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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
<b>Per diode</b>						
$V_F$	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:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.02$ .

[2]  $t_p = 100\text{ }\mu\text{s}$ ; 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 <sup>[1]</sup>	SC-88A	plastic surface-mounted package; 5 leads	SOT353
PZU2.7DB2/DG to PZU24DB2/DG <sup>[1][2]</sup>			

[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 <sup>[1]</sup>	Type number <sup>[2]</sup>	Marking code <sup>[1]</sup>
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 <sup>[1]</sup>	Type number <sup>[2]</sup>	Marking code <sup>[1]</sup>
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
<b>Per diode</b>					
$I_F$	forward current		-	200	mA
$I_{ZSM}$	non-repetitive peak reverse current		<sup>[1]</sup> -	see <a href="#">Table 8</a>	
$P_{ZSM}$	non-repetitive peak reverse power dissipation		<sup>[1]</sup> -	40	W
<b>Per device</b>					
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	<sup>[2]</sup> -	250	mW
			<sup>[3]</sup> -	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  $1\text{ cm}^2$ .

## 6. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
<b>Per device</b>							
$R_{th(j-a)}$	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 cm<sup>2</sup>.

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

## 7. Characteristics

**Table 7. Characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Per diode</b>						
$V_F$	forward voltage		[1]			
		$I_F = 10\text{ mA}$	-	-	0.9	V
		$I_F = 100\text{ mA}$	-	-	1.1	V

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

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

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

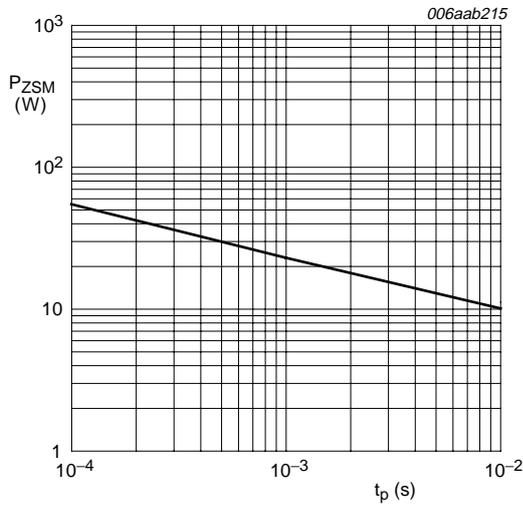
PZUxDB2 PZUxDB2/DG	Working voltage $V_Z$ (V)		Differential resistance $r_{dif}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu\text{A}$ )		Temperature coefficient $S_Z$ (mV/K)	Diode capacitance $C_d$ (pF) <sup>[1]</sup>	Non-repetitive peak reverse current $I_{ZSM}$ (A) <sup>[2]</sup>
	$I_Z = 5\text{ mA}$		$I_Z = 0.5\text{ mA}$	$I_Z = 5\text{ mA}$	Max	$V_R$ (V)	$I_Z = 5\text{ mA}$	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<sub>j</sub> = 25 °C unless otherwise specified.*

PZUxDB2 PZUxDB2/DG	Working voltage V <sub>Z</sub> (V)		Differential resistance r <sub>dif</sub> (Ω)		Reverse current I <sub>R</sub> (μA)		Temperature coefficient S <sub>Z</sub> (mV/K)	Diode capacitance C <sub>d</sub> (pF) <sup>[1]</sup>	Non-repetitive peak reverse current I <sub>ZSM</sub> (A) <sup>[2]</sup>
			I <sub>Z</sub> = 0.5 mA	I <sub>Z</sub> = 5 mA			I <sub>Z</sub> = 5 mA		
	Min	Max	Max	Max	Max	V <sub>R</sub> (V)	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

