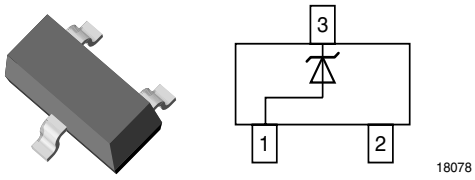
# Small Signal Zener Diodes

## Features

- These diodes are also available in other case styles and other configurations including: the SOD-123 case with type designation BZT52 series, the dual zener diode common anode configuration in the SOT-23 case with type designation AZ23 series and the dual zener diode common cathode configuration in the SOT-23 case with type designation DZ23 series.
- The Zener voltages are graded according to the international E 24 standard. Standard Zener voltage tolerance is ± 5 %. Replace "C" with "B" for ± 2 % tolerance.
- Silicon Planar Power Zener Diodes
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC




## Mechanical Data

**Case:** SOT-23 Plastic case

**Weight:** approx. 8.8 mg

**Packaging Codes/Options:**

GS18 / 10 k per 13" reel (8 mm tape), 10 k/box

GS08 / 3 k per 7" reel (8 mm tape), 15 k/box

## Absolute Maximum Ratings

$T_{amb}$ = 25 °C, unless otherwise specified

| Parameter | Test condition | Symbol | Value | Unit |
|---|---|---|---|---|
| Power dissipation | | $P_{tot}$ | 300 [1] | mW |

[1] Device on fiberglass substrate, see layout.

## Thermal Characteristics

$T_{amb}$ = 25 °C, unless otherwise specified

| Parameter | Test condition | Symbol | Value | Unit |
|---|---|---|---|---|
| Thermal resistance junction to ambient air | | $R_{thJA}$ | 420 [1] | °C/W |
| Junction temperature | | $T_j$ | 150 | °C |
| Storage temperature range | | $T_S$ | - 65 to + 150 | °C |

[1] Device on fiberglass substrate, see layout.

