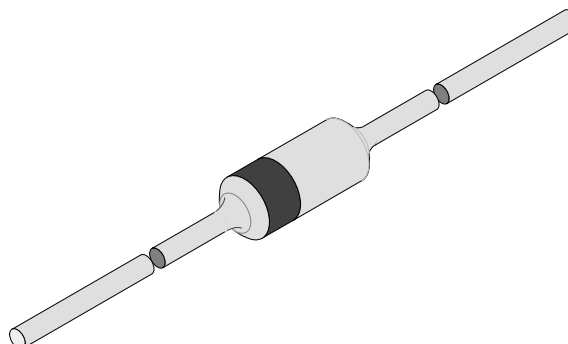


# Silicon Epitaxial Planar Z-Diodes

## Features

- Very sharp reverse characteristic
- Low reverse current level
- Very high stability
- Low noise
- Available with tighter tolerances



94 9367

## Applications

Voltage stabilization

## Absolute Maximum Ratings

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

| Parameter                 | Test Conditions                               | Type | Symbol           | Value            | Unit               |
|---------------------------|-----------------------------------------------|------|------------------|------------------|--------------------|
| Power dissipation         | $I = 4\text{mm}$ , $T_L = 25^{\circ}\text{C}$ |      | $P_V$            | 500              | mW                 |
| Z-current                 |                                               |      | $I_Z$            | $P_V/V_Z$        | mA                 |
| Junction temperature      |                                               |      | $T_j$            | 175              | $^{\circ}\text{C}$ |
| Storage temperature range |                                               |      | $T_{\text{stg}}$ | $-65 \dots +175$ | $^{\circ}\text{C}$ |

## Maximum Thermal Resistance

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

| Parameter        | Test Conditions                            | Symbol            | Value | Unit |
|------------------|--------------------------------------------|-------------------|-------|------|
| Junction ambient | $I = 4\text{mm}$ , $T_L = \text{constant}$ | $R_{\text{thJA}}$ | 300   | K/W  |

## Electrical Characteristics

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

| Parameter       | Test Conditions      | Type | Symbol | Min | Typ | Max | Unit |
|-----------------|----------------------|------|--------|-----|-----|-----|------|
| Forward voltage | $I_F = 200\text{mA}$ |      | $V_F$  |     |     | 1.5 | V    |

