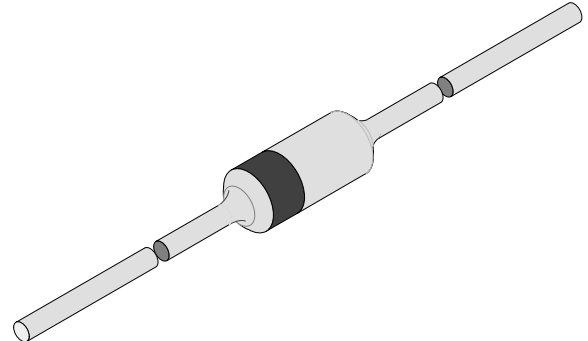


# Silicon Epitaxial Planar Z-Diodes

## Features

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



94 9367

## Applications

Voltage stabilization

## Order Instruction

| Type    | Ordering Code | Remarks  |
|---------|---------------|----------|
| TZX2V4A | TZX2V4A-TAP   | Ammopack |

## Absolute Maximum Ratings

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

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

## Maximum Thermal Resistance

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

| Parameter        | Test Conditions                      | Symbol     | Value | Unit |
|------------------|--------------------------------------|------------|-------|------|
| Junction ambient | $l=4\text{ mm}, T_L=\text{constant}$ | $R_{thJA}$ | 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   | $V_{Zmin.}$ | $V_{Zmax.}$ | Type    | $V_{Zmin.}$ | $V_{Zmax.}$ | $r_{Zmax.}$  | at $I_Z$ | $I_{Rmax.}$ | at $V_R$ |
|--------|-------------|-------------|---------|-------------|-------------|--------------|----------|-------------|----------|
|        | (V)         | (V)         |         | (V)         | (V)         | ( $\Omega$ ) | (mA)     | ( $\mu$ A)  | (V)      |
| TZX2V4 | 2.3         | 2.6         | TZX2V4A | 2.3         | 2.5         | 100          | 5        | 5           | 0.5      |
|        |             |             | 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      |
|        |             |             | TZX2V7B | 2.6         | 2.8         | 100          | 5        | 5           | 0.5      |
|        |             |             | 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      |
|        |             |             | TZX3V0B | 2.9         | 3.1         | 100          | 5        | 5           | 0.5      |
|        |             |             | TZX3V0C | 3.0         | 3.2         | 100          | 5        | 5           | 0.5      |
| TZX3V3 | 3.1         | 3.5         | TZX3V3A | 3.1         | 3.3         | 100          | 5        | 5           | 1        |
|        |             |             | TZX3V3B | 3.2         | 3.4         | 100          | 5        | 5           | 1        |
|        |             |             | TZX3V3C | 3.3         | 3.5         | 100          | 5        | 5           | 1        |
| TZX3V6 | 3.4         | 3.8         | TZX3V6A | 3.4         | 3.6         | 100          | 5        | 5           | 1        |
|        |             |             | TZX3V6B | 3.5         | 3.7         | 100          | 5        | 5           | 1        |
|        |             |             | TZX3V6C | 3.6         | 3.8         | 100          | 5        | 5           | 1        |
| TZX3V9 | 3.7         | 4.1         | TZX3V9A | 3.7         | 3.9         | 100          | 5        | 5           | 1        |
|        |             |             | TZX3V9B | 3.8         | 4.0         | 100          | 5        | 5           | 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      |
|        |             |             | TZX4V3B | 4.1         | 4.3         | 100          | 5        | 5           | 1.5      |
|        |             |             | TZX4V3C | 4.2         | 4.4         | 100          | 5        | 5           | 1.5      |
|        |             |             | TZX4V3D | 4.3         | 4.5         | 100          | 5        | 5           | 1.5      |
| TZX4V7 | 4.4         | 4.9         | TZX4V7A | 4.4         | 4.6         | 100          | 5        | 5           | 2        |
|        |             |             | TZX4V7B | 4.5         | 4.7         | 100          | 5        | 5           | 2        |
|        |             |             | TZX4V7C | 4.6         | 4.8         | 100          | 5        | 5           | 2        |
|        |             |             | TZX4V7D | 4.7         | 4.9         | 100          | 5        | 5           | 2        |
| TZX5V1 | 4.8         | 5.3         | TZX5V1A | 4.8         | 5.0         | 100          | 5        | 5           | 2        |
|        |             |             | TZX5V1B | 4.9         | 5.1         | 100          | 5        | 5           | 2        |
|        |             |             | TZX5V1C | 5.0         | 5.2         | 100          | 5        | 5           | 2        |
|        |             |             | TZX5V1D | 5.1         | 5.3         | 100          | 5        | 5           | 2        |
| TZX5V6 | 5.2         | 5.9         | TZX5V6A | 5.2         | 5.5         | 40           | 5        | 5           | 2        |
|        |             |             | TZX5V6B | 5.3         | 5.6         | 40           | 5        | 5           | 2        |
|        |             |             | TZX5V6C | 5.4         | 5.7         | 40           | 5        | 5           | 2        |
|        |             |             | TZX5V6D | 5.5         | 5.8         | 40           | 5        | 5           | 2        |
|        |             |             | TZX5V6E | 5.6         | 5.9         | 40           | 5        | 5           | 2        |
| TZX6V2 | 5.7         | 6.6         | TZX6V2A | 5.7         | 6.0         | 15           | 5        | 1           | 3        |
|        |             |             | TZX6V2B | 5.8         | 6.1         | 15           | 5        | 1           | 3        |
|        |             |             | TZX6V2C | 6.0         | 6.3         | 15           | 5        | 1           | 3        |
|        |             |             | TZX6V2D | 6.1         | 6.4         | 15           | 5        | 1           | 3        |
|        |             |             | TZX6V2E | 6.3         | 6.6         | 15           | 5        | 1           | 3        |
| TZX6V8 | 6.4         | 7.2         | TZX6V8A | 6.4         | 6.7         | 15           | 5        | 1           | 3.5      |
|        |             |             | TZX6V8B | 6.6         | 6.9         | 15           | 5        | 1           | 3.5      |
|        |             |             | TZX6V8C | 6.7         | 7.0         | 15           | 5        | 1           | 3.5      |
|        |             |             | TZX6V8D | 6.9         | 7.2         | 15           | 5        | 1           | 3.5      |



