

Small Signal Zener Diodes



FEATURES

- Very sharp reverse characteristic
- Low reverse current level
- Very high stability
- Low noise
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Voltage stabilization

LINKS TO ADDITIONAL RESOURCES



| PRIMARY CHARACTERISTICS | | |
|------------------------------|---------------|------|
| PARAMETER | VALUE | UNIT |
| V _Z range nom. | 2.4 to 36 | V |
| Test current I _{ZT} | 2; 5 | mA |
| V _Z specification | Pulse current | |
| Circuit configuration | Single | |

| ORDERING INFORMATION | | | |
|----------------------|----------------|-------------------------------------|------------------------|
| DEVICE NAME | ORDERING CODE | TAPED UNITS PER REEL | MINIMUM ORDER QUANTITY |
| TZX-series | TZX-series-TAP | 10 000 per ammpack (52 mm tape) | 30 000/box |
| TZX-series | TZX-series-TR | 10 000 per 14" reel (52 mm tape) | 30 000/box |

| PACKAGE | | | | |
|------------------|-------------------|---|--------------------------------------|------------------------------|
| PACKAGE NAME | WEIGHT | MOLDING COMPOUND FLAMMABILITY RATING | MOISTURE SENSITIVITY LEVEL | SOLDERING CONDITIONS |
| DO-35 (DO-204AH) | approx. 125 mg | UL 94 V-0 | MSL level 1 (according J-STD-020) | Peak temperature max. 260 °C |

| ABSOLUTE MAXIMUM RATINGS (T _{amb} = 25 °C, unless otherwise specified) | | | | |
|---|-------------------------------------|-------------------|----------------------------------|------|
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
| Power dissipation | I = 4 mm, T _L = 25 °C | P _{tot} | 500 | mW |
| Zener current | | I _Z | P _{tot} /V _Z | mA |
| Thermal resistance junction to ambient air | I = 4 mm, T _L = constant | R _{thJA} | 300 | K/W |
| Junction temperature | | T _j | 175 | °C |
| Storage temperature range | | T _{stg} | -65 to +175 | °C |
| Forward voltage (max.) | I _F = 200 mA | V _F | 1.5 | V |



| ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | | | |
|--|---------------------|------|--------------|-------------------------|-----|----------------------|---|--------------------|
| PART NUMBER | ZENER VOLTAGE RANGE | | TEST CURRENT | REVERSE LEAKAGE CURRENT | | | | DYNAMIC RESISTANCE |
| | V_Z at I_{ZT1} | | I_{ZT1} | I_R at V_R | | I_R at $V_R^{(1)}$ | | Z_Z at I_{ZT1} |
| | V | | mA | μA | V | μA | V | Ω |
| | MIN. | MAX. | | MAX. | | MAX. | | MAX. |
| TZX2V4A | 2.3 | 2.5 | 5 | 5 | 0.5 | 50 | 1 | 100 |
| TZX2V4B | 2.4 | 2.6 | 5 | 5 | 0.5 | 50 | 1 | 100 |
| TZX2V7A | 2.5 | 2.7 | 5 | 5 | 0.5 | 10 | 1 | 100 |
| TZX2V7B | 2.6 | 2.8 | 5 | 5 | 0.5 | 10 | 1 | 100 |
| TZX2V7C | 2.7 | 2.9 | 5 | 5 | 0.5 | 10 | 1 | 100 |
| TZX3V0A | 2.8 | 3 | 5 | 5 | 0.5 | 6 | 1 | 100 |
| TZX3V0B | 2.9 | 3.1 | 5 | 5 | 0.5 | 6 | 1 | 100 |
| TZX3V0C | 3 | 3.2 | 5 | 5 | 0.5 | 6 | 1 | 100 |
| TZX3V3A | 3.1 | 3.3 | 5 | 5 | 1 | 2 | 1 | 100 |
| TZX3V3B | 3.2 | 3.4 | 5 | 5 | 1 | 2 | 1 | 100 |
| TZX3V3C | 3.3 | 3.5 | 5 | 5 | 1 | 2 | 1 | 100 |
| TZX3V6A | 3.4 | 3.6 | 5 | 5 | 1 | 2 | 1 | 100 |
| TZX3V6B | 3.5 | 3.7 | 5 | 5 | 1 | 2 | 1 | 100 |
| TZX3V6C | 3.6 | 3.8 | 5 | 5 | 1 | 2 | 1 | 100 |
| TZX3V9A | 3.7 | 3.9 | 5 | 5 | 1 | 2 | 1 | 100 |
| TZX3V9B | 3.8 | 4 | 5 | 5 | 1 | 2 | 1 | 100 |
| TZX3V9C | 3.9 | 4.1 | 5 | 5 | 1 | 2 | 1 | 100 |
| TZX4V3A | 4 | 4.2 | 5 | 5 | 1.5 | 1 | 1 | 100 |
| TZX4V3B | 4.1 | 4.3 | 5 | 5 | 1.5 | 1 | 1 | 100 |
| TZX4V3C | 4.2 | 4.4 | 5 | 5 | 1.5 | 1 | 1 | 100 |
| TZX4V3D | 4.3 | 4.5 | 5 | 5 | 1.5 | 1 | 1 | 100 |
| TZX4V7A | 4.4 | 4.6 | 5 | 5 | 2 | 6 | 2 | 100 |
| TZX4V7B | 4.5 | 4.7 | 5 | 5 | 2 | 5 | 2 | 100 |
| TZX4V7C | 4.6 | 4.8 | 5 | 5 | 2 | 4 | 2 | 100 |
| TZX4V7D | 4.7 | 4.9 | 5 | 5 | 2 | 3 | 2 | 100 |
| TZX5V1A | 4.8 | 5 | 5 | 5 | 2 | 2 | 2 | 100 |
| TZX5V1B | 4.9 | 5.1 | 5 | 5 | 2 | 2 | 2 | 100 |
| TZX5V1C | 5 | 5.2 | 5 | 5 | 2 | 2 | 2 | 100 |
| TZX5V1D | 5.1 | 5.3 | 5 | 5 | 2 | 2 | 2 | 100 |
| TZX5V6A | 5.2 | 5.5 | 5 | 5 | 2 | 1 | 2 | 40 |
| TZX5V6B | 5.3 | 5.6 | 5 | 5 | 2 | 1 | 2 | 40 |
| TZX5V6C | 5.4 | 5.7 | 5 | 5 | 2 | 1 | 2 | 40 |
| TZX5V6D | 5.5 | 5.8 | 5 | 5 | 2 | 1 | 2 | 40 |
| TZX5V6E | 5.6 | 5.9 | 5 | 5 | 2 | 1 | 2 | 40 |
| TZX6V2A | 5.7 | 6 | 5 | 1 | 3 | 3 | 4 | 15 |
| TZX6V2B | 5.8 | 6.1 | 5 | 1 | 3 | 3 | 4 | 15 |
| TZX6V2C | 6 | 6.3 | 5 | 1 | 3 | 3 | 4 | 15 |
| TZX6V2D | 6.1 | 6.4 | 5 | 1 | 3 | 3 | 4 | 15 |
| TZX6V2E | 6.3 | 6.6 | 5 | 1 | 3 | 3 | 4 | 15 |
| TZX6V8A | 6.4 | 6.7 | 5 | 1 | 3.5 | 2 | 4 | 15 |
| TZX6V8B | 6.6 | 6.9 | 5 | 1 | 3.5 | 2 | 4 | 15 |
| TZX6V8C | 6.7 | 7 | 5 | 1 | 3.5 | 2 | 4 | 15 |
| TZX6V8D | 6.9 | 7.2 | 5 | 1 | 3.5 | 2 | 4 | 15 |



| ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | | | |
|--|---------------------|-------|--------------|-------------------------|------|-------------------------------|------|--------------------|
| PART NUMBER | ZENER VOLTAGE RANGE | | TEST CURRENT | REVERSE LEAKAGE CURRENT | | | | DYNAMIC RESISTANCE |
| | V_Z at I_{ZT1} | | I_{ZT1} | I_R at V_R | | I_R at V_R ⁽¹⁾ | | Z_Z at I_{ZT1} |
| | V | | mA | μA | V | μA | V | Ω |
| | MIN. | MAX. | | MAX. | | MAX. | | MAX. |
| TZX7V5A | 7 | 7.3 | 5 | 1 | 5 | 30 | 6.65 | 15 |
| TZX7V5B | 7.2 | 7.6 | 5 | 1 | 5 | 30 | 6.84 | 15 |
| TZX7V5C | 7.3 | 7.7 | 5 | 1 | 5 | 30 | 6.94 | 15 |
| TZX7V5D | 7.5 | 7.9 | 5 | 1 | 5 | 30 | 7.13 | 15 |
| TZX7V5X | 7.07 | 7.45 | 5 | 1 | 5 | 30 | 6.72 | 15 |
| TZX8V2A | 7.7 | 8.1 | 5 | 1 | 6.2 | 0.1 | 7.32 | 20 |
| TZX8V2B | 7.9 | 8.3 | 5 | 1 | 6.2 | 0.1 | 7.5 | 20 |
| TZX8V2C | 8.1 | 8.5 | 5 | 1 | 6.2 | 0.1 | 7.7 | 20 |
| TZX8V2D | 8.3 | 8.7 | 5 | 1 | 6.2 | 0.1 | 7.98 | 20 |
| TZX9V1A | 8.5 | 8.9 | 5 | 1 | 6.8 | 0.04 | 8.08 | 20 |
| TZX9V1B | 8.7 | 9.1 | 5 | 1 | 6.8 | 0.04 | 8.27 | 20 |
| TZX9V1C | 8.9 | 9.3 | 5 | 1 | 6.8 | 0.04 | 8.46 | 20 |
| TZX9V1D | 9.1 | 9.5 | 5 | 1 | 6.8 | 0.04 | 8.65 | 20 |
| TZX9V1E | 9.3 | 9.7 | 5 | 1 | 6.8 | 0.04 | 8.84 | 20 |
| TZX10A | 9.5 | 9.9 | 5 | 1 | 7.5 | 0.04 | 9.03 | 25 |
| TZX10B | 9.7 | 10.1 | 5 | 1 | 7.5 | 0.04 | 9.22 | 25 |
| TZX10C | 9.9 | 10.3 | 5 | 1 | 7.5 | 0.04 | 9.41 | 25 |
| TZX10D | 10.2 | 10.6 | 5 | 1 | 7.5 | 0.04 | 9.69 | 25 |
| TZX11A | 10.4 | 10.8 | 5 | 1 | 8.2 | 0.04 | 9.88 | 25 |
| TZX11B | 10.7 | 11.1 | 5 | 1 | 8.2 | 0.04 | 10.2 | 25 |
| TZX11C | 10.9 | 11.3 | 5 | 1 | 8.2 | 0.04 | 10.4 | 25 |
| TZX11D | 11.1 | 11.6 | 5 | 1 | 8.2 | 0.04 | 10.5 | 25 |
| TZX12A | 11.4 | 11.9 | 5 | 1 | 9.5 | 0.04 | 10.8 | 35 |
| TZX12B | 11.6 | 12.1 | 5 | 1 | 9.5 | 0.04 | 11 | 35 |
| TZX12C | 11.9 | 12.4 | 5 | 1 | 9.5 | 0.04 | 11.3 | 35 |
| TZX12D | 12.2 | 12.7 | 5 | 1 | 9.5 | 0.04 | 11.6 | 35 |
| TZX12X | 11.44 | 12.03 | 5 | 1 | 9.5 | 0.04 | 10.9 | 35 |
| TZX13A | 12.4 | 12.9 | 5 | 1 | 10 | 0.04 | 11.8 | 35 |
| TZX13B | 12.6 | 13.1 | 5 | 1 | 10 | 0.04 | 12 | 35 |
| TZX13C | 12.9 | 13.4 | 5 | 1 | 10 | 0.04 | 12.3 | 35 |
| TZX14A | 13.2 | 13.7 | 5 | 1 | 11 | 0.04 | 12.5 | 35 |
| TZX14B | 13.5 | 14 | 5 | 1 | 11 | 0.04 | 12.8 | 35 |
| TZX14C | 13.8 | 14.3 | 5 | 1 | 11 | 0.04 | 13.1 | 35 |
| TZX15A | 14.1 | 14.7 | 5 | 1 | 11.5 | 0.04 | 13.4 | 40 |
| TZX15B | 14.5 | 15.1 | 5 | 1 | 11.5 | 0.04 | 13.8 | 40 |
| TZX15C | 14.9 | 15.5 | 5 | 1 | 11.5 | 0.04 | 14.2 | 40 |
| TZX15X | 14.35 | 15.09 | 5 | 1 | 11.5 | 0.04 | 13.6 | 40 |
| TZX16A | 15.3 | 15.9 | 5 | 1 | 12 | 0.04 | 14.5 | 45 |
| TZX16B | 15.7 | 16.5 | 5 | 1 | 12 | 0.04 | 14.9 | 45 |
| TZX16C | 16.3 | 17.1 | 5 | 1 | 12 | 0.04 | 15.5 | 45 |
| TZX18A | 16.9 | 17.7 | 5 | 1 | 13 | 0.04 | 16.1 | 55 |
| TZX18B | 17.5 | 18.3 | 5 | 1 | 13 | 0.04 | 16.6 | 55 |
| TZX18C | 18.1 | 19 | 5 | 1 | 13 | 0.04 | 17.2 | 55 |
| TZX20A | 18.8 | 19.7 | 2 | 1 | 15 | 0.04 | 17.9 | 60 |
| TZX20B | 19.5 | 20.4 | 2 | 1 | 15 | 0.04 | 18.5 | 60 |
| TZX20C | 20.2 | 21.2 | 2 | 1 | 15 | 0.04 | 19.2 | 60 |
| TZX22A | 20.9 | 21.9 | 2 | 1 | 17 | 0.04 | 19.9 | 65 |

| ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | | | |
|--|---------------------|-------|--------------|-------------------------|----|-------------------------------|------|--------------------|
| PART NUMBER | ZENER VOLTAGE RANGE | | TEST CURRENT | REVERSE LEAKAGE CURRENT | | | | DYNAMIC RESISTANCE |
| | V_Z at I_{ZT1} | | I_{ZT1} | I_R at V_R | | I_R at V_R ⁽¹⁾ | | Z_Z at I_{ZT1} |
| | V | | mA | μA | V | μA | V | Ω |
| | MIN. | MAX. | | MAX. | | MAX. | | MAX. |
| TZX22B | 21.6 | 22.6 | 2 | 1 | 17 | 0.04 | 20.5 | 65 |
| TZX22C | 22.3 | 23.3 | 2 | 1 | 17 | 0.04 | 21.2 | 65 |
| TZX24A | 22.9 | 24 | 2 | 1 | 19 | 0.04 | 21.8 | 70 |
| TZX24B | 23.6 | 24.7 | 2 | 1 | 19 | 0.04 | 22.4 | 70 |
| TZX24C | 24.3 | 25.5 | 2 | 1 | 19 | 0.04 | 23.1 | 70 |
| TZX24X | 22.61 | 23.77 | 2 | 1 | 19 | 0.04 | 21.5 | 70 |
| TZX27A | 25.2 | 26.6 | 2 | 1 | 21 | 0.04 | 23.9 | 80 |
| TZX27B | 26.2 | 27.6 | 2 | 1 | 21 | 0.04 | 24.9 | 80 |
| TZX27C | 27.2 | 28.6 | 2 | 1 | 21 | 0.04 | 25.8 | 80 |
| TZX27X | 26.99 | 28.39 | 2 | 1 | 21 | 0.04 | 25.6 | 80 |
| TZX30A | 28.2 | 29.6 | 2 | 1 | 23 | 0.04 | 26.8 | 100 |
| TZX30B | 29.2 | 30.6 | 2 | 1 | 23 | 0.04 | 27.7 | 100 |
| TZX30C | 30.2 | 31.6 | 2 | 1 | 23 | 0.04 | 28.7 | 100 |
| TZX30X | 29.02 | 30.51 | 2 | 1 | 23 | 0.04 | 27.6 | 100 |
| TZX33A | 31.2 | 32.6 | 2 | 1 | 25 | 0.04 | 29.6 | 120 |
| TZX33B | 32.2 | 33.6 | 2 | 1 | 25 | 0.04 | 30.6 | 120 |
| TZX33C | 33.2 | 34.5 | 2 | 1 | 25 | 0.04 | 31.5 | 120 |
| TZX36A | 34.2 | 35.7 | 2 | 1 | 27 | 0.04 | 32.5 | 140 |
| TZX36B | 35.3 | 36.8 | 2 | 1 | 27 | 0.04 | 33.5 | 140 |
| TZX36C | 36.4 | 38 | 2 | 1 | 27 | 0.04 | 34.6 | 140 |
| TZX36X | 35.36 | 37.19 | 2 | 1 | 27 | 0.04 | 33.6 | 140 |

