

Small Signal Zener Diodes


DESIGN SUPPORT TOOLS
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| PRIMARY CHARACTERISTICS | | |
|------------------------------|---------------|------|
| PARAMETER | VALUE | UNIT |
| V _Z range nom. | 2.4 to 75 | V |
| Test current I _{ZT} | 2; 5 | mA |
| V _Z specification | Pulse current | |
| Circuit configuration | Single | |

FEATURES

- Silicon planar Zener diodes
- The Zener voltages are graded according to the international E24 standard
- Standard Zener voltage tolerance is $\pm 5\%$; replace "C" with "B" for $\pm 2\%$ tolerance
- AEC-Q101 qualified available
- ESD capability according to AEC-Q101:
Human body model > 8 kV
Machine model > 800 V
- Base P/N-E3 - RoHS-compliant, commercial grade
- Base P/N-HE3 - RoHS-compliant, AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

 AUTOMOTIVE
GRADE
Available

RoHS
COMPLIANT

| ORDERING INFORMATION | | | |
|----------------------|---------------------------------------|--------------------------------|------------------------|
| DEVICE NAME | ORDERING CODE | TAPED UNITS PER REEL | MINIMUM ORDER QUANTITY |
| BZX384-series | BZX384C2V4-E3-08 to BZX384C75-E3-08 | 3000 (8 mm tape on 7" reel) | 15 000/box |
| | BZX384B2V4-E3-08 to BZX384B75-E3-08 | | |
| | BZX384C2V4-HE3-08 to BZX384C75-HE3-08 | | |
| | BZX384B2V4-HE3-08 to BZX384B75-HE3-08 | | |
| | BZX384C2V4-E3-18 to BZX384C75-E3-18 | 10 000 (8 mm tape on 13" reel) | 10 000/box |
| | BZX384B2V4-E3-18 to BZX384B75-E3-18 | | |
| | BZX384C2V4-HE3-18 to BZX384C75-HE3-18 | | |
| | BZX384B2V4-HE3-18 to BZX384B75-HE3-18 | | |

| PACKAGE | | | | |
|--------------|--------|---|--------------------------------------|--------------------------|
| PACKAGE NAME | WEIGHT | MOLDING COMPOUND FLAMMABILITY RATING | MOISTURE SENSITIVITY LEVEL | SOLDERING CONDITIONS |
| SOD-323 | 4.3 mg | UL 94 V-0 | MSL level 1 (according J-STD-020) | 260 °C/10 s at terminals |

| ABSOLUTE MAXIMUM RATINGS (T _{amb} = 25 °C, unless otherwise specified) | | | | | |
|---|---|--|-------------------|-------------|------|
| PARAMETER | TEST CONDITION | | SYMBOL | VALUE | UNIT |
| Power dissipation | Device on fiberglass substrate | | P _{tot} | 200 | mW |
| Thermal resistance junction to ambient air | Valid that electrodes are kept at ambient temperature | | R _{thJA} | 650 | K/W |
| Junction temperature | | | T _j | 150 | °C |
| Storage temperature range | | | T _{stg} | -65 to +150 | °C |
| Operating temperature range | | | T _{op} | -55 to +150 | °C |



| ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | | | | | | | |
|--|--------------|---------------------|------|------|--------------|-----------|-------------------------|-----------------|--------------------|-----------------------|--|------|
| PART NUMBER | MARKING CODE | ZENER VOLTAGE RANGE | | | TEST CURRENT | | REVERSE LAEKAGE CURRENT | | DYNAMIC RESISTANCE | | TEMPERATURE COEFFICIENT OF ZENER VOLTAGE | |
| | | V_Z at I_{ZT1} | | | I_{ZT1} | I_{ZT2} | I_R at V_R | | Z_Z at I_{ZT1} | Z_{ZK} at I_{ZT2} | α_{VZ} at I_{ZT1} | |
| | | V | | | mA | | μA | V | Ω | | $10^{-4}/^{\circ}\text{C}$ | |
| | | MIN. | NOM. | MAX. | | | MAX. | | TYP. | TYP. | MIN. | MAX. |
| BZX384C2V4 | W1 | 2.2 | 2.4 | 2.6 | 5 | 1 | 50 | 1 | 70 (≤ 100) | 275 | -9 | -4 |
| BZX384C2V7 | W2 | 2.5 | 2.7 | 2.9 | 5 | 1 | 20 | 1 | 75 (≤ 100) | 300 (≤ 600) | -9 | -4 |
| BZX384C3V0 | W3 | 2.8 | 3.0 | 3.2 | 5 | 1 | 10 | 1 | 80 (≤ 95) | 325 (≤ 600) | -9 | -3 |
| BZX384C3V3 | W4 | 3.1 | 3.3 | 3.5 | 5 | 1 | 5 | 1 | 85 (≤ 95) | 350 (≤ 600) | -8 | -3 |
| BZX384C3V6 | W5 | 3.4 | 3.6 | 3.8 | 5 | 1 | 5 | 1 | 85 (≤ 90) | 375 (≤ 600) | -8 | -3 |
| BZX384C3V9 | W6 | 3.7 | 3.9 | 4.1 | 5 | 1 | 3 | 1 | 85 (≤ 90) | 400 (≤ 600) | -7 | -3 |
| BZX384C4V3 | W7 | 4 | 4.3 | 4.6 | 5 | 1 | 3 | 1 | 80 (≤ 90) | 410 (≤ 600) | -6 | -1 |
| BZX384C4V7 | W8 | 4.4 | 4.7 | 5 | 5 | 1 | 3 | 2 | 50 (≤ 80) | 425 (≤ 500) | -5 | 2 |
| BZX384C5V1 | W9 | 4.8 | 5.1 | 5.4 | 5 | 1 | 2 | 2 | 40 (≤ 60) | 400 (≤ 480) | -3 | 4 |
| BZX384C5V6 | WA | 5.2 | 5.6 | 6 | 5 | 1 | 1 | 2 | 15 (≤ 40) | 80 (≤ 400) | -2 | 6 |
| BZX384C6V2 | WB | 5.8 | 6.2 | 6.6 | 5 | 1 | 3 | 4 | 6 (≤ 10) | 40 (≤ 150) | -1 | 7 |
| BZX384C6V8 | WC | 6.4 | 6.8 | 7.2 | 5 | 1 | 2 | 4 | 6 (≤ 15) | 30 (≤ 80) | 2 | 7 |
| BZX384C7V5 | WD | 7 | 7.5 | 7.9 | 5 | 1 | 1 | 5 | 6 (≤ 15) | 30 (≤ 80) | 3 | 7 |
| BZX384C8V2 | WE | 7.7 | 8.2 | 8.7 | 5 | 1 | 0.7 | 5 | 6 (≤ 15) | 40 (≤ 80) | 4 | 7 |
| BZX384C9V1 | WF | 8.5 | 9.1 | 9.6 | 5 | 1 | 0.5 | 6 | 6 (≤ 15) | 40 (≤ 100) | 5 | 8 |
| BZX384C10 | WG | 9.4 | 10 | 10.6 | 5 | 1 | 0.2 | 7 | 8 (≤ 20) | 50 (≤ 150) | 5 | 8 |