## Electrical Characteristics

| Partnumber | Marking Code | Zener Voltage Range | | Dynamic Resistance | | Test Current | Temp. Coefficient of Zener Voltage | | Test Current | Reverse Leakage Current | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $V_Z$ @ $I_{ZT1}$ | | $r_{zj}$ @ $I_{ZT1}$ | $r_{zj}$ @ $I_{ZT2}$ | $I_{ZT1}$ | $\alpha_{VZ}$ @ $I_{ZT1}$ | | $I_{ZT2}$ | $I_R$ | @ $V_R$ |
| | | V | | Ω | | mA | $10^{-4}$/°C | | mA | µA | V |
| | | min | max | | | | min | max | | | |
| BZX84C2V4-V | Z11 | 2.2 | 2.6 | 70 (≤100) | 275 | 5 | -9.0 | -4.0 | 1 | 50 | 1 |
| BZX84C2V7-V | Z12 | 2.5 | 2.9 | 75 (≤100) | 300 (≤600) | 5 | -9.0 | -4.0 | 1 | 20 | 1 |
| BZX84C3V0-V | Z13 | 2.8 | 3.2 | 80 (≤95) | 325 (≤600) | 5 | -9.0 | -3.0 | 1 | 10 | 1 |
| BZX84C3V3-V | Z14 | 3.1 | 3.5 | 85 (≤95) | 350 (≤600) | 5 | -8.0 | -3.0 | 1 | 5 | 1 |
| BZX84C3V6-V | Z15 | 3.4 | 3.8 | 85 (≤90) | 375 (≤600) | 5 | -8.0 | -3.0 | 1 | 5 | 1 |
| BZX84C3V9-V | Z16 | 3.7 | 4.1 | 85 (≤90) | 400 (≤600) | 5 | -7.0 | -3.0 | 1 | 3 | 1 |
| BZX84C4V3-V | Z17 | 4 | 4.6 | 80 (≤90) | 410 (≤600) | 5 | -6.0 | -1.0 | 1 | 3 | 1 |
| BZX84C4V7-V | Z1 | 4.4 | 5 | 50 (≤80) | 425 (≤500) | 5 | -5.0 | +2.0 | 1 | 3 | 2 |
| BZX84C5V1-V | Z2 | 4.8 | 5.4 | 40 (≤60) | 400 (≤480) | 5 | -3.0 | +4.0 | 1 | 2 | 2 |
| BZX84C5V6-V | Z3 | 5.2 | 6 | 15 (≤40) | 80 (≤400) | 5 | -2.0 | +6.0 | 1 | 1 | 2 |
| BZX84C6V2-V | Z4 | 5.8 | 6.6 | 6.0 (≤10) | 40 (≤150) | 5 | -1.0 | +7.0 | 1 | 3 | 4 |
| BZX84C6V8-V | Z5 | 6.4 | 7.2 | 6.0 (≤15) | 30 (≤80) | 5 | +2.0 | +7.0 | 1 | 2 | 4 |
| BZX84C7V5-V | Z6 | 7 | 7.9 | 6.0 (≤15) | 30 (≤80) | 5 | +3.0 | +7.0 | 1 | 1 | 5 |
| BZX84C8V2-V | Z7 | 7.7 | 8.7 | 6.0 (≤15) | 40 (≤80) | 5 | +4.0 | +7.0 | 1 | 0.7 | 5 |
| BZX84C9V1-V | Z8 | 8.5 | 9.6 | 6.0 (≤15) | 40 (≤100) | 5 | +5.0 | +8.0 | 1 | 0.5 | 6 |
| BZX84C10-V | Z9 | 9.4 | 10.6 | 8.0 (≤20) | 50 (≤150) | 5 | +5.0 | +8.0 | 1 | 0.2 | 7 |
| BZX84C11-V | Y1 | 10.4 | 11.6 | 10 (≤20) | 50 (≤150) | 5 | +5.0 | +9.0 | 1 | 0.1 | 8 |
| BZX84C12-V | Y2 | 11.4 | 12.7 | 10 (≤25) | 50 (≤150) | 5 | +6.0 | +9.0 | 1 | 0.1 | 8 |
| BZX84C13-V | Y3 | 12.4 | 14.1 | 10 (≤30) | 50 (≤170) | 5 | +7.0 | +9.0 | 1 | 0.1 | 8 |
| BZX84C15-V | Y4 | 13.8 | 15.6 | 10 (≤30) | 50 (≤200) | 5 | +7.0 | +9.0 | 1 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84C16-V | Y5 | 15.3 | 17.1 | 10 (≤40) | 50 (≤200) | 5 | +8.0 | +9.5 | 1 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84C18-V | Y6 | 16.8 | 19.1 | 10 (≤45) | 50 (≤225) | 5 | +8.0 | +9.5 | 1 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84C20-V | Y7 | 18.8 | 21.2 | 15 (≤55) | 60 (≤225) | 5 | +8.0 | +10 | 1 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84C22-V | Y8 | 20.8 | 23.3 | 20 (≤55) | 60 (≤250) | 5 | +8.0 | +10 | 1 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84C24-V | Y9 | 22.8 | 25.6 | 25 (≤70) | 60 (≤250) | 5 | +8.0 | +10 | 1 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84C27-V | Y10 | 25.1 | 28.9 | 25 (≤80) | 65 (≤300) | 2 | +8.0 | +10 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84C30-V | Y11 | 28 | 32 | 30 (≤80) | 70 (≤300) | 2 | +8.0 | +10 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84C33-V | Y12 | 31 | 35 | 35 (≤80) | 75 (≤325) | 2 | +8.0 | +10 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84C36-V | Y13 | 34 | 38 | 35 (≤90) | 80 (≤350) | 2 | +8.0 | +10 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84C39-V | Y14 | 37 | 41 | 40 (≤130) | 80 (≤350) | 2 | +10 | +12 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84C43-V | Y15 | 40 | 46 | 45 (≤150) | 85 (≤375) | 2 | +10 | +12 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84C47-V | Y16 | 44 | 50 | 50 (≤170) | 85 (≤375) | 2 | +10 | +12 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84C51-V | Y17 | 48 | 54 | 60 (≤180) | 85 (≤400) | 2 | +10 | +12 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84C56-V | Y18 | 52 | 60 | 70 (≤200) | 100 (≤425) | 2 | +9.0 | +11 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84C62-V | Y19 | 58 | 66 | 80 (≤215) | 100 (≤450) | 2 | +9.0 | +12 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84C68-V | Y20 | 64 | 72 | 90 (≤240) | 150 (≤475) | 2 | +10 | +12 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84C75-V | Y21 | 70 | 79 | 95 (≤255) | 170 (≤500) | 2 | +10 | +12 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |