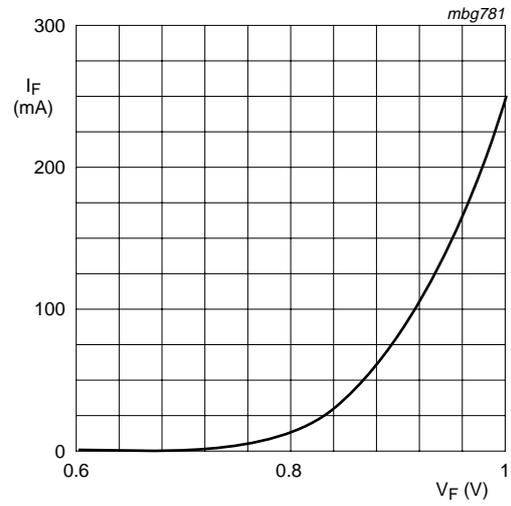
[1] f = 1 MHz; V<sub>R</sub> = 0 V

[2] t<sub>p</sub> = 100 μs; square wave; T<sub>j</sub> = 25 °C prior to surge



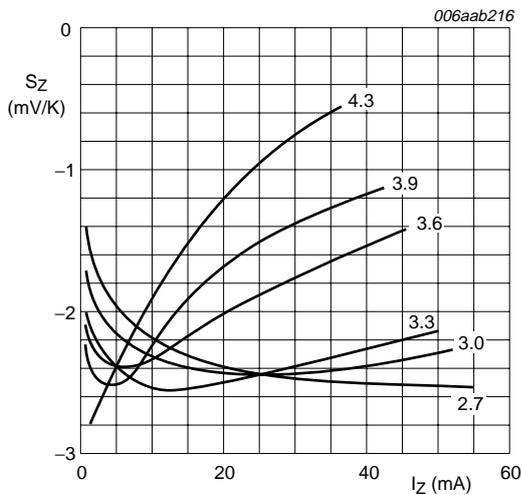
$T_j = 25\text{ }^\circ\text{C}$  (prior to surge)

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



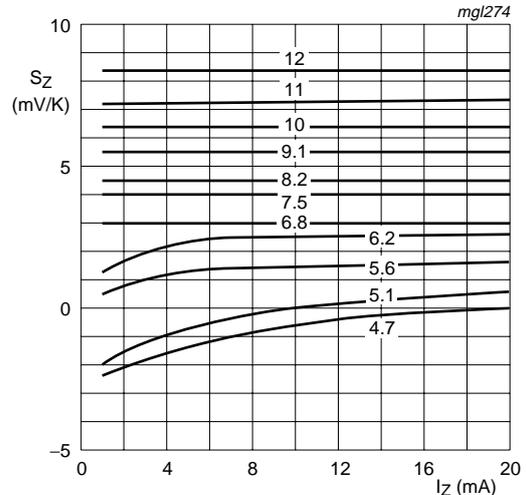
$T_j = 25\text{ }^\circ\text{C}$

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



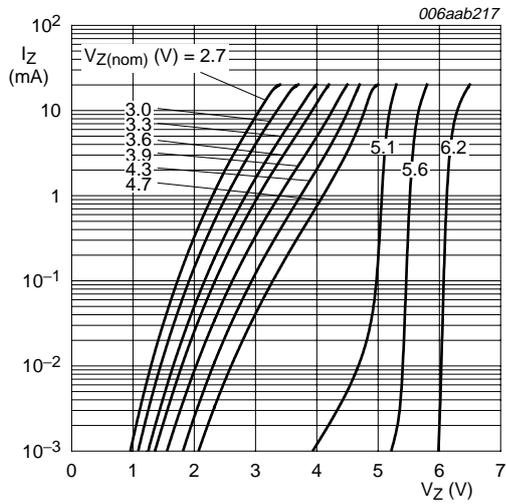
$T_j = 25\text{ }^\circ\text{C}$  to  $150\text{ }^\circ\text{C}$   
 PZU2.7DB2 to PZU4.3DB2  
 PZU2.7DB2/DG to PZU4.3DB2/DG

