

## Important notice

Dear Customer,

On 7 February 2017 the former NXP Standard Product business became a new company with the tradename **Nexperia**. Nexperia is an industry leading supplier of Discrete, Logic and PowerMOS semiconductors with its focus on the automotive, industrial, computing, consumer and wearable application markets

In data sheets and application notes which still contain NXP or Philips Semiconductors references, use the references to Nexperia, as shown below.

Instead of <http://www.nxp.com>, <http://www.philips.com/> or <http://www.semiconductors.philips.com/>, use <http://www.nexperia.com>

Instead of [sales.addresses@www.nxp.com](mailto:sales.addresses@www.nxp.com) or [sales.addresses@www.semiconductors.philips.com](mailto:sales.addresses@www.semiconductors.philips.com), use [salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com) (email)

Replace the copyright notice at the bottom of each page or elsewhere in the document, depending on the version, as shown below:

- © NXP N.V. (year). All rights reserved or © Koninklijke Philips Electronics N.V. (year). All rights reserved

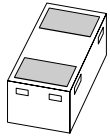
Should be replaced with:

- © **Nexperia B.V. (year). All rights reserved.**

If you have any questions related to the data sheet, please contact our nearest sales office via e-mail or telephone (details via [salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com)). Thank you for your cooperation and understanding,

Kind regards,

Team Nexperia



# PZUxBL series

## Single Zener diodes

Rev. 01 — 6 May 2008

Product data sheet

## 1. Product profile

### 1.1 General description

General-purpose Zener diodes in SOD882 leadless ultra small Surface-Mounted Device (SMD) plastic package.

### 1.2 Features

- Non-repetitive peak reverse power dissipation:  $P_{ZSM} \leq 40 \text{ W}$
- Total power dissipation:  $P_{tot} \leq 250 \text{ mW}$
- Tolerance series:  
B: approximately  $\pm 5 \%$ ;  
B2: approximately  $\pm 2 \%$
- 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	$I_F = 100 \text{ mA}$	[1] -	-	1.1	V
$P_{ZSM}$	non-repetitive peak reverse power dissipation		[2] -	-	40	W
$P_{tot}$	total power dissipation	$T_{amb} \leq 25 \text{ }^\circ\text{C}$	[3][4] -	-	250	mW

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


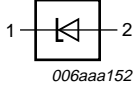
[2]  $t_p = 100 \text{ } \mu\text{s}$ ; square wave;  $T_j = 25 \text{ }^\circ\text{C}$  prior to surge

[3] Reflow soldering is the only recommended soldering method.

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

## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	cathode	 <p>Transparent top view</p>	
2	anode		

[1] The marking bar indicates the cathode.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
PZU2.4BL to PZU36BL[1]	-	leadless ultra small plastic package; 2 terminals; body 1.0 × 0.6 × 0.5 mm	SOD882
PZU2.7B2L to PZU24B2L[2]			

[1] The series consists of 29 types with nominal working voltages from 2.4 V to 36 V.

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

## 4. Marking

Table 4. Marking codes

Type number	Marking code	Type number	Marking code
PZU2.4BL	H2	PZU2.7B2L	HZ
PZU2.7BL	H3	PZU3.0B2L	K1
PZU3.0BL	H4	PZU3.3B2L	K2
PZU3.3BL	H5	PZU3.6B2L	K3
PZU3.6BL	H6	PZU3.9B2L	K4
PZU3.9BL	H7	PZU4.3B2L	K5
PZU4.3BL	H8	PZU4.7B2L	K6
PZU4.7BL	H9	PZU5.1B2L	K7
PZU5.1BL	HA	PZU5.6B2L	K8
PZU5.6BL	HB	PZU6.2B2L	H1
PZU6.2BL	HC	PZU6.8B2L	K9
PZU6.8BL	HD	PZU7.5B2L	KA
PZU7.5BL	HE	PZU8.2B2L	KB
PZU8.2BL	HF	PZU9.1B2L	KC
PZU9.1BL	HG	PZU10B2L	KD
PZU10BL	HH	PZU11B2L	KE
PZU11BL	HK	PZU12B2L	KF