## Electrical Characteristics

| Partnumber | Marking Code | Zener Voltage Range | | Dynamic Resistance | | Test Current | Temp. Coefficient of Zener Voltage | | Test Current | Reverse Leakage Current | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $V_Z$ @ $I_{ZT1}$ | | $r_{zj}$ @ $I_{ZT1}$ | $r_{zj}$ @ $I_{ZT2}$ | $I_{ZT1}$ | $\alpha_{VZ}$ @ $I_{ZT1}$ | | $I_{ZT2}$ | $I_R$ | @ $V_R$ |
| | | V | | Ω | | mA | $10^{-4}$/°C | | mA | µA | V |
| | | min | max | | | | min | max | | | |
| BZX84B2V4-V | Z50 | 2.35 | 2.45 | 70 (≤100) | 275 | 5 | -9 | -4 | 1 | 50 | 1 |
| BZX84B2V7-V | Z51 | 2.65 | 2.75 | 75 (≤100) | 300 (≤600) | 5 | -9 | -4 | 1 | 20 | 1 |
| BZX84B3V0-V | Z52 | 2.94 | 3.06 | 80 (≤95) | 325 (≤600) | 5 | -9 | -3 | 1 | 10 | 1 |
| BZX84B3V3-V | Z53 | 3.23 | 3.37 | 85 (≤95) | 350 (≤600) | 5 | -8 | -3 | 1 | 5 | 1 |
| BZX84B3V6-V | Z54 | 3.53 | 3.67 | 85 (≤90) | 375 (≤600) | 5 | -8 | -3 | 1 | 5 | 1 |
| BZX84B3V9-V | Z55 | 3.82 | 3.98 | 85 (≤90) | 400 (≤600) | 5 | -7 | -3 | 1 | 3 | 1 |
| BZX84B4V3-V | Z56 | 4.21 | 4.39 | 80 (≤90) | 410 (≤600) | 5 | -6 | -1 | 1 | 3 | 1 |
| BZX84B4V7-V | Z57 | 4.61 | 4.79 | 50 (≤80) | 425 (≤500) | 5 | -5 | 2 | 1 | 3 | 2 |
| BZX84B5V1-V | Z58 | 5 | 5.2 | 40 (≤60) | 400 (≤480) | 5 | -3 | 4 | 1 | 2 | 2 |
| BZX84B5V6-V | Z59 | 5.49 | 5.71 | 15 (≤40) | 80 (≤400) | 5 | -2 | 6 | 1 | 1 | 2 |
| BZX84B6V2-V | Z60 | 6.08 | 6.32 | 6.0 (≤10) | 40 (≤150) | 5 | -1 | 7 | 1 | 3 | 4 |
| BZX84B6V8-V | Z61 | 6.66 | 6.94 | 6.0 (≤15) | 30 (≤80) | 5 | 2 | 7 | 1 | 2 | 4 |
| BZX84B7V5-V | Z62 | 7.35 | 7.65 | 6.0 (≤15) | 30 (≤80) | 5 | 3 | 7 | 1 | 1 | 5 |
| BZX84B8V2-V | Z63 | 8.04 | 8.36 | 6.0 (≤15) | 40 (≤80) | 5 | 4 | 7 | 1 | 0.7 | 5 |
| BZX84B9V1-V | Z64 | 8.92 | 9.28 | 6.0 (≤15) | 40 (≤100) | 5 | 5 | 8 | 1 | 0.5 | 6 |
| BZX84B10-V | Z65 | 9.8 | 10.2 | 8.0 (≤20) | 50 (≤150) | 5 | 5 | 8 | 1 | 0.2 | 7 |
| BZX84B11-V | Z66 | 10.8 | 11.2 | 10 (≤20) | 50 (≤150) | 5 | 5 | 9 | 1 | 0.1 | 8 |
| BZX84B12-V | Z67 | 11.8 | 12.2 | 10 (≤25) | 50 (≤150) | 5 | 6 | 9 | 1 | 0.1 | 8 |
| BZX84B13-V | Z68 | 12.7 | 13.3 | 10 (≤30) | 50 (≤170) | 5 | 7 | 9 | 1 | 0.1 | 8 |
| BZX84B15-V | Z69 | 14.7 | 15.3 | 10 (≤30) | 50 (≤200) | 5 | 7 | 9 | 1 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84B16-V | Z70 | 15.7 | 16.3 | 10 (≤40) | 50 (≤200) | 5 | 8 | 9.5 | 1 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84B18-V | Z71 | 17.6 | 18.4 | 10 (≤45) | 50 (≤225) | 5 | 8 | 9.5 | 1 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84B20-V | Z72 | 19.6 | 20.4 | 15 (≤55) | 60 (≤225) | 5 | 8 | 10 | 1 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84B22-V | Z73 | 21.6 | 22.4 | 20 (≤55) | 60 (≤250) | 5 | 8 | 10 | 1 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84B24-V | Z74 | 23.5 | 24.5 | 25 (≤70) | 60 (≤250) | 5 | 8 | 10 | 1 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84B27-V | Z75 | 26.5 | 27.5 | 25 (≤80) | 65 (≤300) | 2 | 8 | 10 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84B30-V | Z76 | 29.4 | 30.6 | 30 (≤80) | 70 (≤300) | 2 | 8 | 10 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84B33-V | Z77 | 32.3 | 33.7 | 35 (≤80) | 75 (≤325) | 2 | 8 | 10 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84B36-V | Z78 | 35.3 | 36.7 | 35 (≤90) | 80 (≤350) | 2 | 8 | 10 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84B39-V | Z79 | 38.2 | 39.8 | 40 (≤130) | 80 (≤350) | 2 | 10 | 12 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84B43-V | Z80 | 42.1 | 43.9 | 45 (≤150) | 85 (≤375) | 2 | 10 | 12 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84B47-V | Z81 | 46.1 | 47.9 | 50 (≤170) | 85 (≤375) | 2 | 10 | 12 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84B51-V | Z82 | 50 | 52 | 60 (≤180) | 85 (≤400) | 2 | 10 | 12 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84B56-V | Z83 | 54.9 | 57.1 | 70 (≤200) | 100 (≤425) | 2 | 9 | 11 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84B62-V | Z84 | 60.8 | 63.2 | 80 (≤215) | 100 (≤450) | 2 | 9 | 12 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84B68-V | Z85 | 66.6 | 69.4 | 90 (≤240) | 150 (≤475) | 2 | 10 | 12 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |
| BZX84B75-V | Z86 | 73.5 | 76.5 | 95 (≤255) | 170 (≤500) | 2 | 10 | 12 | 0.5 | 0.05 | 0.7 $V_{Znom.}$ |

