Voltage regulator diodes Rev. 1 — 6 September 2021

**Product data sheet** 

### 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  $\pm$ 1 % (BZX384-A),  $\pm$ 2 % (BZX384-B) and approximately  $\pm$ 5 % (BZX384-C) tolerance range. The series includes 37 breakdown voltages with nominal working voltages from 2.4 V to 75 V.

### 2. Features and benefits

- Total power dissipation: ≤300 mW
- Three tolerance series: ±1 %, ±2 % and approximately ±5 %
- Working voltage range: nominal 2.4 V to 75 V (E24 range)
- Non-repetitive peak reverse power dissipation: ≤ 40 W
- · 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	Тур	Max	Unit
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 10 mA	[1]	-	-	0.9	V
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	[2]	-	-	300	mW

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

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



### 5. Pinning information

Table 2. Pinni	Table 2. Pinning							
Pin	Symbol	Description		Simplified outline	Graphic symbol			
1	К	cathode	[1]	1 2				
2	A	anode			006aaa152			

[1] The marking bar indicates the cathode.

# 6. Ordering information

#### Table 3. Ordering information

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

The series consists of 111 types with 37 breakdown voltages with nominal working voltages from 2.4 V to 75 V and ±1 %, ±2 % and ±5 % tolerances.

Voltage regulator diodes

# 7. Marking

Type number	Marking code	Type number	Marking code	Type number	Marking code
BZX384-A2V4-Q	2B	BZX384-B2V4-Q	K1	BZX384-C2V4-Q	Т3
BZX384-A2V7-Q	2U	BZX384-B2V7-Q	K2	BZX384-C2V7-Q	T4
BZX384-A3V0-Q	2V	BZX384-B3V0-Q	К3	BZX384-C3V0-Q	T5
BZX384-A3V3-Q	2W	BZX384-B3V3-Q	K4	BZX384-C3V3-Q	T6
BZX384-A3V6-Q	2X	BZX384-B3V6-Q	K5	BZX384-C3V6-Q	T7
BZX384-A3V9-Q	2Y	BZX384-B3V9-Q	K6	BZX384-C3V9-Q	Т8
BZX384-A4V3-Q	2Z	BZX384-B4V3-Q	K7	BZX384-C4V3-Q	Т9
BZX384-A4V7-Q	22	BZX384-B4V7-Q	K8	BZX384-C4V7-Q	Т0
BZX384-A5V1-Q	23	BZX384-B5V1-Q	К9	BZX384-C5V1-Q	D5
BZX384-A5V6-Q	24	BZX384-B5V6-Q	L1	BZX384-C5V6-Q	D6
BZX384-A6V2-Q	25	BZX384-B6V2-Q	L2	BZX384-C6V2-Q	T1
BZX384-A6V8-Q	26	BZX384-B6V8-Q	L3	BZX384-C6V8-Q	D7
BZX384-A7V5-Q	27	BZX384-B7V5-Q	L4	BZX384-C7V5-Q	D8
BZX384-A8V2-Q	28	BZX384-B8V2-Q	L5	BZX384-C8V2-Q	D9
BZX384-A9V1-Q	29	BZX384-B9V1-Q	L6	BZX384-C9V1-Q	D0
BZX384-A10-Q	3X	BZX384-B10-Q	L7	BZX384-C10-Q	T2
BZX384-A11-Q	32	BZX384-B11-Q	L8	BZX384-C11-Q	DA
BZX384-A12-Q	33	BZX384-B12-Q	L9	BZX384-C12-Q	DB
BZX384-A13-Q	34	BZX384-B13-Q	M1	BZX384-C13-Q	DC
BZX384-A15-Q	35	BZX384-B15-Q	M2	BZX384-C15-Q	DD
BZX384-A16-Q	36	BZX384-B16-Q	M3	BZX384-C16-Q	DE
BZX384-A18-Q	37	BZX384-B18-Q	M4	BZX384-C18-Q	DF
BZX384-A20-Q	38	BZX384-B20-Q	M5	BZX384-C20-Q	DG
BZX384-A22-Q	39	BZX384-B22-Q	M6	BZX384-C22-Q	DH
BZX384-A24-Q	4N	BZX384-B24-Q	M7	BZX384-C24-Q	DJ
BZX384-A27-Q	4P	BZX384-B27-Q	M8	BZX384-C27-Q	DK
BZX384-A30-Q	5F	BZX384-B30-Q	M9	BZX384-C30-Q	DL
BZX384-A33-Q	4R	BZX384-B33-Q	N0	BZX384-C33-Q	DM
BZX384-A36-Q	4S	BZX384-B36-Q	N1	BZX384-C36-Q	DN
BZX384-A39-Q	4T	BZX384-B39-Q	N2	BZX384-C39-Q	DP
BZX384-A43-Q	4U	BZX384-B43-Q	N3	BZX384-C43-Q	DR
BZX384-A47-Q	4V	BZX384-B47-Q	N4	BZX384-C47-Q	DS
BZX384-A51-Q	4W	BZX384-B51-Q	N5	BZX384-C51-Q	DT
BZX384-A56-Q	4X	BZX384-B56-Q	N6	BZX384-C56-Q	DU
BZX384-A62-Q	4Y	BZX384-B62-Q	N7	BZX384-C62-Q	DV
BZX384-A68-Q	4Z	BZX384-B68-Q	N8	BZX384-C68-Q	DW
BZX384-A75-Q	42	BZX384-B75-Q	N9	BZX384-C75-Q	DX

