



**THE DATASHEET OF  
BZX84J-C39,115**





# BZX84J series

Single Zener diodes

Rev. 2 — 1 August 2011

Product data sheet

## 1. Product profile

### 1.1 General description

General-purpose Zener diodes in a SOD323F (SC-90) very small and flat lead Surface-Mounted Device (SMD) plastic package.

### 1.2 Features and benefits

- Non-repetitive peak reverse power dissipation:  $\leq 40$  W
- Total power dissipation:  $\leq 550$  mW
- AEC-Q101 qualified
- Small plastic package suitable for surface-mounted design
- Wide working voltage range: nominal 2.4 V to 75 V (E24 range)
- Two tolerance series:  $\pm 2\%$  and  $\pm 5\%$
- Low differential resistance

### 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

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

[2]  $t_p = 100$   $\mu$ s; square wave;  $T_j = 25$  °C prior to surge

## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Symbol
1	cathode		
2	anode		

[1] The marking bar indicates the cathode.

### 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BZX84J-B2V4 to BZX84J-C75 <sup>[1]</sup>	SC-90	plastic surface-mounted package; 2 leads	SOD323F

[1] The series consists of 74 types with nominal working voltages from 2.4 V to 75 V.

### 4. Marking

Table 4. Marking codes

Type number	Marking code	Type number	Marking code	Type number	Marking code	Type number	Marking code
BZX84J-B2V4	SL	BZX84J-B15	SC	BZX84J-C2V4	U3	BZX84J-C15	TV
BZX84J-B2V7	SM	BZX84J-B16	SD	BZX84J-C2V7	U4	BZX84J-C16	TW
BZX84J-B3V0	ST	BZX84J-B18	SE	BZX84J-C3V0	U9	BZX84J-C18	TX
BZX84J-B3V3	SU	BZX84J-B20	SF	BZX84J-C3V3	UA	BZX84J-C20	TY
BZX84J-B3V6	SV	BZX84J-B22	SG	BZX84J-C3V6	UB	BZX84J-C22	TZ
BZX84J-B3V9	SW	BZX84J-B24	SH	BZX84J-C3V9	UC	BZX84J-C24	U1
BZX84J-B4V3	SZ	BZX84J-B27	SK	BZX84J-C4V3	UF	BZX84J-C27	U2
BZX84J-B4V7	TA	BZX84J-B30	SN	BZX84J-C4V7	UG	BZX84J-C30	U5
BZX84J-B5V1	TD	BZX84J-B33	SP	BZX84J-C5V1	UL	BZX84J-C33	U6
BZX84J-B5V6	TE	BZX84J-B36	SR	BZX84J-C5V6	UM	BZX84J-C36	U7
BZX84J-B6V2	TH	BZX84J-B39	SS	BZX84J-C6V2	UR	BZX84J-C39	U8
BZX84J-B6V8	TK	BZX84J-B43	SX	BZX84J-C6V8	US	BZX84J-C43	UD
BZX84J-B7V5	TM	BZX84J-B47	SY	BZX84J-C7V5	UU	BZX84J-C47	UE
BZX84J-B8V2	TN	BZX84J-B51	TB	BZX84J-C8V2	UV	BZX84J-C51	UH
BZX84J-B9V1	TP	BZX84J-B56	TC	BZX84J-C9V1	UW	BZX84J-C56	UK
BZX84J-B10	S8	BZX84J-B62	TF	BZX84J-C10	TR	BZX84J-C62	UN
BZX84J-B11	S9	BZX84J-B68	TG	BZX84J-C11	TS	BZX84J-C68	UP
BZX84J-B12	SA	BZX84J-B75	TL	BZX84J-C12	TT	BZX84J-C75	UT
BZX84J-B13	SB	-	-	BZX84J-C13	TU	-	-

## 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		-	250	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] -	550	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, 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] -	-	230	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point		[2] -	-	55	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode  $1\text{ cm}^2$ .

