

Voltage regulator diodes Rev. 1 — 29 September 2021

**Product data sheet** 

### 1. General description

Low-power voltage regulator diodes in a small SOT23 (TO-236AB) Surface-Mounted Device (SMD) plastic package.

The diodes are available in the normalized E24  $\pm$ 1 % (BZX84-A),  $\pm$ 2 % (BZX84-B) and approximately  $\pm$ 5 % (BZX84-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: ≤250 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]	-	-	250	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

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode	3	K
2	n.c.	not connected		
3	К	cathode		aaa-006592

# 6. Ordering information

Table 3. Ordering information									
Type number	Package								
	Name	Description	Version						
BZX84-Q series[1]	TO-236AB	plastic surface-mounted package; 3 leads	SOT23						

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

# 7. Marking

Type number	Marking code	Type number	Marking code	Type number	Marking code
BZX84-A2V4-Q	%50	BZX84-B2V4-Q	%Z0	BZX84-C2V4-Q	%T3
BZX84-A2V7-Q	%51	BZX84-B2V7-Q	%Z1	BZX84-C2V7-Q	%T4
BZX84-A3V0-Q	%52	BZX84-B3V0-Q	%S1	BZX84-C3V0-Q	%T9
BZX84-A3V3-Q	%53	BZX84-B3V3-Q	%S2	BZX84-C3V3-Q	%B1
BZX84-A3V6-Q	%C1	BZX84-B3V6-Q	%S3	BZX84-C3V6-Q	%B2
BZX84-A3V9-Q	%55	BZX84-B3V9-Q	%S4	BZX84-C3V9-Q	%B3
BZX84-A4V3-Q	%56	BZX84-B4V3-Q	%S7	BZX84-C4V3-Q	%B6
BZX84-A4V7-Q	%57	BZX84-B4V7-Q	%S8	BZX84-C4V7-Q	Z1%
BZX84-A5V1-Q	%58	BZX84-B5V1-Q	%R1	BZX84-C5V1-Q	Z2%
BZX84-A5V6-Q	%59	BZX84-B5V6-Q	%R2	BZX84-C5V6-Q	Z3%
BZX84-A6V2-Q	%60	BZX84-B6V2-Q	%R5	BZX84-C6V2-Q	Z4%
BZX84-A6V8-Q	%61	BZX84-B6V8-Q	%R6	BZX84-C6V8-Q	Z5%
BZX84-A7V5-Q	%62	BZX84-B7V5-Q	%R8	BZX84-C7V5-Q	Z6%
BZX84-A8V2-Q	%63	BZX84-B8V2-Q	%R9	BZX84-C8V2-Q	Z7%
BZX84-A9V1-Q	%64	BZX84-B9V1-Q	%T1	BZX84-C9V1-Q	Z8%
BZX84-A10-Q	%65	BZX84-B10-Q	%66	BZX84-C10-Q	Z9%
BZX84-A11-Q	%04	BZX84-B11-Q	%Z6	BZX84-C11-Q	Y1%
BZX84-A12-Q	%67	BZX84-B12-Q	%Z7	BZX84-C12-Q	Y2%
BZX84-A13-Q	%C0	BZX84-B13-Q	%Z8	BZX84-C13-Q	Y3%
BZX84-A15-Q	%69	BZX84-B15-Q	%Z9	BZX84-C15-Q	Y4%
BZX84-A16-Q	KE%	BZX84-B16-Q	%70	BZX84-C16-Q	Y5%
BZX84-A18-Q	KF%	BZX84-B18-Q	%71	BZX84-C18-Q	Y6%
BZX84-A20-Q	%C2	BZX84-B20-Q	%72	BZX84-C20-Q	Y7%
BZX84-A22-Q	KG%	BZX84-B22-Q	%73	BZX84-C22-Q	Y8%
BZX84-A24-Q	KH%	BZX84-B24-Q	%74	BZX84-C24-Q	Y9%
BZX84-A27-Q	%75	BZX84-B27-Q	%Z5	BZX84-C27-Q	%T2
BZX84-A30-Q	KJ%	BZX84-B30-Q	%Z4	BZX84-C30-Q	%T5
BZX84-A33-Q	KK%	BZX84-B33-Q	%Y1	BZX84-C33-Q	%T6
BZX84-A36-Q	%C3	BZX84-B36-Q	%Y2	BZX84-C36-Q	%T7
BZX84-A39-Q	%C4	BZX84-B39-Q	%S0	BZX84-C39-Q	%T8
BZX84-A43-Q	%C5	BZX84-B43-Q	%S5	BZX84-C43-Q	%B4
BZX84-A51-Q	%C6	BZX84-B47-Q	%S6	BZX84-C47-Q	%B5
BZX84-A75-Q	%86	BZX84-B51-Q	%S9	BZX84-C51-Q	%B7
-	-	BZX84-B56-Q	%R0	BZX84-C56-Q	%B8
-	-	BZX84-B62-Q	%R3	BZX84-C62-Q	%B9
-	-	BZX84-B68-Q	%R4	BZX84-C68-Q	%B0
-	-	BZX84-B75-Q	%R7	BZX84-C75-Q	%A1