### 8. Limiting values

#### Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
I <sub>F</sub>	forward current			-	250	mA
I <sub>ZSM</sub>	non-repetitive peak reverse current		[1]	-	see Tables 8 and 9	
P <sub>ZSM</sub>	non-repetitive peak reverse power dissipation		[1]	-	40	W
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C	[2]	-	300	mW
Tj	junction temperature			-	150	°C
T <sub>amb</sub>	ambient temperature			-65	+150	°C
T <sub>stg</sub>	storage temperature			-65	+150	°C

[1]  $t_p = 100 \ \mu s$ ; square wave;  $T_i = 25 \ ^{\circ}C$  prior to surge.

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

### 9. Thermal characteristics

#### Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Тур	Мах	Unit
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air	[1]	-	-	415	K/W
R <sub>th(j-sp)</sub>	thermal resistance from junction to solder point		[2]	-	-	110	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. Characteristics**

 $T_i$  = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Тур	Max	Unit
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 10 mA	[1]	-	-	0.9	V
		I <sub>F</sub> = 100 mA	[1]	-	-	1.1	V

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

#### Voltage regulator diodes

#### Table 8. Characteristics per type; BZX384-A2V4-Q to BZX384-C24-Q

#### $T_j$ = 25 °C unless otherwise specified.

BZX384 -xxx	Sel	voltage V <sub>Z</sub> (V) I <sub>Z</sub> = 5 mA		Maximum resistance r <sub>dif</sub> (Ω)	differential	Rever currer I <sub>R</sub> (μΑ	nt			Diode capacitance C <sub>d</sub> (pF) [1]	Non-repetitive peak reverse current I <sub>ZSM</sub> (A) [2]
		Min	Max	l <sub>z</sub> = 1 mA	l <sub>Z</sub> = 5 mA	Max	V <sub>R</sub> (V)	Min	Max	Max	Max
2V4-Q	А	2.37	2.43	600	100	50	1	-3.5	0.0	450	6.0
	В	2.35	2.45								
	С	2.20	2.60								
2V7-Q	А	2.67	2.73	600	100	20	1	-3.5	0.0	450	6.0
	В	2.65	2.75								
	С	2.50	2.90								
3V0-Q	А	2.97	3.03	600	95	10	1	-3.5	0.0	450	6.0
	В	2.94	3.06								
	С	2.80	3.20								
3V3-Q	А	3.26	3.34	600	95	5	1	-3.5	0.0	450	6.0
	В	3.23	3.37	]							
	С	3.10	3.50	]							
3V6-Q	А	3.56	3.64	600	90	5	1	-3.5	0.0	450	6.0
	В	3.53	3.67								
	С	3.40	3.80								
3V9-Q	А	3.86	3.94	600	90	3	1	-3.5	0.0	450	6.0
	В	3.82	3.98								
	С	3.70	4.10								
4V3-Q	А	4.25	4.35	600	90	3	1	-3.5	0.0	450	6.0
	В	4.21	4.39								
	С	4.00	4.60								
4V7-Q	А	4.65	4.75	500	80	3	2	-3.5	0.2	300	6.0
	В	4.61	4.79								
	С	4.40	5.00								
5V1-Q	А	5.04	5.16	480	60	2	2	-2.7	1.2	300	6.0
	В	5.00	5.20								
	С	4.80	5.40	]							
5V6-Q	А	5.54	5.66	400	40	1	2	-2.0	2.5	300	6.0
	В	5.49	5.71	]							
	С	5.20	6.00								
6V2-Q	А	6.13	6.27	150	10	3	4	0.4	3.7	200	6.0
	В	6.08	6.32								
	С	5.80	6.60								
6V8-Q	А	6.73	6.87	80	15	2	4	1.2	4.5	200	6.0
	В	6.66	6.94	]							
	С	6.40	7.20	]							
7V5-Q	А	7.42	7.58	80	15	1	5	2.5	5.3	150	4.0
	В	7.35	7.65	1							
	С	7.00	7.90	1							

