# DDZ9681 - DDZ9717

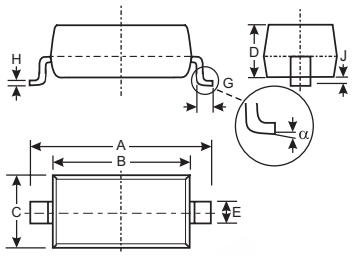
## SURFACE MOUNT PRECISION ZENER DIODE

## Features

- 500mW Power Dissipation on Ceramic PCB
- Very Tight Tolerance on $V_Z$
- Ideally Suited for Automated Assembly Processes
- **Lead Free By Design/RoHS Compliant (Note 2)**

## Mechanical Data

- Case: SOD-123
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminal Connections: Cathode Band
- Terminals: Finish - Matte Tin annealed over Alloy 42 leadframe. Solderable per MIL-STD-202, Method 208
- Marking & Type Code Information: See Electrical Specifications Table
- Ordering Information: See Page 7
- Weight: 0.01 grams (approximate)




| SOD-123 | | |
|---|---|---|
| **Dim** | **Min** | **Max** |
| **A** | 3.55 | 3.85 |
| **B** | 2.55 | 2.85 |
| **C** | 1.40 | 1.70 |
| **D** | — | 1.35 |
| **E** | 0.45 | 0.65 |
| | 0.55 Typical | |
| **G** | 0.25 | — |
| **H** | 0.11 Typical | |
| **J** | — | 0.10 |
| α | 0° | 8° |
| **All Dimensions in mm** | | |

## Maximum Ratings @ $T_A$ = 25°C unless otherwise specified

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Forward Voltage @ $I_F$ = 10mA | $V_F$ | 0.9 | V |
| Operating and Storage Temperature Range | $T_j$, $T_{STG}$ | -65 to +150 | °C |

## Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Power Dissipation (Note 1) | $P_d$ | 500 | mW |
| Thermal Resistance, Junction to Ambient Air (Note 1) | $R_{\theta JA}$ | 305 | °C/W |

Note: 1. Device mounted on ceramic PCB = 7.6mm x 9.4mm x 0.87mm with pad areas 25mm$^2$ at $T_A$ = 25°C or mounted on FR-5 = 3.5x1.5 inches with recommended pad layout, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf, at $T_L$ = 75°C.

2. No purposefully added lead.

## Electrical Characteristics @ $T_A$ = 25°C unless otherwise specified — Table 1

| Type Number | Type Code | Zener Voltage Range (Note 3) | | | | Maximum Reverse Leakage Current (Note 4) | |
|---|---|---|---|---|---|---|---|
| | | $V_Z$ @ $I_{ZT}$ | | | $I_{ZT}$ | $I_R$ @ $V_R$ | |
| | | Nom (V) | Min (V) | Max (V) | μA | μA | V |
| DDZ9681 | H9 | 2.4 | 2.28 | 2.52 | 50 | 2 | 1 |
| DDZ9682 | HA | 2.7 | 2.565 | 2.835 | 50 | 1 | 1 |
| DDZ9683 | HB | 3.0 | 2.85 | 3.15 | 50 | 0.8 | 1 |
| DDZ9684 | HC | 3.3 | 3.13 | 3.47 | 50 | 7.5 | 1.5 |
| DDZ9685 | HD | 3.6 | 3.42 | 3.78 | 50 | 7.5 | 2 |
| DDZ9686 | HE | 3.9 | 3.70 | 4.10 | 50 | 5 | 2 |
| DDZ9687 | HF | 4.3 | 4.09 | 4.52 | 50 | 4 | 2 |
| DDZ9688 | HG | 4.7 | 4.47 | 4.94 | 50 | 5 | 3 |
| DDZ9689 | HH | 5.1 | 4.85 | 5.36 | 50 | 5 | 3 |
| DDZ9690 | HJ | 5.6 | 5.32 | 5.88 | 50 | 2 | 4 |
| DDZ9691 | HK | 6.2 | 5.89 | 6.51 | 50 | 1 | 5 |
| DDZ9692 | HL | 6.8 | 6.46 | 7.14 | 50 | 0.1 | 5.1 |
| DDZ9693 | HM | 7.5 | 7.13 | 7.88 | 50 | 0.1 | 5.7 |
| DDZ9694 | HN | 8.2 | 7.79 | 8.61 | 50 | 0.1 | 6.2 |
| DDZ9696 | HP | 9.1 | 8.65 | 9.56 | 50 | 0.1 | 6.9 |
| DDZ9697 | HQ | 10 | 9.50 | 10.50 | 50 | 0.1 | 7.6 |
| DDZ9698 | HR | 11 | 10.45 | 11.55 | 50 | 0.05 | 8.4 |
| DDZ9699 | HS | 12 | 11.40 | 12.60 | 50 | 0.05 | 9.1 |
| DDZ9700 | HT | 13 | 12.35 | 13.65 | 50 | 0.05 | 9.8 |
| DDZ9701 | HU | 14 | 13.30 | 14.70 | 50 | 0.05 | 10.6 |
| DDZ9702 | HV | 15 | 14.25 | 15.75 | 50 | 0.05 | 11.4 |
| DDZ9703 | HW | 16 | 15.20 | 16.80 | 50 | 0.05 | 12.1 |
| DDZ9704 | H8 | 17 | 16.15 | 17.85 | 50 | 0.05 | 12.9 |
| DDZ9705 | HY | 18 | 17.10 | 18.90 | 50 | 0.05 | 13.6 |
| DDZ9707 | MD | 20 | 19.00 | 21.00 | 50 | 0.05 | 15.2 |
| DDZ9708 | ME | 22 | 20.90 | 23.10 | 50 | 0.05 | 16.7 |
| DDZ9709 | MF | 24 | 22.80 | 25.20 | 50 | 0.05 | 18.2 |
| DDZ9711 | MH | 27 | 25.65 | 28.35 | 50 | 0.05 | 20.4 |
| DDZ9712 | MJ | 28 | 26.60 | 29.40 | 50 | 0.05 | 21.2 |
| DDZ9713 | MK | 30 | 28.50 | 31.50 | 50 | 0.05 | 22.8 |
| DDZ9714 | ML | 33 | 31.35 | 34.65 | 50 | 0.05 | 25.0 |
| DDZ9715 | MM | 36 | 34.20 | 37.80 | 50 | 0.05 | 27.3 |
| DDZ9716 | MN | 39 | 37.05 | 40.95 | 50 | 0.05 | 29.6 |
| DDZ9717 | MO | 43 | 40.85 | 45.15 | 50 | 0.05 | 32.6 |