Table 4. Marking codes ...continued

Type number	Marking code	Type number	Marking code
PZU12BL	HL	PZU13B2L	KG
PZU13BL	HM	PZU14B2L	KH
PZU15BL	HN	PZU15B2L	KK
PZU16BL	HP	PZU16B2L	KL
PZU18BL	HR	PZU18B2L	KM
PZU20BL	HS	PZU20B2L	KN
PZU22BL	HT	PZU22B2L	KP
PZU24BL	HU	PZU24B2L	KR
PZU27BL	HV	-	-
PZU30BL	HW	-	-
PZU33BL	HX	-	-
PZU36BL	HY	-	-

## 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 <a href="#">Table 8</a> and <a href="#">9</a>	
$P_{ZSM}$	non-repetitive peak reverse power dissipation		[1] -	40	W
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	[2][3] -	250	mW
			[2][4] -	500	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] Reflow soldering is the only recommended soldering method.

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

[4] 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	
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1][2]	-	-	500	K/W
			[1][3]	-	-	250	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[4]	-	-	55	K/W

[1] Reflow soldering is the only recommended soldering method.

[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<sup>2</sup>.

[4] Soldering point of cathode tab.

## 7. Characteristics

**Table 7. Characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$V_F$	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; PZU2.4BL to PZU5.6B2L**

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

PZUxxx	Sel	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>
		$I_Z = 5\text{ mA}$		$I_Z = 0.5\text{ mA}$	$I_Z = 5\text{ mA}$	$V_R$ (V)	$I_Z = 5\text{ mA}$			
		Min	Max	Max	Max		Max	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
	B2	2.65	2.9							
3.0	B	2.80	3.20	1000	95	10	1	-2.1	425	8
	B2	2.95	3.20							
3.3	B	3.10	3.50	1000	95	5	1	-2.4	410	8
	B2	3.25	3.50							
3.6	B	3.40	3.80	1000	90	5	1	-2.4	390	8
	B2	3.55	3.80							
3.9	B	3.70	4.10	1000	90	3	1	-2.5	370	8
	B2	3.87	4.10							
4.3	B	4.01	4.48	1000	90	3	1	-2.5	350	8
	B2	4.15	4.34							

**Table 8. Characteristics per type; PZU2.4BL to PZU5.6B2L ...continued**

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

PZUxxx	Sel	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>
		Min	Max	Max	Max	Max	$V_R$ (V)	Typ	Max	Max
4.7	B	4.42	4.90	800	80	2	1	-1.4	325	8
	B2	4.55	4.75							
5.1	B	4.84	5.37	250	60	2	1.5	0.3	300	5.5
	B2	4.98	5.20							
5.6	B	5.31	5.92	100	40	1	2.5	1.9	275	5.5
	B2	5.49	5.73							

[1]  $f = 1\text{ MHz}$ ;  $V_R = 0\text{ V}$

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

**Table 9. Characteristics per type; PZU6.2BL to PZU36BL**

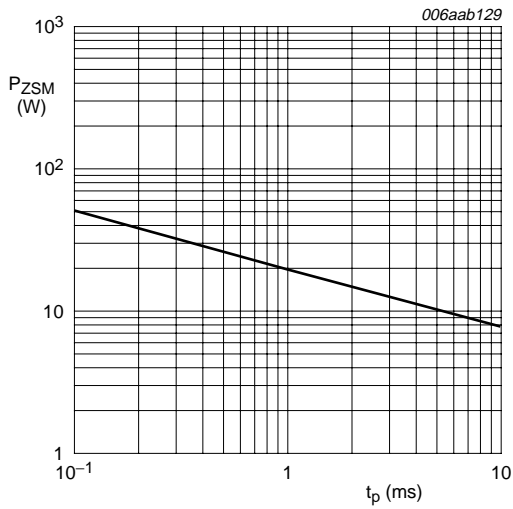
$T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified.

