



**THE DATASHEET OF
PZU24DB2,115**



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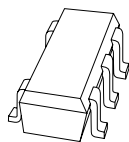
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PZUxDB2 series

Dual Zener diodes

Rev. 01 — 31 March 2008

Product data sheet

1. Product profile

1.1 General description

Dual isolated general-purpose Zener diodes in SOT353 (SC-88A) very small Surface-Mounted Device (SMD) standard plastic and dark-green plastic packages.

1.2 Features

- Non-repetitive peak reverse power dissipation: $P_{ZSM} = 40 \text{ W}$
- Total power dissipation: $P_{tot} \leq 250 \text{ mW}$
- Tolerance series:
B2: approximately $\pm 2 \%$
- Wide working voltage range:
nominal 2.7 V to 24 V
- Dual isolated diodes configuration
- Small standard plastic package suitable for surface-mounted design
- Small dark-green, halogen-free plastic package suitable for surface-mounted design
- AEC-Q101 qualified

1.3 Applications

- General regulation functions

1.4 Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|---|------------------------|-------|-----|-----|------|
| Per diode | | | | | | |
| V_F | forward voltage | $I_F = 100 \text{ mA}$ | [1] - | - | 1.1 | V |
| P_{ZSM} | non-repetitive peak reverse power dissipation | | [2] - | - | 40 | W |

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

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

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-----|-------------------|--------------------|----------------|
| 1 | anode (diode 1) | | |
| 2 | not connected | | |
| 3 | anode (diode 2) | | |
| 4 | cathode (diode 2) | | |
| 5 | cathode (diode 1) | | |

006aab219

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|---|---------|--|---------|
| | Name | Description | Version |
| PZU2.7DB2 to PZU24DB2 ^[1] | SC-88A | plastic surface-mounted package; 5 leads | SOT353 |
| PZU2.7DB2/DG to PZU24DB2/DG ^{[1][2]} | | | |

[1] The series consists of 25 types with nominal working voltages from 2.7 V to 24 V.

[2] /DG: halogen-free plastic package

4. Marking

Table 4. Marking codes

| Type number | Marking code ^[1] | Type number ^[2] | Marking code ^[1] |
|-------------|-----------------------------|----------------------------|-----------------------------|
| PZU2.7DB2 | T1* | PZU2.7DB2/DG | U1* |
| PZU3.0DB2 | T2* | PZU3.0DB2/DG | U2* |
| PZU3.3DB2 | T3* | PZU3.3DB2/DG | U3* |
| PZU3.6DB2 | T4* | PZU3.6DB2/DG | U4* |
| PZU3.9DB2 | T5* | PZU3.9DB2/DG | U5* |
| PZU4.3DB2 | T6* | PZU4.3DB2/DG | U6* |
| PZU4.7DB2 | T7* | PZU4.7DB2/DG | U7* |
| PZU5.1DB2 | T8* | PZU5.1DB2/DG | U8* |
| PZU5.6DB2 | T9* | PZU5.6DB2/DG | U9* |
| PZU6.2DB2 | TA* | PZU6.2DB2/DG | UA* |
| PZU6.8DB2 | TB* | PZU6.8DB2/DG | UB* |
| PZU7.5DB2 | TC* | PZU7.5DB2/DG | UC* |
| PZU8.2DB2 | TD* | PZU8.2DB2/DG | UD* |
| PZU9.1DB2 | TE* | PZU9.1DB2/DG | UE* |

Table 4. Marking codes ...continued

| Type number | Marking code ^[1] | Type number ^[2] | Marking code ^[1] |
|-------------|-----------------------------|----------------------------|-----------------------------|
| PZU10DB2 | TF* | PZU10DB2/DG | UF* |
| PZU11DB2 | TG* | PZU11DB2/DG | UG* |
| PZU12DB2 | TH* | PZU12DB2/DG | UH* |
| PZU13DB2 | TK* | PZU13DB2/DG | UK* |
| PZU14DB2 | TL* | PZU14DB2/DG | UL* |
| PZU15DB2 | TM* | PZU15DB2/DG | UM* |
| PZU16DB2 | TN* | PZU16DB2/DG | UN* |
| PZU18DB2 | TP* | PZU18DB2/DG | UP* |
| PZU20DB2 | TR* | PZU20DB2/DG | UR* |
| PZU22DB2 | TS* | PZU22DB2/DG | US* |
| PZU24DB2 | TT* | PZU24DB2/DG | UT* |

