

PZUxBA series

Single Zener diodes

Rev. 01 — 19 September 2008 **Product data sheet**

1. Product profile

1.1 General description

General-purpose Zener diodes in a SOD323 (SC-76) very small Surface-Mounted Device (SMD) plastic package.

1.2 Features

- Non-repetitive peak reverse power dissipation: $P_{ZSM} \leq 40$ W
- Total power dissipation: $P_{tot} \leq 320$ mW
- Tolerance series:
  B: approximately ±5 %;
  B1, B2, B3: approximately ±2 %
- Wide working voltage range:
  nominal 2.4 V to 36 V (E24 range)
- Low reverse current I_R range
- Small 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
V_F	forward voltage	I_F = 100 mA	[1]	-	-	1.1	V
P_{ZSM}	non-repetitive peak reverse power dissipation		[2]	-	-	40	W
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[3]	-	-	320	mW

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

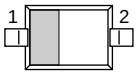
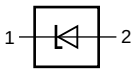
[2] t_p = 100 µs; square wave; T_j = 25 °C prior to surge

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

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2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	cathode [1]		
2	anode		

006aaa152

[1] The marking bar indicates the cathode.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PZU2.4BA to PZU36BA[1]	SC-76	plastic surface-mounted package; 2 leads	SOD323
PZU2.4BA/DG to PZU36BA/DG[1][2]			

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

[2] /DG: halogen-free

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4. Marking

Table 4. Marking codes

Type number[1]	Marking code				Type number[1]	Marking code			
	B	B1	B2	B3		B	B1	B2	B3
PZU2.4*A	X8	-	-	-	PZU2.4*A/DG	Y8	-	-	-
PZU2.7*A	X9	XA	XB	-	PZU2.7*A/DG	Y9	YA	YB	-
PZU3.0*A	XT	XU	XV	-	PZU3.0*A/DG	YT	YU	YV	-
PZU3.3*A	XW	XX	XY	-	PZU3.3*A/DG	YW	YX	YY	-
PZU3.6*A	XZ	MC	MD	-	PZU3.6*A/DG	YZ	NC	ND	-
PZU3.9*A	ME	MF	MG	-	PZU3.9*A/DG	NE	NF	NG	-
PZU4.3*A	MM	MN	MP	MR	PZU4.3*A/DG	NM	NN	NP	NR
PZU4.7*A	MS	MT	MU	MV	PZU4.7*A/DG	NS	NT	NU	NV
PZU5.1*A	MW	MX	MY	MZ	PZU5.1*A/DG	NW	NX	NY	NZ
PZU5.6*A	LF	LG	LH	LK	PZU5.6*A/DG	RF	RG	RH	RK
PZU6.2*A	LL	LM	LN	LP	PZU6.2*A/DG	RL	RM	RN	RP
PZU6.8*A	LR	LS	LT	LU	PZU6.8*A/DG	RR	RS	RT	RU
PZU7.5*A	LV	LW	LX	LY	PZU7.5*A/DG	RV	RW	RX	RY
PZU8.2*A	LZ	CR	CS	CT	PZU8.2*A/DG	RZ	ER	ES	ET
PZU9.1*A	CU	CV	CW	CX	PZU9.1*A/DG	EU	EV	EW	EX
PZU10*A	VA	VB	VC	VD	PZU10*A/DG	WA	WB	WC	WD
PZU11*A	VE	VF	VG	VH	PZU11*A/DG	WE	WF	WG	WH
PZU12*A	VK	VL	VM	VN	PZU12*A/DG	WK	WL	WM	WN
PZU13*A	VP	VR	VS	VT	PZU13*A/DG	WP	WR	WS	WT
PZU14*A	-	-	VU	-	PZU14*A/DG	-	-	WU	-
PZU15*A	VV	VW	VX	VY	PZU15*A/DG	WV	WW	WX	WY
PZU16*A	VZ	X1	X2	X3	PZU16*A/DG	WZ	Y1	Y2	Y3
PZU18*A	X4	X5	X6	X7	PZU18*A/DG	Y4	Y5	Y6	Y7
PZU20*A	XC	XD	XE	XF	PZU20*A/DG	YC	YD	YE	YF
PZU22*A	XG	XH	XK	XL	PZU22*A/DG	YG	YH	YK	YL
PZU24*A	XM	XN	XP	XR	PZU24*A/DG	YM	YN	YP	YR
PZU27*A	XS	-	-	-	PZU27*A/DG	YS	-	-	-
PZU30*A	MH	-	-	-	PZU30*A/DG	NH	-	-	-
PZU33*A	MK	-	-	-	PZU33*A/DG	NK	-	-	-
PZU36*A	ML	-	-	-	PZU36*A/DG	NL	-	-	-

[1] * = B: tolerance series B, approximately ±5 %
* = B1, B2, B3: tolerance series B1, B2, B3: approximately ±2 %

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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		[1]	-	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]	-	320	mW
			[3]	-	490	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 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 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]	-	-	390	K/W
			[2]	-	-	255	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 °C unless otherwise specified.