| Type   | V <sub>Zmin.</sub><br>(V) | V <sub>Zmax.</sub><br>(V) | Type    | V <sub>Zmin.</sub><br>(V) | V <sub>Zmax.</sub><br>(V) | r <sub>Zmax.</sub><br>(Ω) | at I <sub>Z</sub><br>(mA) | I <sub>Rmax.</sub><br>(μA) | at V <sub>R</sub><br>(V) |
|--------|---------------------------|---------------------------|---------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|--------------------------|
| TZX2V4 | 2.3                       | 2.6                       | TZX2V4A | 2.3                       | 2.5                       | 100                       | 5                         | 5                          | 0.5                      |
| TZX2V4 | 2.3                       | 2.6                       | TZX2V4B | 2.4                       | 2.6                       | 100                       | 5                         | 5                          | 0.5                      |
| TZX2V7 | 2.5                       | 2.9                       | TZX2V7A | 2.5                       | 2.7                       | 100                       | 5                         | 5                          | 0.5                      |
| TZX2V7 | 2.5                       | 2.9                       | TZX2V7B | 2.6                       | 2.8                       | 100                       | 5                         | 5                          | 0.5                      |
| TZX2V7 | 2.5                       | 2.9                       | TZX2V7C | 2.7                       | 2.9                       | 100                       | 5                         | 5                          | 0.5                      |
| TZX3V0 | 2.8                       | 3.2                       | TZX3V0A | 2.8                       | 3.0                       | 100                       | 5                         | 5                          | 0.5                      |
| TZX3V0 | 2.8                       | 3.2                       | TZX3V0B | 2.9                       | 3.1                       | 100                       | 5                         | 5                          | 0.5                      |
| TZX3V0 | 2.8                       | 3.2                       | TZX3V0C | 3.0                       | 3.2                       | 100                       | 5                         | 5                          | 0.5                      |
| TZX3V3 | 3.1                       | 3.5                       | TZX3V3A | 3.1                       | 3.3                       | 100                       | 5                         | 5                          | 1                        |
| TZX3V3 | 3.1                       | 3.5                       | TZX3V3B | 3.2                       | 3.4                       | 100                       | 5                         | 5                          | 1                        |
| TZX3V3 | 3.1                       | 3.5                       | TZX3V3C | 3.3                       | 3.5                       | 100                       | 5                         | 5                          | 1                        |
| TZX3V6 | 3.4                       | 3.8                       | TZX3V6A | 3.4                       | 3.6                       | 100                       | 5                         | 5                          | 1                        |
| TZX3V6 | 3.4                       | 3.8                       | TZX3V6B | 3.5                       | 3.7                       | 100                       | 5                         | 5                          | 1                        |
| TZX3V6 | 3.4                       | 3.8                       | TZX3V6C | 3.6                       | 3.8                       | 100                       | 5                         | 5                          | 1                        |
| TZX3V9 | 3.7                       | 4.1                       | TZX3V9A | 3.7                       | 3.9                       | 100                       | 5                         | 5                          | 1                        |
| TZX3V9 | 3.7                       | 4.1                       | TZX3V9B | 3.8                       | 4.0                       | 100                       | 5                         | 5                          | 1                        |
| TZX3V9 | 3.7                       | 4.1                       | TZX3V9C | 3.9                       | 4.1                       | 100                       | 5                         | 5                          | 1                        |
| TZX4V3 | 4.0                       | 4.5                       | TZX4V3A | 4.0                       | 4.2                       | 100                       | 5                         | 5                          | 1.5                      |
| TZX4V3 | 4.0                       | 4.5                       | TZX4V3B | 4.1                       | 4.3                       | 100                       | 5                         | 5                          | 1.5                      |
| TZX4V3 | 4.0                       | 4.5                       | TZX4V3C | 4.2                       | 4.4                       | 100                       | 5                         | 5                          | 1.5                      |
| TZX4V3 | 4.0                       | 4.5                       | TZX4V3D | 4.3                       | 4.5                       | 100                       | 5                         | 5                          | 1.5                      |
| TZX4V7 | 4.4                       | 4.9                       | TZX4V7A | 4.4                       | 4.6                       | 100                       | 5                         | 5                          | 2                        |
