



BZX384 series

Voltage regulator diodes

Rev. 4 — 1 January 2023

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: $\pm 1\%$, $\pm 2\%$ and approximately $\pm 5\%$
- Working voltage range: nominal 2.4 V to 75 V (E24 range)
- Non-repetitive peak reverse power dissipation: ≤ 40 W

3. Applications

- General regulation functions

4. Quick reference data

Table 1. Quick reference data

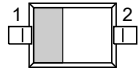
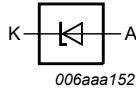
| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|-----------|-------------------------|----------------------|-----|-----|-----|-----|------|
| V_F | forward voltage | $I_F = 10$ mA | [1] | - | - | 0.9 | V |
| P_{tot} | total power dissipation | $T_{amb} \leq 25$ °C | [2] | - | - | 300 | mW |

[1] Pulse test: $t_p \leq 100$ μ s; $\delta \leq 0.02$.

[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 | K | cathode | [1] |  |  |
| 2 | A | anode | | | |

[1] The marking bar indicates the cathode.

6. Ordering information

Table 3. Ordering information

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

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

7. Marking

Table 4. Marking codes

| Type number | Marking code | Type number | Marking code | Type number | Marking code |
|-------------|--------------|-------------|--------------|-------------|--------------|
| BZX384-A2V4 | 2B | BZX384-B2V4 | K1 | BZX384-C2V4 | T3 |
| BZX384-A2V7 | 2U | BZX384-B2V7 | K2 | BZX384-C2V7 | T4 |
| BZX384-A3V0 | 2V | BZX384-B3V0 | K3 | BZX384-C3V0 | T5 |
| BZX384-A3V3 | 2W | BZX384-B3V3 | K4 | BZX384-C3V3 | T6 |
| BZX384-A3V6 | 2X | BZX384-B3V6 | K5 | BZX384-C3V6 | T7 |
| BZX384-A3V9 | 2Y | BZX384-B3V9 | K6 | BZX384-C3V9 | T8 |
| BZX384-A4V3 | 2Z | BZX384-B4V3 | K7 | BZX384-C4V3 | T9 |
| BZX384-A4V7 | 22 | BZX384-B4V7 | K8 | BZX384-C4V7 | T0 |
| BZX384-A5V1 | 23 | BZX384-B5V1 | K9 | BZX384-C5V1 | D5 |
| BZX384-A5V6 | 24 | BZX384-B5V6 | L1 | BZX384-C5V6 | D6 |
| BZX384-A6V2 | 25 | BZX384-B6V2 | L2 | BZX384-C6V2 | T1 |
| BZX384-A6V8 | 26 | BZX384-B6V8 | L3 | BZX384-C6V8 | D7 |
| BZX384-A7V5 | 27 | BZX384-B7V5 | L4 | BZX384-C7V5 | D8 |
| BZX384-A8V2 | 28 | BZX384-B8V2 | L5 | BZX384-C8V2 | D9 |
| BZX384-A9V1 | 29 | BZX384-B9V1 | L6 | BZX384-C9V1 | D0 |
| BZX384-A10 | 3X | BZX384-B10 | L7 | BZX384-C10 | T2 |
| BZX384-A11 | 32 | BZX384-B11 | L8 | BZX384-C11 | DA |
| BZX384-A12 | 33 | BZX384-B12 | L9 | BZX384-C12 | DB |
| BZX384-A13 | 34 | BZX384-B13 | M1 | BZX384-C13 | DC |
| BZX384-A15 | 35 | BZX384-B15 | M2 | BZX384-C15 | DD |
| BZX384-A16 | 36 | BZX384-B16 | M3 | BZX384-C16 | DE |
| BZX384-A18 | 37 | BZX384-B18 | M4 | BZX384-C18 | DF |
| BZX384-A20 | 38 | BZX384-B20 | M5 | BZX384-C20 | DG |
| BZX384-A22 | 39 | BZX384-B22 | M6 | BZX384-C22 | DH |
| BZX384-A24 | 4N | BZX384-B24 | M7 | BZX384-C24 | DJ |
| BZX384-A27 | 4P | BZX384-B27 | M8 | BZX384-C27 | DK |
| BZX384-A30 | 5F | BZX384-B30 | M9 | BZX384-C30 | DL |
| BZX384-A33 | 4R | BZX384-B33 | N0 | BZX384-C33 | DM |
| BZX384-A36 | 4S | BZX384-B36 | N1 | BZX384-C36 | DN |
| BZX384-A39 | 4T | BZX384-B39 | N2 | BZX384-C39 | DP |
| BZX384-A43 | 4U | BZX384-B43 | N3 | BZX384-C43 | DR |
| BZX384-A47 | 4V | BZX384-B47 | N4 | BZX384-C47 | DS |
| BZX384-A51 | 4W | BZX384-B51 | N5 | BZX384-C51 | DT |
| BZX384-A56 | 4X | BZX384-B56 | N6 | BZX384-C56 | DU |
| BZX384-A62 | 4Y | BZX384-B62 | N7 | BZX384-C62 | DV |
| BZX384-A68 | 4Z | BZX384-B68 | N8 | BZX384-C68 | DW |
| BZX384-A75 | 42 | BZX384-B75 | N9 | BZX384-C75 | 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_F | forward current | | - | 250 | mA |
| I_{ZSM} | non-repetitive peak reverse current | | [1] - | see Tables 8 and 9 | |
| P_{ZSM} | non-repetitive peak reverse power dissipation | | [1] - | 40 | W |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [2] - | 300 | mW |
| T_j | junction temperature | | - | 150 | °C |
| T_{amb} | ambient temperature | | -65 | +150 | °C |
| T_{stg} | storage temperature | | -65 | +150 | °C |