PZUxxx	Sel	Working voltage $V_Z$ (V)		Differential resistance $r_{dif}$ ( $\Omega$ )		Reverse current $I_R$ (nA)		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>
		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
	B2	6.06	6.33							
6.8	B	6.47	7.14	60	20	500	3.5	3.4	215	5.5
	B2	6.65	6.93							
7.5	B	7.06	7.84	60	10	500	4	4.0	170	3.5
	B2	7.28	7.60							
8.2	B	7.76	8.64	60	10	500	5	4.6	150	3.5
	B2	8.02	8.36							
9.1	B	8.56	9.55	60	10	500	6	5.5	120	3.5
	B2	8.85	9.23							
10	B	9.45	10.55	60	10	100	7	6.4	110	3.5
	B2	9.77	10.21							
11	B	10.44	11.56	60	10	100	8	7.4	108	3
	B2	10.76	11.22							
12	B	11.42	12.60	80	10	100	9	8.4	105	3
	B2	11.74	12.24							
13	B	12.47	13.96	80	10	100	10	9.4	103	2.5
	B2	12.91	13.49							
14	B2	13.70	14.30	80	10	100	11	10.4	101	2

**Table 9. Characteristics per type; PZU6.2BL to PZU36BL ...continued** $T_j = 25\text{ °C}$  unless otherwise specified.

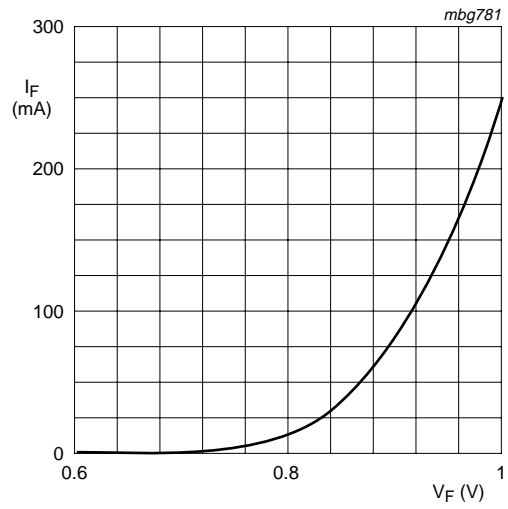
PZUxxx	Sel	Working voltage $V_Z$ (V)		Differential resistance $r_{\text{dif}}$ ( $\Omega$ )		Reverse current $I_R$ (nA)		Temperature coefficient $S_Z$ (mV/K)	Diode capacitance $C_d$ (pF) <sup>[1]</sup>	Non-repetitive peak reverse current $I_{ZSM}$ (A) <sup>[2]</sup>
		$I_Z = 5\text{ mA}$		$I_Z = 0.5\text{ mA}$	$I_Z = 5\text{ mA}$	$V_R$ (V)	$I_Z = 5\text{ mA}$			
		Min	Max	Max	Max		Max	Typ	Max	Max
15	B	13.84	15.52	80	15	50	11	11.4	99	2
	B2	14.34	14.98							
16	B	15.37	17.09	80	20	50	12	12.4	97	1.5
	B2	15.85	16.51							
18	B	16.94	19.03	80	20	50	13	14.4	93	1.5
	B2	17.56	18.35							
20	B	18.86	21.08	100	20	50	15	16.4	88	1.5
	B2	19.52	20.39							
22	B	20.88	23.17	100	25	50	17	18.4	84	1.3
	B2	21.54	22.47							
24	B	22.93	25.57	120	30	50	19	20.4	80	1.3
	B2	23.72	24.78							
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