| Type   | V <sub>Zmin.</sub> | V <sub>Zmax.</sub> | Type    | V <sub>Zmin.</sub> | V <sub>Zmax.</sub> | r <sub>Zmax.</sub> | at I <sub>Z</sub> | I <sub>Rmax.</sub> | at V <sub>R</sub> |
|--------|--------------------|--------------------|---------|--------------------|--------------------|--------------------|-------------------|--------------------|-------------------|
|        | (V)                | (V)                |         | (V)                | (V)                | (Ω)                | (mA)              | (μA)               | (V)               |
| TZX7V5 | 7.0                | 7.9                | TZX7V5A | 7.0                | 7.3                | 15                 | 5                 | 1                  | 5.0               |
|        |                    |                    | TZX7V5B | 7.2                | 7.6                | 15                 | 5                 | 1                  | 5.0               |
|        |                    |                    | TZX7V5C | 7.3                | 7.7                | 15                 | 5                 | 1                  | 5.0               |
|        |                    |                    | 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               |
|        |                    |                    | TZX8V2B | 7.9                | 8.3                | 20                 | 5                 | 1                  | 6.2               |
|        |                    |                    | TZX8V2C | 8.1                | 8.5                | 20                 | 5                 | 1                  | 6.2               |
|        |                    |                    | 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               |
|        |                    |                    | TZX9V1B | 8.7                | 9.1                | 20                 | 5                 | 1                  | 6.8               |
|        |                    |                    | TZX9V1C | 8.9                | 9.3                | 20                 | 5                 | 1                  | 6.8               |
|        |                    |                    | TZX9V1D | 9.1                | 9.5                | 20                 | 5                 | 1                  | 6.8               |
|        |                    |                    | 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               |
|        |                    |                    | TZX10B  | 9.7                | 10.1               | 25                 | 5                 | 1                  | 7.5               |
|        |                    |                    | TZX10C  | 9.9                | 10.3               | 25                 | 5                 | 1                  | 7.5               |
|        |                    |                    | 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               |
|        |                    |                    | TZX11B  | 10.7               | 11.1               | 25                 | 5                 | 1                  | 8.2               |
|        |                    |                    | TZX11C  | 10.9               | 11.3               | 25                 | 5                 | 1                  | 8.2               |
|        |                    |                    | 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               |
|        |                    |                    | TZX12B  | 11.6               | 12.1               | 35                 | 5                 | 1                  | 9.5               |
|        |                    |                    | TZX12C  | 11.9               | 12.4               | 35                 | 5                 | 1                  | 9.5               |
|        |                    |                    | TZX12D  | 12.2               | 12.7               | 35                 | 5                 | 1                  | 9.5               |
| TZX13  | 12.4               | 13.4               | TZX13A  | 12.4               | 12.9               | 35                 | 5                 | 1                  | 10                |
|        |                    |                    | TZX13B  | 12.6               | 13.1               | 35                 | 5                 | 1                  | 10                |
|        |                    |                    | TZX13C  | 12.9               | 13.4               | 35                 | 5                 | 1                  | 10                |
| TZX14  | 13.2               | 14.3               | TZX14A  | 13.2               | 13.7               | 35                 | 5                 | 1                  | 11                |
|        |                    |                    | TZX14B  | 13.5               | 14.0               | 35                 | 5                 | 1                  | 11                |
|        |                    |                    | TZX14C  | 13.8               | 14.3               | 35                 | 5                 | 1                  | 11                |
| TZX15  | 14.1               | 15.5               | TZX15A  | 14.1               | 14.7               | 40                 | 5                 | 1                  | 11.5              |
|        |                    |                    | TZX15B  | 14.5               | 15.1               | 40                 | 5                 | 1                  | 11.5              |
|        |                    |                    | TZX15C  | 14.9               | 15.5               | 40                 | 5                 | 1                  | 11.5              |
| TZX16  | 15.3               | 17.1               | TZX16A  | 15.3               | 15.9               | 45                 | 5                 | 1                  | 12                |
|        |                    |                    | TZX16B  | 15.7               | 16.5               | 45                 | 5                 | 1                  | 12                |
|        |                    |                    | TZX16C  | 16.3               | 17.1               | 45                 | 5                 | 1                  | 12                |
| TZX18  | 16.9               | 19.0               | TZX18A  | 16.9               | 17.7               | 55                 | 5                 | 1                  | 13                |
|        |                    |                    | TZX18B  | 17.5               | 18.3               | 55                 | 5                 | 1                  | 13                |
|        |                    |                    | TZX18C  | 18.1               | 19.0               | 55                 | 5                 | 1                  | 13                |
| TZX20  | 18.8               | 21.2               | TZX20A  | 18.8               | 19.7               | 60                 | 2                 | 1                  | 15                |
|        |                    |                    | TZX20B  | 19.5               | 20.4               | 60                 | 2                 | 1                  | 15                |
|        |                    |                    | TZX20C  | 20.2               | 21.2               | 60                 | 2                 | 1                  | 15                |

