THE DATASHEET OF

BZX384-B18,115

BZX384 series

Voltage regulator diodes

Rev. 3 — 11 October 2016 Product data sheet

1. Product profile

1.1 General description

Low-power voltage regulator diodes in a small SOD323 (SC-76) Surface-Mounted Device (SMD) plastic package.

The diodes are available in the normalized E24 ±2 % (BZX384-B) and approximately ±5 % (BZX384-C) tolerance range. The series includes 37 breakdown voltages with nominal working voltages from 2.4 V to 75 V.

1.2 Features and benefits

- Total power dissipation: ≤ 300 mW
- Two tolerance series: ±2 % and approximately ±5 %
- AEC-Q101 qualified
- Working voltage range: nominal 2.4 V to 75 V (E24 range)
- Non-repetitive peak reverse power dissipation: ≤ 40 W

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 = 10 mA	[1]	-	-	0.9	V
P_{tot}	total power dissipation	T_{amb} ≤ 25 °C	[2]	-	-	300	mW

[1] Pulse test: $t_p \leq 100\ \mu s$; $\delta \leq 0.02$

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

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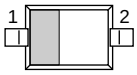
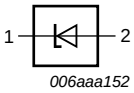
2. Pinning information

Table 2. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode [1]		 006aaa152
2	A	anode		

[1] The marking bar indicates the cathode.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BZX384 series[1]	SC-76	plastic surface-mounted package; 2 leads	SOD323

[1] The series includes 37 breakdown voltages with nominal working voltages from 2.4 V to 75 V and ±2 % and ±5 % tolerances.

4. Marking

Table 4. Marking codes

Type number	Marking code	Type number	Marking code	Type number	Marking code	Type number	Marking code
BZX384-B2V4	K1	BZX384-B15	M2	BZX384-C2V4	T3	BZX384-C15	DD
BZX384-B2V7	K2	BZX384-B16	M3	BZX384-C2V7	T4	BZX384-C16	DE
BZX384-B3V0	K3	BZX384-B18	M4	BZX384-C3V0	T5	BZX384-C18	DF
BZX384-B3V3	K4	BZX384-B20	M5	BZX384-C3V3	T6	BZX384-C20	DG
BZX384-B3V6	K5	BZX384-B22	M6	BZX384-C3V6	T7	BZX384-C22	DH
BZX384-B3V9	K6	BZX384-B24	M7	BZX384-C3V9	T8	BZX384-C24	DJ
BZX384-B4V3	K7	BZX384-B27	M8	BZX384-C4V3	T9	BZX384-C27	DK
BZX384-B4V7	K8	BZX384-B30	M9	BZX384-C4V7	T0	BZX384-C30	DL
BZX384-B5V1	K9	BZX384-B33	N0	BZX384-C5V1	D5	BZX384-C33	DM
BZX384-B5V6	L1	BZX384-B36	N1	BZX384-C5V6	D6	BZX384-C36	DN
BZX384-B6V2	L2	BZX384-B39	N2	BZX384-C6V2	T1	BZX384-C39	DP
BZX384-B6V8	L3	BZX384-B43	N3	BZX384-C6V8	D7	BZX384-C43	DR
BZX384-B7V5	L4	BZX384-B47	N4	BZX384-C7V5	D8	BZX384-C47	DS
BZX384-B8V2	L5	BZX384-B51	N5	BZX384-C8V2	D9	BZX384-C51	DT
BZX384-B9V1	L6	BZX384-B56	N6	BZX384-C9V1	D0	BZX384-C56	DU
BZX384-B10	L7	BZX384-B62	N7	BZX384-C10	T2	BZX384-C62	DV
BZX384-B11	L8	BZX384-B68	N8	BZX384-C11	DA	BZX384-C68	DW
BZX384-B12	L9	BZX384-B75	N9	BZX384-C12	DB	BZX384-C75	DX
BZX384-B13	M1	-	-	BZX384-C13	DC	-	-