### Voltage regulator diodes

BZX384 -xxx	U U		Maximum differential resistance r <sub>dif</sub> (Ω)		Rever currer I <sub>R</sub> (µA)	nt	Temp coeffi S <sub>Z</sub> (m I <sub>Z</sub> = 5	V/K)	Diode capacitance C <sub>d</sub> (pF) [1]	Non-repetitive peak reverse current I <sub>ZSM</sub> (A) [2]				
		Min	Max	l <sub>z</sub> = 1 mA	I <sub>Z</sub> = 5 mA	Max	V <sub>R</sub> (V)	Min	Max	Max	Мах			
8V2-Q	A	8.11	8.29	80	15	0.7	5	3.2	6.2	150	4.0			
	В	8.04	8.36											
	С	7.70	8.70											
9V1-Q	А	9.00	9.20	100	15	0.5	6	3.8	7.0	150	3.0			
	В	8.92	9.28											
	С	8.50	9.60											
10-Q	А	9.90	10.10	150	20	0.2	7	4.5	8.0	90	3.0			
	В	9.80	10.20											
	С	9.40	10.60											
11-Q	А	10.89	11.11	150	20	0.1	8	5.4	9.0	85	2.5			
	В	10.80	11.20											
	С	10.40	11.60											
12-Q	А	11.88	12.12	150	25	0.1	8	6.0	10.0	85	2.5			
	В	11.80	12.20											
	С	11.40	12.70											
13-Q	А	12.87	13.13	170	30	0.1	8	7.0	11.0	80	2.5			
	В	12.70	13.30											
	С	12.40	14.10											
15-Q	А	14.85	15.15	200	200	200	200	30	0.05	10.5	9.2	13.0	75	2.0
	В	14.70	15.30											
	С	13.80	15.60											
16-Q	А	15.84	16.16	200	40	0.05	11.2	10.4	14.0	75	1.5			
	В	15.70	16.30											
	С	15.30	17.10											
18-Q	A	17.82	18.18	225	45	0.05	12.6	12.4	16.0	70	1.5			
	В	17.60	18.40	]										
	С	16.80	19.10	1										
20-Q	А	19.80	20.20	225	55	0.05	14	14.4	18.0	60	1.5			
	В	19.60	20.40	]										
	С	18.80	21.20	1										
22-Q	A	21.78	22.22	250	55	0.05	15.4	16.4	20.0	60	1.25			
	В	21.60	22.40	1										
	С	20.80	23.30											
24-Q	A	23.76	24.24	250	70	0.05	16.8	18.4	22.0	55	1.25			
	В	23.50	24.50				0.00				1.20			
	С	22.80	25.60	1										

