BZB784 series

Voltage regulator double diodes

Rev. 3 — 31 January 2024 Product data sheet

1. General description

Low-power voltage regulator double diodes in a SOT323 (SC-70) small Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Total power dissipation: ≤ 350 mW
- Approximately 5% V_Z tolerance
- Working voltage range: nominal 2.4 to 15 V (E24 range)
- AEC-Q101 qualified

3. Applications

- General regulation functions
- ESD and surge protection

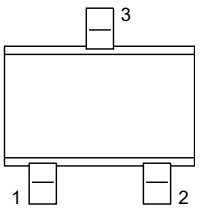
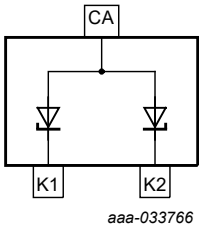
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_F	forward voltage	I_F = 10 mA; T_j = 25 °C	-	-	0.9	V

5. Pinning information

Table 2. Pinning

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K1	cathode (diode 1)		
2	K2	cathode (diode 2)		
3	CA	common anode		

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BZB784-C2V4 to BZB784-C15[1]	SC-70	plastic, surface-mounted package; 3 leads; 1.3 mm pitch; 2 mm x 1.25 mm x 0.95 mm body	SOT323

[1] The series consists of 20 types with nominal working voltages from 2.4 V to 15 V.

7. Marking

Table 4. Marking Codes

Type number	Marking Code	Type number	Marking Code	Type number	Marking Code	Type number	Marking Code
BZB784-C2V4	91	BZB784-C3V9	96	BZB784-C6V2	9B	BZB784-C10	9G
BZB784-C2V7	92	BZB784-C4V3	97	BZB784-C6V8	9C	BZB784-C11	9H
BZB784-C3V0	93	BZB784-C4V7	98	BZB784-C7V5	9D	BZB784-C12	9J
BZB784-C3V3	94	BZB784-C5V1	99	BZB784-C8V2	9E	BZB784-C13	9K
BZB784-C3V6	95	BZB784-C5V6	9A	BZB784-C9V1	9F	BZB784-C15	9L

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		-	200	mA
I_{ZSM}	non-repetitive peak reverse current	t_p = 100 µs; square wave; T_{amb} = 25 °C; prior to surge -	see Table 8		
P_{ZSM}	non-repetitive peak reverse power dissipation	t_p = 100 µs; square wave; T_{amb} = 25 °C; prior to surge	-	40	W
P_{tot}	total power dissipation	T_{amb} = 25 °C; 2 diodes loaded [1]	-	350	mW
		T_{amb} = 25 °C; 1 diode loaded [1]	-	180	mW
T_j	junction temperature		-	150	°C
T_{amb}	ambient temperature		−55	+150	°C
T_{stg}	storage temperature		−65	+150	°C

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

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 2 diodes loaded	[1]	-	-	355	K/W
		in free air 1 diode loaded	[1]	-	-	680	K/W
$R_{th(j-sp)}$	thermal resistance from junction to solder point	2 diodes loaded	[2]	-	-	140	K/W
		1 diode loaded	[2]	-	-	265	K/W

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
[2] Soldering point of cathode tab.

10. Characteristics

Table 7. Electrical characteristics per type: BZB784-C2V4 to BZB784-C15

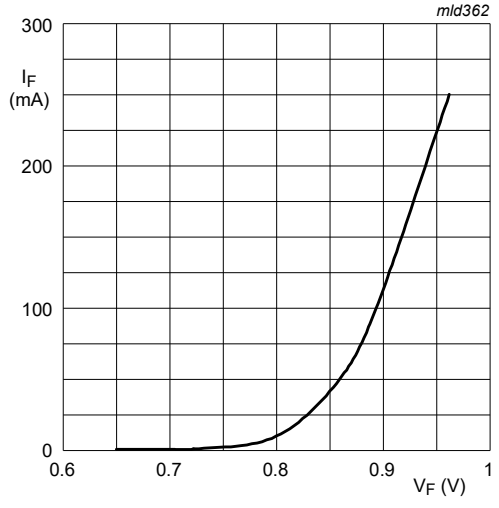
T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Max	Unit
V_F	forward voltage	I_F = 10 mA	0.9	V
I_R	reverse current			
	BZB784-C2V4	V_R = 1 V	50	µA
	BZB784-C2V7		20	µA
	BZB784-C3V0		10	µA
	BZB784-C3V3		5	µA
	BZB784-C3V6		5	µA
	BZB784-C3V9		3	µA
	BZB784-C4V3		3	µA
	BZB784-C4V7	V_R = 2 V	3	µA
	BZB784-C5V1		2	µA
	BZB784-C5V6		1	µA
	BZB784-C6V2	V_R = 4 V	3	µA
	BZB784-C6V8		2	µA
	BZB784-C7V5	V_R = 5 V	1	µA
	BZB784-C8V2		700	nA
	BZB784-C9V1	V_R = 6 V	500	nA
	BZB784-C10	V_R = 7 V	200	nA
	BZB784-C11	V_R = 8 V	100	nA
	BZB784-C12		100	nA
	BZB784-C13		100	nA
	BZB784-C15	V_R = 10.5 V	50	nA