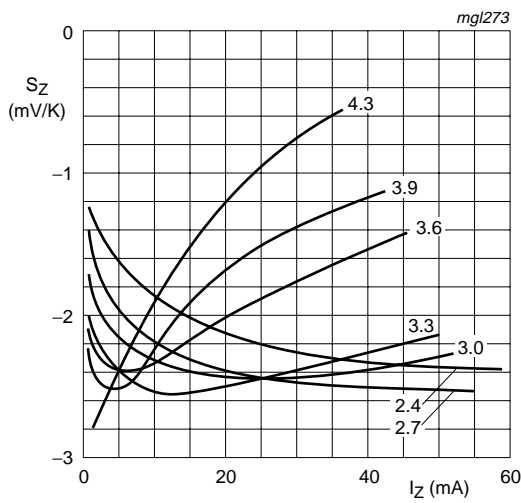
$T_j = 25\text{ }^\circ\text{C}$  (prior to surge)

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



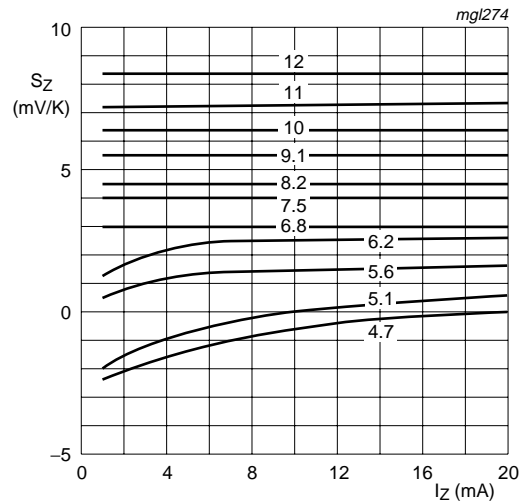
$T_j = 25\text{ }^\circ\text{C}$

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



$T_j = 25\text{ }^\circ\text{C}$  to  $150\text{ }^\circ\text{C}$   
PZU2.4BL to PZU4.3B2L

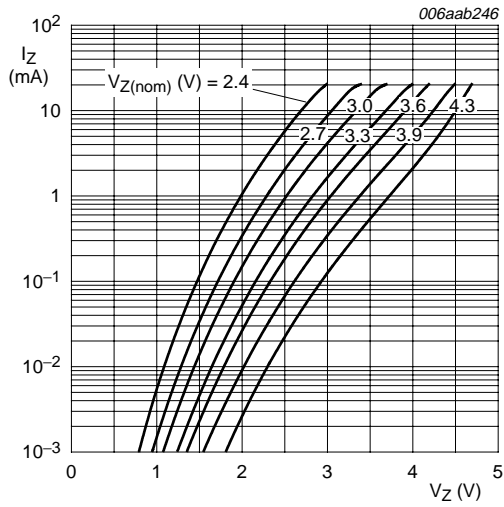
**Fig 3. Temperature coefficient as a function of working current; typical values**



$T_j = 25\text{ }^\circ\text{C}$  to  $150\text{ }^\circ\text{C}$   
PZU4.7BL to PZU12B2L

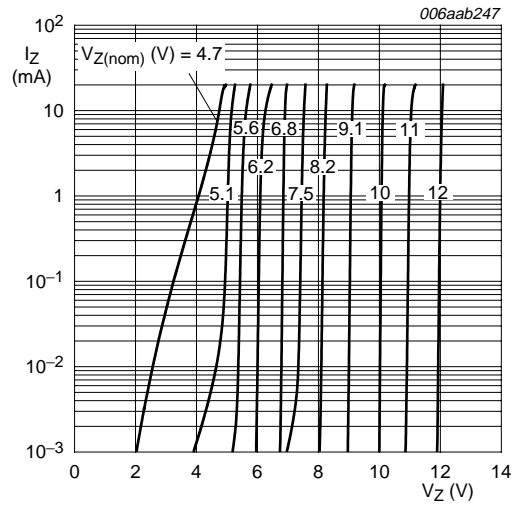
**Fig 4. Temperature coefficient as a function of working current; typical values**