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

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

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Table 8. Characteristics per type; PZU2.4BA to PZU5.6B3A and PZU2.4BA/DG to PZU5.6B3A/DG

T_j = 25 °C unless otherwise specified.

PZUxBA	Sel	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			I_Z = 5 mA		
		Min	Max	Max	Max	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	2.8	3.2	1000	95	10	1	−2.1	425	8
	B1	2.8	3.05							
	B2	2.95	3.2							
3.3	B	3.1	3.5	1000	95	5	1	−2.4	410	8
	B1	3.1	3.35							
	B2	3.25	3.5							
3.6	B	3.4	3.8	1000	90	5	1	−2.4	390	8
	B1	3.4	3.65							
	B2	3.55	3.8							
3.9	B	3.7	4.1	1000	90	3	1	−2.5	370	8
	B1	3.7	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	4.9	800	80	2	1	−1.4	325	8
	B1	4.42	4.61							
	B2	4.55	4.75							
	B3	4.69	4.9							
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	5.2							
	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; PZU6.2BA to PZU36BA and PZU6.2BA/DG to PZU36BA/DG

T_j = 25 °C unless otherwise specified.

PZUxBA	Sel	Working voltage V_Z (V)		Differential resistance r_{dif} (Ω)		Reverse current I_R (nA)		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			I_Z = 5 mA		
		Min	Max	Max	Max	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	8.1							
	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	11.1	11.56							
12	B	11.42	12.6	80	10	100	9	8.4	105	3
	B1	11.42	11.9							
	B2	11.74	12.24							
	B3	12.08	12.6							
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							

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Table 9. Characteristics per type; PZU6.2BA to PZU36BA and PZU6.2BA/DG to PZU36BA/DG *...continued*

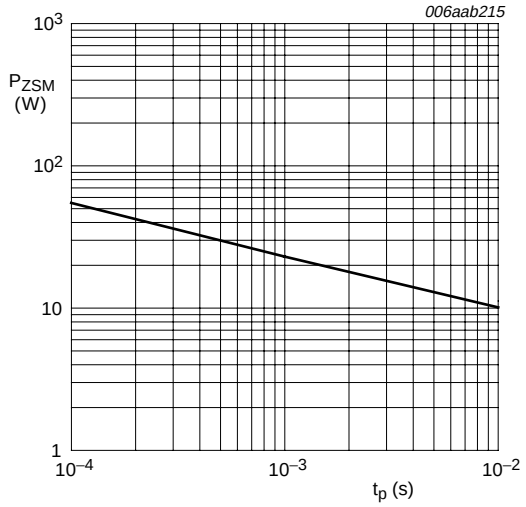
T_j = 25 °C unless otherwise specified.

PZUxBA	Sel	Working voltage V_Z (V)		Differential resistance r_{dif} (Ω)		Reverse current I_R (nA)		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			I_Z = 5 mA		
		Min	Max	Max	Max	Max	V_R (V)	Typ	Max	Max
14	B2	13.70	14.30	80	10	100	11	10.4	101	2
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	17.7							
	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	19.7							
	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

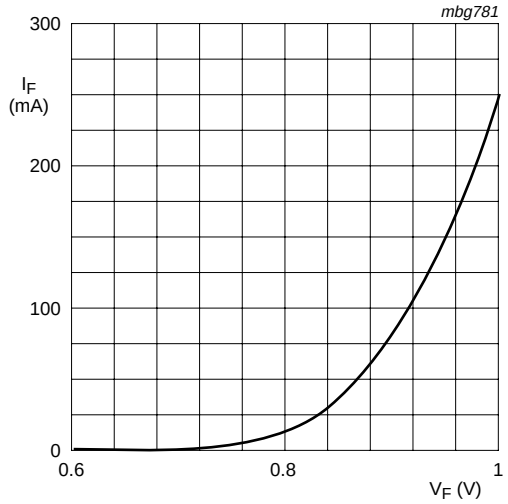
[2] t_p = 100 µs; square wave; T_j = 25 °C prior to surge