[1] $t_p = 100\text{ }\mu\text{s}$; square wave; $T_j = 25\text{ °C}$ 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 | Typ | Max | Unit |
|----------------|--|-------------|-------|-----|-----|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] - | - | 415 | K/W |
| $R_{th(j-sp)}$ | 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

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------|-----------------|-----------------------|-------|-----|-----|------|
| V_F | forward voltage | $I_F = 10\text{ mA}$ | [1] - | - | 0.9 | V |
| | | $I_F = 100\text{ mA}$ | [1] - | - | 1.1 | V |

[1] Pulse test: $t_p \leq 100\text{ }\mu\text{s}$; $\delta \leq 0.02$.

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

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

| BZX384 -xxx | Sel | Working voltage V_Z (V) $I_Z = 5\text{ mA}$ | | Maximum differential resistance r_{dif} (Ω) | | Reverse current I_R (μA) | | Temperature coefficient S_Z (mV/K) $I_Z = 5\text{ mA}$ | | Diode capacitance C_d (pF) [1] | Non-repetitive peak reverse current I_{ZSM} (A) [2] |
|----------------|-----|---|------|--|---------------------|--|-----------|--|-----|-------------------------------------|--|
| | | Min | Max | $I_Z = 1\text{ mA}$ | $I_Z = 5\text{ mA}$ | Max | V_R (V) | Min | Max | Max | Max |
| 2V4 | A | 2.37 | 2.43 | 600 | 100 | 50 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | B | 2.35 | 2.45 | | | | | | | | |
| | C | 2.20 | 2.60 | | | | | | | | |
| 2V7 | A | 2.67 | 2.73 | 600 | 100 | 20 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | B | 2.65 | 2.75 | | | | | | | | |
| | C | 2.50 | 2.90 | | | | | | | | |
| 3V0 | A | 2.97 | 3.03 | 600 | 95 | 10 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | B | 2.94 | 3.06 | | | | | | | | |
| | C | 2.80 | 3.20 | | | | | | | | |
| 3V3 | A | 3.26 | 3.34 | 600 | 95 | 5 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | B | 3.23 | 3.37 | | | | | | | | |
| | C | 3.10 | 3.50 | | | | | | | | |
| 3V6 | A | 3.56 | 3.64 | 600 | 90 | 5 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | B | 3.53 | 3.67 | | | | | | | | |
| | C | 3.40 | 3.80 | | | | | | | | |
| 3V9 | A | 3.86 | 3.94 | 600 | 90 | 3 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | B | 3.82 | 3.98 | | | | | | | | |
| | C | 3.70 | 4.10 | | | | | | | | |
| 4V3 | A | 4.25 | 4.35 | 600 | 90 | 3 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | B | 4.21 | 4.39 | | | | | | | | |
| | C | 4.00 | 4.60 | | | | | | | | |
| 4V7 | A | 4.65 | 4.75 | 500 | 80 | 3 | 2 | -3.5 | 0.2 | 300 | 6.0 |
| | B | 4.61 | 4.79 | | | | | | | | |
| | C | 4.40 | 5.00 | | | | | | | | |
| 5V1 | A | 5.04 | 5.16 | 480 | 60 | 2 | 2 | -2.7 | 1.2 | 300 | 6.0 |
| | B | 5.00 | 5.20 | | | | | | | | |