| TZX4V7 | 4.4                       | 4.9                       | TZX4V7B | 4.5                       | 4.7                       | 100                       | 5                         | 5                          | 2                        |
| TZX4V7 | 4.4                       | 4.9                       | TZX4V7C | 4.6                       | 4.8                       | 100                       | 5                         | 5                          | 2                        |
| TZX4V7 | 4.4                       | 4.9                       | TZX4V7D | 4.7                       | 4.9                       | 100                       | 5                         | 5                          | 2                        |
| TZX5V1 | 4.8                       | 5.3                       | TZX5V1A | 4.8                       | 5.0                       | 100                       | 5                         | 5                          | 2                        |
| TZX5V1 | 4.8                       | 5.3                       | TZX5V1B | 4.9                       | 5.1                       | 100                       | 5                         | 5                          | 2                        |
| TZX5V1 | 4.8                       | 5.3                       | TZX5V1C | 5.0                       | 5.2                       | 100                       | 5                         | 5                          | 2                        |
| TZX5V1 | 4.8                       | 5.3                       | TZX5V1D | 5.1                       | 5.3                       | 100                       | 5                         | 5                          | 2                        |
| TZX5V6 | 5.2                       | 5.9                       | TZX5V6A | 5.2                       | 5.5                       | 40                        | 5                         | 5                          | 2                        |
| TZX5V6 | 5.2                       | 5.9                       | TZX5V6B | 5.3                       | 5.6                       | 40                        | 5                         | 5                          | 2                        |
| TZX5V6 | 5.2                       | 5.9                       | TZX5V6C | 5.4                       | 5.7                       | 40                        | 5                         | 5                          | 2                        |
| TZX5V6 | 5.2                       | 5.9                       | TZX5V6D | 5.5                       | 5.8                       | 40                        | 5                         | 5                          | 2                        |
| TZX5V6 | 5.2                       | 5.9                       | TZX5V6E | 5.6                       | 5.9                       | 40                        | 5                         | 5                          | 2                        |
| TZX6V2 | 5.7                       | 6.6                       | TZX6V2A | 5.7                       | 6.0                       | 15                        | 5                         | 1                          | 3                        |
| TZX6V2 | 5.7                       | 6.6                       | TZX6V2B | 5.8                       | 6.1                       | 15                        | 5                         | 1                          | 3                        |
| TZX6V2 | 5.7                       | 6.6                       | TZX6V2C | 6.0                       | 6.3                       | 15                        | 5                         | 1                          | 3                        |
| TZX6V2 | 5.7                       | 6.6                       | TZX6V2D | 6.1                       | 6.4                       | 15                        | 5                         | 1                          | 3                        |
| TZX6V2 | 5.7                       | 6.6                       | TZX6V2E | 6.3                       | 6.6                       | 15                        | 5                         | 1                          | 3                        |
| TZX6V8 | 6.4                       | 7.2                       | TZX6V8A | 6.4                       | 6.7                       | 15                        | 5                         | 1                          | 3.5                      |
| TZX6V8 | 6.4                       | 7.2                       | TZX6V8B | 6.6                       | 6.9                       | 15                        | 5                         | 1                          | 3.5                      |
| TZX6V8 | 6.4                       | 7.2                       | TZX6V8C | 6.7                       | 7.0                       | 15                        | 5                         | 1                          | 3.5                      |
| TZX6V8 | 6.4                       | 7.2                       | TZX6V8D | 6.9                       | 7.2                       | 15                        | 5                         | 1                          | 3.5                      |
| TZX7V5 | 7.0                       | 7.9                       | TZX7V5A | 7.0                       | 7.3                       | 15                        | 5                         | 1                          | 5.0                      |
| TZX7V5 | 7.0                       | 7.9                       | TZX7V5B | 7.2                       | 7.6                       | 15                        | 5                         | 1                          | 5.0                      |



