BZX84J-Q series

Zener voltage regulator diodes

Rev. 1 — 26 September 2024 Product data sheet

1. General description

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

2. Features and benefits

- Non-repetitive peak reverse power dissipation: ≤ 100 W for types ≤ 6.8 V
- Non-repetitive peak reverse power dissipation: ≤ 40 W for types ≥ 7.5 V
- Total power dissipation: ≤550 mW
- Two tolerance series: ±2 % and approximately ±5 %
- Wide working voltage range: nominal 2.4 V to 75 V (E24 range)
- Small plastic package suitable for surface-mounted design
- Low differential resistance
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- General regulation functions

4. Quick reference data

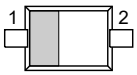
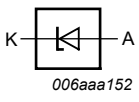
Table 1. Quick reference data

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]	-	-	100	W
			[3]	-	-	40	W

[1] Pulse test: t_p ≤ 300 µs; δ ≤ 0.02.
[2] t_p = 100 µs; square wave; T_j = 25 °C prior to surge; ≤ 6.8 V.
[3] t_p = 100 µs; square wave; T_j = 25 °C prior to surge;≥ 7.5 V.

5. Pinning information

Table 2. Pinning

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

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BZX84J-B2V4-Q to BZX84J-C75-Q [1]	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.

7. Marking

Table 4. Marking codes

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

8. 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 Tables 8 and 9	
P_{ZSM}	non-repetitive peak reverse power dissipation		[2]	-	40	W
			[3]	-	100	W
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C	[4]	-	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 µs; square wave; T_j = 25 °C prior to surge.
[2] t_p = 100 µs; square wave; T_j = 25 °C prior to surge;≥ 7.5 V.
[3] t_p = 100 µs; square wave; T_j = 25 °C prior to surge; ≤ 6.8 V.
[4] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2.

9. 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 cm^2.
[2] Soldering point of cathode tab.

10. Characteristics

Table 7. Characteristics

T_j = 25 °C unless otherwise specified.

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

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

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

T_j = 25 °C unless otherwise specified.

BZX84J -xxx-Q	Sel	Working voltage V_Z (V);		Maximum 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 = 1 mA	I_Z = 5 mA			I_Z = 5 mA			
		Min	Max	Max	Max	Max	V_R (V)	Min	Max	Max	Max
2V4	B	2.35	2.45	400	100	50	1	-3.5	0.0	450	12
	C	2.20	2.60								
2V7	B	2.65	2.75	450	100	20	1	-3.5	0.0	440	12
	C	2.50	2.90								
3V0	B	2.94	3.06	500	95	10	1	-3.5	0.0	425	12
	C	2.80	3.20								
3V3	B	3.23	3.37	500	95	5	1	-3.5	0.0	410	12
	C	3.10	3.50								
3V6	B	3.53	3.67	500	90	5	1	-3.5	0.0	390	12
	C	3.40	3.80								
3V9	B	3.82	3.98	500	90	3	1	-3.5	0.0	370	12
	C	3.70	4.10								
4V3	B	4.21	4.39	600	90	3	1	-3.5	0.0	350	12
	C	4.00	4.60								
4V7	B	4.61	4.79	500	80	3	2	-3.5	0.2	325	12
	C	4.40	5.00								
5V1	B	5.00	5.20	480	60	2	2	-2.7	1.2	300	12
	C	4.80	5.40								
5V6	B	5.49	5.71	400	40	1	2	-2.0	2.5	275	12
	C	5.20	6.00								
6V2	B	6.08	6.32	150	10	3	4	0.4	3.7	250	12
	C	5.80	6.60								
6V8	B	6.66	6.94	80	15	2	4	1.2	4.5	215	12
	C	6.40	7.20								
7V5	B	7.35	7.65	80	10	1	5	2.5	5.3	170	4
	C	7.00	7.90								
8V2	B	8.04	8.36	80	10	0.7	5	3.2	6.2	150	4
	C	7.70	8.70								
9V1	B	8.92	9.28	100	10	0.5	6	3.8	7.0	120	3
	C	8.50	9.60								
10	B	9.8	10.2	150	10	0.2	7	4.5	8.0	110	3
	C	9.4	10.6								
11	B	10.8	11.2	150	10	0.1	8	5.4	9.0	108	2.5
	C	10.4	11.6								
12	B	11.8	12.2	150	10	0.1	8	6.0	10.0	105	2.5
	C	11.4	12.7								
13	B	12.7	13.3	170	10	0.1	8	7.0	11.0	103	2.5
	C	12.4	14.1								