| | C | 4.80 | 5.40 | | | | | | | | |
| 5V6 | A | 5.54 | 5.66 | 400 | 40 | 1 | 2 | -2.0 | 2.5 | 300 | 6.0 |
| | B | 5.49 | 5.71 | | | | | | | | |
| | C | 5.20 | 6.00 | | | | | | | | |
| 6V2 | A | 6.13 | 6.27 | 150 | 10 | 3 | 4 | 0.4 | 3.7 | 200 | 6.0 |
| | B | 6.08 | 6.32 | | | | | | | | |
| | C | 5.80 | 6.60 | | | | | | | | |
| 6V8 | A | 6.73 | 6.87 | 80 | 15 | 2 | 4 | 1.2 | 4.5 | 200 | 6.0 |
| | B | 6.66 | 6.94 | | | | | | | | |
| | C | 6.40 | 7.20 | | | | | | | | |
| 7V5 | A | 7.42 | 7.58 | 80 | 15 | 1 | 5 | 2.5 | 5.3 | 150 | 4.0 |
| | B | 7.35 | 7.65 | | | | | | | | |
| | C | 7.00 | 7.90 | | | | | | | | |

| BZX384 -xxx | Sel | Working voltage V_Z (V) $I_Z = 5$ mA | | Maximum differential resistance r_{dif} (Ω) | | Reverse current I_R (μ A) | | Temperature coefficient S_Z (mV/K) $I_Z = 5$ 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 | A | 8.11 | 8.29 | 80 | 15 | 0.7 | 5 | 3.2 | 6.2 | 150 | 4.0 |
| | B | 8.04 | 8.36 | | | | | | | | |
| | C | 7.70 | 8.70 | | | | | | | | |
| 9V1 | A | 9.00 | 9.20 | 100 | 15 | 0.5 | 6 | 3.8 | 7.0 | 150 | 3.0 |
| | B | 8.92 | 9.28 | | | | | | | | |
| | C | 8.50 | 9.60 | | | | | | | | |
| 10 | A | 9.90 | 10.10 | 150 | 20 | 0.2 | 7 | 4.5 | 8.0 | 90 | 3.0 |
| | B | 9.80 | 10.20 | | | | | | | | |
| | C | 9.40 | 10.60 | | | | | | | | |
| 11 | A | 10.89 | 11.11 | 150 | 20 | 0.1 | 8 | 5.4 | 9.0 | 85 | 2.5 |
| | B | 10.80 | 11.20 | | | | | | | | |
| | C | 10.40 | 11.60 | | | | | | | | |
| 12 | A | 11.88 | 12.12 | 150 | 25 | 0.1 | 8 | 6.0 | 10.0 | 85 | 2.5 |
| | B | 11.80 | 12.20 | | | | | | | | |
| | C | 11.40 | 12.70 | | | | | | | | |
| 13 | A | 12.87 | 13.13 | 170 | 30 | 0.1 | 8 | 7.0 | 11.0 | 80 | 2.5 |
| | B | 12.70 | 13.30 | | | | | | | | |
| | C | 12.40 | 14.10 | | | | | | | | |
| 15 | A | 14.85 | 15.15 | 200 | 30 | 0.05 | 10.5 | 9.2 | 13.0 | 75 | 2.0 |
| | B | 14.70 | 15.30 | | | | | | | | |
| | C | 13.80 | 15.60 | | | | | | | | |
| 16 | A | 15.84 | 16.16 | 200 | 40 | 0.05 | 11.2 | 10.4 | 14.0 | 75 | 1.5 |
| | B | 15.70 | 16.30 | | | | | | | | |
| | C | 15.30 | 17.10 | | | | | | | | |
| 18 | A | 17.82 | 18.18 | 225 | 45 | 0.05 | 12.6 | 12.4 | 16.0 | 70 | 1.5 |
| | B | 17.60 | 18.40 | | | | | | | | |
| | C | 16.80 | 19.10 | | | | | | | | |
| 20 | A | 19.80 | 20.20 | 225 | 55 | 0.05 | 14 | 14.4 | 18.0 | 60 | 1.5 |
| | B | 19.60 | 20.40 | | | | | | | | |
| | C | 18.80 | 21.20 | | | | | | | | |
| 22 | A | 21.78 | 22.22 | 250 | 55 | 0.05 | 15.4 | 16.4 | 20.0 | 60 | 1.25 |
| | B | 21.60 | 22.40 | | | | | | | | |
| | C | 20.80 | 23.30 | | | | | | | | |
| 24 | A | 23.76 | 24.24 | 250 | 70 | 0.05 | 16.8 | 18.4 | 22.0 | 55 | 1.25 |
| | B | 23.50 | 24.50 | | | | | | | | |
| | C | 22.80 | 25.60 | | | | | | | | |