| Type  | V <sub>Zmin.</sub> | V <sub>Zmax.</sub> | Type   | V <sub>Zmin.</sub> | V <sub>Zmax.</sub> | r <sub>Zmax.</sub> | at I <sub>Z</sub> | I <sub>Rmax.</sub> | at V <sub>R</sub> |
|-------|--------------------|--------------------|--------|--------------------|--------------------|--------------------|-------------------|--------------------|-------------------|
|       | (V)                | (V)                |        | (V)                | (V)                | (Ω)                | (mA)              | (μA)               | (V)               |
| TZX22 | 20.9               | 23.3               | TZX22A | 20.9               | 21.9               | 65                 | 2                 | 1                  | 17                |
|       |                    |                    | TZX22B | 21.6               | 22.6               | 65                 | 2                 | 1                  | 17                |
|       |                    |                    | TZX22C | 22.3               | 23.3               | 65                 | 2                 | 1                  | 17                |
| TZX24 | 22.9               | 25.5               | TZX24A | 22.9               | 24.0               | 70                 | 2                 | 1                  | 19                |
|       |                    |                    | TZX24B | 23.6               | 24.7               | 70                 | 2                 | 1                  | 19                |
|       |                    |                    | TZX24C | 24.3               | 25.5               | 70                 | 2                 | 1                  | 19                |
| TZX27 | 25.2               | 28.6               | TZX27A | 25.2               | 26.6               | 80                 | 2                 | 1                  | 21                |
|       |                    |                    | TZX27B | 26.2               | 27.6               | 80                 | 2                 | 1                  | 21                |
|       |                    |                    | TZX27C | 27.2               | 28.6               | 80                 | 2                 | 1                  | 21                |
| TZX30 | 28.2               | 31.6               | TZX30A | 28.2               | 29.6               | 100                | 2                 | 1                  | 23                |
|       |                    |                    | TZX30B | 29.2               | 30.6               | 100                | 2                 | 1                  | 23                |
|       |                    |                    | TZX30C | 30.2               | 31.6               | 100                | 2                 | 1                  | 23                |
| TZX33 | 31.2               | 34.5               | TZX33A | 31.2               | 32.6               | 120                | 2                 | 1                  | 25                |
|       |                    |                    | TZX33B | 32.2               | 33.6               | 120                | 2                 | 1                  | 25                |
|       |                    |                    | TZX33C | 33.2               | 34.5               | 120                | 2                 | 1                  | 25                |
| TZX36 | 34.2               | 38.0               | TZX36A | 34.2               | 35.7               | 140                | 2                 | 1                  | 27                |
|       |                    |                    | TZX36B | 35.3               | 36.8               | 140                | 2                 | 1                  | 27                |
|       |                    |                    | TZX36C | 36.4               | 38.0               | 140                | 2                 | 1                  | 27                |