[1] f = 1 MHz;  $V_R$  = 0 V [2]  $t_p$  = 100 µs; square wave;  $T_j$  = 25 °C

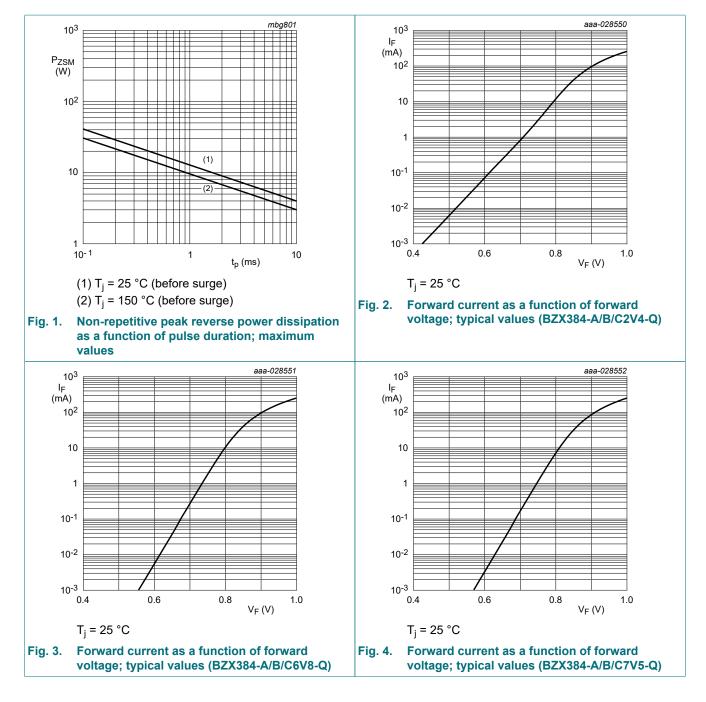
#### Voltage regulator diodes

#### Table 9. Characteristics per type; BZX384-A27-Q to BZX384-C75-Q

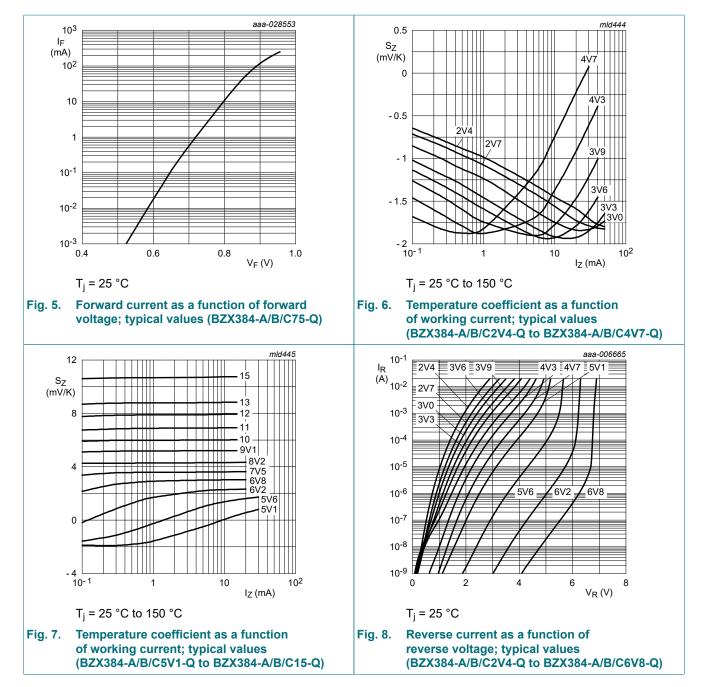
#### $T_i = 25 \text{ °C}$ unless otherwise specified.

BZX384 -xxx	xxx volta V <sub>Z</sub> (V		Working voltageMaximum di resistance $V_Z$ (V) $r_{dif}$ ( $\Omega$ ) $I_Z$ = 2 mA			lifferential Reverse current I <sub>R</sub> (μΑ)		Temp coeffi S <sub>Z</sub> (m I <sub>Z</sub> = 2	V/K)	Diode capacitance C <sub>d</sub> (pF) [1]	Non-repetitive peak reverse current I <sub>ZSM</sub> (A) [2]
		Min	Мах	l <sub>Z</sub> = 0.5 mA	I <sub>Z</sub> = 2 mA	Max	V <sub>R</sub> (V)	Min	Max	Мах	Мах
27-Q	А	26.73	27.27	300	80	0.05	18.9	21.4	25.3	50	1.0
	В	26.50	27.50	]							
	С	25.10	28.90								
30-Q	А	29.70	30.30	300	80	0.05	21	24.4	29.4	50	1.0
	В	29.40	30.60								
	С	28.00	32.00								
33-Q	А	32.67	33.33	325	80	0.05	23.1	27.4	33.4	45	0.9
	В	32.30	33.70								
	С	31.00	35.00	1							
36-Q	A	35.64	36.36	350	90	0.05	25.2	30.4	37.4	45	0.8
	В	35.30	36.70	1							
	С	34.00	38.00	-							
39-Q	А	38.61	39.39	350	130	0.05	27.3	33.4	41.2	45	0.7
	В	38.20	39.80	-							
	С	37.00	41.00	-							
43-Q	А	42.57	43.43	375	150	0.05	30.1	37.6	46.6	40	0.6
	В	42.10	43.90	-							
	С	40.00	46.00	-							
47-Q	A	46.53	47.47	375 170	170 0.05	0.05	5 32.9	42.0	51.8	40	0.5
	В	46.10	47.90								
	С	44.00	50.00	-							
51-Q	A	50.49	51.51	400	180	0.05	35.7	46.6	57.2	40	0.4
	В	50.00	52.00	-							
	С	48.00	54.00	1							
56-Q	А	55.44	56.56	425	200	0.05	39.2	52.2	63.8	40	0.3
	В	54.90	57.10	-							
	С	52.00	60.00	1							
62-Q	A	61.38	62.62	450	215	0.05	43.4	58.8	71.6	35	0.3
	В	60.80	63.20	1							
	С	58.00	66.00	-							
68-Q	A	67.32	68.68	475	240	0.05	47.6	65.6	79.8	35	0.25
	В	66.60	69.40	-							
	С	64.00	72.00	1							
75-Q	A	74.25	75.75	500	255	0.05	52.5	73.4	88.6	35	0.20
	В	73.50	76.50	-							
	С	70.00	79.00	-							