[1] $f = 1$ MHz; $V_R = 0$ V

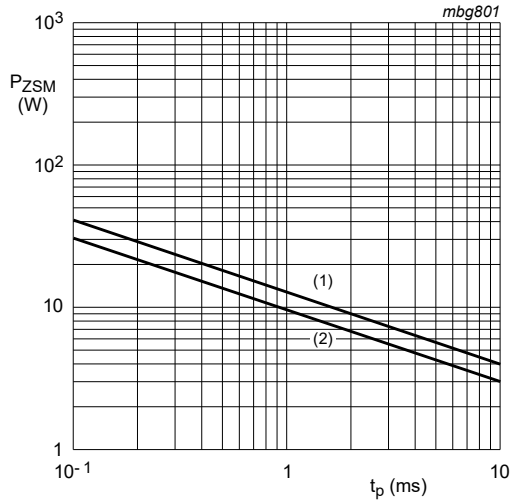
[2] $t_p = 100$ μ s; square wave; $T_j = 25$ °C

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

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

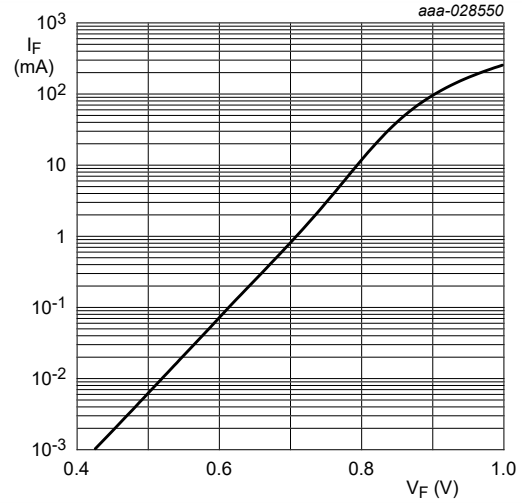
| BZX384 -xxx | Sel | Working voltage V_Z (V) $I_Z = 2\text{ mA}$ | | Maximum differential resistance r_{dif} (Ω) | | Reverse current I_R (μA) | | Temperature coefficient S_Z (mV/K) $I_Z = 2\text{ mA}$ | | Diode capacitance C_d (pF) [1] | Non-repetitive peak reverse current I_{ZSM} (A) [2] |
|----------------|-----|---|-------|--|---------------------|--|-------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