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

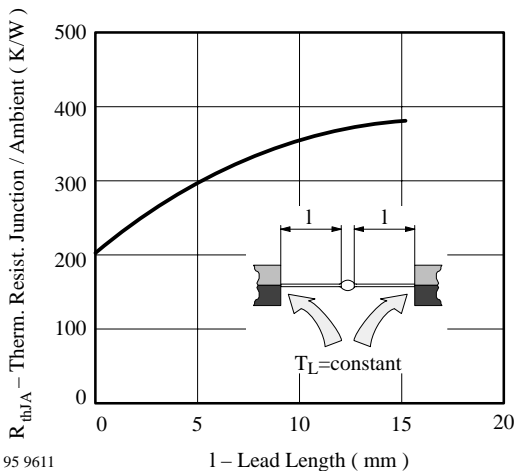


Figure 1. Thermal Resistance vs. Lead Length

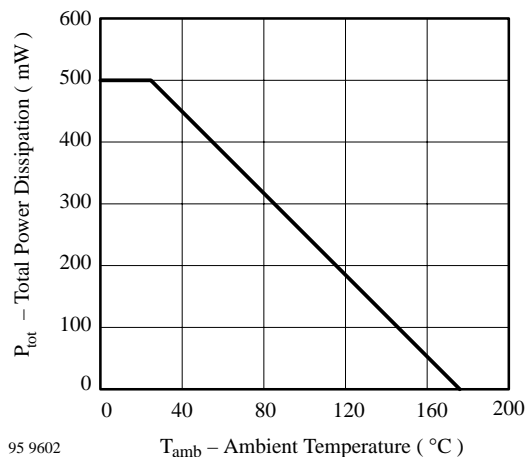
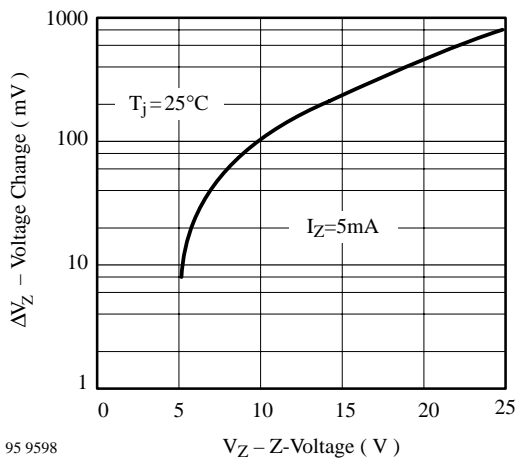
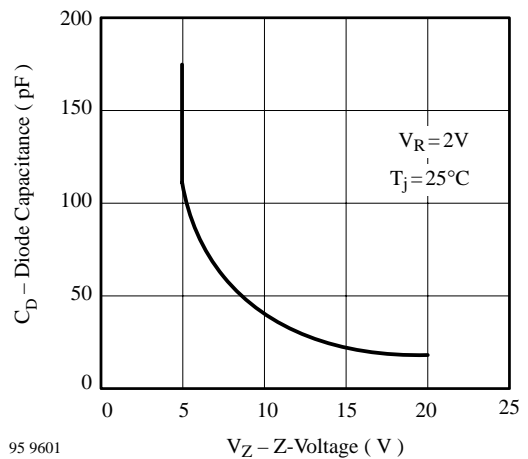