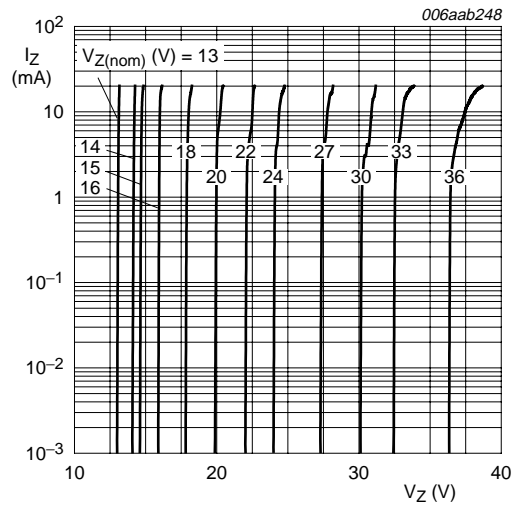
$T_j = 25\text{ }^\circ\text{C}$   
 PZU2.4BL to PZU4.3B2L

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



$T_j = 25\text{ }^\circ\text{C}$   
 PZU4.7BL to PZU12B2L

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



$T_j = 25\text{ }^\circ\text{C}$   
 PZU13BL to PZU36BL

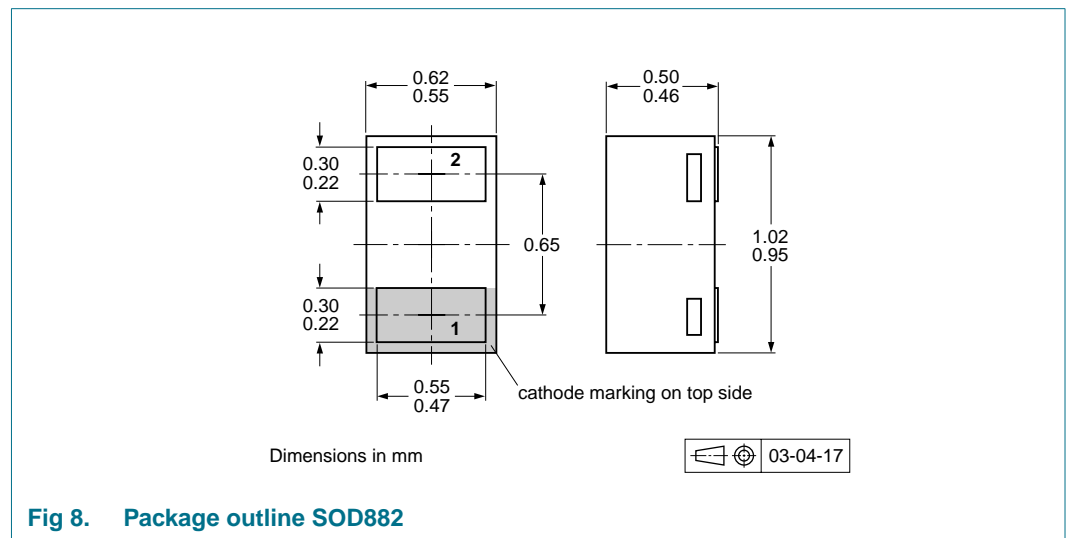
**Fig 7. Working current as a function of working voltage; typical values**