[1] $f = 1\text{ MHz}$; $V_R = 0\text{ V}$ [2] $t_p = 100\text{ }\mu\text{s}$; square wave; $T_j = 25\text{ °C}$



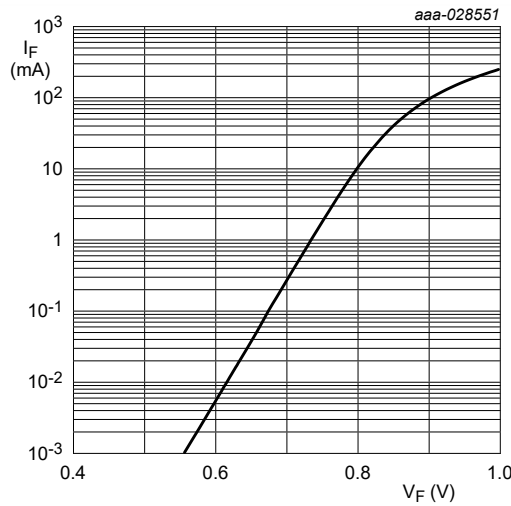
(1) $T_j = 25^\circ\text{C}$ (before surge)
 (2) $T_j = 150^\circ\text{C}$ (before surge)

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



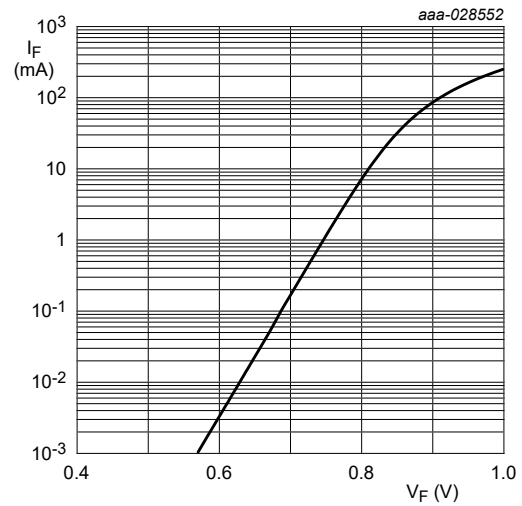
$T_j = 25^\circ\text{C}$

Fig. 2. Forward current as a function of forward voltage; typical values (BZX384-A/B/C2V4)



$T_j = 25^\circ\text{C}$

Fig. 3. Forward current as a function of forward voltage; typical values (BZX384-A/B/C6V8)



$T_j = 25^\circ\text{C}$

Fig. 4. Forward current as a function of forward voltage; typical values (BZX384-A/B/C7V5)

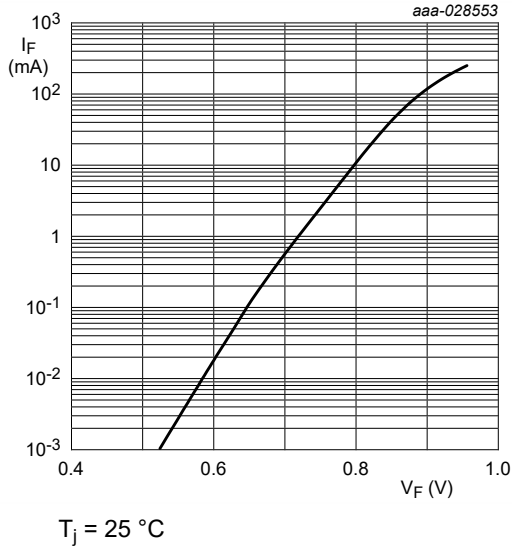


Fig. 5. Forward current as a function of forward voltage; typical values (BZX384-A/B/C75)