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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 Table 8 and 9	
P_{ZSM}	non-repetitive peak reverse power dissipation	[1]	-	40	W
P_{tot}	total power dissipation	$T_{amb} \leq 25$ °C [2]	-	300	mW
T_j	junction temperature		−65	+150	°C
T_{amb}	ambient temperature		−65	+150	°C
T_{stg}	storage temperature		−65	+150	°C

[1] $t_p = 100$ μs; square wave; $T_j = 25$ °C before surge

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

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]	-	-	415	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point	[2]	-	-	110	K/W

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

[2] Soldering point of cathode tab.

7. 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]	-	-	1.1	V

[1] Pulse test: $t_p \leq 100$ μs; $\delta \leq 0.02$

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Table 8. Characteristics per type; BZX384-B2V4 to BZX384-C24

T_j = 25 °C unless otherwise specified.

BZX384 -xxx	Sel	Working voltage V_Z (V)		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	Typ	Max	Typ	Max	Max	V_R (V)	Min	Typ	Max	Max	Max
2V4	B	2.35	2.45	275	600	70	100	50	1	−3.5	−1.6	0	450	6.0
	C	2.2	2.6											
2V7	B	2.65	2.75	300	600	75	100	20	1	−3.5	−2.0	0	450	6.0
	C	2.5	2.9											
3V0	B	2.94	3.06	325	600	80	95	10	1	−3.5	−2.1	0	450	6.0
	C	2.8	3.2											
3V3	B	3.23	3.37	350	600	85	95	5	1	−3.5	−2.4	0	450	6.0
	C	3.1	3.5											
3V6	B	3.53	3.67	375	600	85	90	5	1	−3.5	−2.4	0	450	6.0
	C	3.4	3.8											
3V9	B	3.82	3.98	400	600	85	90	3	1	−3.5	−2.5	0	450	6.0
	C	3.7	4.1											
4V3	B	4.21	4.39	410	600	80	90	3	1	−3.5	−2.5	0	450	6.0
	C	4.0	4.6											
4V7	B	4.61	4.79	425	500	50	80	3	2	−3.5	−1.4	0.2	300	6.0
	C	4.4	5.0											
5V1	B	5.0	5.2	400	480	40	60	2	2	−2.7	−0.8	1.2	300	6.0
	C	4.8	5.4											
5V6	B	5.49	5.71	80	400	15	40	1	2	−2.0	1.2	2.5	300	6.0
	C	5.2	6.0											
6V2	B	6.08	6.32	40	150	6	10	3	4	0.4	2.3	3.7	200	6.0
	C	5.8	6.6											
6V8	B	6.66	6.94	30	80	6	15	2	4	1.2	3.0	4.5	200	6.0
	C	6.4	7.2											
7V5	B	7.35	7.65	30	80	6	15	1	5	2.5	4.0	5.3	150	4.0
	C	7.0	7.9											
8V2	B	8.04	8.36	40	80	6	15	0.7	5	3.2	4.6	6.2	150	4.0
	C	7.7	8.7											
9V1	B	8.92	9.28	40	100	6	15	0.5	6	3.8	5.5	7.0	150	3.0
	C	8.5	9.6											
10	B	9.8	10.2	50	150	8	20	0.2	7	4.5	6.4	8.0	90	3.0
	C	9.4	10.6											
11	B	10.8	11.2	50	150	10	20	0.1	8	5.4	7.4	9.0	85	2.5
	C	10.4	11.6											
12	B	11.8	12.2	50	150	10	25	0.1	8	6.0	8.4	10.0	85	2.5
	C	11.4	12.7											

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Table 8. Characteristics per type; BZX384-B2V4 to BZX384-C24 *…continued*

T_j = 25 °C unless otherwise specified.