## Typical Characteristics (Tamb = 25 °C unless otherwise specified)

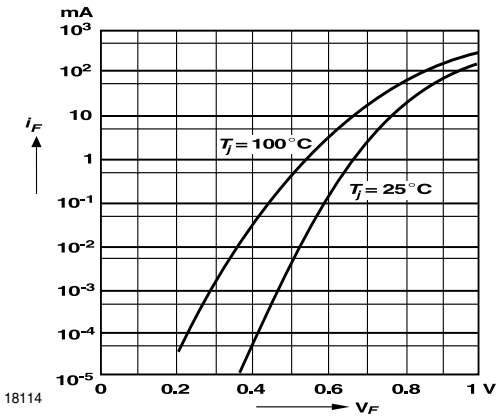



Figure 1. Forward characteristics

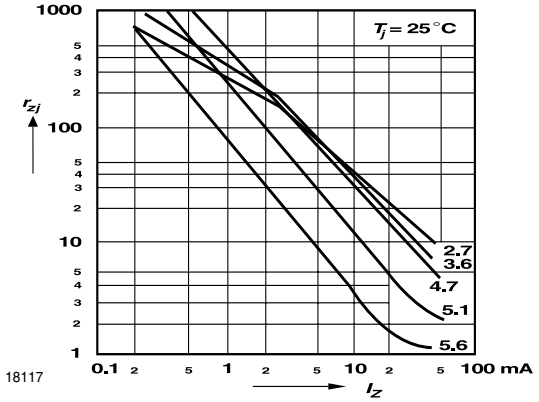



Figure 4. Dynamic Resistance vs. Zener Current

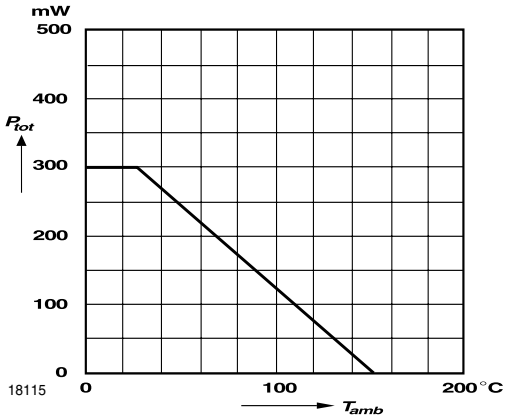



Figure 2. Admissible Power Dissipation vs. Ambient Temperature

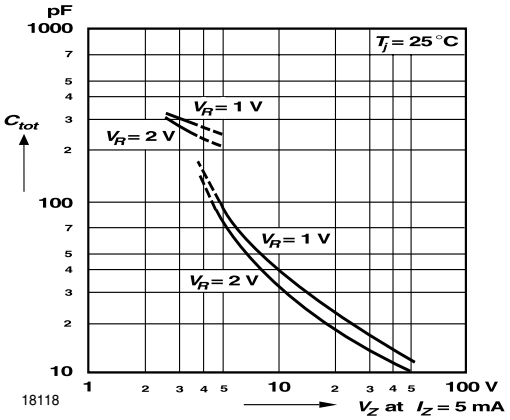



Figure 5. Capacitance vs. Zener Voltage

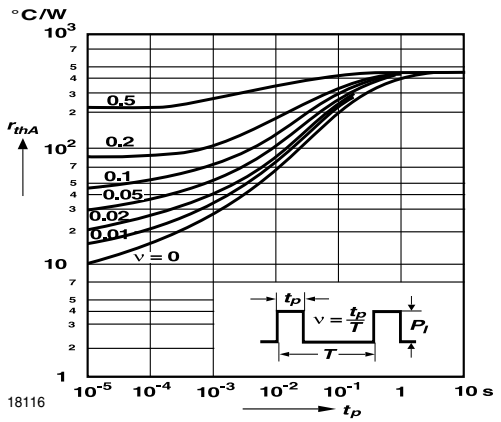



Figure 3. Pulse Thermal Resistance vs. Pulse Duration