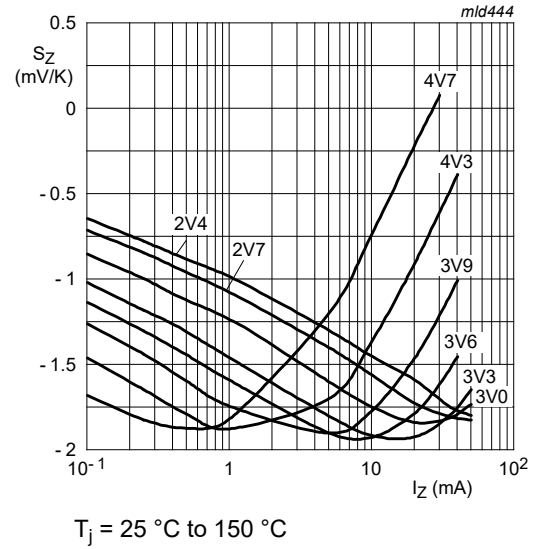


Fig. 6. Temperature coefficient as a function of working current; typical values (BZX384-A/B/C2V4 to BZX384-A/B/C4V7)

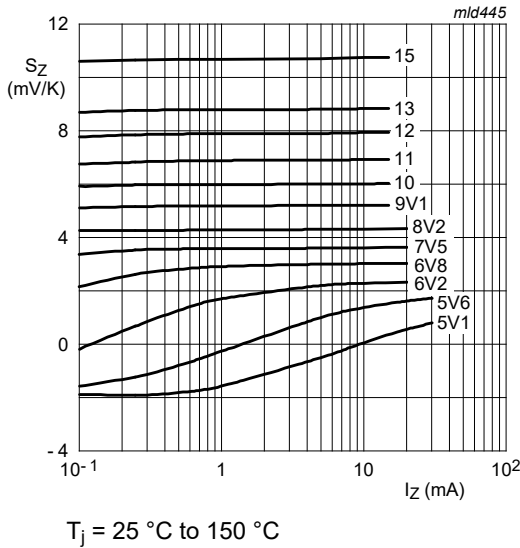


Fig. 7. Temperature coefficient as a function of working current; typical values (BZX384-A/B/C5V1 to BZX384-A/B/C15)

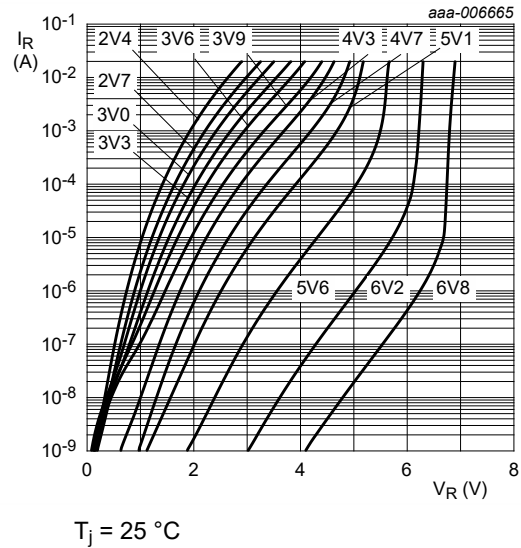
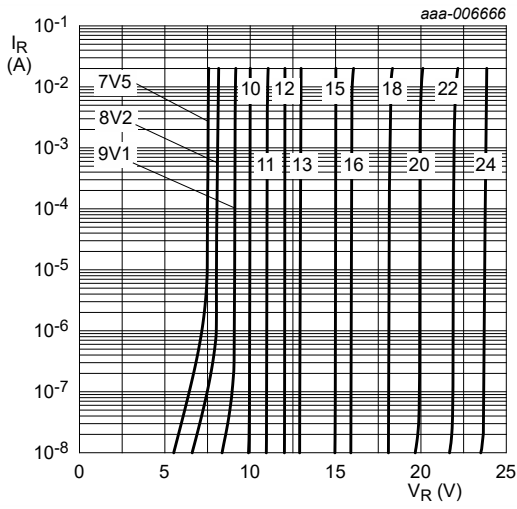
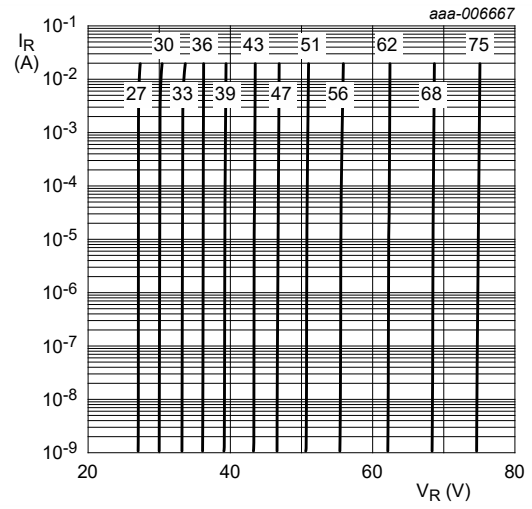


