



**THE DATASHEET OF  
PZU3.9B2L,315**



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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:  $t_p \leq 300 \text{ } \mu\text{s}$ ;  $\delta \leq 0.02$ .


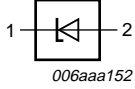
[2]  $t_p = 100 \text{ } \mu\text{s}$ ; square wave;  $T_j = 25 \text{ }^\circ\text{C}$  prior to surge

[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



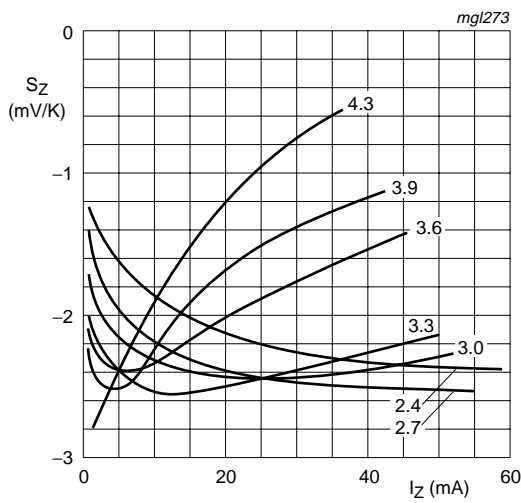
$T_j = 25\text{ }^\circ\text{C}$  (prior to surge)

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



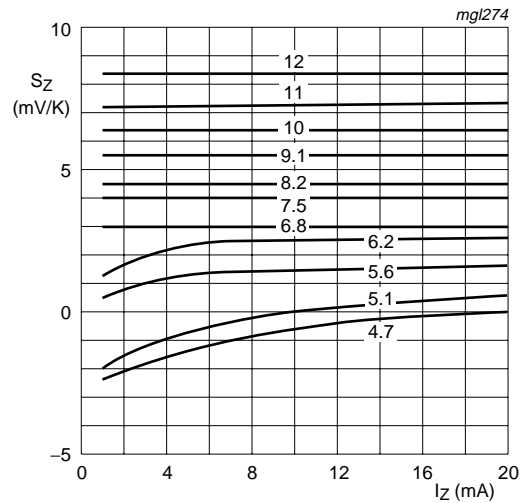
$T_j = 25\text{ }^\circ\text{C}$

**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**



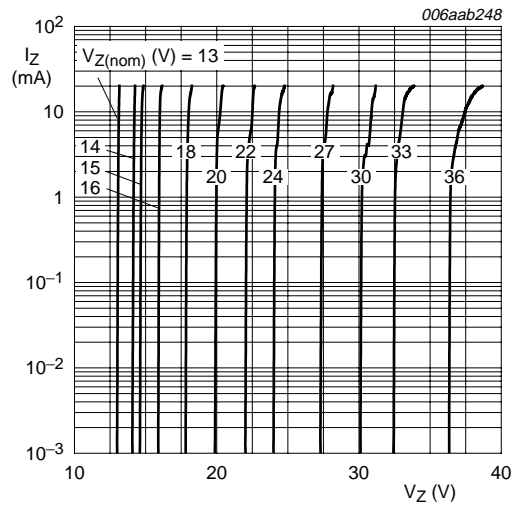
$T_j = 25\text{ }^\circ\text{C}$   
 PZU2.4BL to PZU4.3BL