### 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			-	200	mA
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]	-	250	mW
Tj	junction temperature			-	150	°C
T <sub>amb</sub>	ambient temperature			-55	+150	°C
T <sub>stg</sub>	storage temperature			-65	+150	°C

[1]

 $t_p$  = 100 µs; square wave;  $T_j$  = 25 °C prior to surge. Device mounted on an FR4 PCB, single-sided 70 µm copper, tin-plated and standard footprint. [2]

# 9. Thermal characteristics

	_		
Table (	6.	Thermal	characteristics

Symbol	Parameter	Conditions		Min	Тур	Max	Unit
R <sub>th(j-a)</sub>	thermal resistance from junction to ambient	in free air	[1]	-	-	500	K/W
R <sub>th(j-sp)</sub>	thermal resistance from junction to solder point		[2]	-	-	330	K/W

Device mounted on an FR4 PCB, single-sided 70 µm copper, tin-plated and standard footprint. [1]

[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

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

### Voltage regulator diodes

### Table 8. Characteristics per type; BZX84-A2V4-Q to BZX84-C24-Q

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

BZX84 Sel -xxx		Working 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	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	I <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	A	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	A	3.26	3.34	600	95	5	1	-3.5	0.0	450	6.0
	В	3.23	3.37	1							
	С	3.10	3.50	1							
3V6-Q	A	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	A	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	A	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	A	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	A	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	1							
5V6-Q	A	5.54	5.66	400	40	1	2	-2.0	2.5	300	6.0
	В	5.49	5.71	1							
	С	5.20	6.00	1							
6V2-Q	A	6.13	6.27	150	10	3	4	0.4	3.7	200	6.0
	В	6.08	6.32	1							
	С	5.80	6.60	1							
6V8-Q	A	6.73	6.87	80	15	2	4	1.2	4.5	200	6.0
	В	6.66	6.94	1							
	С	6.40	7.20	1							
7V5-Q	A	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							

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### Voltage regulator diodes

BZX84 Sel -xxx		Working voltage V <sub>Z</sub> (V) I <sub>Z</sub> = 5 mA		Maximum differential resistance r <sub>dif</sub> (Ω)		currer	Reverse current Ι <sub>R</sub> (μΑ)		erature cient V/K) mA	Diode capacitance C <sub>d</sub> (pF) [1]	current I <sub>ZSM</sub> (A) [2]	
		Min	Max	I <sub>Z</sub> = 1 mA	l <sub>Z</sub> = 5 mA	Мах	V <sub>R</sub> (V)	Min	Max	Max	Max	
8V2-Q	А	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	A	14.85	15.15	200	200 30	0.05	10.5	9.2	.2 13.0	75	2.0	
	В	14.70	15.30									
	С	13.80	15.60									
16-Q	A	15.84	16.16	200	40	0.05	11.2	10.4	10.4 14.0	75	1.5	
	В	15.70	16.30									
	С	15.30	17.10									
18-Q	А	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	1								
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	1		0.00	0.00 10.0					1.20
	С	22.80	25.60	1								