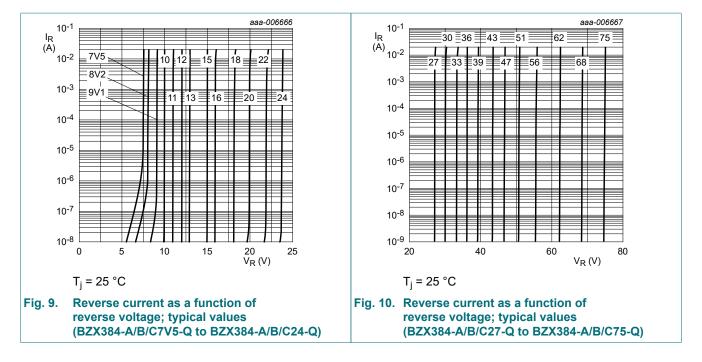
#### Voltage regulator diodes



#### Voltage regulator diodes



#### Voltage regulator diodes

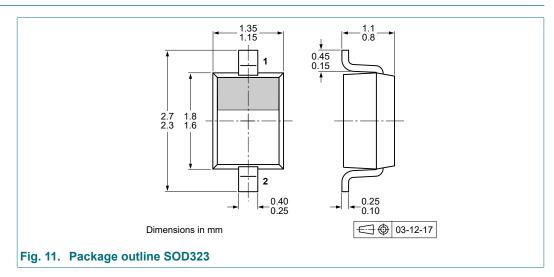


### 11. Test information

#### **Quality information**

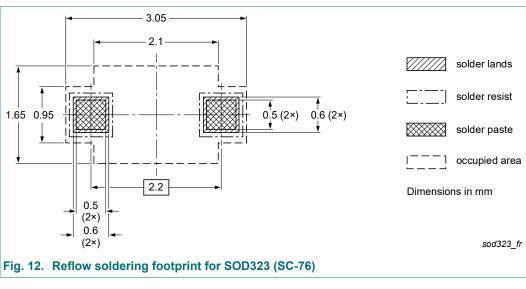
This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - *Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

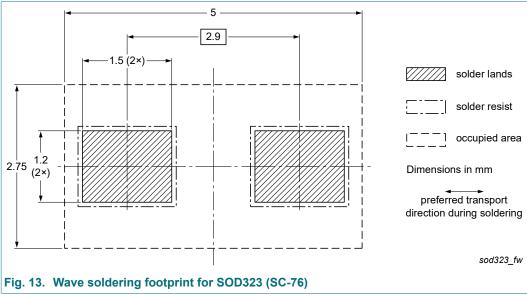
### 12. Package outline



#### Voltage regulator diodes

### 13. Soldering





# 14. Revision history

Table 10. Revision history								
Document ID	Release date	Data sheet status	Change notice	Supersedes				
BZX384-Q_SER v.1	20210906	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.

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### **BZX384-Q series**

#### Voltage regulator diodes

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Voltage regulator diodes

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