[2] 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; BZX84J-B2V4 to BZX84J-C24

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

BZX84J-xxx	Sel	Working voltage $V_Z$ (V)		Differential resistance $r_{dif}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu$ 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>
		$I_Z = 5\text{ mA}$		$I_Z = 1\text{ mA}$	$I_Z = 5\text{ mA}$	Max	$V_R$ (V)	$I_Z = 5\text{ mA}$			
		Min	Max	Max	Max			Min	Max	Max	Max
2V4	B	2.35	2.45	400	100	50	1	-3.5	0	450	12
	C	2.2	2.6								
2V7	B	2.65	2.75	450	100	20	1	-3.5	0	440	12
	C	2.5	2.9								
3V0	B	2.94	3.06	500	95	10	1	-3.5	0	425	12
	C	2.8	3.2								
3V3	B	3.23	3.37	500	95	5	1	-3.5	0	410	12
	C	3.1	3.5								
3V6	B	3.53	3.67	500	90	5	1	-3.5	0	390	12
	C	3.4	3.8								
3V9	B	3.82	3.98	500	90	3	1	-3.5	0	370	12
	C	3.7	4.1								
4V3	B	4.21	4.39	600	90	3	1	-3.5	0	350	12
	C	4	4.6								
4V7	B	4.61	4.79	500	80	3	2	-3.5	0.2	325	12
	C	4.4	5								
5V1	B	5	5.2	480	60	2	2	-2.7	1.2	300	12
	C	4.8	5.4								
5V6	B	5.49	5.71	400	40	1	2	-2	2.5	275	12
	C	5.2	6								
6V2	B	6.08	6.32	150	10	3	4	0.4	3.7	250	12
	C	5.8	6.6								
6V8	B	6.66	6.94	80	15	2	4	1.2	4.5	215	12
	C	6.4	7.2								
7V5	B	7.35	7.65	80	10	1	5	2.5	5.3	170	4
	C	7	7.9								
8V2	B	8.04	8.36	80	10	0.7	5	3.2	6.2	150	4
	C	7.7	8.7								
9V1	B	8.92	9.28	100	10	0.5	6	3.8	7	120	3
	C	8.5	9.6								
10	B	9.8	10.2	150	10	0.2	7	4.5	8	110	3
	C	9.4	10.6								
11	B	10.8	11.2	150	10	0.1	8	5.4	9	108	2.5
	C	10.4	11.6								
12	B	11.8	12.2	150	10	0.1	8	6	10	105	2.5
	C	11.4	12.7								

Table 8. Characteristics per type; BZX84J-B2V4 to BZX84J-C24 ...continued

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

BZX84J-xxx	Sel	Working voltage $V_Z$ (V)		Differential resistance $r_{dif}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu$ 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>
		$I_Z = 5\text{ mA}$		$I_Z = 1\text{ mA}$	$I_Z = 5\text{ mA}$	Max	$V_R$ (V)	$I_Z = 5\text{ mA}$			
		Min	Max	Max	Max			Min	Max		
13	B	12.7	13.3	170	10	0.1	8	7	11	103	2.5
	C	12.4	14.1								
15	B	14.7	15.3	200	15	0.05	10.5	9.2	13	99	2
	C	13.8	15.6								
16	B	15.7	16.3	200	20	0.05	11.2	10.4	14	97	1.5
	C	15.3	17.1								
18	B	17.6	18.4	225	20	0.05	12.6	12.4	16	93	1.5
	C	16.8	19.1								
20	B	19.6	20.4	225	20	0.05	14	14.4	18	88	1.5
	C	18.8	21.2								
22	B	21.6	22.4	250	25	0.05	15.4	16.4	20	84	1.25
	C	20.8	23.3								
24	B	23.5	24.5	250	30	0.05	16.8	18.4	22	80	1.25
	C	22.8	25.6								

[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

**Table 9. Characteristics per type; BZX84J-B27 to BZX84J-C75** $T_j = 25\text{ °C}$  unless otherwise specified.

BZX84J-xxx	Sel	Working voltage $V_Z$ (V)		Differential resistance $r_{dif}$ ( $\Omega$ )		Reverse current $I_R$ ( $\mu$ 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>
		$I_Z = 2\text{ mA}$		$I_Z = 0.5\text{ mA}$	$I_Z = 2\text{ mA}$	$V_R$ (V)	$I_Z = 2\text{ mA}$				
		Min	Max	Max	Max		Min	Max	Max		
27	B	26.5	27.5	250	40	0.05	18.9	21.4	25.3	73	1
	C	25.1	28.9								
30	B	29.4	30.6	250	40	0.05	21	24.4	29.4	66	1
	C	28	32								
33	B	32.3	33.7	275	40	0.05	23.1	27.4	33.4	60	0.9
	C	31	35								
36	B	35.3	36.7	300	60	0.05	25.2	30.4	37.4	59	0.8
	C	34	38								
39	B	38.2	39.8	300	75	0.05	27.3	33.4	41.2	58	0.7
	C	37	41								
43	B	42.1	43.9	325	80	0.05	30.1	37.6	46.6	56	0.6
	C	40	46								
47	B	46.1	47.9	325	90	0.05	32.9	42	51.8	55	0.5
	C	44	50								
51	B	50	52	350	110	0.05	35.7	46.6	57.2	52	0.4
	C	48	54								
56	B	54.9	57.1	375	120	0.05	39.2	52.2	63.8	49	0.3
	C	52	60								
62	B	60.8	63.2	400	140	0.05	43.4	58.8	71.6	44	0.3
	C	58	66								
68	B	66.6	69.4	400	160	0.05	47.6	65.6	79.8	40	0.25
	C	64	72								
75	B	73.5	76.5	400	175	0.05	52.5	73.4	88.6	35	0.2
	C	70	79								