#### Voltage regulator diodes

#### Table 9. Characteristics per type; BZX84-A27-Q to BZX84-C75-Q

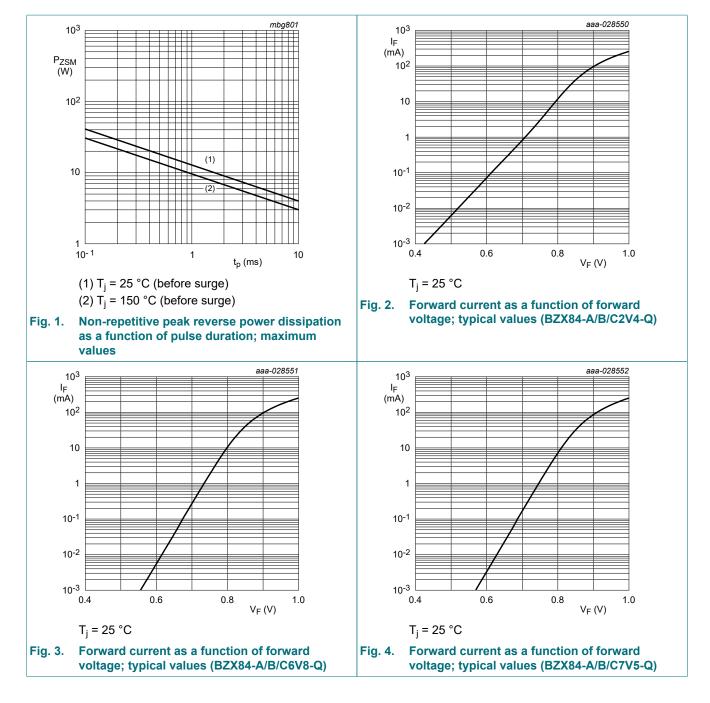
### $T_i$ = 25 °C unless otherwise specified.

BZX84 -xxx	Sel	Workin voltag V <sub>Z</sub> (V) I <sub>Z</sub> = 2 i	e	Maximum differential resistance r <sub>dif</sub> (Ω)		Reverse current Ι <sub>R</sub> (μΑ)		Tempo coeffi S <sub>Z</sub> (m <sup>2</sup> 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	Мах	Мах	Мах		
27-Q	А	26.73	27.27	300	80	0.05	18.9	21.4	1.4 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										
36-Q	А	35.64	36.36	350	90	0.05	25.2	30.4	37.4	45	0.8		
	В	35.30	36.70										
	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	В	38.20	39.80										
	С	37.00	41.00										
43-Q	А	42.57	43.43	375	150	150 (	5 150	0.05	30.1	37.6	46.6	40	0.6
	В	42.10	43.90										
	С	40.00	46.00										
47-Q	В	46.10	47.90	375	170	0.05	32.9	42.0	51.8	40	0.5		
	С	44.00	50.00										
51-Q	А	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										
56-Q	В	54.90	57.10	425	200	0.05	39.2	52.2	63.8	40	0.3		
	С	52.00	60.00	]									
62-Q	В	60.80	63.20	450	215	0.05	43.4	58.8	71.6	35	0.3		
	С	58.00	66.00	1									
68-Q	В	66.60	69.40	475	240	0.05	47.6	65.6	79.8	35	0.25		
	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	1									
	С	70.00	79.00	1									

[1]  $f = 1 \text{ MHz}; V_R = 0 \text{ V}$ 

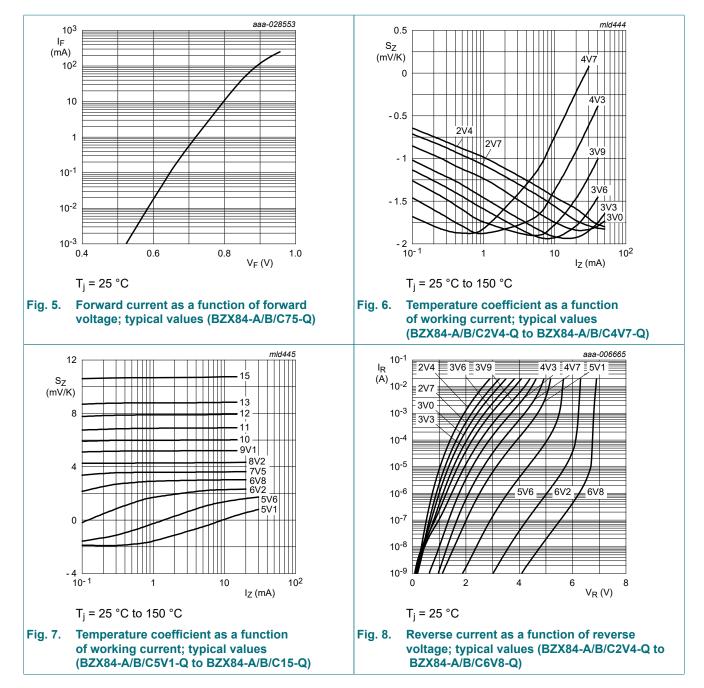
[2]  $t_p = 100 \ \mu s$ ; square wave;  $T_j = 25 \ ^{\circ}C$ 