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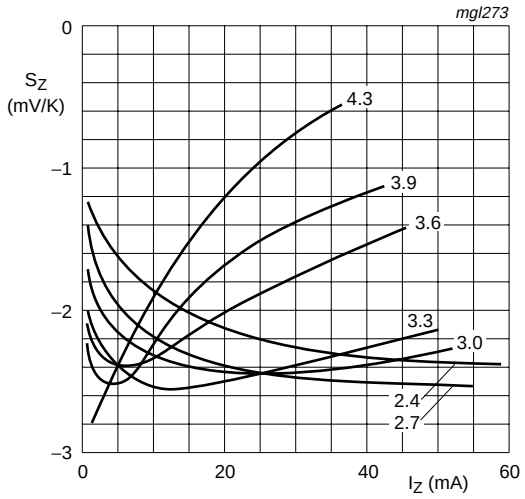
T_j = 25 °C (prior to surge)

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



T_j = 25 °C

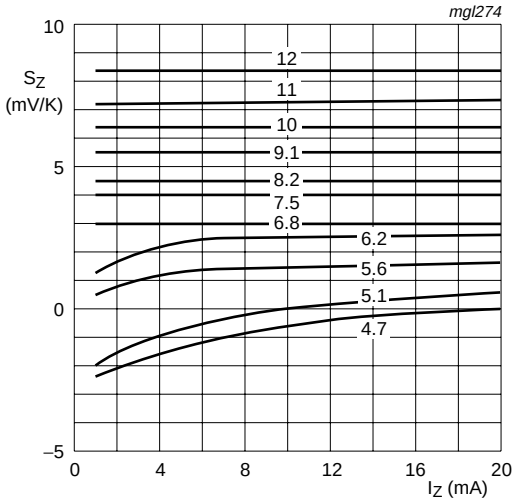
Fig 2. Forward current as a function of forward voltage; typical values



T_j = 25 °C to 150 °C

V_Z = 2.4 V to 4.3 V

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

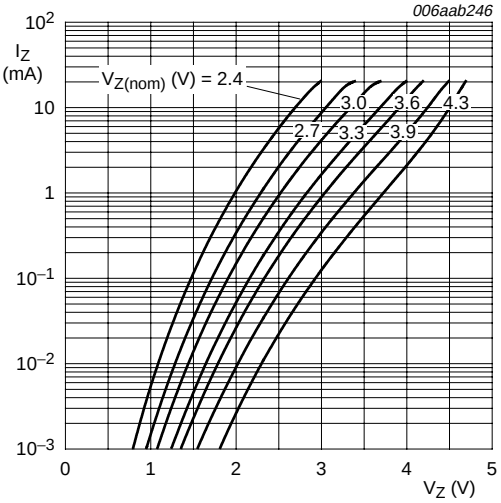


T_j = 25 °C to 150 °C

V_Z = 4.7 V to 12 V

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

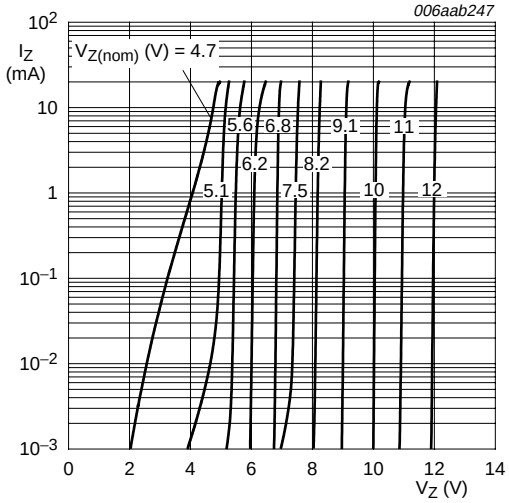
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T_j = 25 °C

V_Z = 2.4 V to 4.3 V

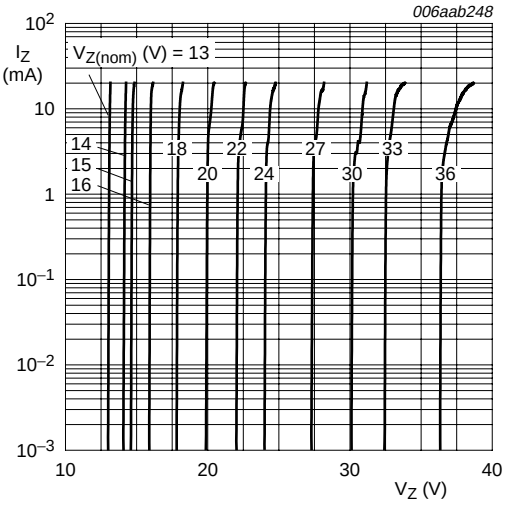
Fig 5. Working current as a function of working voltage; typical values