| Type   | V <sub>Zmin.</sub><br>(V) | V <sub>Zmax.</sub><br>(V) | Type    | V <sub>Zmin.</sub><br>(V) | V <sub>Zmax.</sub><br>(V) | r <sub>Zmax.</sub><br>(Ω) | at I <sub>Z</sub><br>(mA) | I <sub>Rmax.</sub><br>(μA) | at V <sub>R</sub><br>(V) |
|--------|---------------------------|---------------------------|---------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|--------------------------|
| TZX7V5 | 7.0                       | 7.9                       | TZX7V5C | 7.3                       | 7.7                       | 15                        | 5                         | 1                          | 5.0                      |
| TZX7V5 | 7.0                       | 7.9                       | TZX7V5D | 7.5                       | 7.9                       | 15                        | 5                         | 1                          | 5.0                      |
| TZX8V2 | 7.7                       | 8.7                       | TZX8V2A | 7.7                       | 8.1                       | 20                        | 5                         | 1                          | 6.2                      |
| TZX8V2 | 7.7                       | 8.7                       | TZX8V2B | 7.9                       | 8.3                       | 20                        | 5                         | 1                          | 6.2                      |
| TZX8V2 | 7.7                       | 8.7                       | TZX8V2C | 8.1                       | 8.5                       | 20                        | 5                         | 1                          | 6.2                      |
| TZX8V2 | 7.7                       | 8.7                       | TZX8V2D | 8.3                       | 8.7                       | 20                        | 5                         | 1                          | 6.2                      |
| TZX9V1 | 8.5                       | 9.7                       | TZX9V1A | 8.5                       | 8.9                       | 20                        | 5                         | 1                          | 6.8                      |
| TZX9V1 | 8.5                       | 9.7                       | TZX9V1B | 8.7                       | 9.1                       | 20                        | 5                         | 1                          | 6.8                      |
| TZX9V1 | 8.5                       | 9.7                       | TZX9V1C | 8.9                       | 9.3                       | 20                        | 5                         | 1                          | 6.8                      |
| TZX9V1 | 8.5                       | 9.7                       | TZX9V1D | 9.1                       | 9.5                       | 20                        | 5                         | 1                          | 6.8                      |
| TZX9V1 | 8.5                       | 9.7                       | TZX9V1E | 9.3                       | 9.7                       | 20                        | 5                         | 1                          | 6.8                      |
| TZX10  | 9.5                       | 10.6                      | TZX10A  | 9.5                       | 9.9                       | 25                        | 5                         | 1                          | 7.5                      |
| TZX10  | 9.5                       | 10.6                      | TZX10B  | 9.7                       | 10.1                      | 25                        | 5                         | 1                          | 7.5                      |
| TZX10  | 9.5                       | 10.6                      | TZX10C  | 9.9                       | 10.3                      | 25                        | 5                         | 1                          | 7.5                      |
| TZX10  | 9.5                       | 10.6                      | TZX10D  | 10.2                      | 10.6                      | 25                        | 5                         | 1                          | 7.5                      |
| TZX11  | 10.4                      | 11.6                      | TZX11A  | 10.4                      | 10.8                      | 25                        | 5                         | 1                          | 8.2                      |
| TZX11  | 10.4                      | 11.6                      | TZX11B  | 10.7                      | 11.1                      | 25                        | 5                         | 1                          | 8.2                      |
| TZX11  | 10.4                      | 11.6                      | TZX11C  | 10.9                      | 11.3                      | 25                        | 5                         | 1                          | 8.2                      |
| TZX11  | 10.4                      | 11.6                      | TZX11D  | 11.1                      | 11.6                      | 25                        | 5                         | 1                          | 8.2                      |
| TZX12  | 11.4                      | 12.7                      | TZX12A  | 11.4                      | 11.9                      | 35                        | 5                         | 1                          | 9.5                      |
| TZX12  | 11.4                      | 12.7                      | TZX12B  | 11.6                      | 12.1                      | 35                        | 5                         | 1                          | 9.5                      |
| TZX12  | 11.4                      | 12.7                      | TZX12C  | 11.9                      | 12.4                      | 35                        | 5                         | 1                          | 9.5                      |
| TZX12  | 11.4                      | 12.7                      | TZX12D  | 12.2                      | 12.7                      | 35                        | 5                         | 1                          | 9.5                      |
| TZX13  | 12.4                      | 13.4                      | TZX13A  | 12.4                      | 12.9                      | 35                        | 5                         | 1                          | 10                       |
| TZX13  | 12.4                      | 13.4                      | TZX13B  | 12.6                      | 13.1                      | 35                        | 5                         | 1                          | 10                       |
| TZX13  | 12.4                      | 13.4                      | TZX13C  | 12.9                      | 13.4                      | 35                        | 5                         | 1                          | 10                       |
| TZX14  | 13.2                      | 14.3                      | TZX14A  | 13.2                      | 13.7                      | 35                        | 5                         | 1                          | 11                       |
| TZX14  | 13.2                      | 14.3                      | TZX14B  | 13.5                      | 14.0                      | 35                        | 5                         | 1                          | 11                       |
| TZX14  | 13.2                      | 14.3                      | TZX14C  | 13.8                      | 14.3                      | 35                        | 5                         | 1                          | 11                       |
| TZX15  | 14.1                      | 15.5                      | TZX15A  | 14.1                      | 14.7                      | 40                        | 5                         | 1                          | 11.5                     |
| TZX15  | 14.1                      | 15.5                      | TZX15B  | 14.5                      | 15.1                      | 40                        | 5                         | 1                          | 11.5                     |
| TZX15  | 14.1                      | 15.5                      | TZX15C  | 14.9                      | 15.5                      | 40                        | 5                         | 1                          | 11.5                     |
| TZX16  | 15.3                      | 17.1                      | TZX16A  | 15.3                      | 15.9                      | 45                        | 5                         | 1                          | 12                       |
| TZX16  | 15.3                      | 17.1                      | TZX16B  | 15.7                      | 16.5                      | 45                        | 5                         | 1                          | 12                       |
| TZX16  | 15.3                      | 17.1                      | TZX16C  | 16.3                      | 17.1                      | 45                        | 5                         | 1                          | 12                       |
| TZX18  | 16.9                      | 19.0                      | TZX18A  | 16.9                      | 17.7                      | 55                        | 5                         | 1                          | 13                       |
| TZX18  | 16.9                      | 19.0                      | TZX18B  | 17.5                      | 18.3                      | 55                        | 5                         | 1                          | 13                       |
| TZX18  | 16.9                      | 19.0                      | TZX18C  | 18.1                      | 19.0                      | 55                        | 5                         | 1                          | 13                       |
| TZX20  | 18.8                      | 21.2                      | TZX20A  | 18.8                      | 19.7                      | 60                        | 2                         | 1                          | 15                       |
| TZX20  | 18.8                      | 21.2                      | TZX20B  | 19.5                      | 20.4                      | 60                        | 2                         | 1                          | 15                       |
| TZX20  | 18.8                      | 21.2                      | TZX20C  | 20.2                      | 21.2                      | 60                        | 2                         | 1                          | 15                       |
| TZX22  | 20.9                      | 23.3                      | TZX22A  | 20.9                      | 21.9                      | 65                        | 2                         | 1                          | 17                       |
| TZX22  | 20.9                      | 23.3                      | TZX22B  | 21.6                      | 22.6                      | 65                        | 2                         | 1                          | 17                       |
| TZX22  | 20.9                      | 23.3                      | TZX22C  | 22.3                      | 23.3                      | 65                        | 2                         | 1                          | 17                       |
| TZX24  | 22.9                      | 25.5                      | TZX24A  | 22.9                      | 24.0                      | 70                        | 2                         | 1                          | 19                       |
| TZX24  | 22.9                      | 25.5                      | TZX24B  | 23.6                      | 24.7                      | 70                        | 2                         | 1                          | 19                       |