- [1] * = -: made in Hong Kong
 * = p: made in Hong Kong
 * = t: made in Malaysia
 * = W: made in China

- [2] /DG: halogen-free plastic package

5. Limiting values

Table 5. Limiting values

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

| Symbol | Parameter | Conditions | Min | Max | Unit |
|-------------------|---|-----------------------------|------------------|-----------------------------|------|
| Per diode | | | | | |
| I_F | forward current | | - | 200 | mA |
| I_{ZSM} | non-repetitive peak reverse current | | ^[1] - | see Table 8 | |
| P_{ZSM} | non-repetitive peak reverse power dissipation | | ^[1] - | 40 | W |
| Per device | | | | | |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | ^[2] - | 250 | mW |
| | | | ^[3] - | 275 | mW |
| T_j | junction temperature | | - | 150 | °C |
| T_{amb} | ambient temperature | | -55 | +150 | °C |
| T_{stg} | storage temperature | | -65 | +150 | °C |

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

- [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 cm^2 .

6. Thermal characteristics

Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit | |
|-----------------------|--|-------------|-----|-----|-----|------|-----|
| Per device | | | | | | | |
| R _{th(j-a)} | thermal resistance from junction to ambient | in free air | [1] | - | - | 500 | K/W |
| | | | [2] | - | - | 455 | K/W |
| R _{th(j-sp)} | thermal resistance from junction to solder point | | [3] | - | - | 200 | 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 cm².

[3] Soldering points at pin 4 and pin 5.

7. Characteristics

Table 7. Characteristics

T_j = 25 °C unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|-----------------|-------------------------|-----|-----|-----|------|
| Per diode | | | | | | |
| V _F | forward voltage | | [1] | | | |
| | | I _F = 10 mA | - | - | 0.9 | V |
| | | I _F = 100 mA | - | - | 1.1 | V |

[1] Pulse test: t_p ≤ 300 μs; δ ≤ 0.02.

Table 8. Characteristics per type; PZU2.7DB2 to PZU24DB2 and PZU2.7DB2/DG to PZU24DB2/DG

T_j = 25 °C unless otherwise specified.

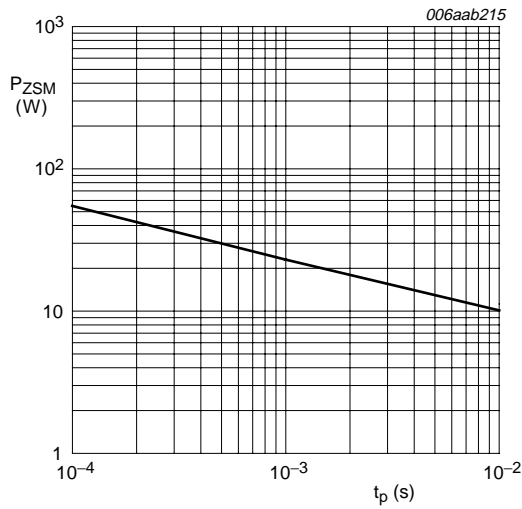
| PZUxDB2 PZUxDB2/DG | Working voltage V _Z (V) | | Differential resistance r _{dif} (Ω) | | Reverse current I _R (μA) | | Temperature coefficient S _Z (mV/K) | Diode capacitance C _d (pF) ^[1] | Non-repetitive peak reverse current I _{ZSM} (A) ^[2] |
|-----------------------|---------------------------------------|------|---|-----------------------|--|--------------------|--|---|--|
| | I _Z = 5 mA | | I _Z = 0.5 mA | I _Z = 5 mA | Max | V _R (V) | I _Z = 5 mA | Max | Max |
| | Min | Max | Max | Max | | | Typ | | |
| 2.7 | 2.65 | 2.9 | 1000 | 100 | 20 | 1 | -2.0 | 440 | 8 |
| 3.0 | 2.95 | 3.2 | 1000 | 95 | 10 | 1 | -2.1 | 425 | 8 |
| 3.3 | 3.25 | 3.5 | 1000 | 95 | 5 | 1 | -2.4 | 410 | 8 |
| 3.6 | 3.55 | 3.8 | 1000 | 90 | 5 | 1 | -2.4 | 390 | 8 |
| 3.9 | 3.87 | 4.1 | 1000 | 90 | 3 | 1 | -2.5 | 370 | 8 |
| 4.3 | 4.15 | 4.34 | 1000 | 90 | 3 | 1 | -2.5 | 350 | 8 |
| 4.7 | 4.55 | 4.75 | 800 | 80 | 2 | 1 | -1.4 | 325 | 8 |
| 5.1 | 4.98 | 5.2 | 250 | 60 | 2 | 1.5 | 0.3 | 300 | 5.5 |
| 5.6 | 5.49 | 5.73 | 100 | 40 | 1 | 2.5 | 1.9 | 275 | 5.5 |
| 6.2 | 6.06 | 6.33 | 80 | 30 | 0.5 | 3 | 2.7 | 250 | 5.5 |
| 6.8 | 6.65 | 6.93 | 60 | 20 | 0.5 | 3.5 | 3.4 | 215 | 5.5 |
| 7.5 | 7.28 | 7.6 | 60 | 10 | 0.5 | 4 | 4.0 | 170 | 3.5 |

