BZX84-Q series

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 ± 1 % (BZX84-A), ± 2 % (BZX84-B) and approximately ± 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_{F}	forward voltage	I _F = 10 mA	[1]	-	-	0.9	V
P _{tot}	total power dissipation	T _{amb} ≤ 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

Table 2. Pinning

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

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

Table 4. Marking codes

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 _F	forward current			-	200	mA
P _{ZSM}	non-repetitive peak reverse power dissipation		[1]	-	40	W
P _{tot}	total power dissipation	T _{amb} ≤ 25 °C	[2]	-	250	mW
Tj	junction temperature			-	150	°C
T _{amb}	ambient temperature			-55	+150	°C
T _{stg}	storage temperature			-65	+150	°C

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Тур	Max	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	[1]	-	-	500	K/W
R _{th(j-sp)}	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.

10. Characteristics

Table 7. Characteristics

 T_i = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Тур	Max	Unit
V _F	forward voltage	I _F = 10 mA	[1]	-	-	0.9	٧

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

 t_p = 100 μ s; square wave; T_j = 25 °C prior to surge. Device mounted on an FR4 PCB, single-sided 70 μ m copper, tin-plated and standard footprint.

Soldering point of cathode tab.

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

 T_i = 25 °C unless otherwise specified.

BZX84 -xxx	Sel Working voltage $V_Z(V)$ $I_Z = 5 \text{ mA}$			Maximum differential resistance $r_{dif}\left(\Omega\right)$		Reverse current I _R (μA)		erature icient V/K) mA	Diode capacitance C _d (pF) [1]	Non-repetitive peak reverse current I _{ZSM} (A) [2]		
		Min	Max	I _Z = 1 mA	I _Z = 5 mA	Max	V _R (V)	Min	Max	Max	Max	
2V4-Q	Α	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	Α	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	Α	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	Α	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	Α	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	Α	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	Α	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	Α	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	Α	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	Α	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	Α	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	Α	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	1								
7V5-Q	Α	7.42	7.58	80	15	1	5	2.5	5.3	150	4.0	
	В	7.35	7.65									
	С	7.00	7.90	1								

BZX84 -xxx			$\begin{array}{l} \text{Maximum differential} \\ \text{resistance} \\ \text{r}_{\text{dif}}\left(\Omega\right) \end{array}$		currer	Reverse current I _R (μA)		erature cient V/K) mA	Diode capacitance C _d (pF) [1]	Non-repetitive peak reverse current I _{ZSM} (A) [2]		
		Min	Max	I _Z = 1 mA	I _Z = 5 mA	Max	V _R (V)	Min	Max	Max	Max	
8V2-Q	Α	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	Α	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	Α	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	Α	10.89	11.11	150	20	0.1	8	5.4	9.0	85	2.5	
	В	10.80	11.20	1								
	С	10.40	11.60									
12-Q	Α	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	Α	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	Α	14.85	15.15	200 30	30	0.05	0.05 10.5	9.2	.2 13.0	75	2.0	
	В	14.70	15.30]								
	С	13.80	15.60									
16-Q	Α	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	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									
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									
22-Q	Α	21.78	22.22	250	55	0.05	15.4	16.4	20.0	60	1.25	
	В	21.60	22.40									
	С	20.80	23.30									
24-Q	Α	23.76	24.24	250	70	0.05	16.8	18.4	22.0	55	1.25	
	В	23.50	24.50									
	С	22.80	25.60									

^[1] f = 1 MHz; V_R = 0 V [2] t_p = 100 μ s; square wave; T_j = 25 °C

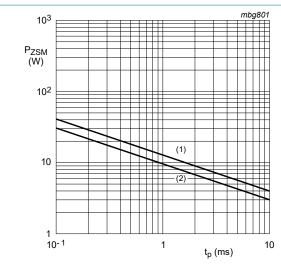
Table 9. Characteristics per type; BZX84-A27-Q to BZX84-C75-Q

 T_i = 25 °C unless otherwise specified.

BZX84 -xxx			ng e mA	Maximum differential resistance $r_{dif}\left(\Omega\right)$		curren	Reverse current I _R (μA)		erature cient V/K) mA	Diode capacitance C _d (pF) [1]	Non-repetitive peak reverse current I _{ZSM} (A) [2]							
		Min	Max	I _Z = 0.5 mA	I _Z = 2 mA	Max	V _R (V)	Min	Max	Max	Max							
27-Q	Α	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	Α	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	1														
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	Α	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	1														
39-Q	Α	38.61	39.39	350	130	0.05	27.3	33.4	41.2	45	0.7							
	В	38.20	39.80	1														
	С	37.00	41.00	1														
43-Q	Α	42.57	43.43	375	150	0.05	30.1	37.6	46.6	40	0.6							
	В	42.10	43.90	1														
	С	40.00	46.00	1														
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	Α	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	1														
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	Α	74.25	75.75	500	255	0.05	52.5	73.4	88.6	35	0.20							
	В	73.50	76.50	1			0.00	0.00	0.00	0.00	0.00	0.00	0.00					
	С	70.00	79.00	1														

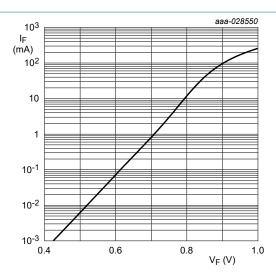
^[1] $f = 1 \text{ MHz}; V_R = 0 \text{ V}$

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



- (1) T_i = 25 °C (before surge)
- (2) T_i = 150 °C (before surge)

Fig. 1. Non-repetitive peak reverse power dissipation as a function of pulse duration; maximum values



 $T_i = 25 \,^{\circ}C$

Fig. 2. Forward current as a function of forward voltage; typical values (BZX84-A/B/C2V4-Q)