BZX84J -xxx-Q	Sel	Working voltage V_Z (V);		Maximum 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 = 1 mA	I_Z = 5 mA			I_Z = 5 mA			
		Min	Max	Max	Max	Max	V_R (V)	Min	Max	Max	Max
15	B	14.7	15.3	200	15	0.05	10.5	9.2	13.0	99	1.5
	C	13.8	15.6								
16	B	15.7	16.3	200	20	0.05	11.2	10.4	14.0	97	1.5
	C	15.3	17.1								
18	B	17.6	18.4	225	20	0.05	12.6	12.4	16.0	93	1.5
	C	16.8	19.1								
20	B	19.6	20.4	225	20	0.05	14	14.4	18.0	88	1.5
	C	18.8	21.2								
22	B	21.6	22.4	250	25	0.05	15.4	16.4	20.0	84	1.25
	C	20.8	23.3								
24	B	23.5	24.5	250	30	0.05	16.8	18.4	22.0	80	1.25
	C	22.8	25.6								

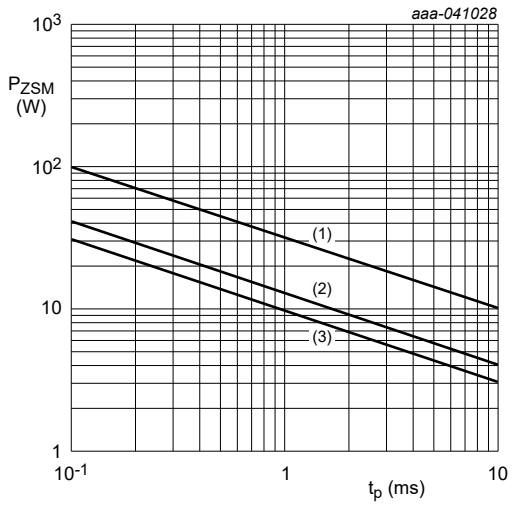
[1] f = 1 MHz; V_R = 0 V.
[2] t_p = 100 µs; T_{amb} = 25 °C.

Table 9. Characteristics per type; BZX84J-B27-Q to BZX84J-C75-Q

T_j = 25 °C unless otherwise specified.

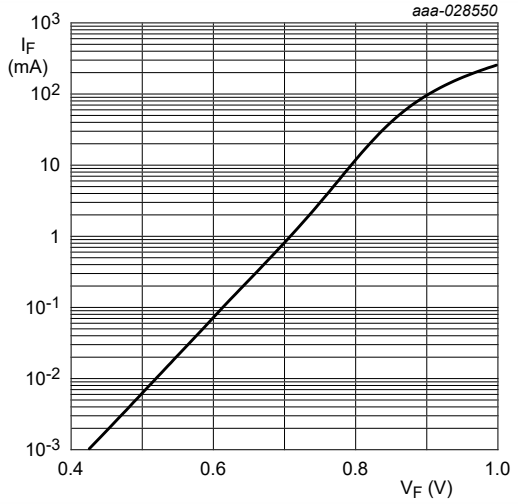
BZX84J-xxx-Q	Sel	Working voltage V_Z (V); I_Z = 2 mA		Maximum differential resistance r_{dif} (Ω)		Reverse current I_R (μA)		Temperature coefficient S_Z (mV/K); I_Z = 2 mA		Diode capacitance C_d (pF) [1]	Non-repetitive peak reverse current I_{ZSM} (A) [2]
				I_Z = 0.5 mA	I_Z = 2 mA						
		Min	Max	Max	Max	Max	V_R (V)	Min	Max	Max	Max
27	B	26.5	27.5	250	40	0.05	18.9	21.4	25.3	73	1.0
	C	25.1	28.9								
30	B	29.4	30.6	250	40	0.05	21	24.4	29.4	66	1.0
	C	28.0	32.0								
33	B	32.3	33.7	275	40	0.05	23.1	27.4	33.4	60	0.9
	C	31.0	35.0								
36	B	35.3	36.7	300	60	0.05	25.2	30.4	37.4	59	0.8
	C	34.0	38.0								
39	B	38.2	39.8	300	75	0.05	27.3	33.4	41.2	58	0.7
	C	37.0	41.0								
43	B	42.1	43.9	325	80	0.05	30.1	37.6	46.6	56	0.6
	C	40.0	46.0								
47	B	46.1	47.9	325	90	0.05	32.9	42.0	51.8	55	0.5
	C	44.0	50.0								
51	B	50.0	52.0	350	110	0.05	35.7	46.6	57.2	52	0.4
	C	48.0	54.0								
56	B	54.9	57.1	375	120	0.05	39.2	52.2	63.8	49	0.3
	C	52.0	60.0								
62	B	60.8	63.2	400	140	0.05	43.4	58.8	71.6	44	0.3
	C	58.0	66.0								
68	B	66.6	69.4	400	160	0.05	47.6	65.6	79.8	40	0.25
	C	64.0	72.0								
75	B	73.5	76.5	400	175	0.05	52.5	73.4	88.6	35	0.20
	C	70.0	79.0								