Table 8. Characteristics per type; PZU2.7DB2 to PZU24DB2 and PZU2.7DB2/DG to PZU24DB2/DG ...continued
T_j = 25 °C unless otherwise specified.

| PZUxDB2 PZUxDB2/DG | Working voltage V _Z (V) | | Differential resistance r _{dif} (Ω) | | Reverse current I _R (μA) | | Temperature coefficient S _Z (mV/K) | Diode capacitance C _d (pF) ^[1] | Non-repetitive peak reverse current I _{ZSM} (A) ^[2] |
|-----------------------|---------------------------------------|-------|---|-----------------------|--|--------------------|--|---|--|
| | I _Z = 5 mA | | I _Z = 0.5 mA | I _Z = 5 mA | Max | V _R (V) | I _Z = 5 mA | | |
| | Min | Max | Max | Max | | | Typ | Max | Max |
| 8.2 | 8.02 | 8.36 | 60 | 10 | 0.5 | 5 | 4.6 | 150 | 3.5 |
| 9.1 | 8.85 | 9.23 | 60 | 10 | 0.5 | 6 | 5.5 | 120 | 3.5 |
| 10 | 9.77 | 10.21 | 60 | 10 | 0.1 | 7 | 6.4 | 110 | 3.5 |
| 11 | 10.76 | 11.22 | 60 | 10 | 0.1 | 8 | 7.4 | 108 | 3 |
| 12 | 11.74 | 12.24 | 80 | 10 | 0.1 | 9 | 8.4 | 105 | 3 |
| 13 | 12.91 | 13.49 | 80 | 10 | 0.1 | 10 | 9.4 | 103 | 2.5 |
| 14 | 13.7 | 14.3 | 80 | 10 | 0.1 | 11 | 10.4 | 101 | 2 |
| 15 | 14.34 | 14.98 | 80 | 15 | 0.05 | 11 | 11.4 | 99 | 2 |
| 16 | 15.85 | 16.51 | 80 | 20 | 0.05 | 12 | 12.4 | 97 | 1.5 |
| 18 | 17.56 | 18.35 | 80 | 20 | 0.05 | 13 | 14.4 | 93 | 1.5 |
| 20 | 19.52 | 20.39 | 100 | 20 | 0.05 | 15 | 16.4 | 88 | 1.5 |
| 22 | 21.54 | 22.47 | 100 | 25 | 0.05 | 17 | 18.4 | 84 | 1.3 |
| 24 | 23.72 | 24.78 | 120 | 30 | 0.05 | 19 | 20.4 | 80 | 1.3 |