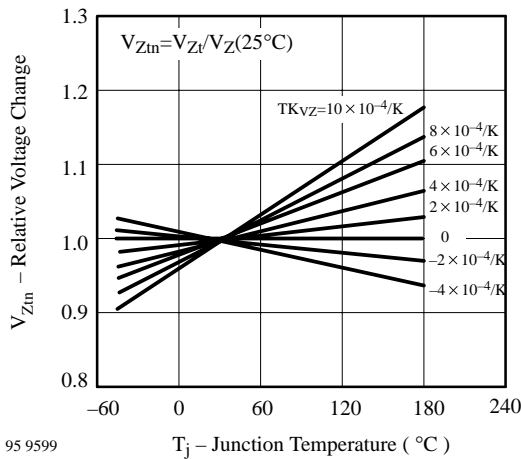
Figure 2. Total Power Dissipation vs. Ambient Temperature



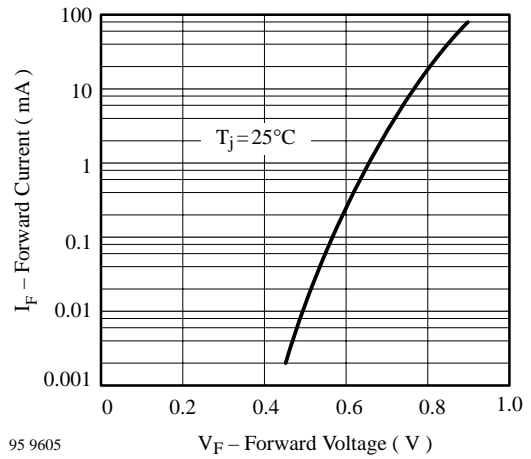
95 9598  
Figure 3. Typical Change of Working Voltage under Operating Conditions at  $T_{amb}=25^{\circ}C$



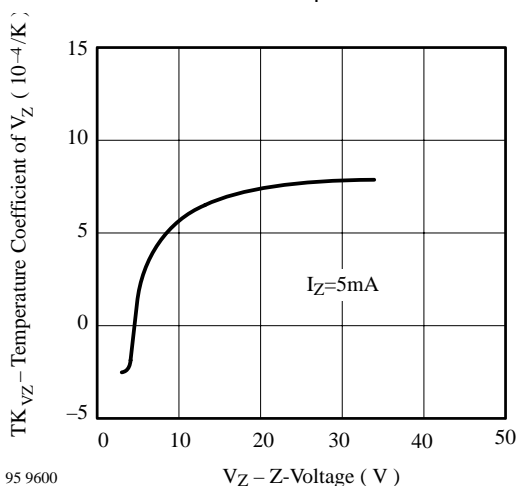
95 9601  
Figure 6. Diode Capacitance vs. Z-Voltage



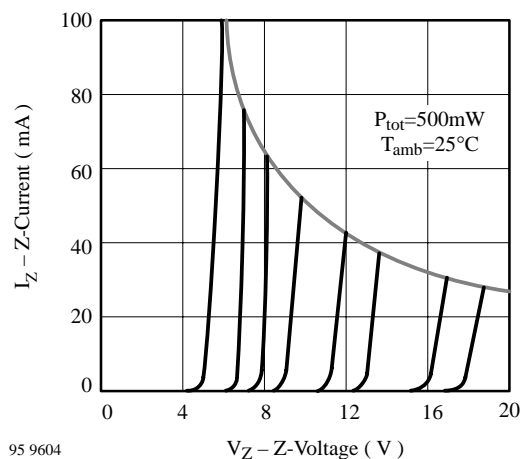
95 9599  
Figure 4. Typical Change of Working Voltage vs. Junction Temperature



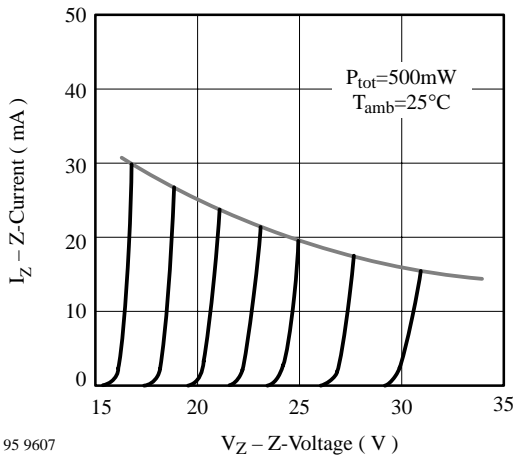
95 9605  
Figure 7. Forward Current vs. Forward Voltage