T_j = 25 °C

V_Z = 4.7 V to 12 V

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



T_j = 25 °C

V_Z = 13 V to 36 V

Fig 7. Working current as a function of working voltage; typical values

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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

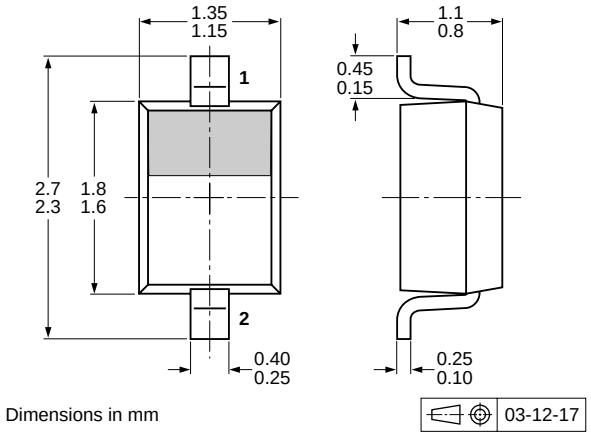


Fig 8. Package outline SOD323 (SC-76)

10. 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
PZU2.4BA to PZU36BA	SOD323	4 mm pitch, 8 mm tape and reel	-115	-135
PZU2.4BA/DG to PZU36BA/DG				

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

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11. Soldering

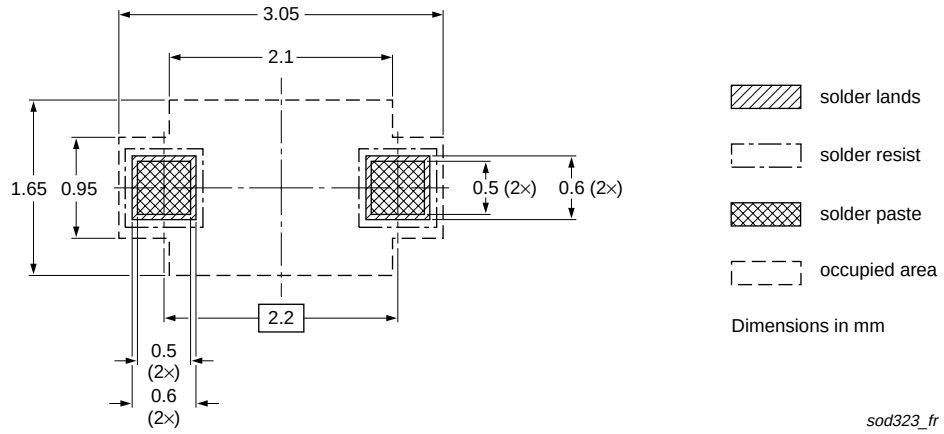


Fig 9. Reflow soldering footprint SOD323 (SC-76)

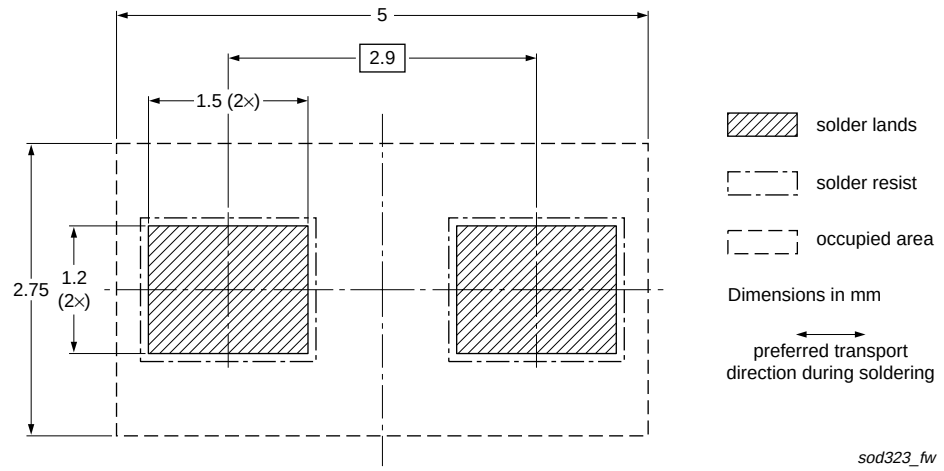


Fig 10. Wave soldering footprint SOD323 (SC-76)

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12. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PZUXBA_SER_1	20080919	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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