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



$T_j = 25\text{ }^\circ\text{C}$   
 PZU4.7BL to PZU12BL

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



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

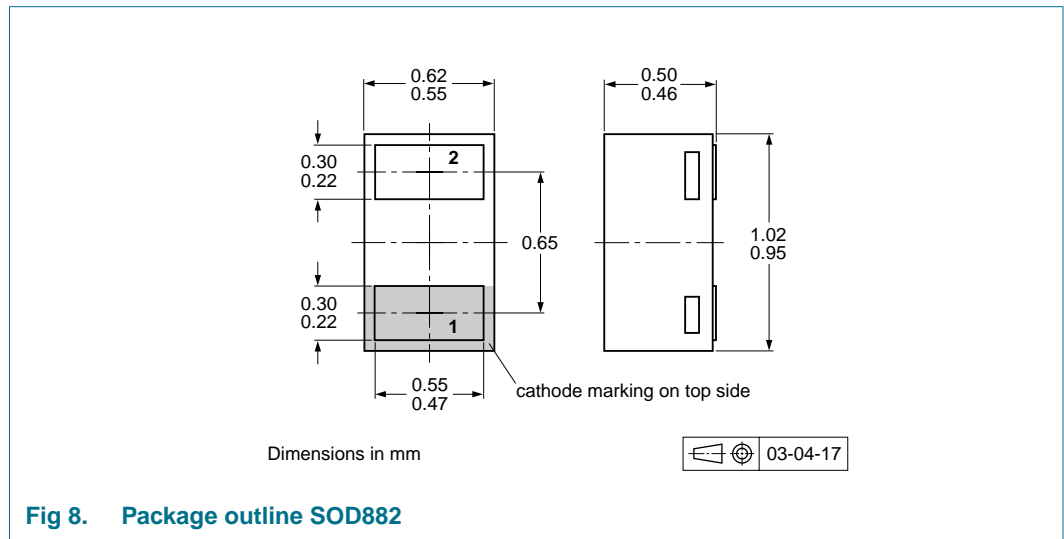
**Fig 7. Working current as a function of working voltage; typical values**

## 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

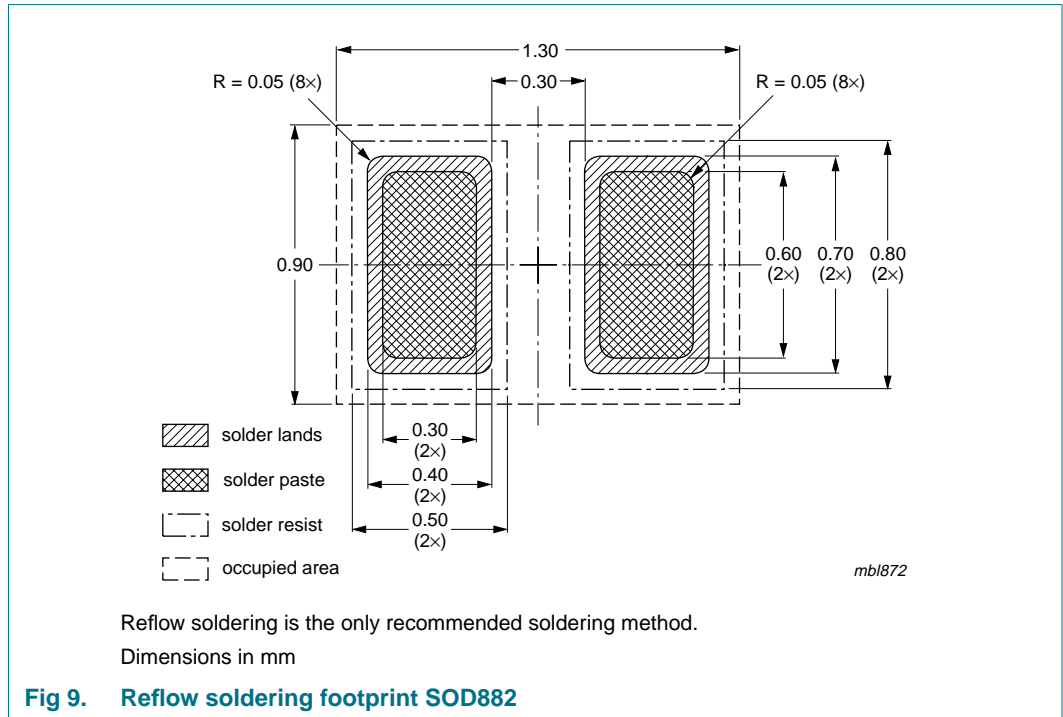
**Table 10. Packing methods**

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.
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