[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



- (1)  $T_j = 25\text{ °C}$  (prior to surge)
- (2)  $T_j = 150\text{ °C}$  (prior to surge)

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



$T_j = 25\text{ °C}$

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



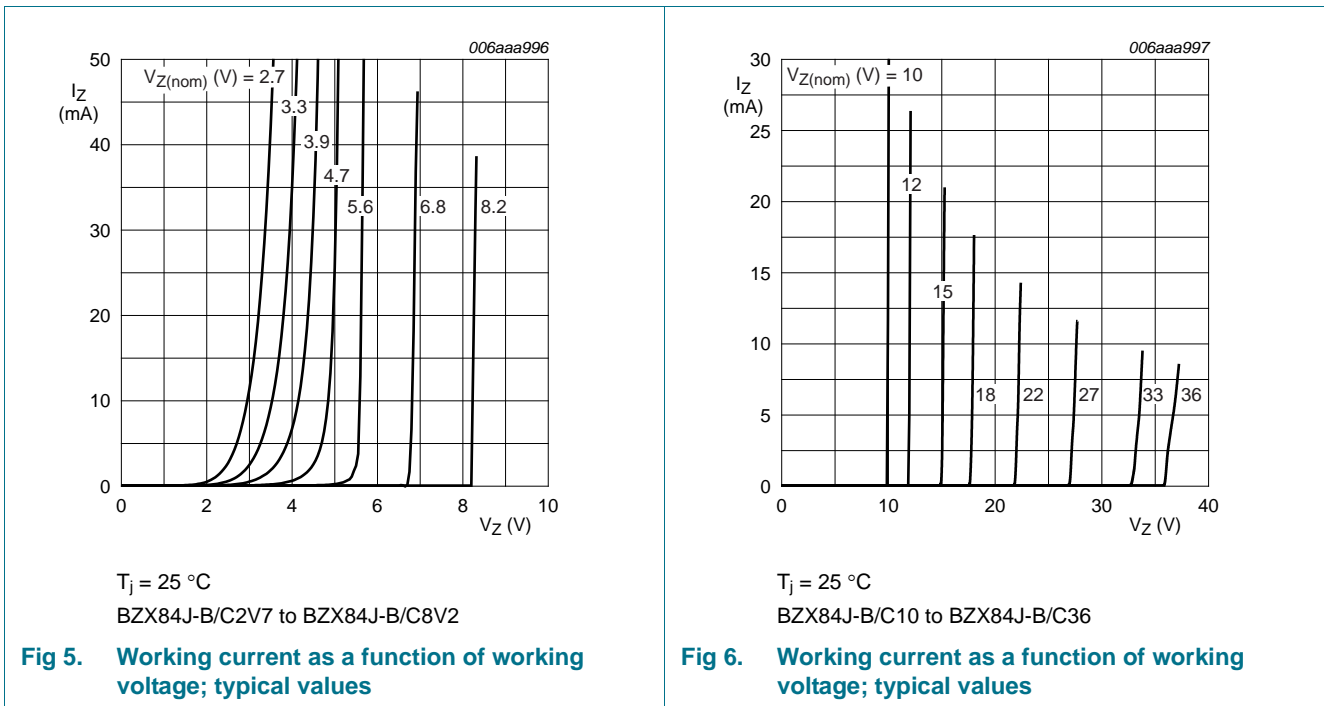
BZX84J-B/C2V4 to BZX84J-B/C4V7  
 $T_j = 25\text{ °C}$  to  $150\text{ °C}$