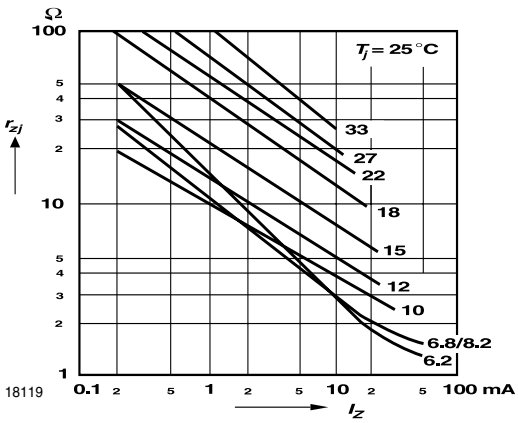



Figure 6. Dynamic Resistance vs. Zener Current

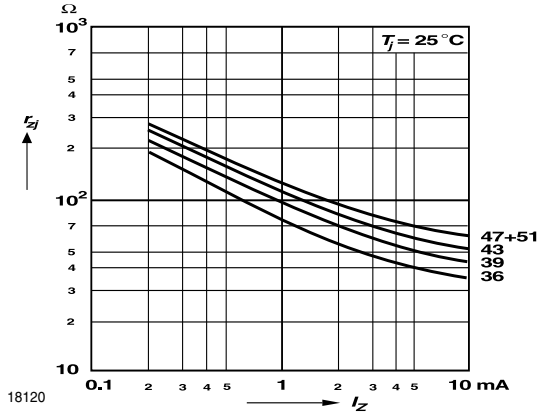



Figure 7. Dynamic Resistance vs. Zener Current

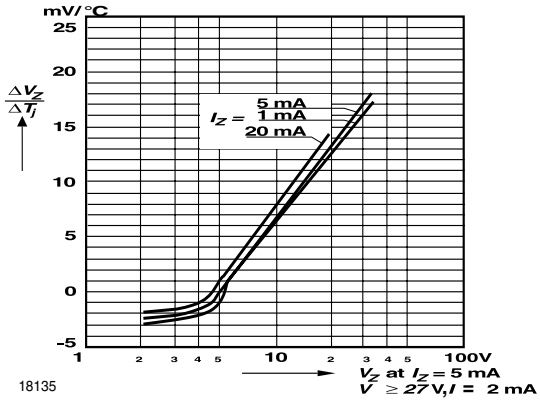



Figure 10. Temperature Dependence of Zener Voltage vs. Zener Voltage

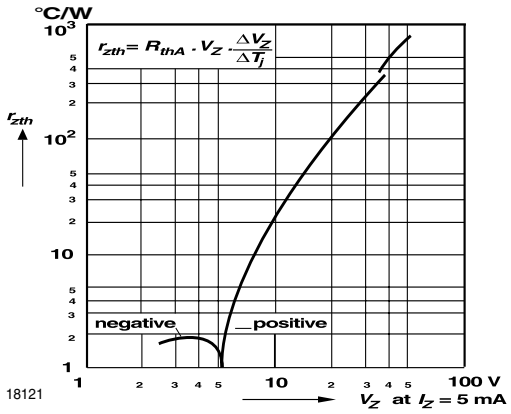



Figure 8. Thermal Differential Resistance vs. Zener Voltage

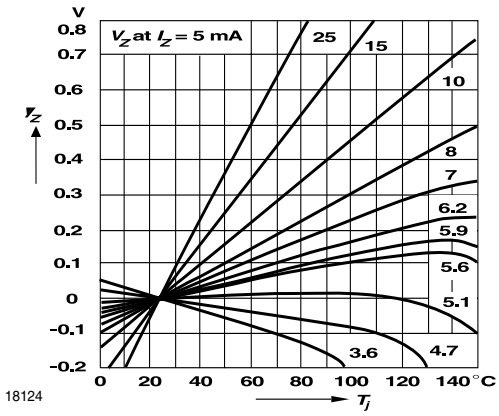



Figure 11. Change of Zener Voltage vs. Junction Temperature

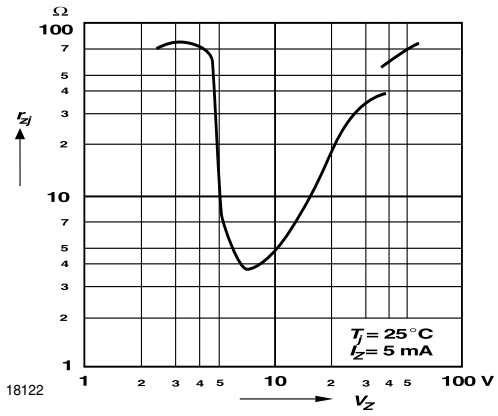