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



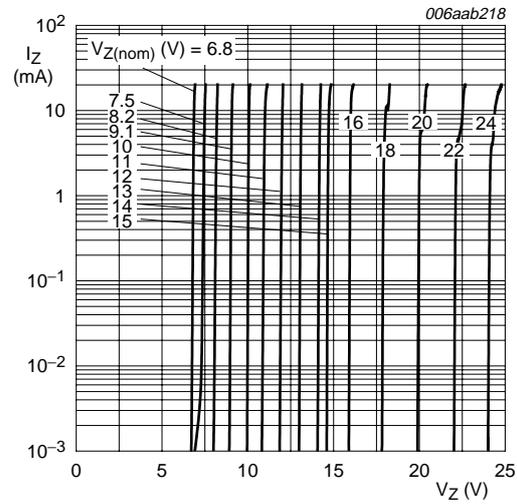
$T_j = 25\text{ }^\circ\text{C}$  to  $150\text{ }^\circ\text{C}$   
 PZU4.7DB2 to PZU12DB2  
 PZU4.7DB2/DG to PZU12DB2/DG

**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

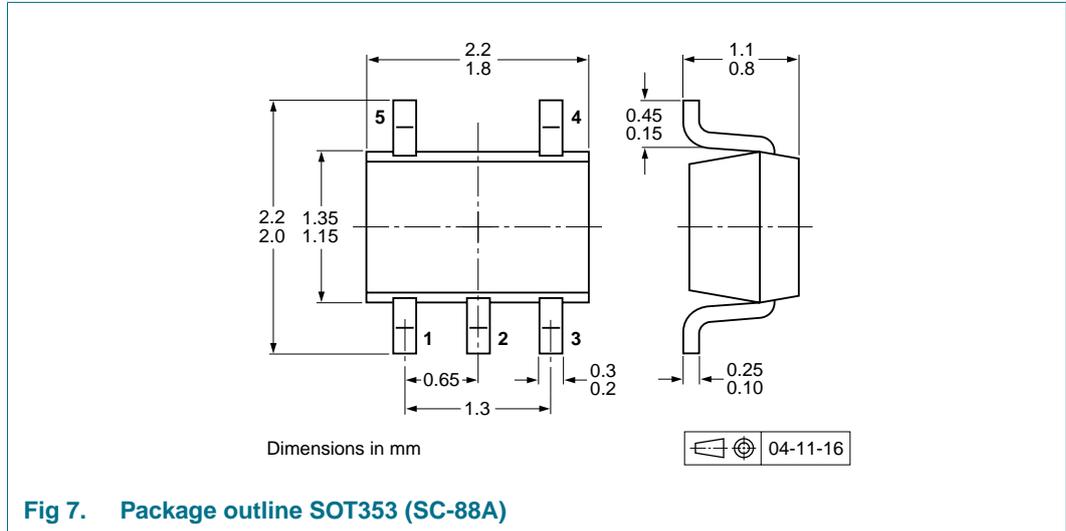
**Fig 6. Working current as a function of working voltage; typical values**

## 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



## 10. Packing information

**Table 9. Packing methods**

The indicated -xxx are the last three digits of the 12NC ordering code.<sup>[1]</sup>