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



BZX84J-B/C5V1 to BZX84J-B/C15  
 $T_j = 25\text{ °C}$  to  $150\text{ °C}$

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

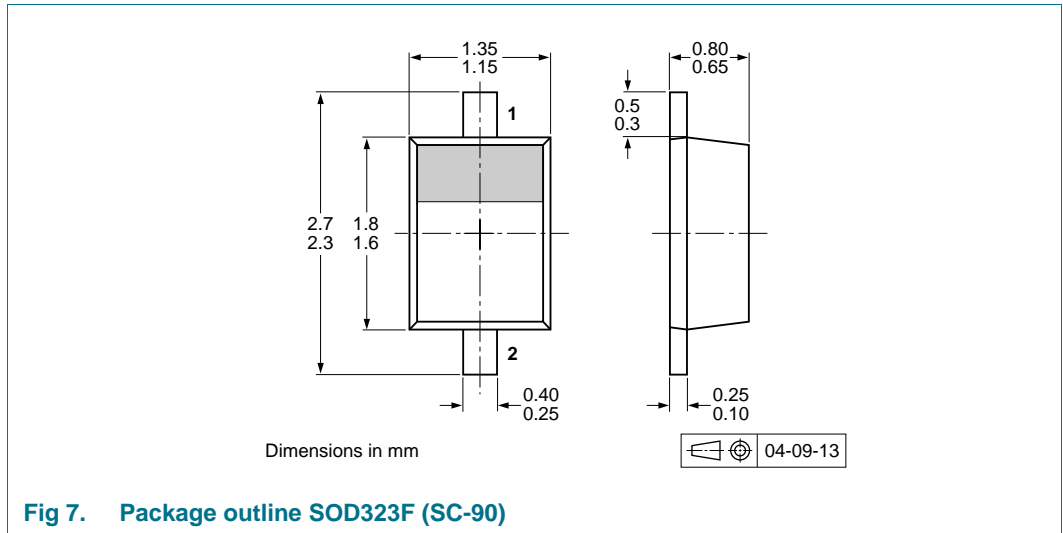


Fig 7. Package outline SOD323F (SC-90)

## 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
BZX84J-B2V4 to BZX84J-C75	SOD323F	4 mm pitch, 8 mm tape and reel	-115	-135

[1] For further information and the availability of packing methods, see [Section 14](#).

## 11. Soldering

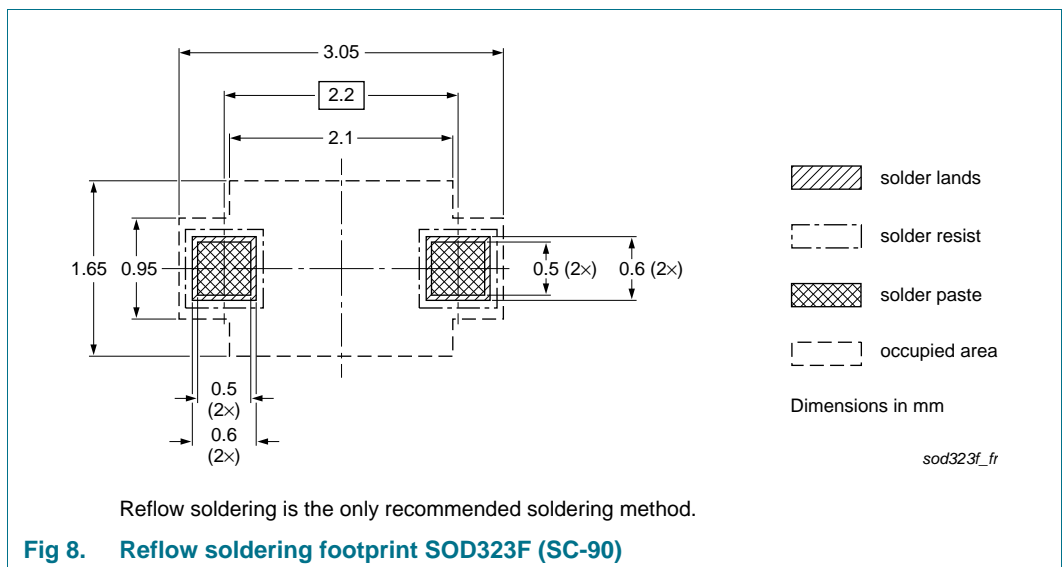


Fig 8. Reflow soldering footprint SOD323F (SC-90)

## 12. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BZX84J_SER v.2	20110801	Product data sheet	-	BZX84J_SER v.1
Modifications:	<ul style="list-style-type: none"><li>• <a href="#">Figure 5</a> and <a href="#">Figure 6</a> updated</li><li>• <a href="#">Figure 8</a> updated</li><li>• <a href="#">Section 1.2 “Features and benefits”</a> updated</li><li>• <a href="#">Section 5 “Limiting values”</a> updated</li><li>• <a href="#">Section 8 “Test information”</a> added</li><li>• <a href="#">Section 13 “Legal information”</a> updated</li></ul>			
BZX84J_SER v.1	20070301	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".

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## 14. Contact information

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