Figure 9. Dynamic Resistance vs. Zener Voltage

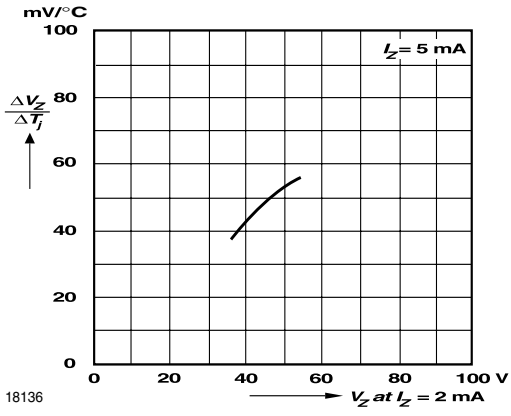



Figure 12. Temperature Dependence of Zener Voltage vs. Zener Voltage

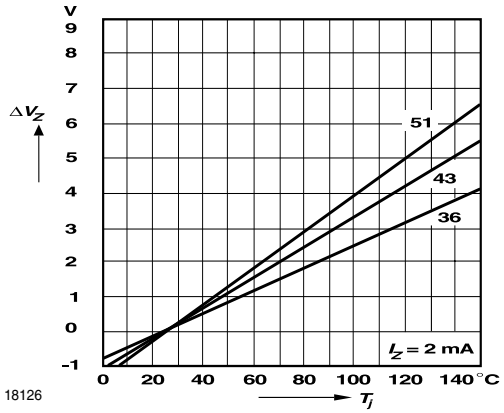



Figure 13. Change of Zener Voltage vs. Junction Temperature

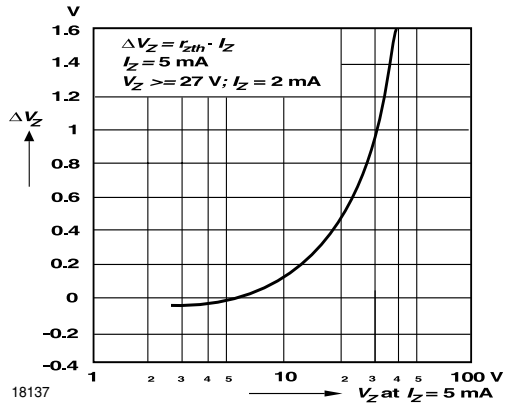



Figure 14. Change of Zener voltage from turn-on up to the point of thermal equilibrium vs. Zener voltage

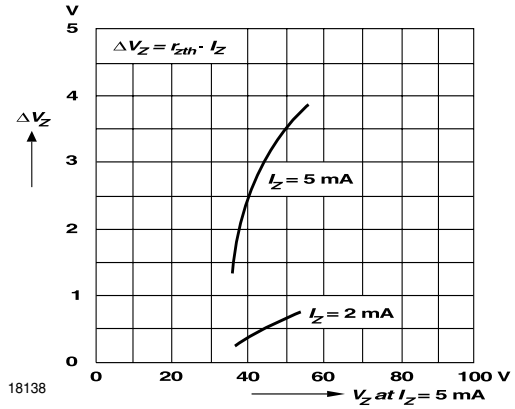



Figure 15. Change of Zener voltage from turn-on up to the point of thermal equilibrium vs. Zener voltage