[1] f = 1 MHz; V_R = 0 V.
[2] t_p = 100 μs; T_{amb} = 25 °C.



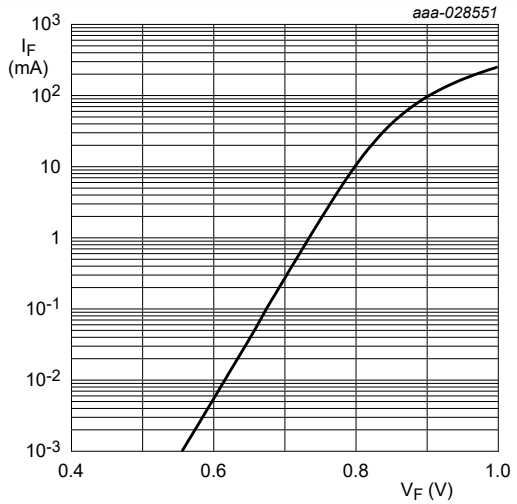
(1) 2.4 V to 6.8 V (T_j = 25 °C)
(2) 7.5 V to 75 V (T_j = 25 °C)
(3) 2.4 V to 75 V (T_j = 150 °C)

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



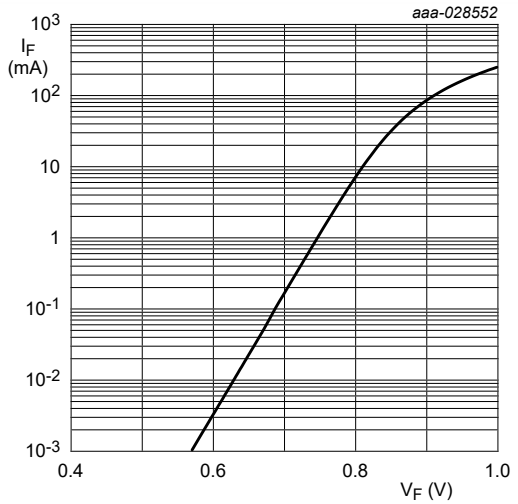
T_j = 25 °C

Fig. 2. Forward current as a function of forward voltage; typical values (BZX84J-B/C2V4-Q)



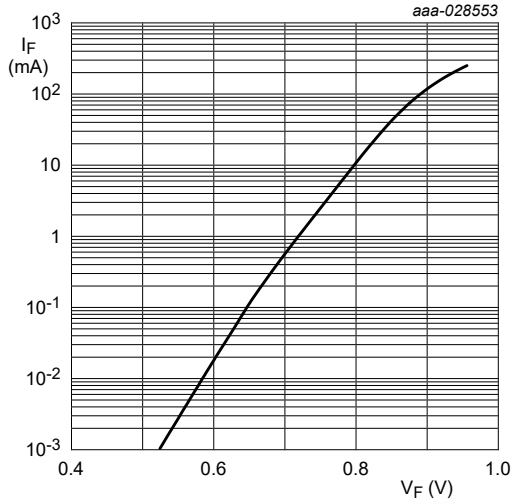
T_j = 25 °C

Fig. 3. Forward current as a function of forward voltage; typical values (BZX84J-B/C6V8-Q)