95 9600  
Figure 5. Temperature Coefficient of  $V_Z$  vs. Z-Voltage

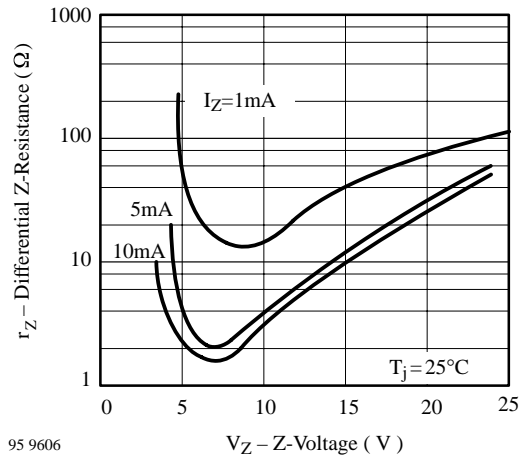


95 9604  
Figure 8. Z-Current vs. Z-Voltage



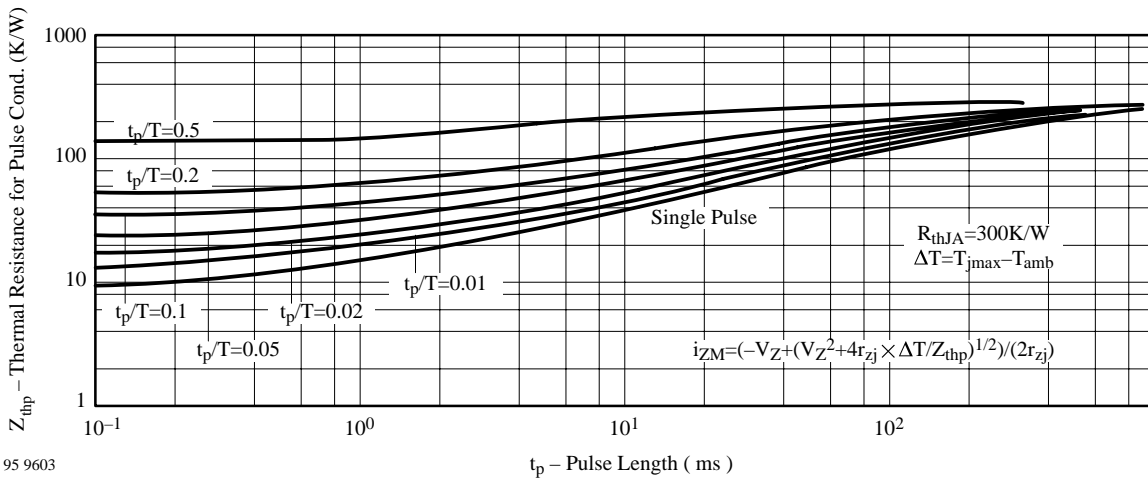
95 9607

Figure 9. Z-Current vs. Z-Voltage



95 9606

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



95 9603

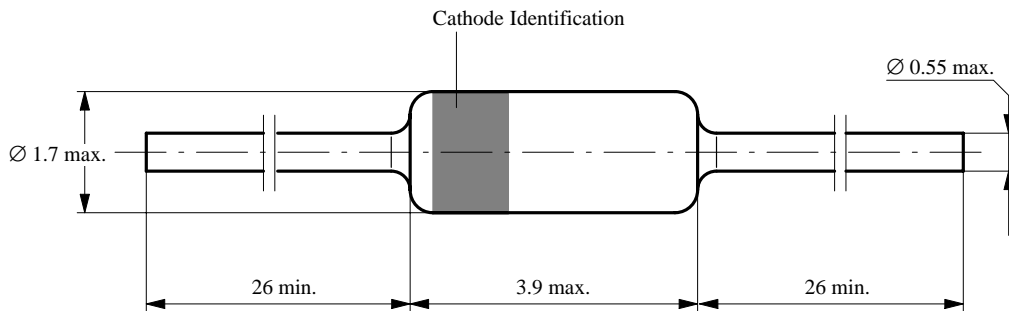
Figure 11. Thermal Response

### 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