BZB784-Q series

Voltage regulator double diodes

Rev. 2 — 28 March 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)
- Qualified according to AEC-Q101 and recommended for use in automotive applications

3. Applications

- General regulation functions
- ESD and surge protection

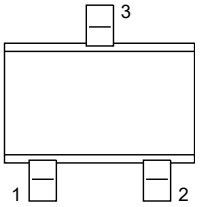
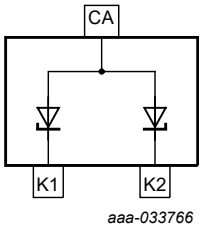
4. Quick reference data

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

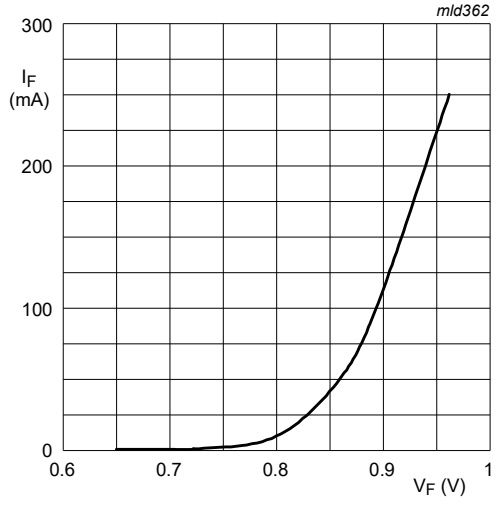
T_j = 25 °C unless otherwise specified.

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

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

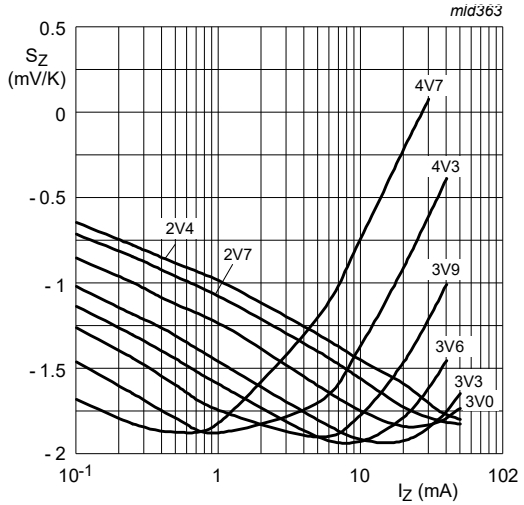
T_j = 25 °C unless otherwise specified.

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-Q	2.2	2.6	275	600	70	100	-1.3	450	6.0
2V7-Q	2.5	2.9	300	600	75	100	-1.4	450	6.0
3V0-Q	2.8	3.2	325	600	80	95	-1.6	450	6.0
3V3-Q	3.1	3.5	350	600	85	95	-1.8	450	6.0
3V6-Q	3.4	3.8	375	600	85	90	-1.9	450	6.0
3V9-Q	3.7	4.1	400	600	85	90	-1.9	450	6.0
4V3-Q	4.0	4.6	410	600	80	90	-1.7	450	6.0
4V7-Q	4.4	5.0	425	500	50	80	-1.2	300	6.0
5V1-Q	4.8	5.4	400	480	40	60	-0.5	300	6.0
5V6-Q	5.2	6.0	80	400	15	40	1.0	300	6.0
6V2-Q	5.8	6.6	40	150	6	10	2.2	200	6.0
6V8-Q	6.4	7.2	30	80	6	15	3.0	200	6.0
7V5-Q	7.0	7.9	30	80	6	15	3.6	150	4.0
8V2-Q	7.7	8.7	40	80	6	15	4.3	150	4.0
9V1-Q	8.5	9.6	40	100	6	15	5.2	150	3.0
10-Q	9.4	10.6	50	150	8	20	6.0	90	3.0
11-Q	10.4	11.6	50	150	10	20	6.9	90	2.5
12-Q	11.4	12.7	50	150	10	25	7.9	85	2.5
13-Q	12.4	14.1	50	170	10	30	8.8	80	2.5
15-Q	13.8	15.6	50	200	10	30	10.7	75	2.0



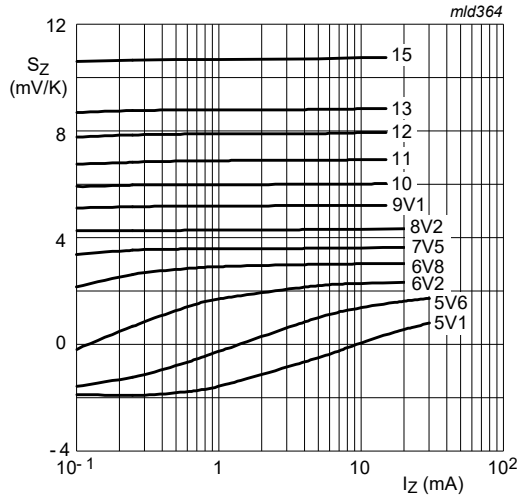
T_j = 25 °C

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-Q to C4V7-Q)