BZX384 -xxx	Sel	Working voltage V_Z (V)		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	Typ	Max	Typ	Max	Max	V_R (V)	Min	Typ	Max	Max	Max
13	B	12.7	13.3	50	170	10	30	0.1	8	7.0	9.4	11.0	80	2.5
	C	12.4	14.1											
15	B	14.7	15.3	50	200	10	30	0.05	10.5	9.2	11.4	13.0	75	2.0
	C	13.8	15.6											
16	B	15.7	16.3	50	200	10	40	0.05	11.2	10.4	12.4	14.0	75	1.5
	C	15.3	17.1											
18	B	17.6	18.4	50	225	10	45	0.05	12.6	12.4	14.4	16.0	70	1.5
	C	16.8	19.1											
20	B	19.6	20.4	60	225	15	55	0.05	14	14.4	16.4	18.0	60	1.5
	C	18.8	21.2											
22	B	21.6	22.4	60	250	20	55	0.05	15.4	16.4	18.4	20.0	60	1.25
	C	20.8	23.3											
24	B	23.5	24.5	60	250	25	70	0.05	16.8	18.4	20.4	22.0	55	1.25
	C	22.8	25.6											

[1] f = 1 MHz; V_R = 0 V

[2] t_p = 100 μs; square wave; T_j = 25 °C before surge

Table 9. Characteristics per type; BZX384-B27 to BZX384-C75

T_j = 25 °C unless otherwise specified.

BZX384 -xxx	Sel	Working voltage V_Z (V)		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 = 2 mA		I_Z = 0.5 mA		I_Z = 2 mA				I_Z = 2 mA				
		Min	Max	Typ	Max	Typ	Max	Max	V_R (V)	Min	Typ	Max	Max	Max
27	B	26.5	27.5	65	300	25	80	0.05	18.9	21.4	23.4	25.3	50	1.0
	C	25.1	28.9											
30	B	29.4	30.6	70	300	30	80	0.05	21	24.4	26.6	29.4	50	1.0
	C	28.0	32.0											
33	B	32.3	33.7	75	325	35	80	0.05	23.1	27.4	29.7	33.4	45	0.9
	C	31.0	35.0											
36	B	35.3	36.7	80	350	35	90	0.05	25.2	30.4	33.0	37.4	45	0.8
	C	34.0	38.0											
39	B	38.2	39.8	80	350	40	130	0.05	27.3	33.4	36.4	41.2	45	0.7
	C	37.0	41.0											
43	B	42.1	43.9	85	375	45	150	0.05	30.1	37.6	41.2	46.6	40	0.6
	C	40.0	46.0											

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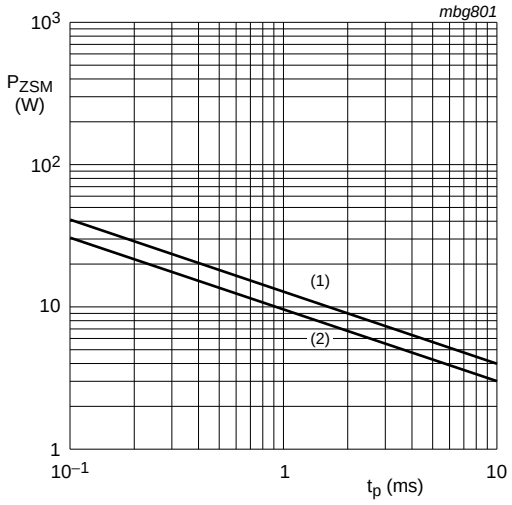
Table 9. Characteristics per type; BZX384-B27 to BZX384-C75 *…continued*

T_j = 25 °C unless otherwise specified.