Notes

- Additional measurement of voltage group TZX27A to TZX36, I_R at 95 % V_{Zmin} , $\leq 40\text{ nA}$ at $T_j = 25\text{ }^{\circ}\text{C}$
- ⁽¹⁾ Additional measurement

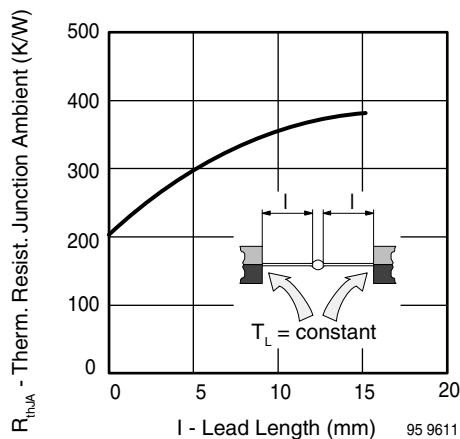
BASIC CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)


Fig. 1 - Thermal Resistance vs. Lead Length

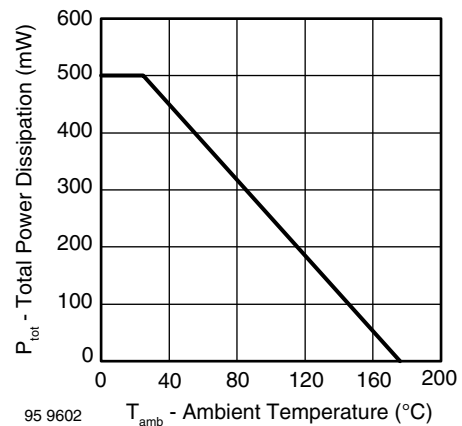


Fig. 2 - Total Power Dissipation vs. Ambient Temperature

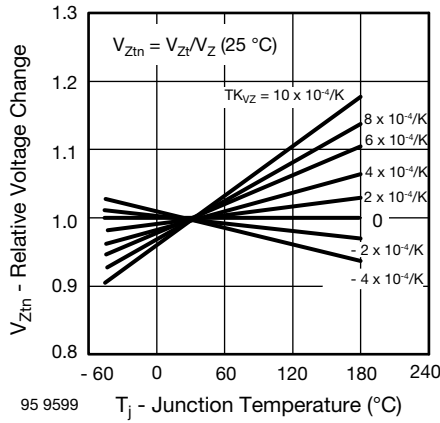


Fig. 3 - Typical Change of Working Voltage vs. Junction Temperature

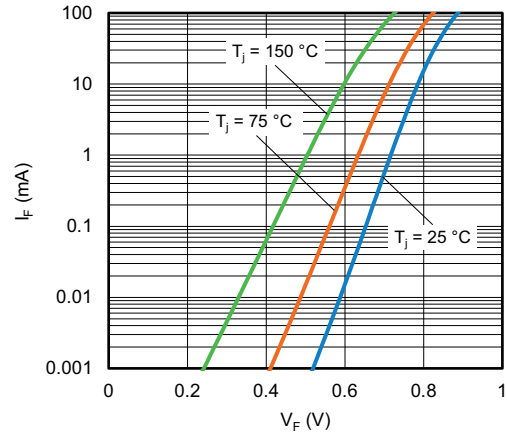


Fig. 6 - Typical Forward Current I_F vs. Forward Voltage V_F