| Type  | V <sub>Zmin.</sub><br>(V) | V <sub>Zmax.</sub><br>(V) | Type   | V <sub>Zmin.</sub><br>(V) | V <sub>Zmax.</sub><br>(V) | r <sub>Zmax.</sub><br>(Ω) | at I <sub>Z</sub><br>(mA) | I <sub>Rmax.</sub><br>(μA) | at V <sub>R</sub><br>(V) |
|-------|---------------------------|---------------------------|--------|---------------------------|---------------------------|---------------------------|---------------------------|----------------------------|--------------------------|
| TZX24 | 22.9                      | 25.5                      | TZX24C | 24.3                      | 25.5                      | 70                        | 2                         | 1                          | 19                       |
| TZX27 | 25.2                      | 28.6                      | TZX27A | 25.2                      | 26.6                      | 80                        | 2                         | 1                          | 21                       |
| TZX27 | 25.2                      | 28.6                      | TZX27B | 26.2                      | 27.6                      | 80                        | 2                         | 1                          | 21                       |
| TZX27 | 25.2                      | 28.6                      | TZX27C | 27.2                      | 28.6                      | 80                        | 2                         | 1                          | 21                       |
| TZX30 | 28.2                      | 31.6                      | TZX30A | 28.2                      | 29.6                      | 100                       | 2                         | 1                          | 23                       |
| TZX30 | 28.2                      | 31.6                      | TZX30B | 29.2                      | 30.6                      | 100                       | 2                         | 1                          | 23                       |
| TZX30 | 28.2                      | 31.6                      | TZX30C | 30.2                      | 31.6                      | 100                       | 2                         | 1                          | 23                       |
| TZX33 | 31.2                      | 34.5                      | TZX33A | 31.2                      | 32.6                      | 120                       | 2                         | 1                          | 25                       |
| TZX33 | 31.2                      | 34.5                      | TZX33B | 32.2                      | 33.6                      | 120                       | 2                         | 1                          | 25                       |
| TZX33 | 31.2                      | 34.5                      | TZX33C | 33.2                      | 34.5                      | 120                       | 2                         | 1                          | 25                       |
| TZX36 | 34.2                      | 38.0                      | TZX36A | 34.2                      | 35.7                      | 140                       | 2                         | 1                          | 27                       |
| TZX36 | 34.2                      | 38.0                      | TZX36B | 35.3                      | 36.8                      | 140                       | 2                         | 1                          | 27                       |
| TZX36 | 34.2                      | 38.0                      | TZX36C | 36.4                      | 38.0                      | 140                       | 2                         | 1                          | 27                       |