| BZX384C11 | WH | 10.4 | 11 | 11.6 | 5 | 1 | 0.1 | 8 | 10 (≤ 20) | 50 (≤ 150) | 5 | 9 |
| BZX384C12 | WI | 11.4 | 12 | 12.7 | 5 | 1 | 0.1 | 8 | 10 (≤ 25) | 50 (≤ 150) | 6 | 9 |
| BZX384C13 | WK | 12.4 | 13 | 14.1 | 5 | 1 | 0.1 | 8 | 10 (≤ 30) | 50 (≤ 170) | 7 | 9 |
| BZX384C15 | WL | 13.8 | 15 | 15.6 | 5 | 1 | 0.05 | $0.7 V_{Znom.}$ | 10 (≤ 30) | 50 (≤ 200) | 7 | 9 |
| BZX384C16 | WM | 15.3 | 16 | 17.1 | 5 | 1 | 0.05 | $0.7 V_{Znom.}$ | 10 (≤ 40) | 50 (≤ 200) | 8 | 9.5 |
| BZX384C18 | WN | 16.8 | 18 | 19.1 | 5 | 1 | 0.05 | $0.7 V_{Znom.}$ | 10 (≤ 45) | 50 (≤ 225) | 8 | 9.5 |
| BZX384C20 | WO | 18.8 | 20 | 21.2 | 5 | 1 | 0.05 | $0.7 V_{Znom.}$ | 15 (≤ 55) | 60 (≤ 225) | 8 | 10 |
| BZX384C22 | WP | 20.8 | 22 | 23.3 | 5 | 1 | 0.05 | $0.7 V_{Znom.}$ | 20 (≤ 55) | 60 (≤ 250) | 8 | 10 |
| BZX384C24 | WR | 22.8 | 24 | 25.6 | 5 | 1 | 0.05 | $0.7 V_{Znom.}$ | 25 (≤ 70) | 60 (≤ 250) | 8 | 10 |
| BZX384C27 | WS | 25.1 | 27 | 28.9 | 2 | 0.5 | 0.05 | $0.7 V_{Znom.}$ | 25 (≤ 80) | 65 (≤ 300) | 8 | 10 |
| BZX384C30 | WT | 28 | 30 | 32 | 2 | 0.5 | 0.05 | $0.7 V_{Znom.}$ | 30 (≤ 80) | 70 (≤ 300) | 8 | 10 |
| BZX384C33 | WU | 31 | 33 | 35 | 2 | 0.5 | 0.05 | $0.7 V_{Znom.}$ | 35 (≤ 80) | 75 (≤ 325) | 8 | 10 |
| BZX384C36 | WW | 34 | 36 | 38 | 2 | 0.5 | 0.05 | $0.7 V_{Znom.}$ | 35 (≤ 90) | 80 (≤ 350) | 8 | 10 |
| BZX384C39 | WX | 37 | 39 | 41 | 2 | 0.5 | 0.05 | $0.7 V_{Znom.}$ | 40 (≤ 130) | 80 (≤ 350) | 10 | 12 |
| BZX384C43 | WY | 40 | 43 | 46 | 2 | 0.5 | 0.05 | $0.7 V_{Znom.}$ | 45 (≤ 150) | 85 (≤ 375) | 10 | 12 |
| BZX384C47 | WZ | 44 | 47 | 50 | 2 | 0.5 | 0.05 | $0.7 V_{Znom.}$ | 50 (≤ 170) | 85 (≤ 375) | 10 | 12 |
| BZX384C51 | X1 | 48 | 51 | 54 | 2 | 0.5 | 0.05 | $0.7 V_{Znom.}$ | 60 (≤ 180) | 85 (≤ 400) | 8 | 10 |
| BZX384C56 | X2 | 52 | 56 | 60 | 2 | 0.5 | 0.05 | $0.7 V_{Znom.}$ | 70 (≤ 200) | 100 (≤ 425) | 10 | 12 |
| BZX384C62 | X3 | 58 | 62 | 66 | 2 | 0.5 | 0.05 | $0.7 V_{Znom.}$ | 80 (≤ 215) | 100 (≤ 450) | 10 | 12 |
| BZX384C68 | X4 | 64 | 68 | 72 | 2 | 0.5 | 0.05 | $0.7 V_{Znom.}$ | 90 (≤ 240) | 150 (≤ 475) | 10 | 12 |
| BZX384C75 | X5 | 70 | 75 | 79 | 2 | 0.5 | 0.05 | $0.7 V_{Znom.}$ | 95 (≤ 255) | 170 (≤ 500) | 10 | 12 |



| ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | | | | | | | |
|--|--------------|---------------------|------|------|--------------|-----------|-------------------------|-----------------|--------------------|-----------------------|--|------|
| PART NUMBER | MARKING CODE | ZENER VOLTAGE RANGE | | | TEST CURRENT | | REVERSE LEAKAGE CURRENT | | DYNAMIC RESISTANCE | | TEMPERATURE COEFFICIENT OF ZENER VOLTAGE | |
| | | V_Z at I_{ZT1} | | | I_{ZT1} | I_{ZT2} | I_R at V_R | | Z_Z at I_{ZT1} | Z_{ZK} at I_{ZT2} | α_{VZ} at I_{ZT1} | |
| | | V | | | mA | | μA | V | Ω | | $10^{-4}/^{\circ}\text{C}$ | |
| | | MIN. | NOM. | MAX. | | | MAX. | | TYP. | TYP. | MIN. | MAX. |
| BZX384B2V4 | W1 | 2.35 | 2.4 | 2.45 | 5 | 1 | 50 | 1 | 70 (≤ 100) | 275 | -9 | -4 |
| BZX384B2V7 | W2 | 2.65 | 2.7 | 2.75 | 5 | 1 | 20 | 1 | 75 (≤ 100) | 300 (≤ 600) | -9 | -3 |
| BZX384B3V0 | W3 | 2.94 | 3.0 | 3.06 | 5 | 1 | 10 | 1 | 80 (≤ 95) | 325 (≤ 600) | -8 | -3 |
| BZX384B3V3 | W4 | 3.23 | 3.3 | 3.37 | 5 | 1 | 5 | 1 | 85 (≤ 95) | 350 (≤ 600) | -8 | -3 |
| BZX384B3V6 | W5 | 3.53 | 3.6 | 3.67 | 5 | 1 | 5 | 1 | 85 (≤ 90) | 375 (≤ 600) | -7 | -3 |
| BZX384B3V9 | W6 | 3.82 | 3.9 | 3.98 | 5 | 1 | 3 | 1 | 85 (≤ 90) | 400 (≤ 600) | -6 | -1 |
| BZX384B4V3 | W7 | 4.21 | 4.3 | 4.39 | 5 | 1 | 3 | 1 | 80 (≤ 90) | 410 (≤ 600) | -5 | 2 |
| BZX384B4V7 | W8 | 4.61 | 4.7 | 4.79 | 5 | 1 | 3 | 2 | 50 (≤ 80) | 425 (≤ 500) | -3 | 4 |
| BZX384B5V1 | W9 | 5 | 5.1 | 5.2 | 5 | 1 | 2 | 2 | 40 (≤ 60) | 400 (≤ 480) | -2 | 6 |
| BZX384B5V6 | WA | 5.49 | 5.6 | 5.71 | 5 | 1 | 1 | 2 | 15 (≤ 40) | 80 (≤ 400) | -1 | 7 |
| BZX384B6V2 | WB | 6.08 | 6.2 | 6.32 | 5 | 1 | 3 | 4 | 6 (≤ 10) | 40 (≤ 150) | 2 | 7 |
| BZX384B6V8 | WC | 6.66 | 6.8 | 6.94 | 5 | 1 | 2 | 4 | 6 (≤ 15) | 30 (≤ 80) | 3 | 7 |
| BZX384B7V5 | WD | 7.35 | 7.5 | 7.65 | 5 | 1 | 1 | 5 | 6 (≤ 15) | 30 (≤ 80) | 4 | 7 |
| BZX384B8V2 | WE | 8.04 | 8.2 | 8.36 | 5 | 1 | 0.7 | 5 | 6 (≤ 15) | 40 (≤ 80) | 5 | 8 |
| BZX384B9V1 | WF | 8.92 | 9.1 | 9.28 | 5 | 1 | 0.5 | 6 | 6 (≤ 15) | 40 (≤ 100) | 5 | 8 |
| BZX384B10 | WG | 9.8 | 10 | 10.2 | 5 | 1 | 0.2 | 7 | 8 (≤ 20) | 50 (≤ 150) | 5 | 9 |
| BZX384B11 | WH | 10.8 | 11 | 11.2 | 5 | 1 | 0.1 | 8 | 10 (≤ 20) | 50 (≤ 150) | 6 | 9 |
| BZX384B12 | WI | 11.8 | 12 | 12.2 | 5 | 1 | 0.1 | 8 | 10 (≤ 25) | 50 (≤ 150) | 7 | 9 |
