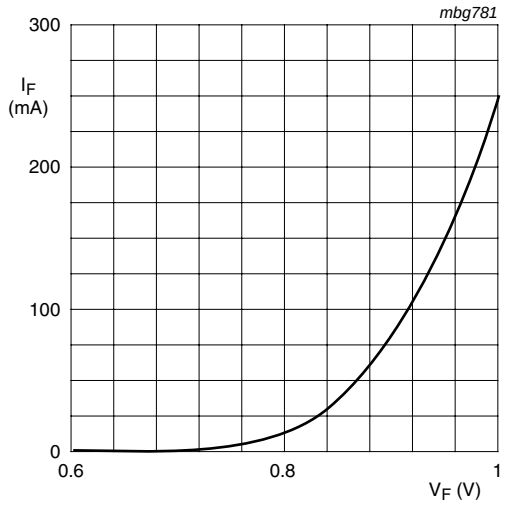
| PZU xxx | Sel | Working voltage $V_Z$ (V); $I_Z$ = 5 mA | | Maximum differential resistance $r_{dif}$ (Ω) | | Reverse current $I_R$ (nA) | | Temperature coefficient $S_Z$ (mV/K); $I_Z$ = 5 mA | Diode capacitance $C_d$ (pF)[1] | Non-repetitive peak reverse current $I_{ZSM}$ (A)[2] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Max | $I_Z$ = 0.5 mA | $I_Z$ = 5 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 MHz; $V_R$ = 0 V

[2] $t_p$ = 100 µs; square wave; $T_j$ = 25 °C prior to surge

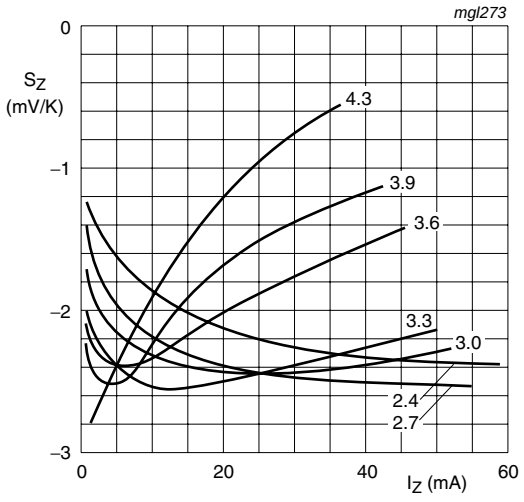


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$T_j$ = 25 °C

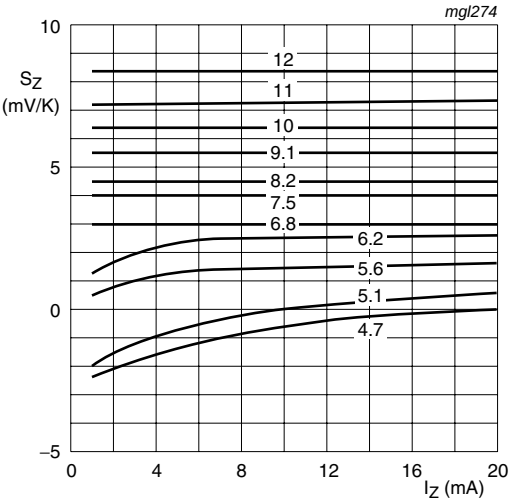
**Fig 1. Forward current as a function of forward voltage; typical values**




PZU2.4B to PZU4.3B

$T_j$ = 25 °C to 150 °C

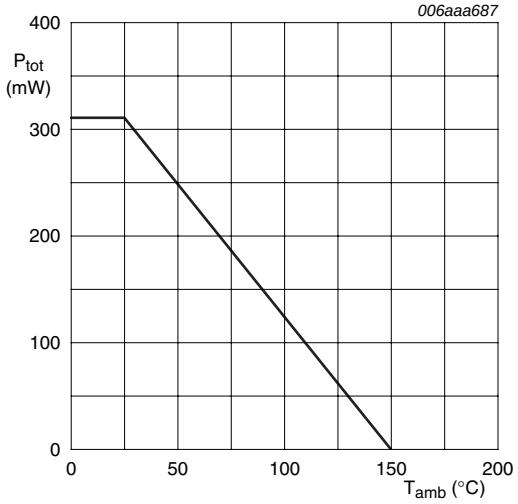
**Fig 2. Temperature coefficient as a function of working current; typical values**