T_j = 25 °C to 150 °C

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

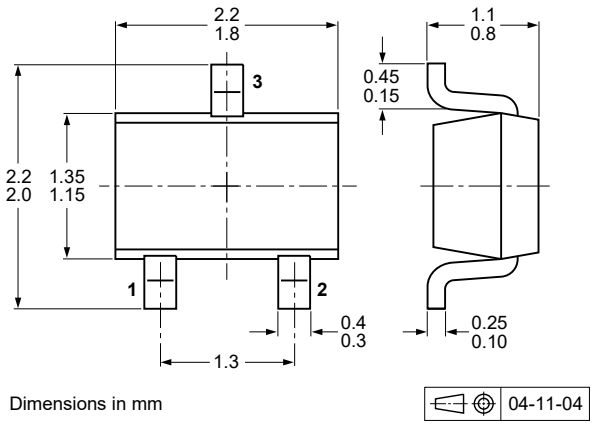


Fig. 4. Package outline SC-70 (SOT323)

13. Soldering

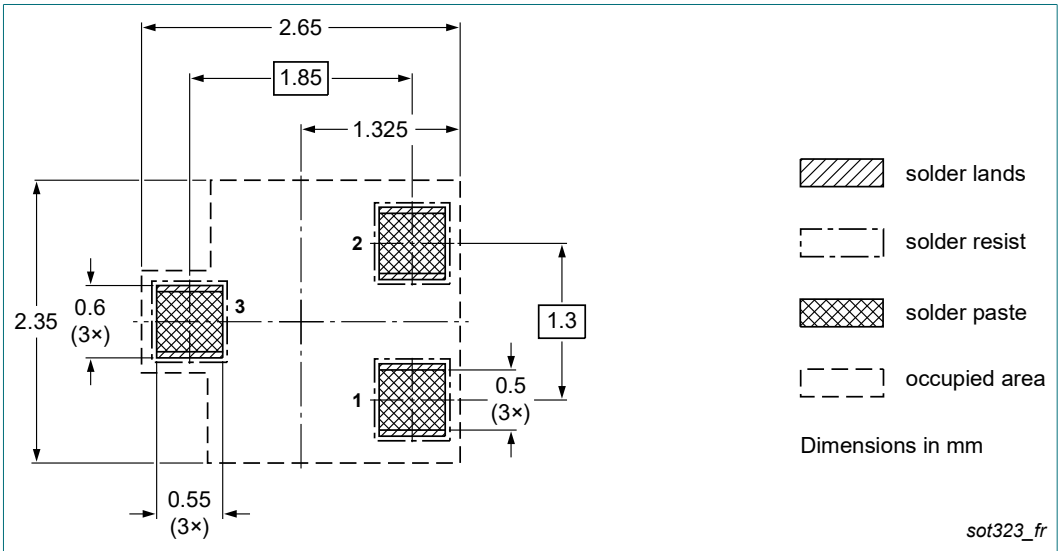


Fig. 5. Reflow soldering footprint for SC-70 (SOT323)

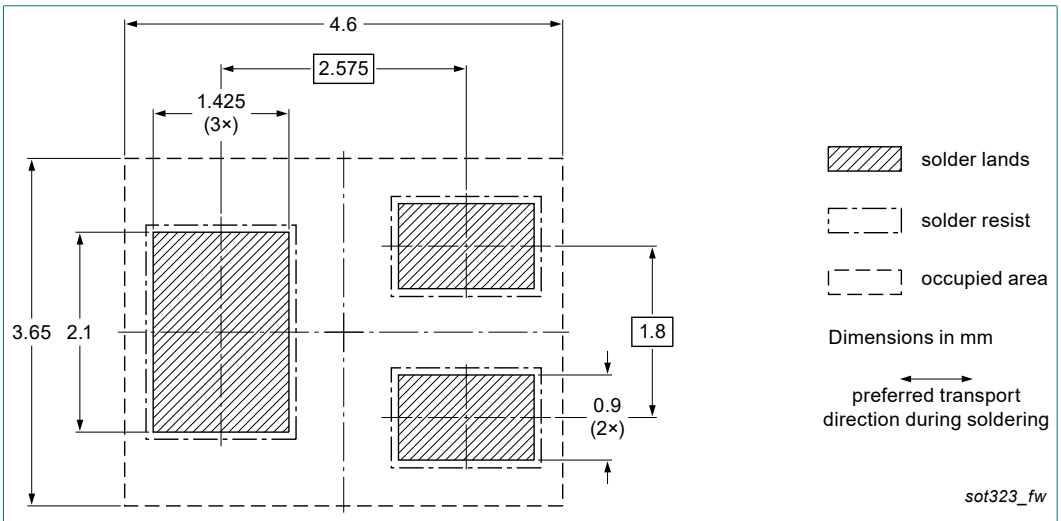


Fig. 6. Wave soldering footprint for SC-70 (SOT323)

14. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BZB784-Q_SER v.2	20240228	Product data sheet	-	BZB784-Q_SER v.1
Modifications:	• All -Q-selections were added			
BZB784-Q_SER v.1	20240131	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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