#### Voltage regulator diodes



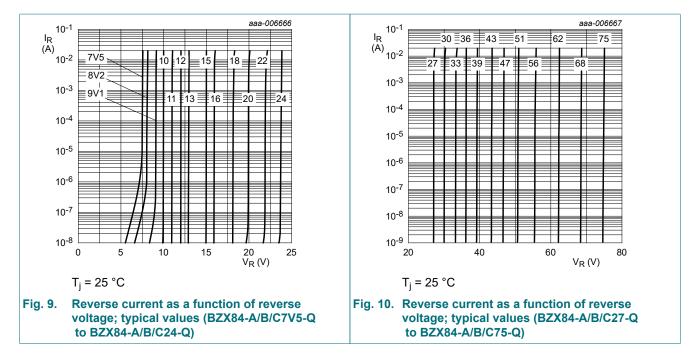
**Product data sheet** 

#### Voltage regulator diodes



**Product data sheet** 

#### Voltage regulator diodes

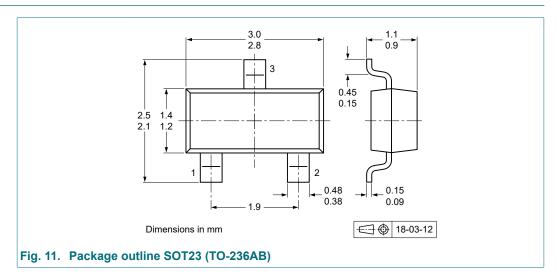


### 11. Test information

### **Quality information**

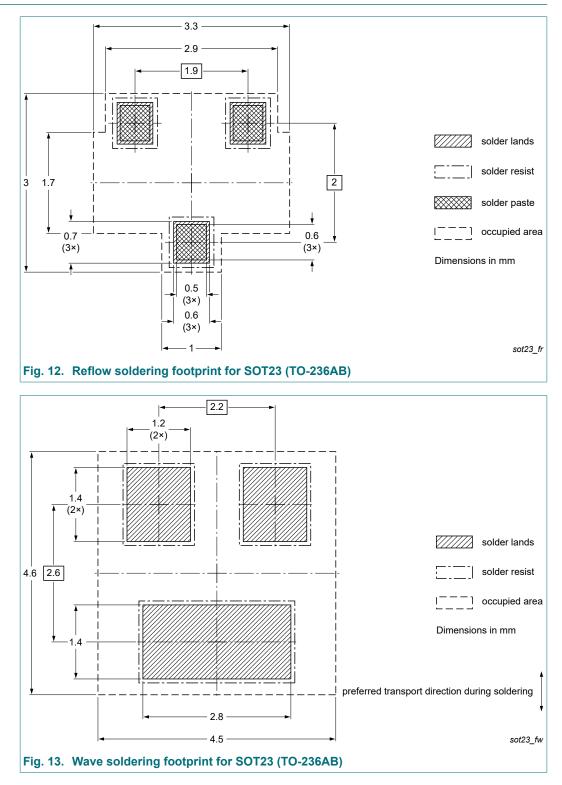
This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - *Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

### 12. Package outline



### Voltage regulator diodes

### 13. Soldering



**Product data sheet** 

# 14. Revision history

Table 10. Revision history									
Document ID	Release date	Data sheet status	Change notice	Supersedes					
BZX84-Q_SER v.1	20210929	Product data sheet	-	-					

BZX84-Q\_SER

# 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.

 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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### **BZX84-Q series**

#### Voltage regulator diodes

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