| BZX384B13 | WK | 12.7 | 13 | 13.3 | 5 | 1 | 0.1 | 8 | 10 (≤ 30) | 50 (≤ 170) | 7 | 9 |
| BZX384B15 | WL | 14.7 | 15 | 15.3 | 5 | 1 | 0.05 | 0.7 $V_{Znom.}$ | 10 (≤ 30) | 50 (≤ 200) | 8 | 9.5 |
| BZX384B16 | WM | 15.7 | 16 | 16.3 | 5 | 1 | 0.05 | 0.7 $V_{Znom.}$ | 10 (≤ 40) | 50 (≤ 200) | 8 | 9.5 |
| BZX384B18 | WN | 17.6 | 18 | 18.4 | 5 | 1 | 0.05 | 0.7 $V_{Znom.}$ | 10 (≤ 45) | 50 (≤ 225) | 8 | 10 |
| BZX384B20 | WO | 19.6 | 20 | 20.4 | 5 | 1 | 0.05 | 0.7 $V_{Znom.}$ | 15 (≤ 55) | 60 (≤ 225) | 8 | 10 |
| BZX384B22 | WP | 21.6 | 22 | 22.4 | 5 | 1 | 0.05 | 0.7 $V_{Znom.}$ | 20 (≤ 55) | 60 (≤ 250) | 8 | 10 |
| BZX384B24 | WR | 23.5 | 24 | 24.5 | 5 | 1 | 0.05 | 0.7 $V_{Znom.}$ | 25 (≤ 70) | 60 (≤ 250) | 8 | 10 |
| BZX384B27 | WS | 26.5 | 27 | 27.5 | 2 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ | 25 (≤ 80) | 65 (≤ 300) | 8 | 10 |
| BZX384B30 | WT | 29.4 | 30 | 30.6 | 2 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ | 30 (≤ 80) | 70 (≤ 300) | 8 | 10 |
| BZX384B33 | WU | 32.3 | 33 | 33.7 | 2 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ | 35 (≤ 80) | 75 (≤ 325) | 8 | 10 |
| BZX384B36 | WW | 35.3 | 36 | 36.7 | 2 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ | 35 (≤ 90) | 80 (≤ 350) | 10 | 12 |
| BZX384B39 | WX | 38.2 | 39 | 39.8 | 2 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ | 40 (≤ 130) | 80 (≤ 350) | 10 | 12 |
| BZX384B43 | WY | 42.1 | 43 | 43.9 | 2 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ | 45 (≤ 150) | 85 (≤ 375) | 10 | 12 |
| BZX384B47 | WZ | 46.1 | 47 | 47.9 | 2 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ | 50 (≤ 170) | 85 (≤ 375) | 10 | 12 |
| BZX384B51 | X1 | 50 | 51 | 52 | 2 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ | 60 (≤ 180) | 85 (≤ 400) | 10 | 12 |
| BZX384B56 | X2 | 54.9 | 56 | 57.1 | 2 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ | 70 (≤ 200) | 100 (≤ 425) | 10 | 12 |
| BZX384B62 | X3 | 60.8 | 62 | 63.2 | 2 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ | 80 (≤ 215) | 100 (≤ 450) | 10 | 12 |
| BZX384B68 | X4 | 66.6 | 68 | 69.4 | 2 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ | 90 (≤ 240) | 150 (≤ 475) | 10 | 12 |
| BZX384B75 | X5 | 73.5 | 75 | 76.5 | 2 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ | 95 (≤ 255) | 170 (≤ 500) | 10 | 12 |

TYPICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

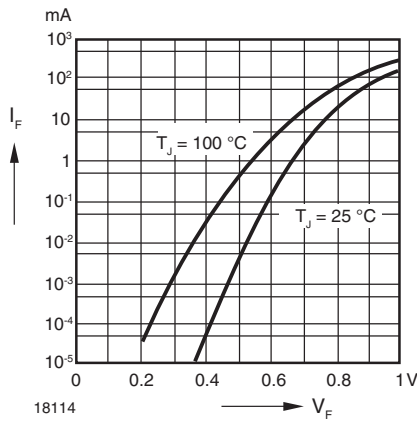


Fig. 1 - Forward characteristics

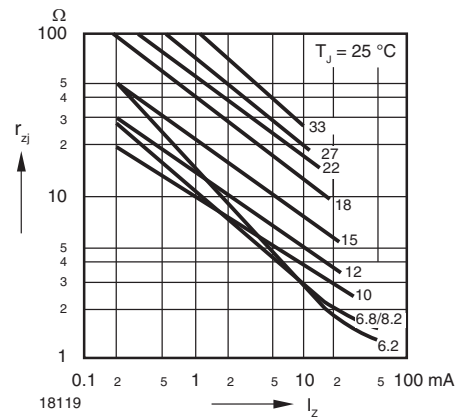


Fig. 4 - Dynamic Resistance vs. Zener Current

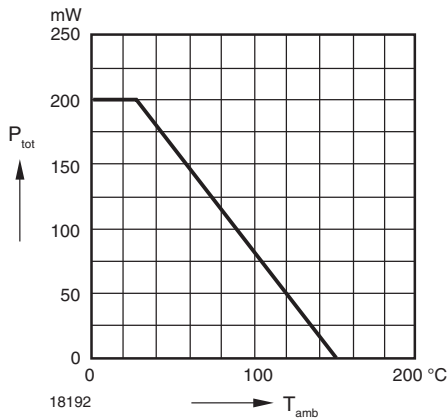


Fig. 2 - Admissible Power Dissipation vs. Ambient Temperature

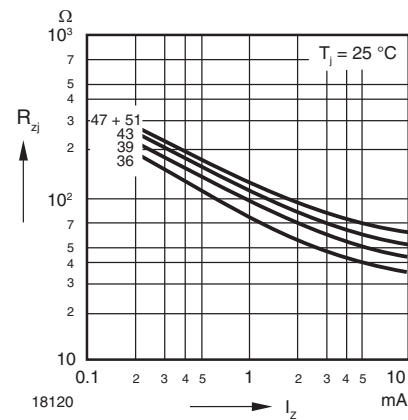


Fig. 5 - Dynamic Resistance vs. Zener Current

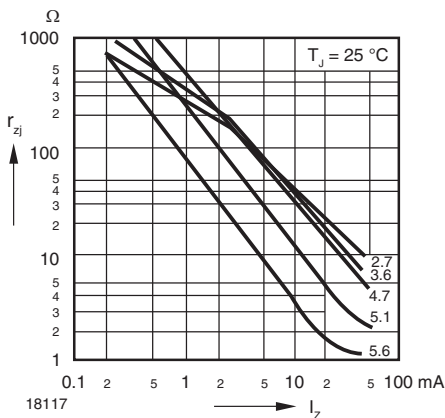


Fig. 3 - Dynamic Resistance vs. Zener Current

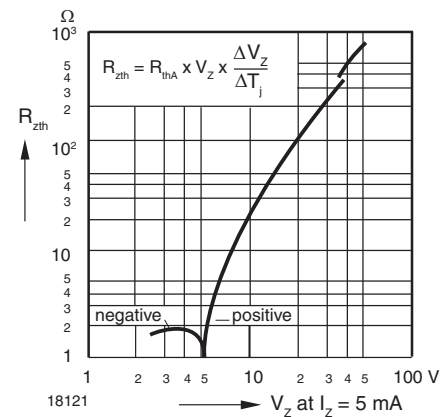


Fig. 6 - Thermal Differential Resistance vs. Zener Voltage

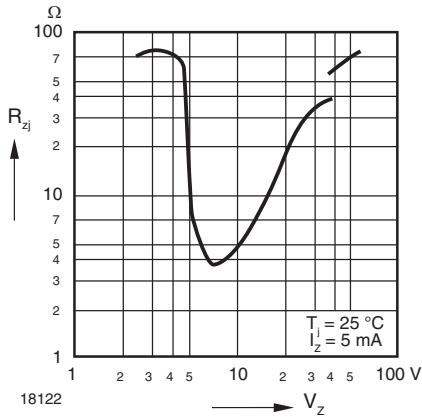


Fig. 7 - Dynamic Resistance vs. Zener Voltage