### Characteristics (T<sub>j</sub> = 25°C unless otherwise specified)

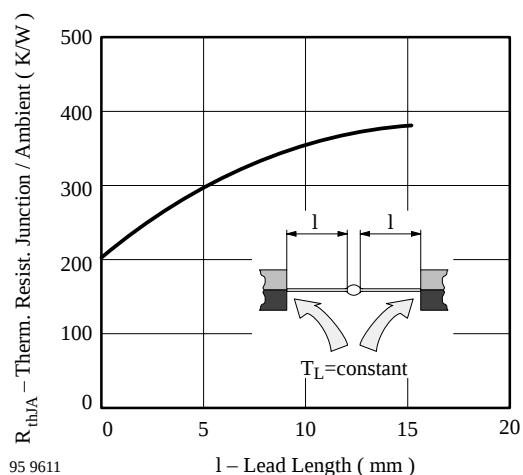


Figure 1. Thermal Resistance vs. Lead Length

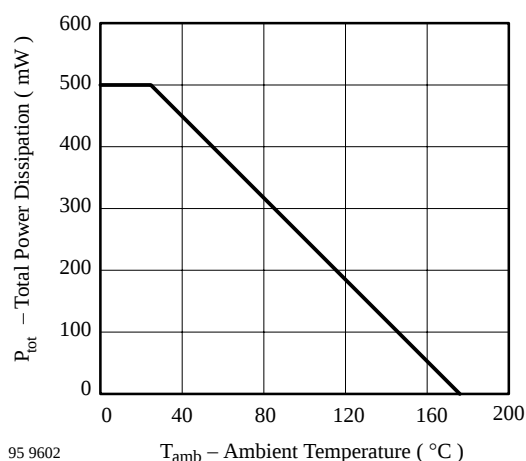


Figure 2. Total Power Dissipation vs. Ambient Temperature

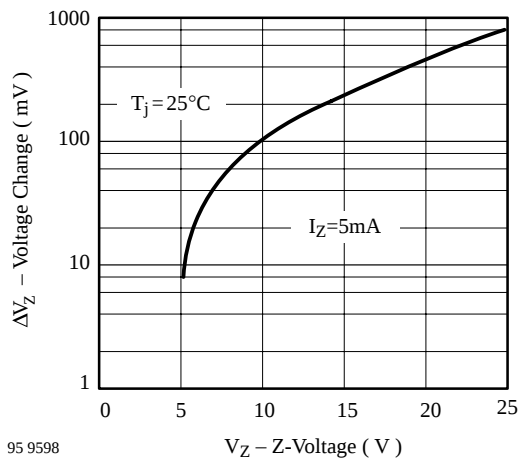


Figure 3. Typical Change of Working Voltage under Operating Conditions at  $T_{amb}=25^{\circ}C$