PZU4.7B to PZU12B

$T_j$ = 25 °C to 150 °C

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




FR4 PCB, standard footprint

**Fig 4. Power derating curve**



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## 8. Package outline

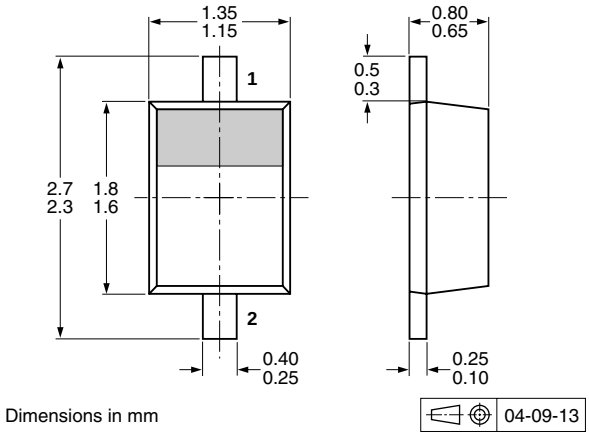



**Fig 5. Package outline SOD323F (SC-90)**

## 9. Packing information

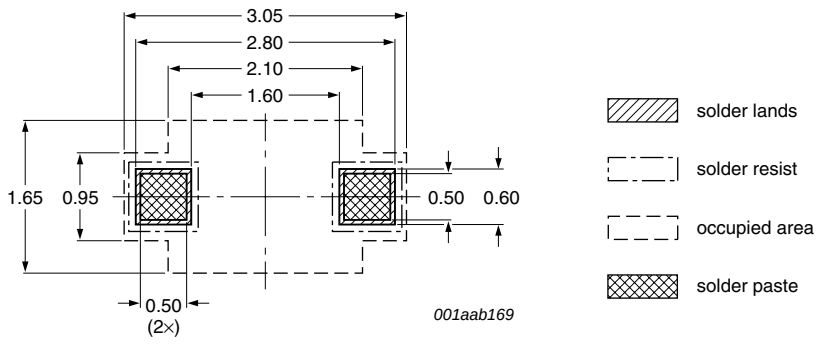
**Table 10. Packing methods**

*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




Reflow soldering is the only recommended soldering method.

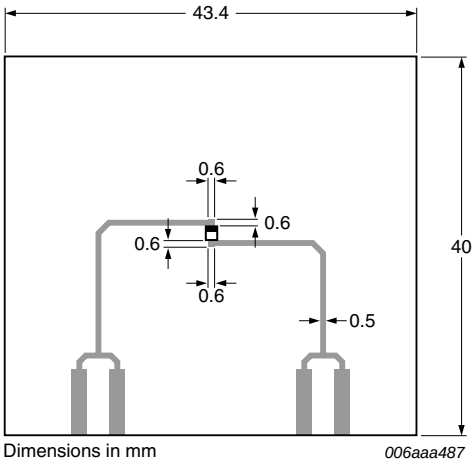
Dimensions in mm

**Fig 6. Reflow soldering footprint SOD323F (SC-90)**



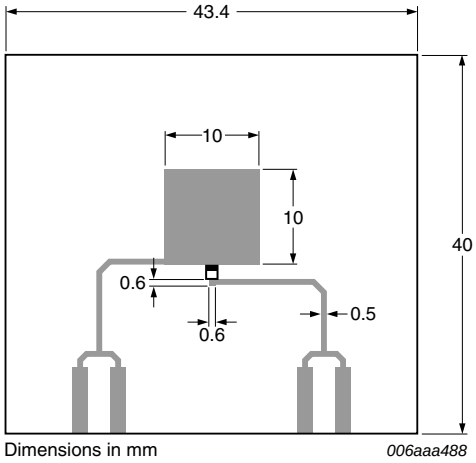
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## 11. Mounting




PCB thickness = 1.6 mm

**Fig 7. FR4 PCB, standard footprint**




PCB thickness = 1.6 mm

**Fig 8. FR4 PCB, mounting pad for cathode 1cm$^2$**



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## 12. Revision history

**Table 11. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| PZUXB_SER_2 | 20091115 | Product data sheet | - | PZUXB_SER_1 |
| Modifications: | • This data sheet was changed to reflect the new company name NXP Semiconductors, including new legal definitions and disclaimers. No changes were made to the technical content. | | | |
| PZUXB_SER_1 | 20060307 | Product data sheet | - | - |



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# 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. |
| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
| Product [short] data sheet | Production | This document contains the product specification. |

[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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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# 14. Contact information

For more information, please visit: **http://www.nxp.com**

For sales office addresses, please send an email to: **salesaddresses@nxp.com**



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