Fig. 8. Reverse current as a function of reverse voltage; typical values (BZX384-A/B/C2V4 to BZX384-A/B/C6V8)



$T_j = 25\text{ }^\circ\text{C}$

Fig. 9. Reverse current as a function of reverse voltage; typical values (BZX384-A/B/C7V5 to BZX384-A/B/C24)



$T_j = 25\text{ }^\circ\text{C}$

Fig. 10. Reverse current as a function of reverse voltage; typical values (BZX384-A/B/C27 to BZX384-A/B/C75)

11. Package outline

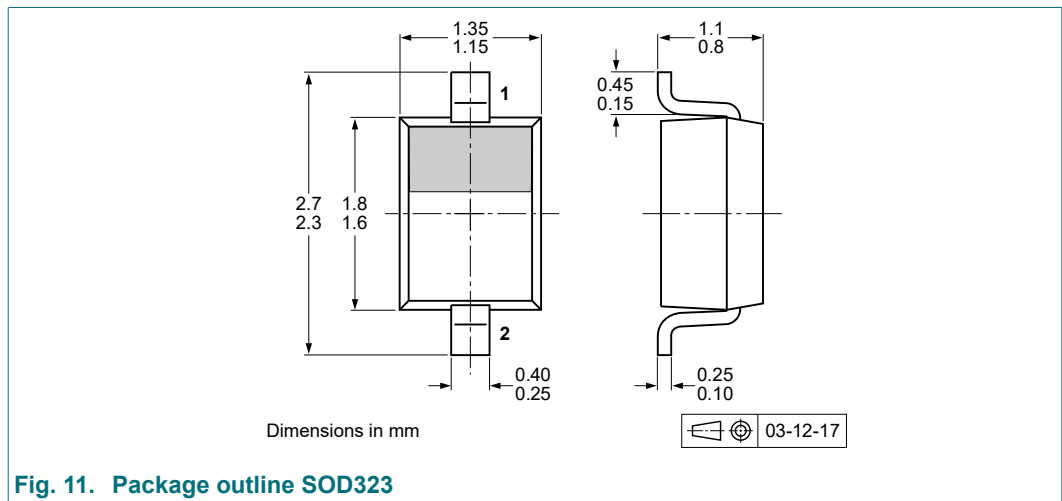


Fig. 11. Package outline SOD323

12. Soldering

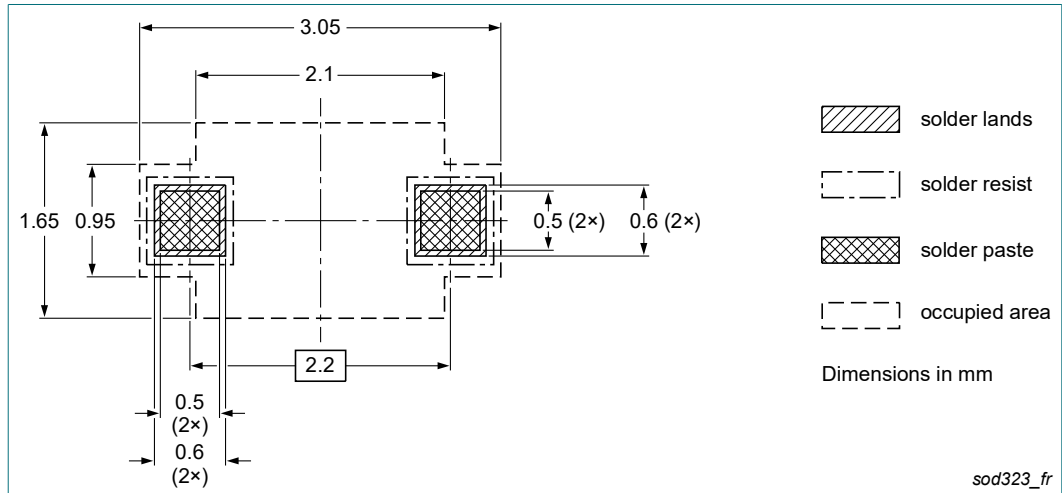


Fig. 12. Reflow soldering footprint for SOD323 (SC-76)

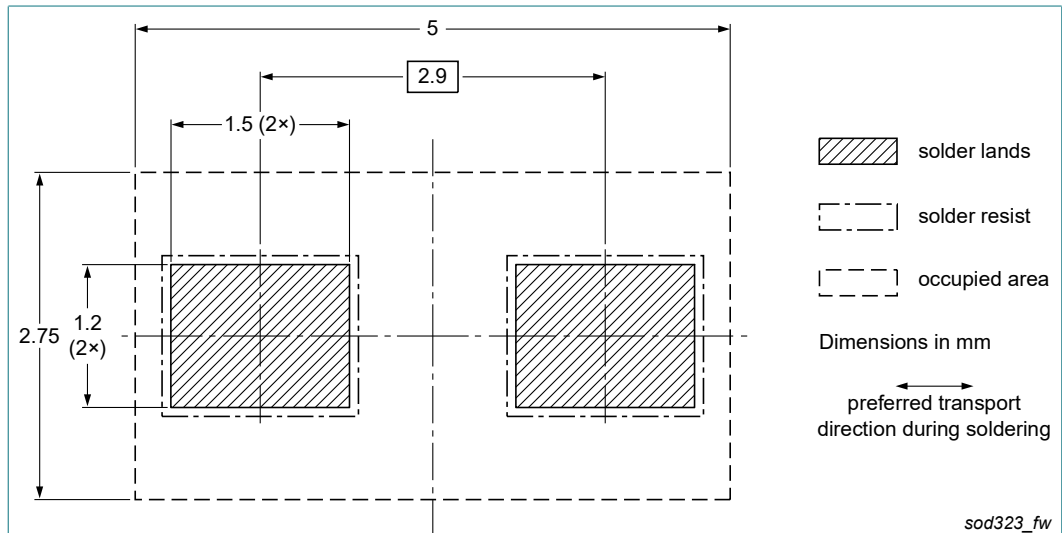


Fig. 13. Wave soldering footprint for SOD323 (SC-76)

13. Revision history

Table 10. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|--|--------------------|---------------|----------------|
| BZX384_SER v.4 | 20230101 | Product data sheet | - | BZX384_SER v.3 |
| Modifications: | <ul style="list-style-type: none"> • BZX384-A selections added • Products changed to non-automotive qualification. Please refer to nexperia.com for automotive (-Q) product alternatives. • Limiting values: Temperature specification adjusted | | | |
| BZX384_SER v.3 | 20161011 | Product data sheet | - | BZX384_SER v.2 |
| BZX384_SER v.2 | 20040322 | Product data sheet | - | BZX384_SER v.1 |
| BZX384_SER v.1 | 20030401 | Product data sheet | - | - |

14. 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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Contents

| | |
|---------------------------------|----|
| 1. General description..... | 1 |
| 2. Features and benefits..... | 1 |
| 3. Applications..... | 1 |
| 4. Quick reference data..... | 1 |
| 5. Pinning information..... | 2 |
| 6. Ordering information..... | 2 |
| 7. Marking..... | 3 |
| 8. Limiting values..... | 4 |
| 9. Thermal characteristics..... | 4 |
| 10. Characteristics..... | 4 |
| 11. Package outline..... | 10 |
| 12. Soldering..... | 11 |
| 13. Revision history..... | 12 |
| 14. Legal information..... | 13 |

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