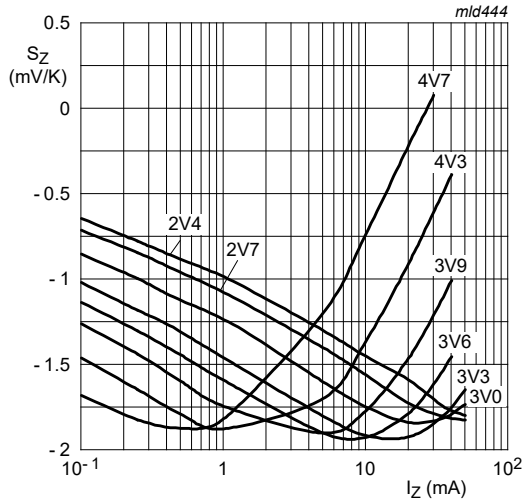
T_j = 25 °C

Fig. 4. Forward current as a function of forward voltage; typical values (BZX84J-B/C7V5-Q)



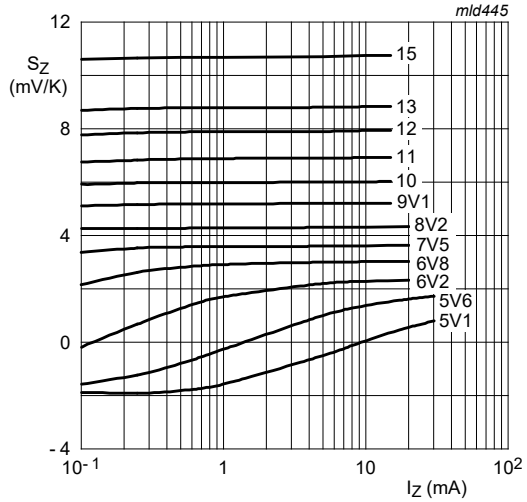
T_j = 25 °C

Fig. 5. Forward current as a function of forward voltage; typical values (BZX84J-B/C75-Q)



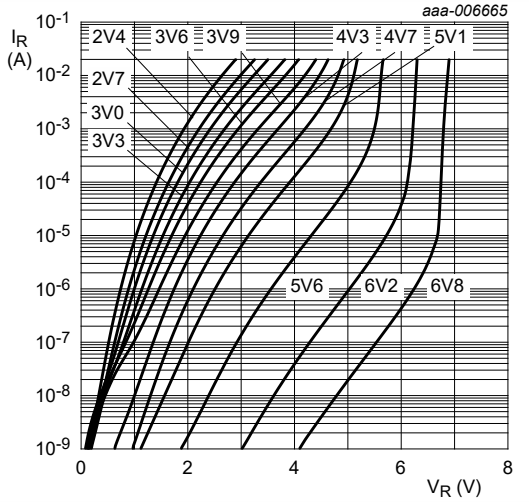
T_j = 25 °C to 150 °C

Fig. 6. Temperature coefficient as a function of working current; typical values (BZX84J-B/C2V4-Q to B/C4V7-Q)



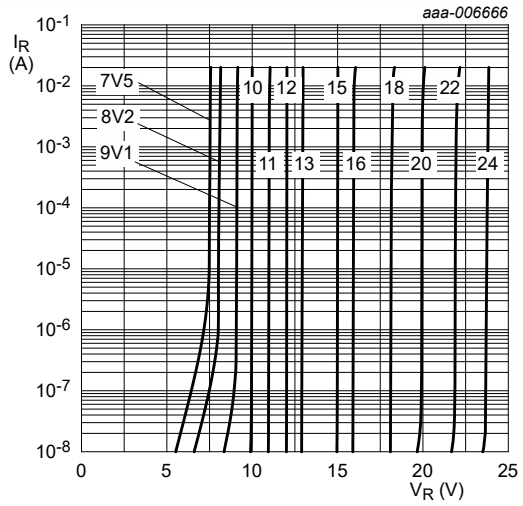
T_j = 25 °C to 150 °C

Fig. 7. Temperature coefficient as a function of working current; typical values (BZX84J-B/C5V1-Q to B/C15-Q)