Table 8. Electrical characteristics per type: BZB784-C2V4 to BZB784-C15

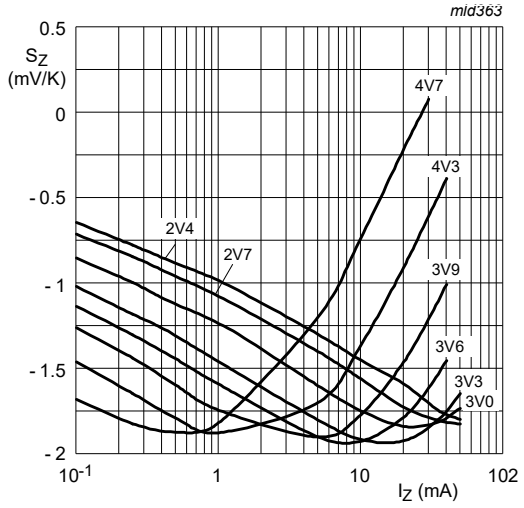
T_j = 25 °C unless otherwise specified.

BZB784-C	Working voltage V_Z (V)		Differential resistance r_{diff} (Ω)				Temperature coefficient S_Z (mV/K)	Diode capacitance C_d (pF)	Non-repetitive peak reverse current I_{ZSM} (A)
	Tol. ± 5 % I_Z = 5 mA		I_Z = 1 mA		I_Z = 5 mA		I_Z = 5 mA	f = 1 MHz V_R = 0 V	t_p = 100 µs T_{amb} = 25 °C
	Min	Max	Typ	Max	Typ	Max	Typ	Max	Max
2V4	2.2	2.6	275	600	70	100	-1.3	450	6.0
2V7	2.5	2.9	300	600	75	100	-1.4	450	6.0
3V0	2.8	3.2	325	600	80	95	-1.6	450	6.0
3V3	3.1	3.5	350	600	85	95	-1.8	450	6.0
3V6	3.4	3.8	375	600	85	90	-1.9	450	6.0
3V9	3.7	4.1	400	600	85	90	-1.9	450	6.0
4V3	4.0	4.6	410	600	80	90	-1.7	450	6.0
4V7	4.4	5.0	425	500	50	80	-1.2	300	6.0
5V1	4.8	5.4	400	480	40	60	-0.5	300	6.0
5V6	5.2	6.0	80	400	15	40	1.0	300	6.0
6V2	5.8	6.6	40	150	6	10	2.2	200	6.0
6V8	6.4	7.2	30	80	6	15	3.0	200	6.0
7V5	7.0	7.9	30	80	6	15	3.6	150	4.0
8V2	7.7	8.7	40	80	6	15	4.3	150	4.0
9V1	8.5	9.6	40	100	6	15	5.2	150	3.0
10	9.4	10.6	50	150	8	20	6.0	90	3.0
11	10.4	11.6	50	150	10	20	6.9	90	2.5
12	11.4	12.7	50	150	10	25	7.9	85	2.5
13	12.4	14.1	50	170	10	30	8.8	80	2.5
15	13.8	15.6	50	200	10	30	10.7	75	2.0



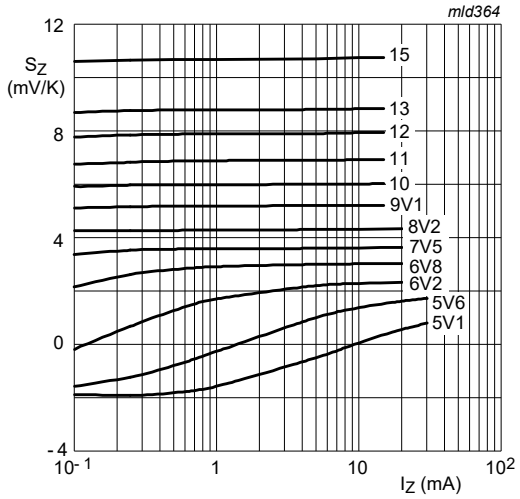
T_j = 25 °C

Fig. 1. Forward current as a function of forward voltage; typical values



T_j = 25 °C to 150 °C

Fig. 2. Temperature coefficient as a function of working current; typical values (BZB784-C2V4 to C4V7)



T_j = 25 °C to 150 °C

Fig. 3. Temperature coefficient as a function of working current; typical values (BZB784-C5V1 to C15)