## 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

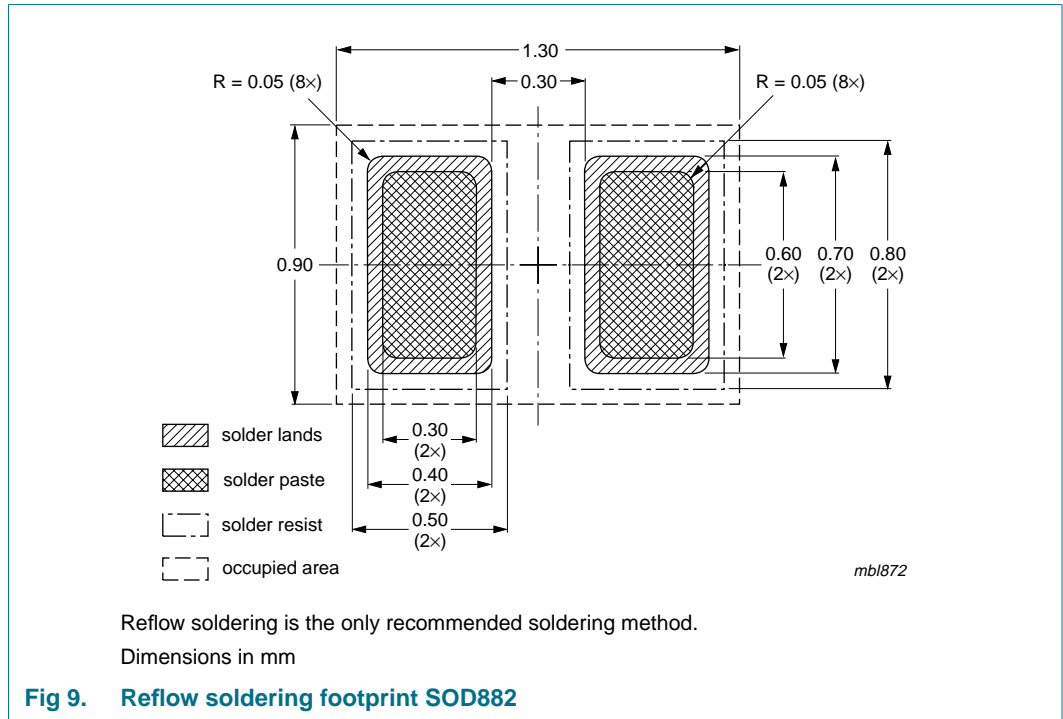
**Table 10. Packing methods**

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

Type number	Package	Description	Packing quantity
			10000
PZU2.4BL to PZU36BL	SOD882	2 mm pitch, 8 mm tape and reel	-315
PZU2.7B2L to PZU24B2L			

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

11. Soldering



## 12. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
PZUXBL_SER_1	20080506	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.
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>.

### 13.2 Definitions

**Draft** — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

**Short data sheet** — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

### 13.3 Disclaimers

**General** — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

**Right to make changes** — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

**Suitability for use** — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental

damage. NXP Semiconductors accepts no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

**Applications** — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

**Limiting values** — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) may cause permanent damage to the device. Limiting values are stress ratings only and operation of the device at these or any other conditions above those given in the Characteristics sections of this document is not implied. Exposure to limiting values for extended periods may affect device reliability.

**Terms and conditions of sale** — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nxp.com/profile/terms>, including those pertaining to warranty, intellectual property rights infringement and limitation of liability, unless explicitly otherwise agreed to in writing by NXP Semiconductors. In case of any inconsistency or conflict between information in this document and such terms and conditions, the latter will prevail.

**No offer to sell or license** — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

**Quick reference data** — The Quick reference data is an extract of the product data given in the Limiting values and Characteristics sections of this document, and as such is not complete, exhaustive or legally binding.

### 13.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

## 14. Contact information

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

For sales office addresses, please send an email to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

**15. Contents**

**1 Product profile . . . . . 1**

1.1 General description . . . . . 1

1.2 Features . . . . . 1

1.3 Applications . . . . . 1

1.4 Quick reference data . . . . . 1

**2 Pinning information . . . . . 2**

**3 Ordering information . . . . . 2**

**4 Marking . . . . . 2**

**5 Limiting values . . . . . 3**

**6 Thermal characteristics . . . . . 4**

**7 Characteristics . . . . . 4**

**8 Test information . . . . . 9**

8.1 Quality information . . . . . 9

**9 Package outline . . . . . 9**

**10 Packing information . . . . . 9**

**11 Soldering . . . . . 10**

**12 Revision history . . . . . 11**

**13 Legal information . . . . . 12**

13.1 Data sheet status . . . . . 12

13.2 Definitions . . . . . 12

13.3 Disclaimers . . . . . 12

13.4 Trademarks . . . . . 12

**14 Contact information . . . . . 12**

**15 Contents . . . . . 13**

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.



© NXP B.V. 2008.

All rights reserved.

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

For sales office addresses, please send an email to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

Date of release: 6 May 2008

Document identifier: PZUXBL\_SER\_1