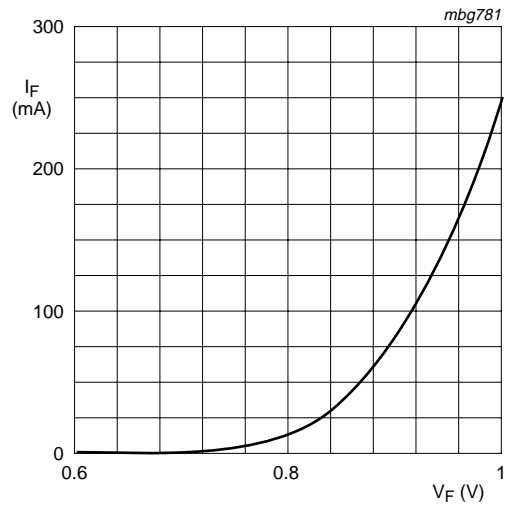
[1] f = 1 MHz; V_R = 0 V

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



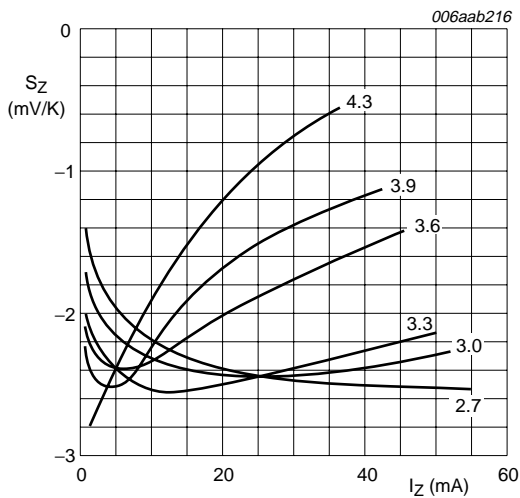
$T_j = 25\text{ }^\circ\text{C}$ (prior to surge)

Fig 1. Non-repetitive peak reverse power dissipation as a function of pulse duration; maximum values



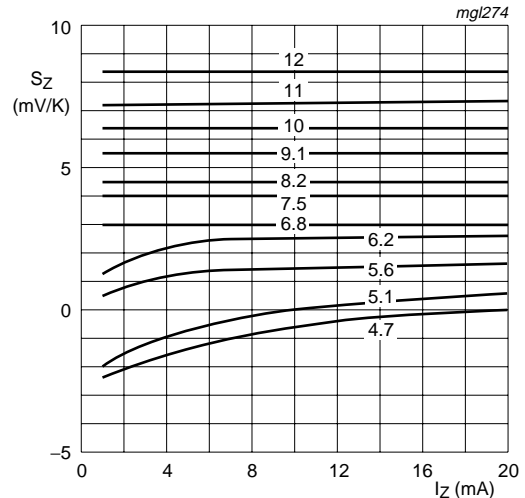
$T_j = 25\text{ }^\circ\text{C}$

Fig 2. Forward current as a function of forward voltage; typical values



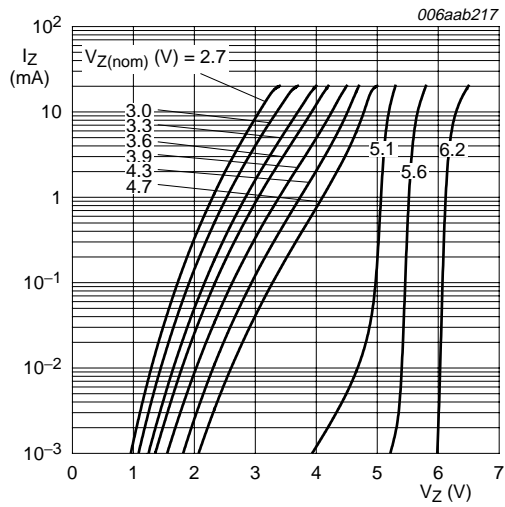
$T_j = 25\text{ }^\circ\text{C}$ to $150\text{ }^\circ\text{C}$
 PZU2.7DB2 to PZU4.3DB2
 PZU2.7DB2/DG to PZU4.3DB2/DG

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



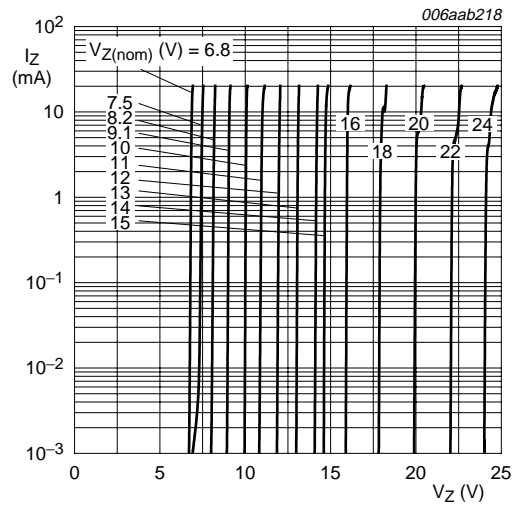
$T_j = 25\text{ }^\circ\text{C}$ to $150\text{ }^\circ\text{C}$
 PZU4.7DB2 to PZU12DB2
 PZU4.7DB2/DG to PZU12DB2/DG