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

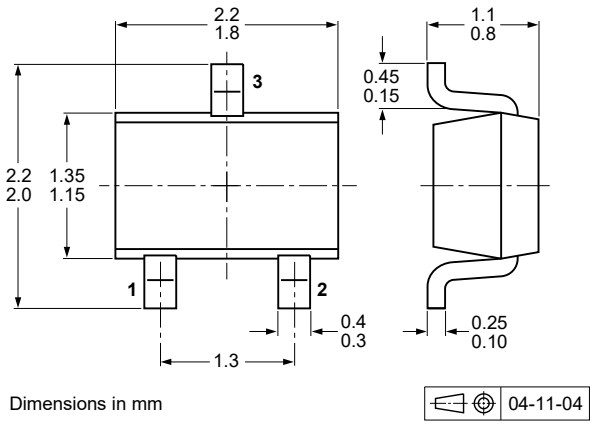


Fig. 4. Package outline SC-70 (SOT323)

13. Soldering

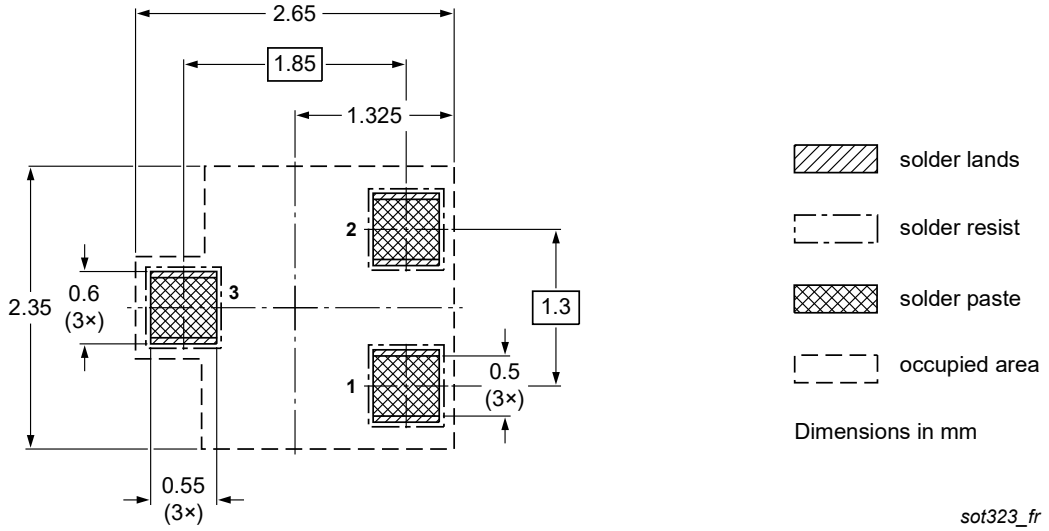


Fig. 5. Reflow soldering footprint for SC-70 (SOT323)

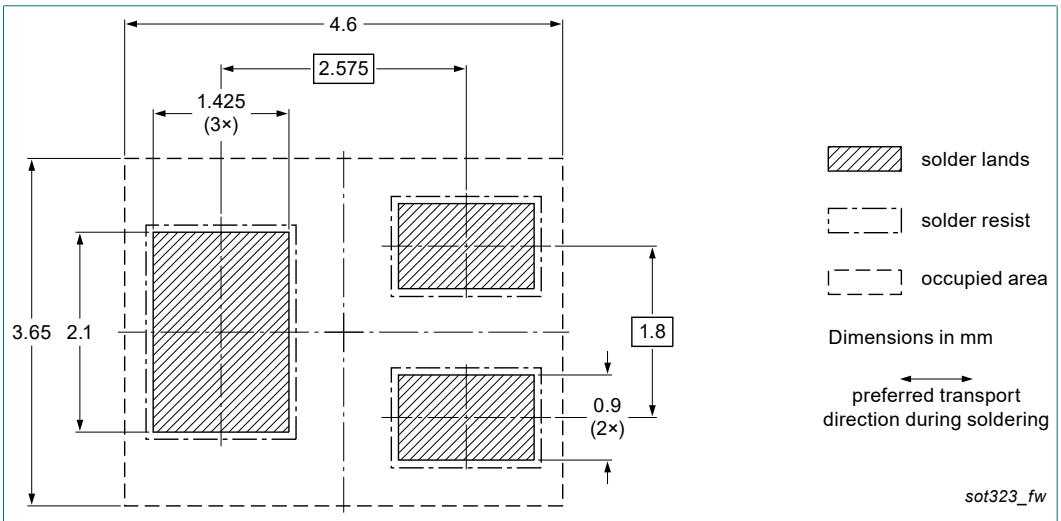


Fig. 6. Wave soldering footprint for SC-70 (SOT323)

14. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BZB784_SER v.3	20240131	Product data sheet	-	BZB784_SER v.2
Modifications:	• The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. • Legal texts have been adapted to the new company name where appropriate.			
BZB784_SER v.2	20010227			BZB784_SER v.1
BZB784_SER v.1	20000524	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".
[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 https://www.nexperia.com.

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Date of release: 31 January 2024

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