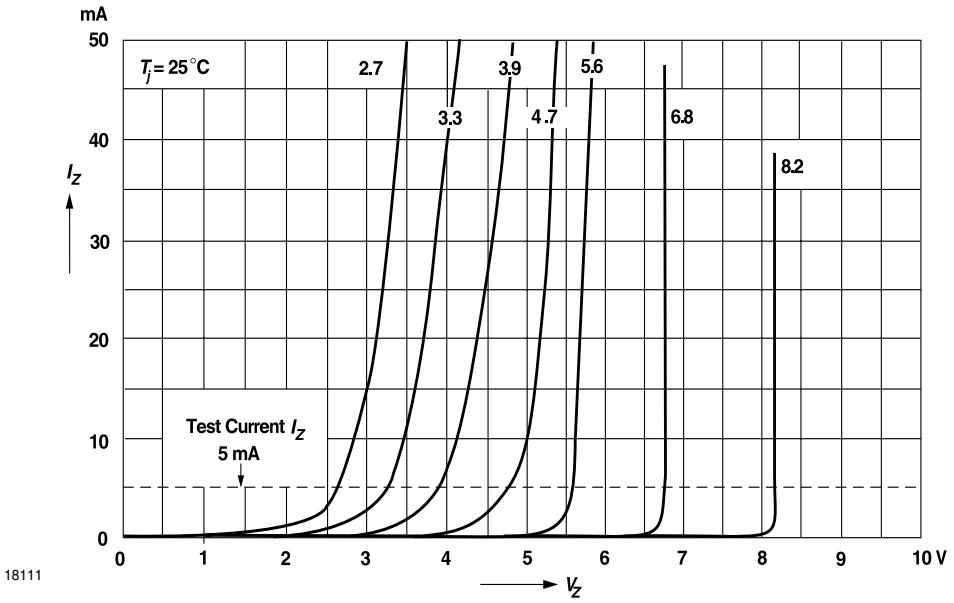



Figure 16. Breakdown Characteristics

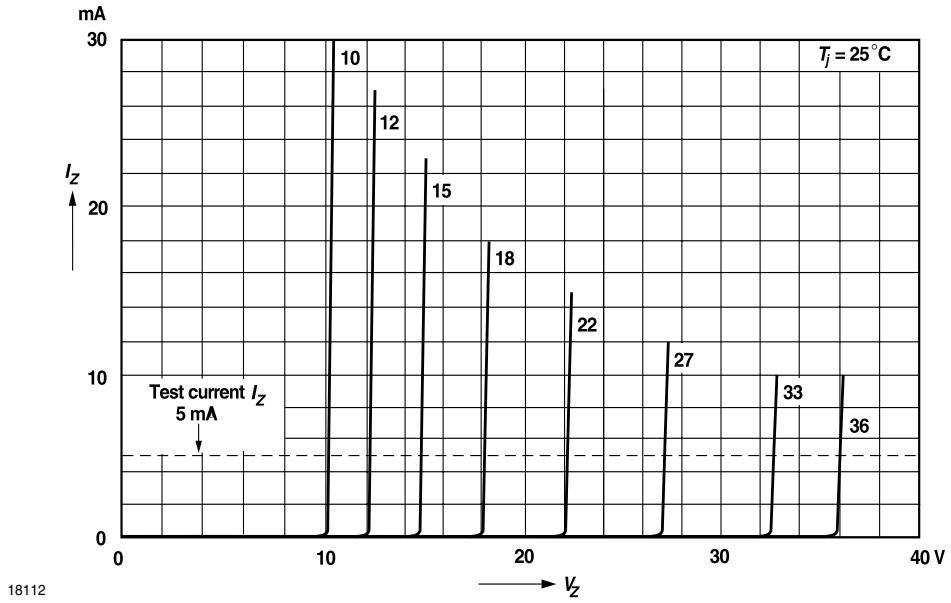



Figure 17. Breakdown Characteristics

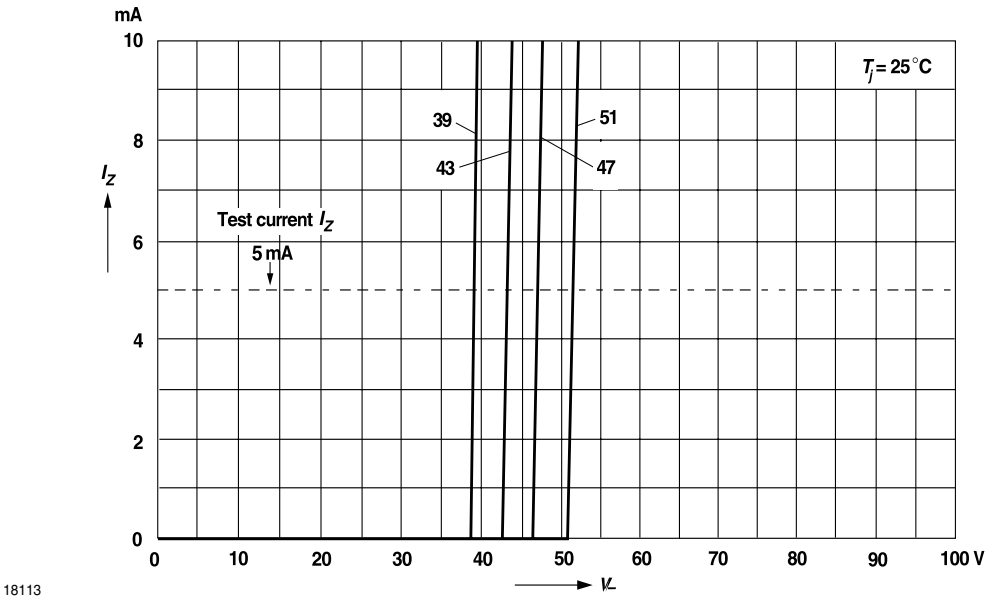
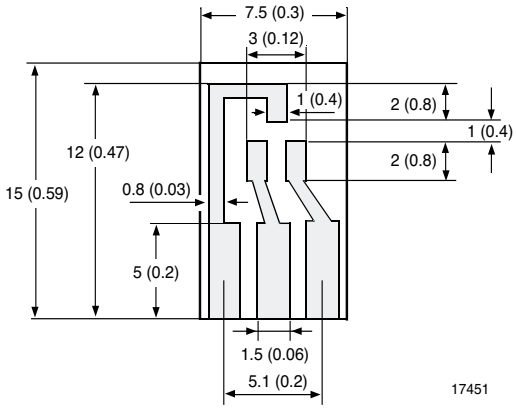


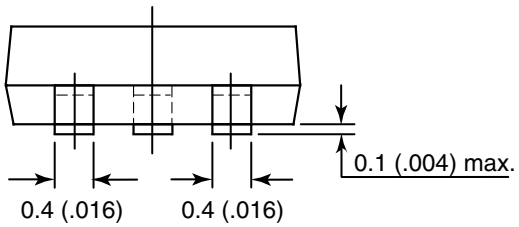

Figure 18. Breakdown Characteristics

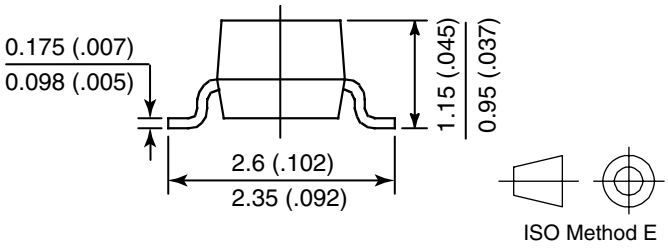
## Layout for $R_{Theta;JA}$ test

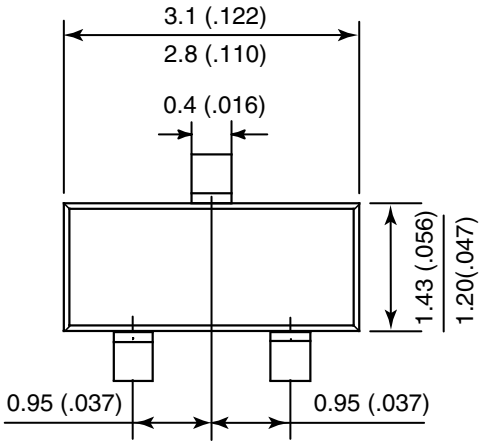
Thickness: Fiberglass 0.059 in. (1.5 mm)
Copper leads 0.012 in. (0.3 mm)



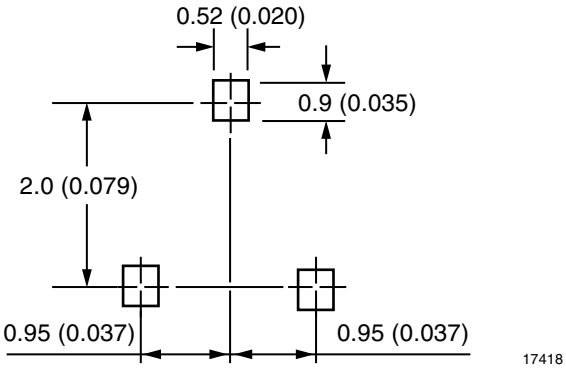
## Package Dimensions in mm (Inches)




**Mounting Pad Layout**



## Ozone Depleting Substances Policy Statement

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.


We reserve the right to make changes to improve technical design
and may do so without further notice.
Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.



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