BZX384 -xxx	Sel	Working voltage V_Z (V)		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 = 2 mA		I_Z = 0.5 mA		I_Z = 2 mA				I_Z = 2 mA				
		Min	Max	Typ	Max	Typ	Max	Max	V_R (V)	Min	Typ	Max	Max	Max
47	B	46.1	47.9	85	375	50	170	0.05	32.9	42.0	46.1	51.8	40	0.5
	C	44.0	50.0											
51	B	50.0	52.0	90	400	60	180	0.05	35.7	46.6	51.0	57.2	40	0.4
	C	48.0	54.0											
56	B	54.9	57.1	100	425	70	200	0.05	39.2	52.2	57.0	63.8	40	0.3
	C	52.0	60.0											
62	B	60.8	63.2	120	450	80	215	0.05	43.4	58.8	64.4	71.6	35	0.3
	C	58.0	66.0											
68	B	66.6	69.4	150	475	90	240	0.05	47.6	65.6	71.7	79.8	35	0.25
	C	64.0	72.0											
75	B	73.5	76.5	170	500	95	255	0.05	52.5	73.4	80.2	88.6	35	0.20
	C	70.0	79.0											

[1] f = 1 MHz; V_R = 0 V

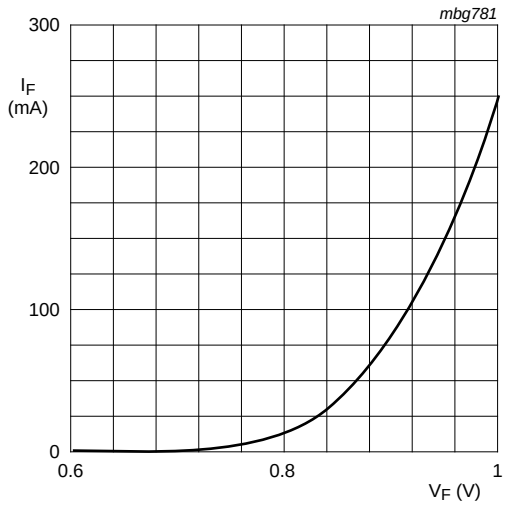
[2] t_p = 100 μs; square wave; T_j = 25 °C before surge



(1) T_j = 25 °C (before surge)

(2) T_j = 150 °C (before surge)

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

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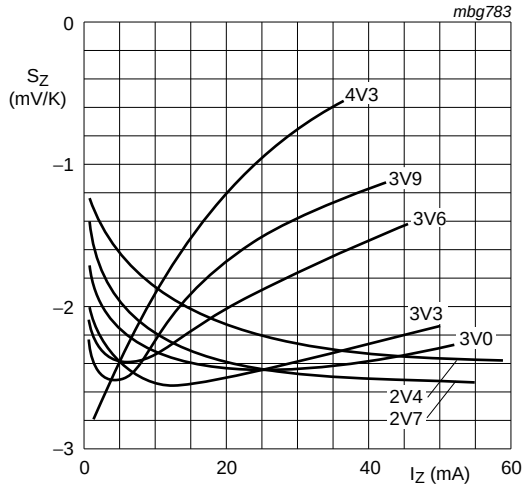
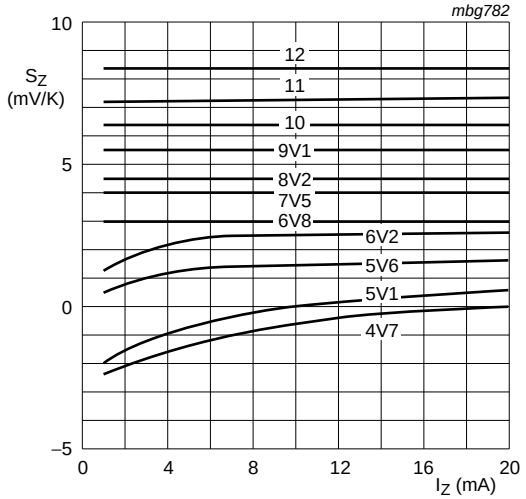