Fig 4. Temperature coefficient as a function of working current; typical values



$T_j = 25\text{ }^\circ\text{C}$
 PZU2.7DB2 to PZU6.2DB2
 PZU2.7DB2/DG to PZU6.2DB2/DG

Fig 5. Working current as a function of working voltage; typical values



$T_j = 25\text{ }^\circ\text{C}$
 PZU6.8DB2 to PZU24DB2
 PZU6.8DB2/DG to PZU24DB2/DG

Fig 6. Working current as a function of working voltage; typical values

8. Test information

8.1 Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard *Q101 - Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

9. Package outline

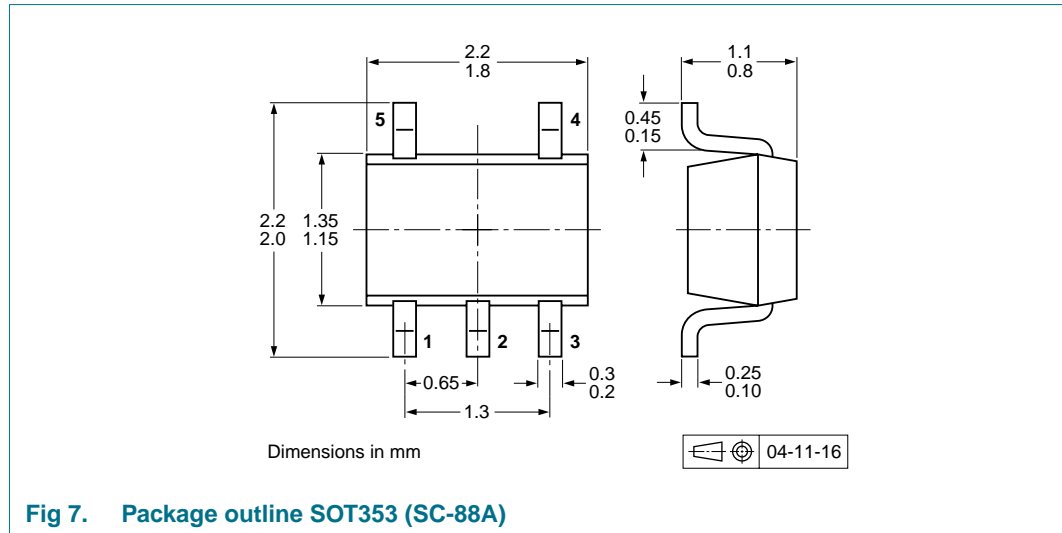


Fig 7. Package outline SOT353 (SC-88A)

10. Packing information

Table 9. Packing methods

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

| Type number | Package | Description | Packing quantity | |
|--------------------------------|---------|--------------------------------|------------------|-------|
| | | | 3000 | 10000 |
| PZU2.7DB2 to PZU24DB2 | SOT353 | 4 mm pitch, 8 mm tape and reel | -115 | -135 |
| PZU2.7DB2/DG to PZU24DB2/DG | | | | |

[1] For further information and the availability of packing methods, see [Section 13](#).