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

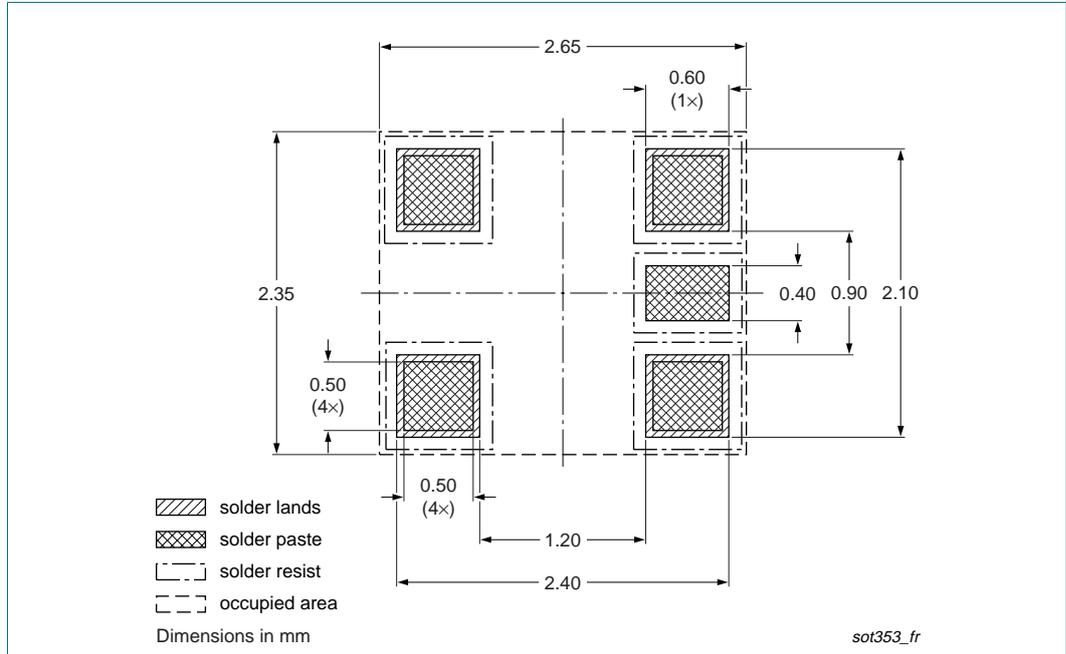


Fig 8. Reflow soldering footprint SOT353 (SC-88A)

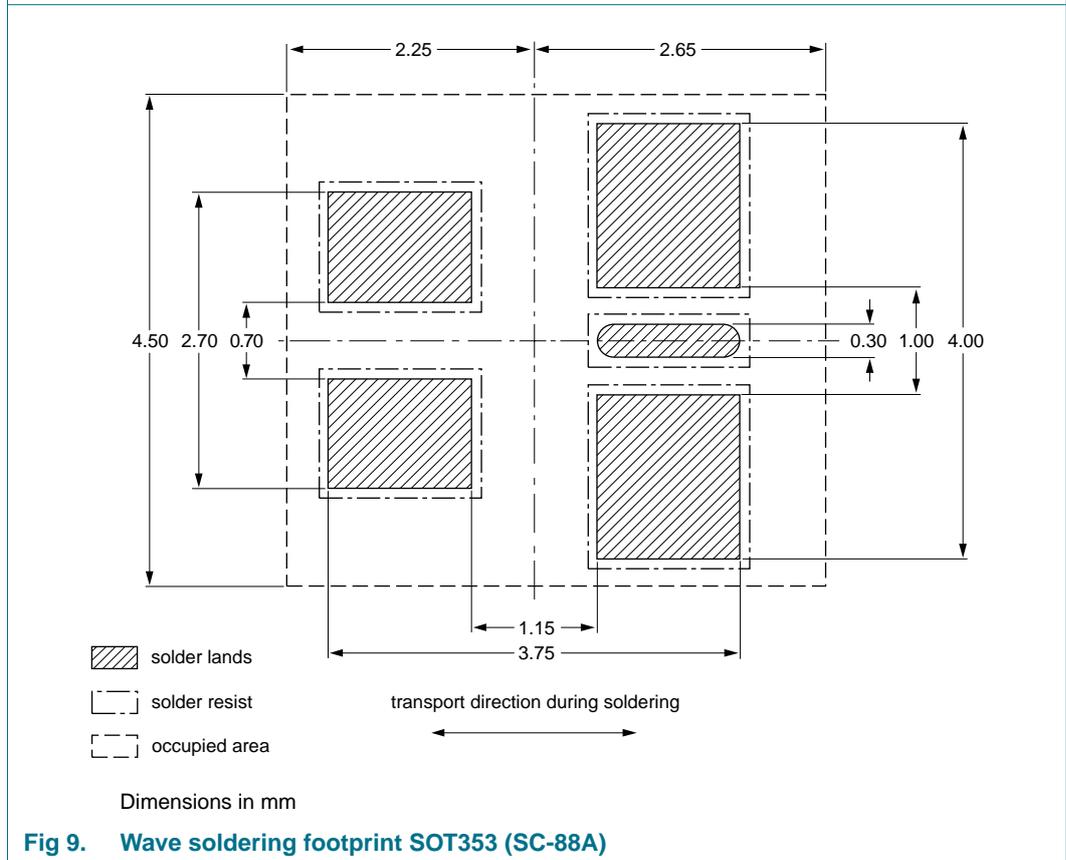


Fig 9. Wave soldering footprint SOT353 (SC-88A)

## 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 <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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.
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