BZX384-B/C2V4 to BZX384-B/C4V3

T_j = 25 °C to 150 °C

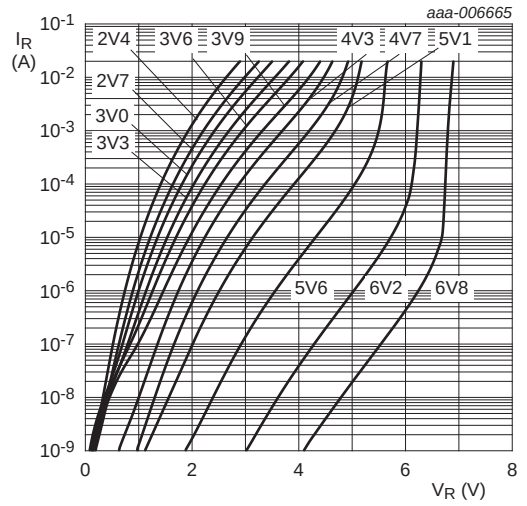
Fig 3. Temperature coefficient as a function of working current; typical values



BZX384-B/C4V7 to BZX384-B/C12

T_j = 25 °C to 150 °C

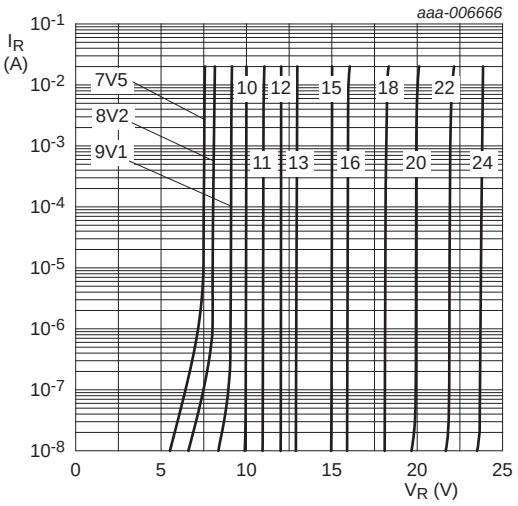
Fig 4. Temperature coefficient as a function of working current; typical values



BZX384-B/C2V4 to BZX384-B/C6V8

T_{amb} = 25 °C

Fig 5. Reverse current as a function of reverse voltage; typical values



BZX384-B/C7V5 to BZX384-B/C24

T_{amb} = 25 °C

Fig 6. Reverse current as a function of reverse voltage; typical values

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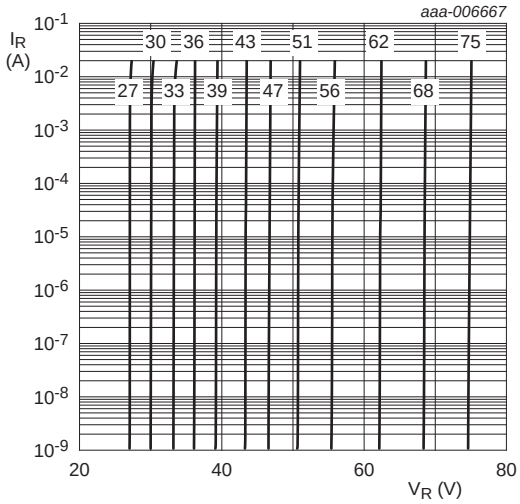

BZX384-B/C27 to BZX384-B/C75

T_{amb} = 25 °C

Fig 7. Reverse current as a function of reverse 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

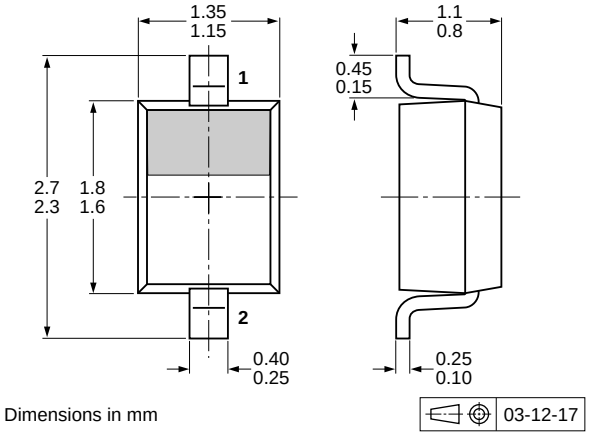

Fig 8. Package outline SOD323 (SC-76)