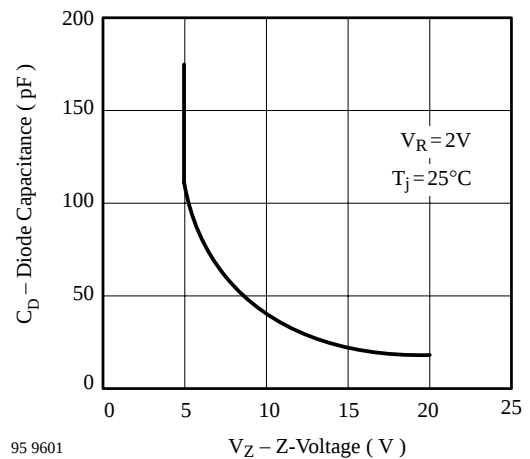


Figure 6. Diode Capacitance vs. Z-Voltage

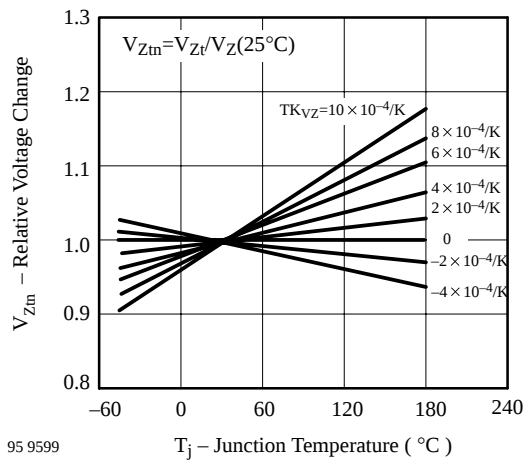


Figure 4. Typical Change of Working Voltage vs. Junction Temperature

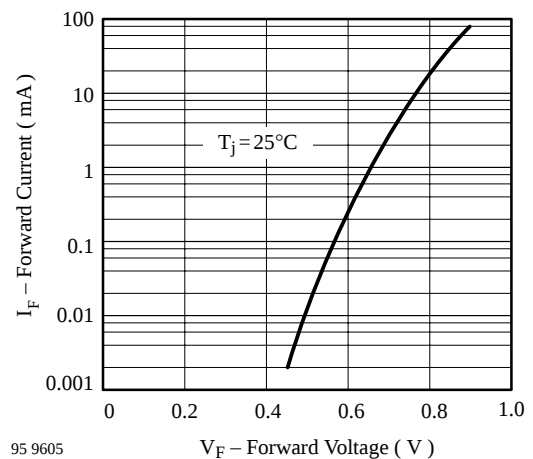


Figure 7. Forward Current vs. Forward Voltage

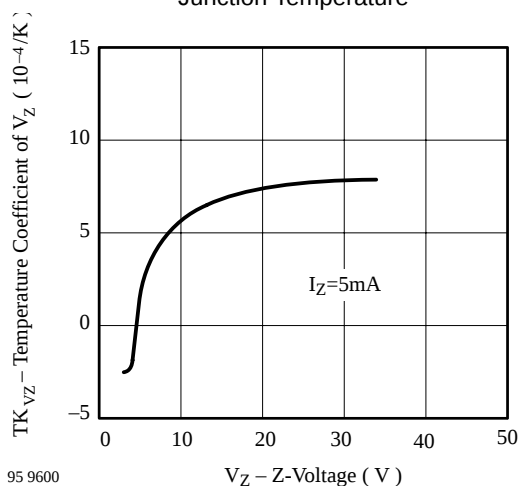


Figure 5. Temperature Coefficient of  $V_Z$  vs. Z-Voltage

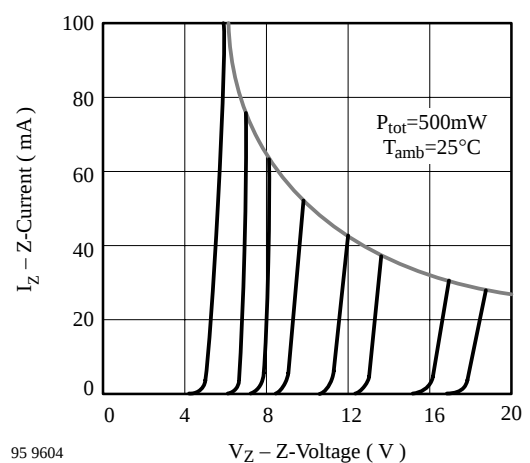


Figure 8. Z-Current vs. Z-Voltage

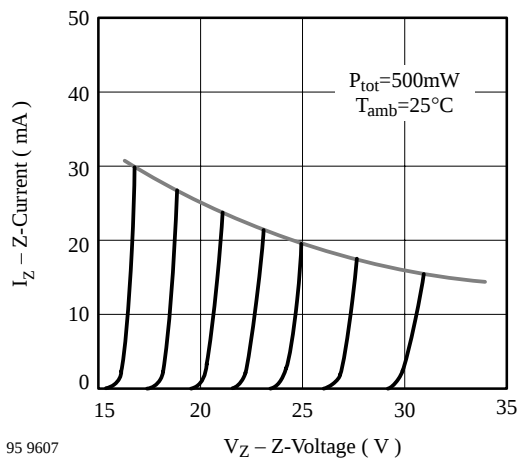


Figure 9. Z-Current vs. Z-Voltage

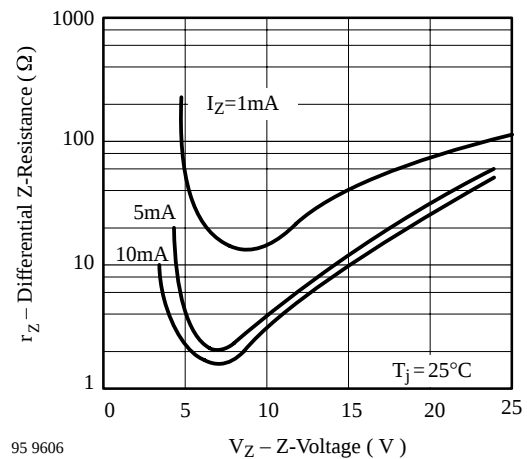


Figure 10. Differential Z-Resistance vs. Z-Voltage