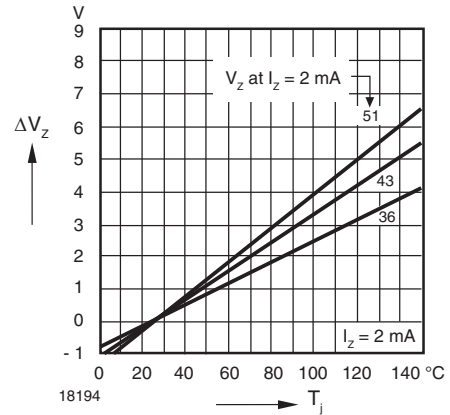


Fig. 10 - Change of Zener Voltage vs. Junction Temperature

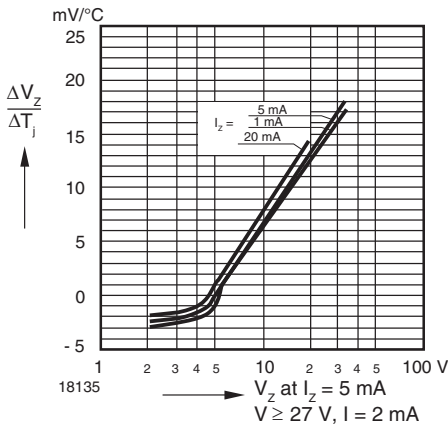


Fig. 8 - Temperature Dependence of Zener Voltage vs. Zener Voltage

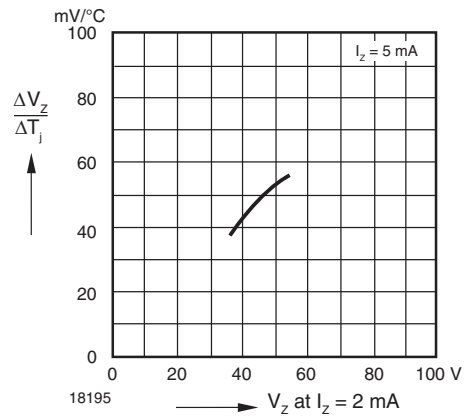


Fig. 11 - Temperature Dependence of Zener Voltage vs. Zener Voltage

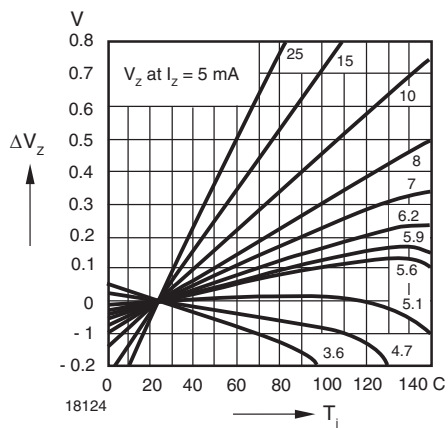


Fig. 9 - Change of Zener Voltage vs. Junction Temperature

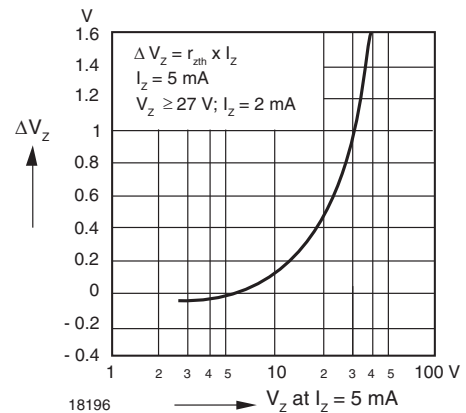


Fig. 12 - Change of Zener Voltage from Turn-on up to the Point of Thermal Equilibrium vs. Zener Voltage

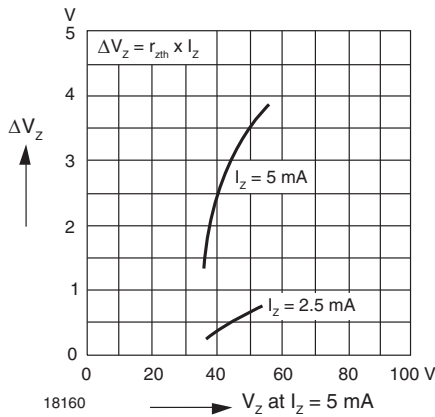


Fig. 13 - Change of Zener Voltage from Turn-on up to the Point of Thermal Equilibrium vs. Zener Voltage