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10. Soldering

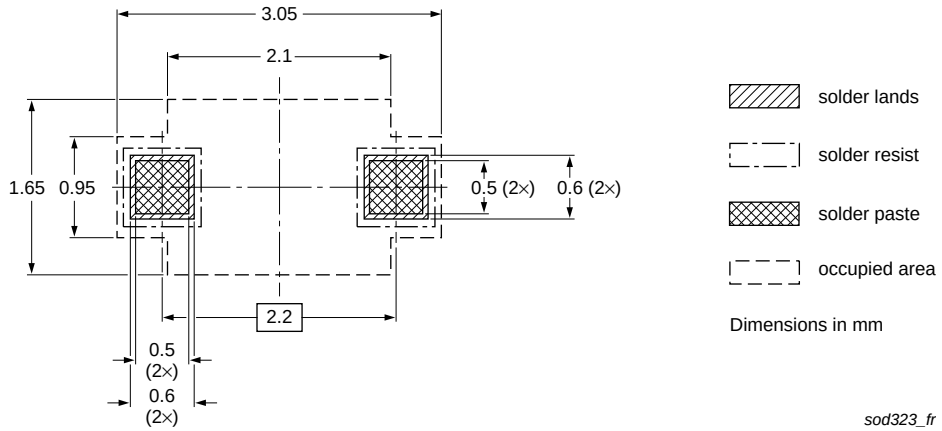

Fig 9. Reflow soldering footprint SOD323 (SC-76)

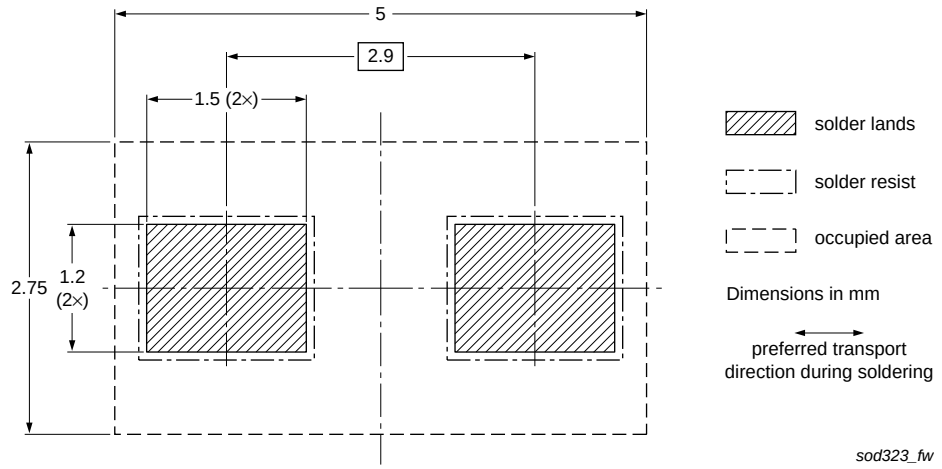

Fig 10. Wave soldering footprint SOD323 (SC-76)

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11. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BZX384_SER v.3	20161011	Product data sheet	-	BZX384_SER v.2
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors • Legal texts have been adapted to the new company name where appropriate. • Section 1 “Product profile”: enhanced. • Table 5: T_{amb} added. • Figure 5 to Figure 7: added. • Section 8 “Test information”: added. • Figure 9: replaced by minimized package outline. • Section 10 “Soldering”: added. • Section 12 “Legal information”: updated.			
BZX384_SER v.2	20040322	Product data sheet	-	BZX384_SER v.1
BZX384_SER v.1	20030401	Product specification	-	-

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12. Legal information

12.1 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".

[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.nexperia.com.

12.2 Definitions

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