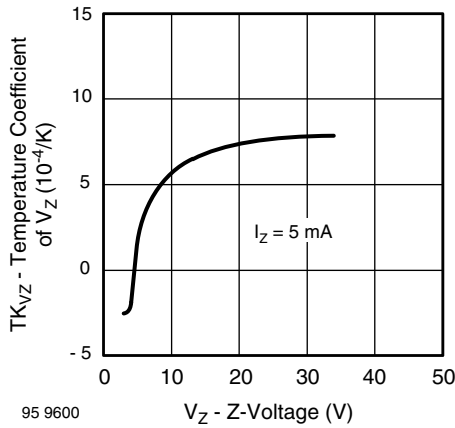


Fig. 4 - Typical Temperature Coefficient of V_Z vs. Z-Voltage

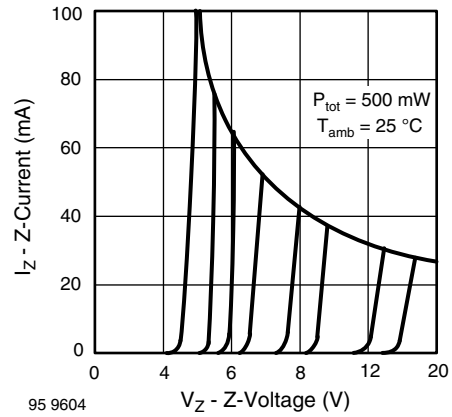


Fig. 7 - Typical Z-Current vs. Z-Voltage

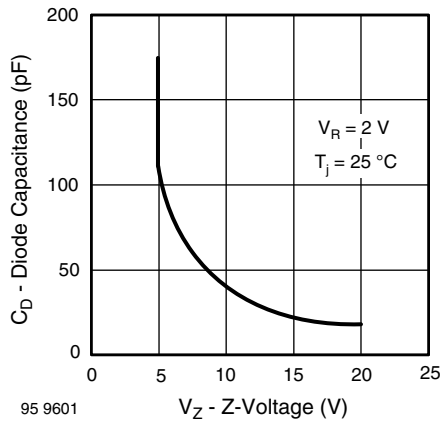


Fig. 5 - Diode Capacitance vs. Z-Voltage

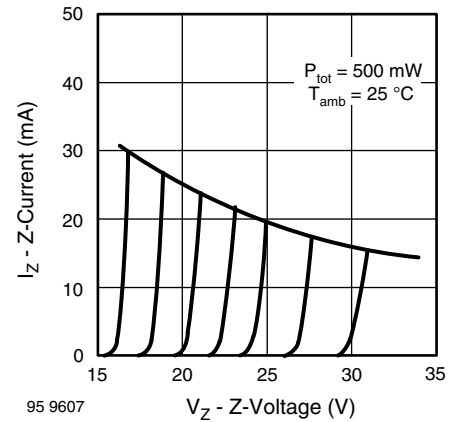


Fig. 8 - Typical Z-Current vs. Z-Voltage

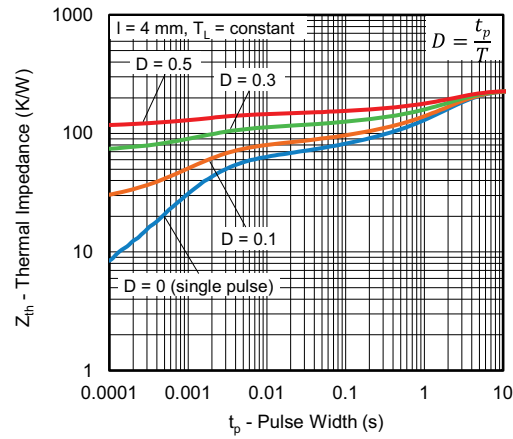
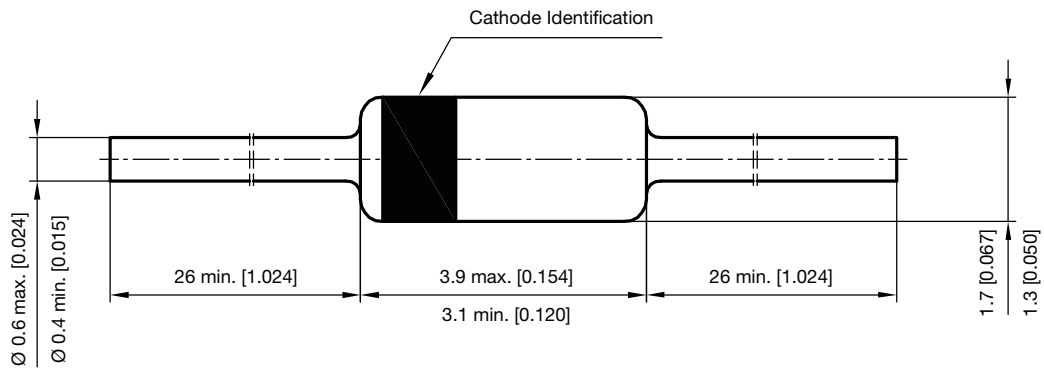


Fig. 9 - Typical Thermal Response

PACKAGE DIMENSIONS in millimeters (inches): **DO-35 (DO-204AH)**



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 94 9366



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