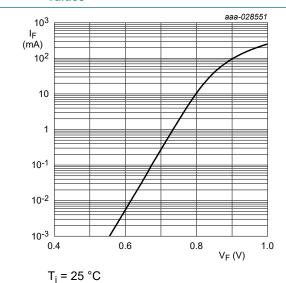


Fig. 3. Forward current as a function of forward voltage; typical values (BZX84-A/B/C6V8-Q)

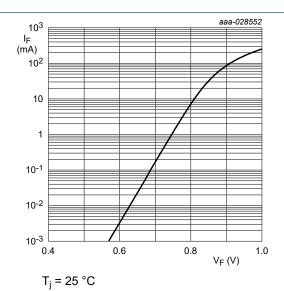


Fig. 4. Forward current as a function of forward voltage; typical values (BZX84-A/B/C7V5-Q)

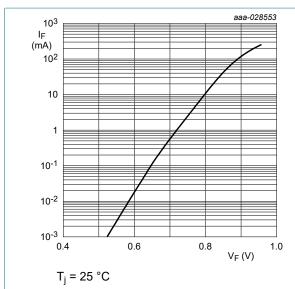
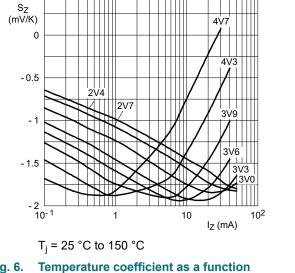


Fig. 5. Forward current as a function of forward voltage; typical values (BZX84-A/B/C75-Q)



0.5

Fig. 6. Temperature coefficient as a function of working current; typical values (BZX84-A/B/C2V4-Q to BZX84-A/B/C4V7-Q)

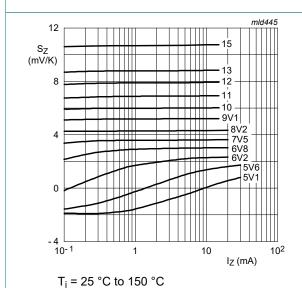


Fig. 7. Temperature coefficient as a function of working current; typical values (BZX84-A/B/C5V1-Q to BZX84-A/B/C15-Q)

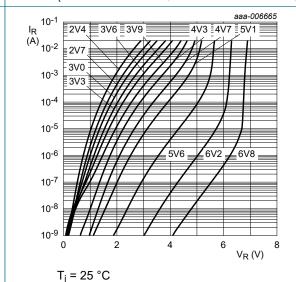


Fig. 8. Reverse current as a function of reverse voltage; typical values (BZX84-A/B/C2V4-Q to BZX84-A/B/C6V8-Q)

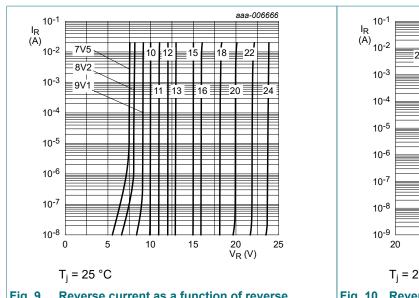


Fig. 9. Reverse current as a function of reverse voltage; typical values (BZX84-A/B/C7V5-Q to BZX84-A/B/C24-Q)

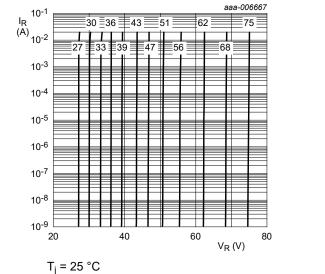


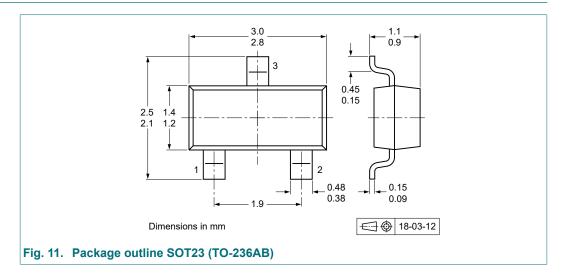
Fig. 10. Reverse current as a function of reverse voltage; typical values (BZX84-A/B/C27-Q to BZX84-A/B/C75-Q)

11. Test information

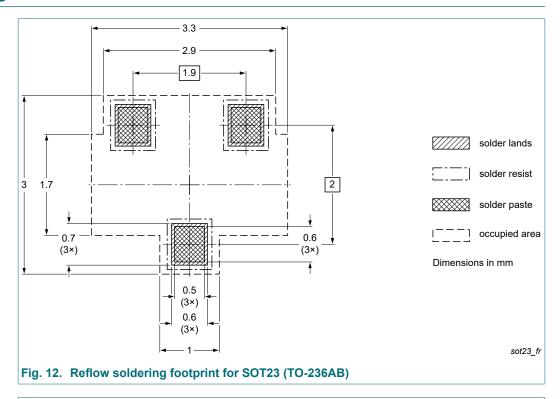
Quality information

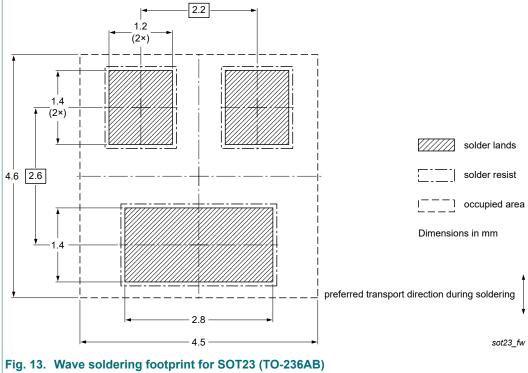
This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - *Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

12. Package outline



13. Soldering





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	-	-

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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