



**THE DATASHEET OF  
PZU5.1BA,115**



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Kind regards,

Team Nexperia



# 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:  $P_{ZSM} \leq 40 \text{ W}$
- Total power dissipation:  $P_{tot} \leq 320 \text{ mW}$
- Tolerance series:  
B: approximately  $\pm 5 \%$ ;  
B1, B2, B3: 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] -	-	320	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] 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 <a href="#">[1]</a>		
2	anode		

[1] The marking bar indicates the cathode.

## 3. Ordering information

**Table 3. Ordering information**

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

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

[2] /DG: halogen-free

## 4. Marking

Table 4. Marking codes

Type number <sup>[1]</sup>	Marking code				Type number <sup>[1]</sup>	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  $\pm 5\%$

\* = B1, B2, B3: tolerance series B1, B2, B3: approximately  $\pm 2\%$

## 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	$T_{amb} \leq 25\text{ °C}$	[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]  $t_p = 100\ \mu\text{s}$ ; square wave;  $T_j = 25\text{ °C}$  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<sup>2</sup>.

## 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<sup>2</sup>.

[3] Soldering point of cathode tab.

## 7. Characteristics

**Table 7. Characteristics**

$T_j = 25\text{ °C}$  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:  $t_p \leq 300\ \mu\text{s}$ ;  $\delta \leq 0.02$ .

**Table 8. Characteristics per type; PZU2.4BA to PZU5.6B3A and PZU2.4BA/DG to PZU5.6B3A/DG***T<sub>J</sub> = 25 °C unless otherwise specified.*

PZUxBA	Sel	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>
		Min	Max	Max	Max	Max	V <sub>R</sub> (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<sub>R</sub> = 0 V[2] t<sub>p</sub> = 100 μs; square wave; T<sub>J</sub> = 25 °C prior to surge

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

*T<sub>j</sub> = 25 °C unless otherwise specified.*

PZUxBA	Sel	Working voltage V <sub>Z</sub> (V)		Differential resistance r <sub>dif</sub> (Ω)		Reverse current I <sub>R</sub> (nA)		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
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							

**Table 9. Characteristics per type; PZU6.2BA to PZU36BA and PZU6.2BA/DG to PZU36BA/DG ...continued**  
*T<sub>j</sub> = 25 °C unless otherwise specified.*

PZUxBA	Sel	Working voltage V <sub>Z</sub> (V)		Differential resistance r <sub>dif</sub> (Ω)		Reverse current I <sub>R</sub> (nA)		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
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<sub>R</sub> = 0 V

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



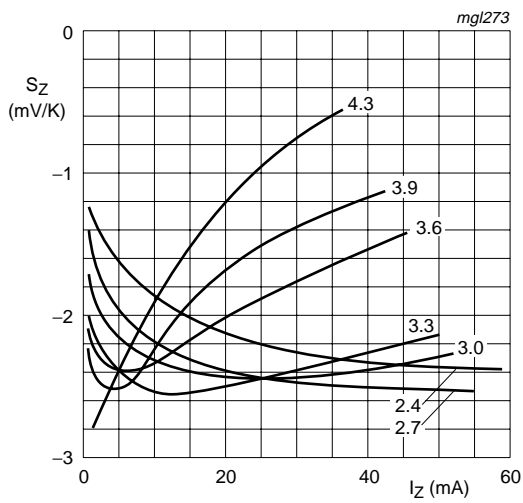
$T_j = 25\text{ }^\circ\text{C}$  (prior to surge)

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



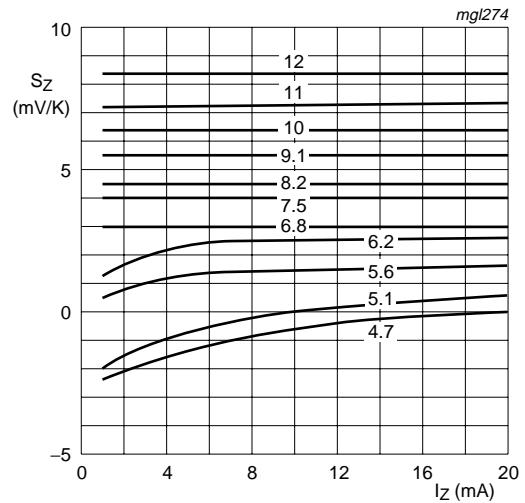
$T_j = 25\text{ }^\circ\text{C}$

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



$T_j = 25\text{ }^\circ\text{C}$  to  $150\text{ }^\circ\text{C}$   
 $V_Z = 2.4\text{ V}$  to  $4.3\text{ V}$

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



$T_j = 25\text{ }^\circ\text{C}$  to  $150\text{ }^\circ\text{C}$   
 $V_Z = 4.7\text{ V}$  to  $12\text{ V}$

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



$T_j = 25\text{ }^\circ\text{C}$   
 $V_Z = 2.4\text{ V to }4.3\text{ V}$

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



$T_j = 25\text{ }^\circ\text{C}$   
 $V_Z = 4.7\text{ V to }12\text{ V}$

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



$T_j = 25\text{ }^\circ\text{C}$   
 $V_Z = 13\text{ V to }36\text{ V}$

**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



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.<sup>[1]</sup>

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](#).

11. Soldering



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



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

## 12. Revision history

Table 11. Revision history

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

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