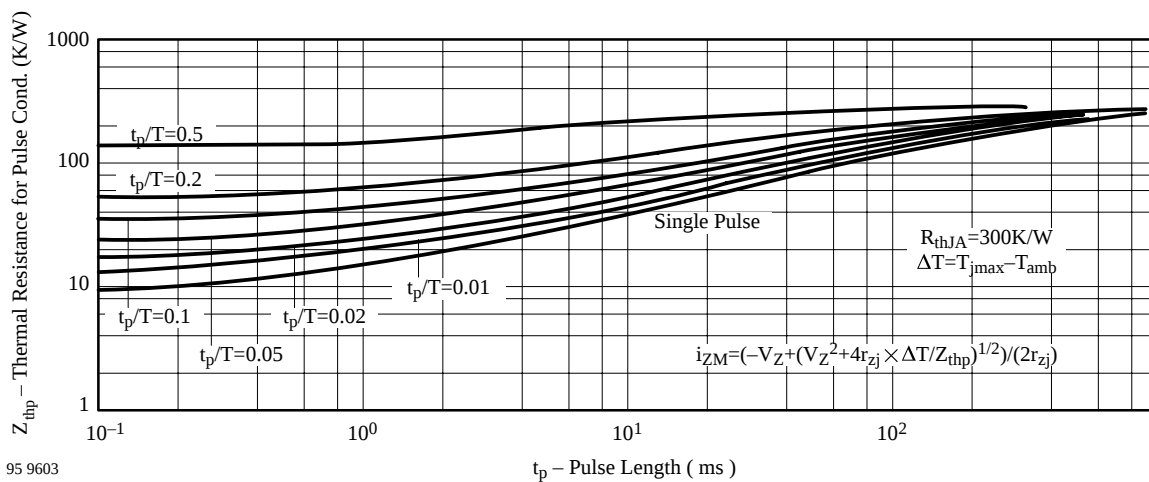


Figure 11. Thermal Response

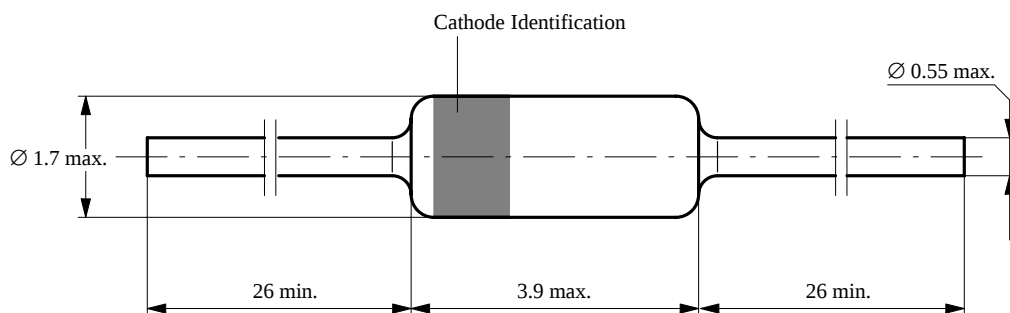
## Dimensions in mm



technical drawings  
according to DIN  
specifications

94 9366

Standard Glass Case  
54 A 2 DIN 41880  
JEDEC DO 35  
Weight max. 0.3 g





## 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-Telefunken products for any unintended or unauthorized application, the buyer shall indemnify Vishay-Telefunken 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.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany  
Telephone: 49 (0) 7131 67 2831, Fax number: 49 (0) 7131 67 2423