11. Soldering

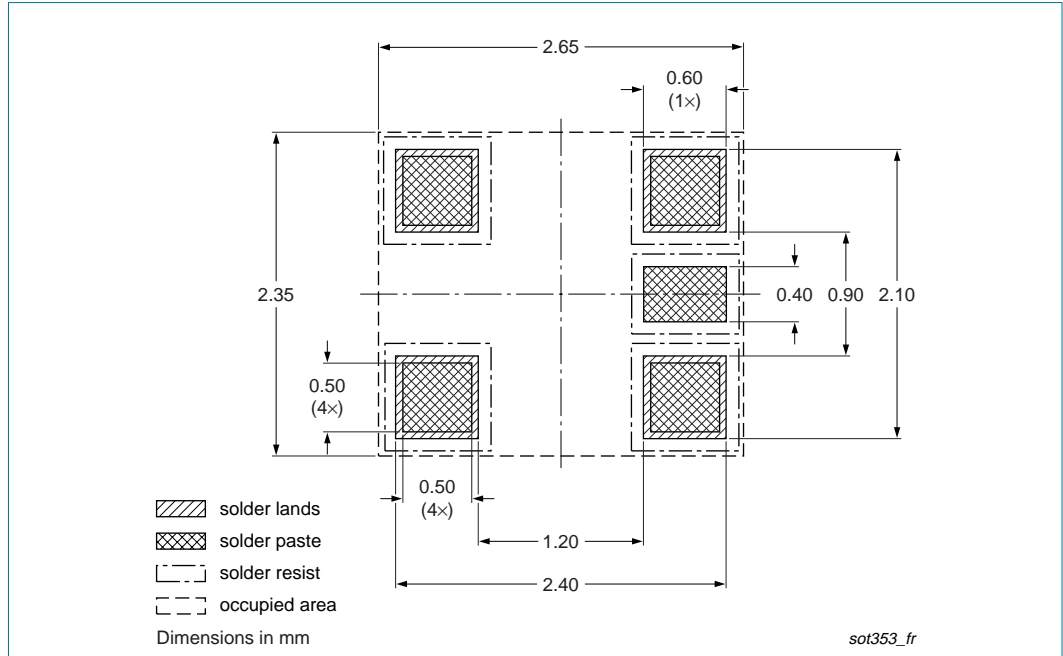


Fig 8. Reflow soldering footprint SOT353 (SC-88A)

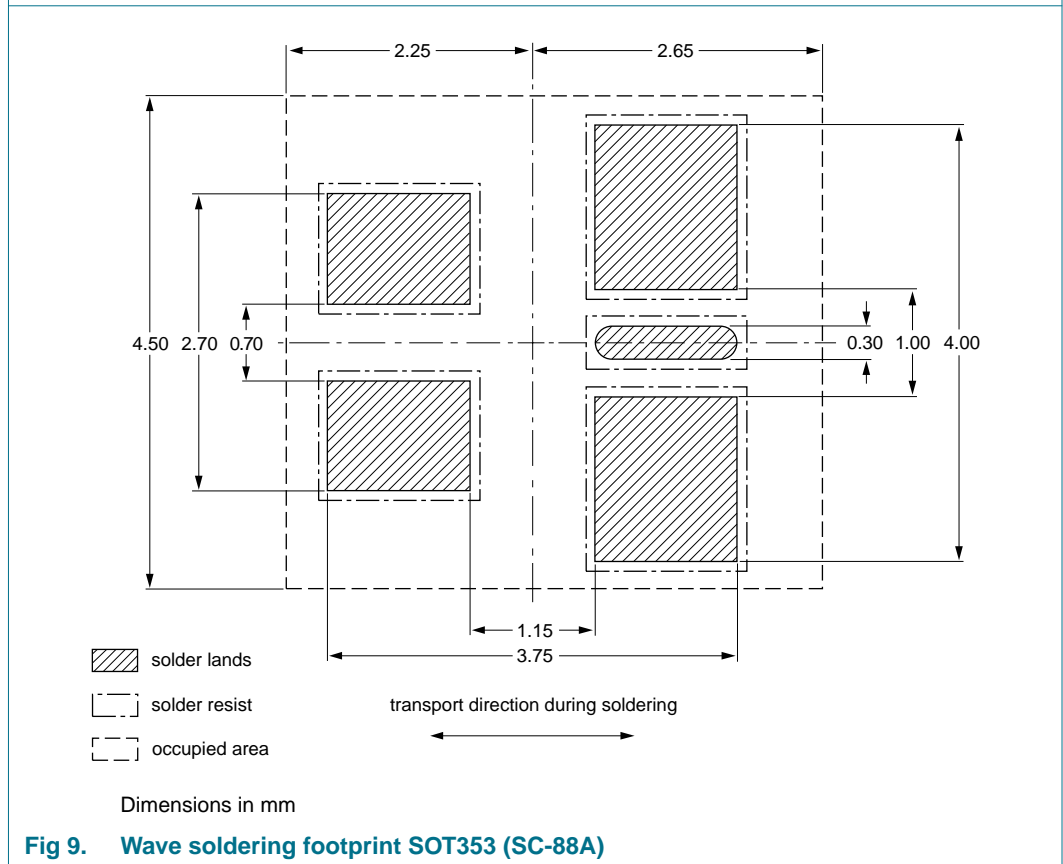


Fig 9. Wave soldering footprint SOT353 (SC-88A)

12. Revision history

Table 10. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---------------|--------------|--------------------|---------------|------------|
| PZUXDB2_SER_1 | 20080331 | 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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[2] The term 'short data sheet' is explained in section "Definitions".

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