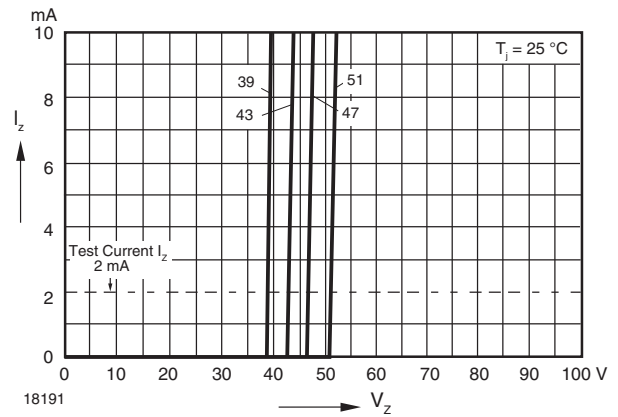


Fig. 16 - Breakdown Characteristics

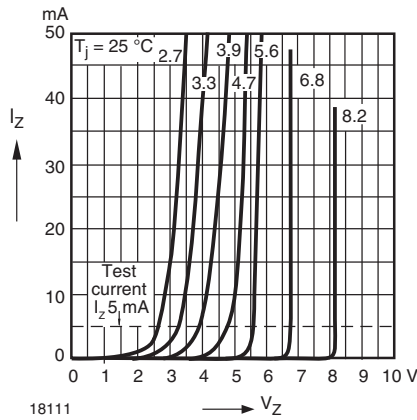


Fig. 14 - Breakdown Characteristics

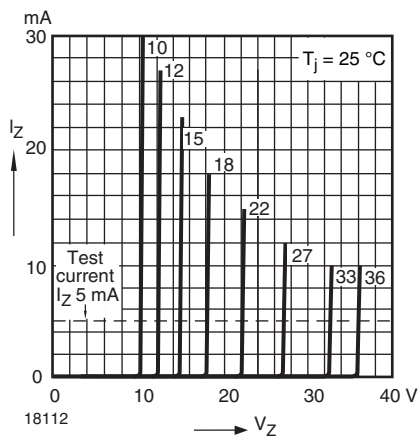
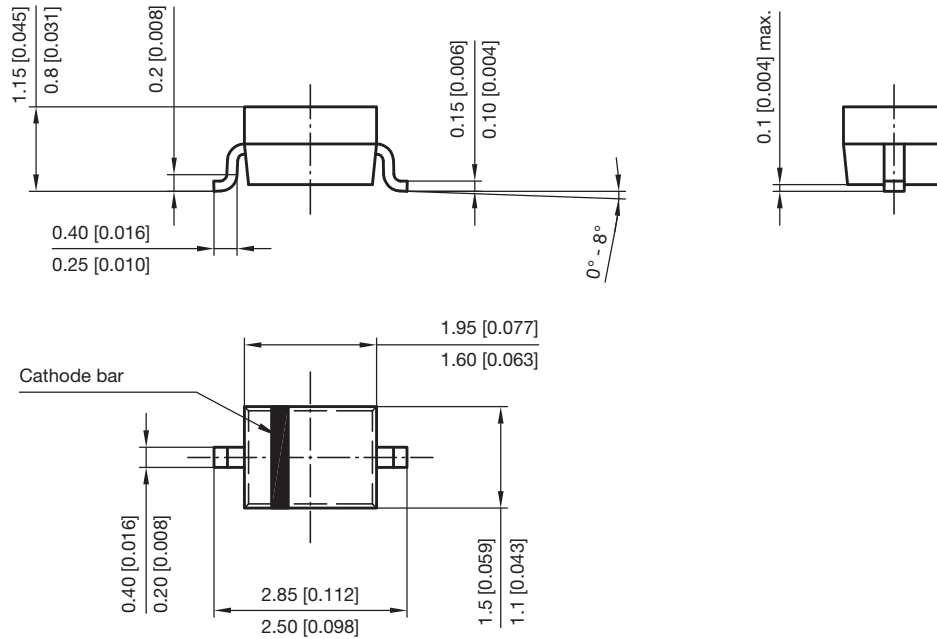


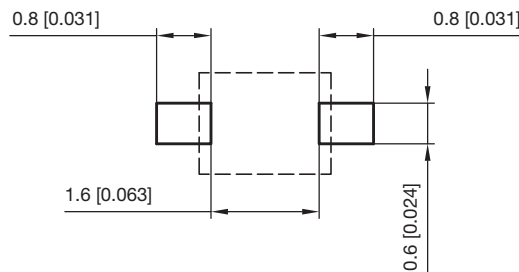
Fig. 15 - Breakdown Characteristics



PACKAGE DIMENSIONS in millimeters (inches): **SOD-323**



Footprint recommendation:



Document no.: S8-V-3910.02-001 (4)
Created - Date: 24.August.2004
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17443



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