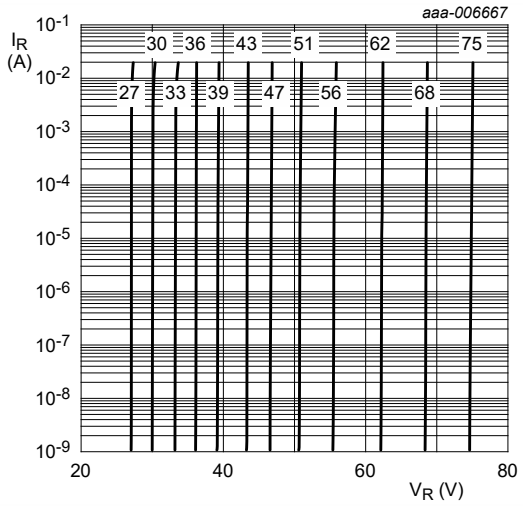
T_j = 25 °C

Fig. 8. Reverse current as a function of reverse voltage; typical values (BZX84J-B/C2V4-Q to B/C6V8-Q)



T_j = 25 °C

Fig. 9. Reverse current as a function of reverse voltage; typical values (BZX84J-B/C7V5-Q to B/C24-Q)



T_j = 25 °C

Fig. 10. Reverse current as a function of reverse voltage; typical values (BZX84J-B/C27-Q to B/C75-Q)

11. Test information

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.

12. Package outline

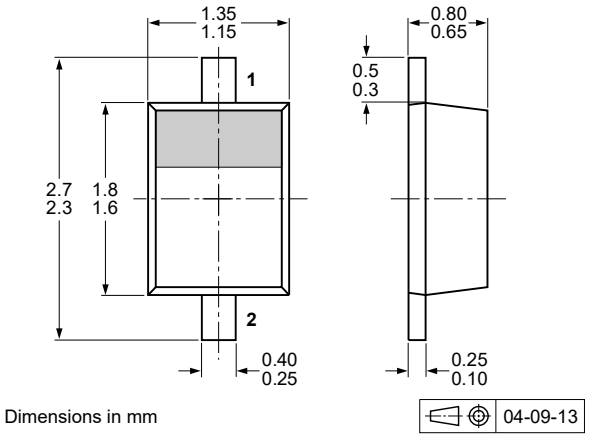
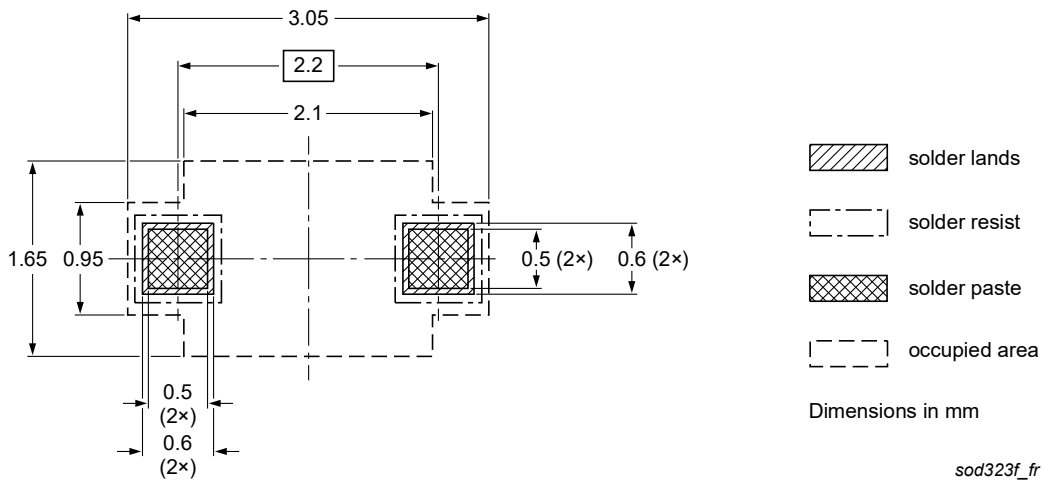


Fig. 11. Package outline SC-90 (SOD323F)

13. Soldering



Reflow soldering is the only recommended soldering method.

Fig. 12. Reflow soldering footprint for SC-90 (SOD323F)

14. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BZX84J-Q_SER v.1	20240926	Product data sheet	-	-

15. Legal information

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".
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