Notes: 3. Nominal Zener voltage is measured with the device junction in thermal equilibrium at $T_T$ = 30°C ±1°C.
4. Short duration pulse test used to minimize self-heating effect.

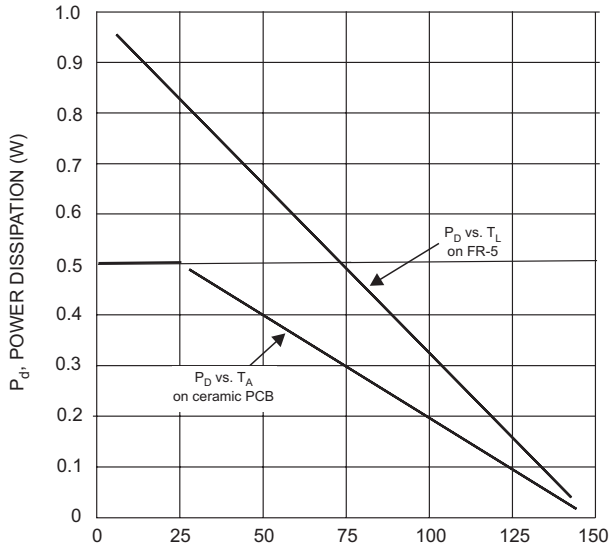



Fig. 1 Power Dissipation vs Ambient Temperature

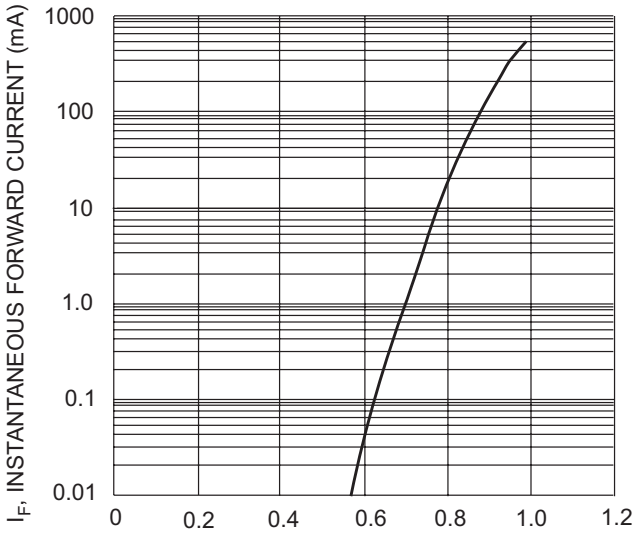



Fig. 2 Typical Forward Characteristics

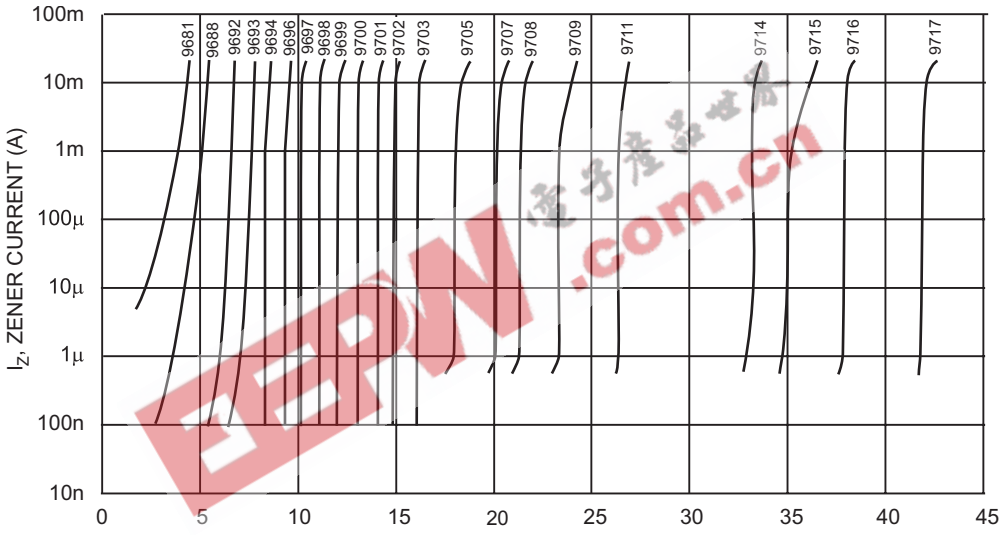



Fig. 3 Typical Reverse Characteristics

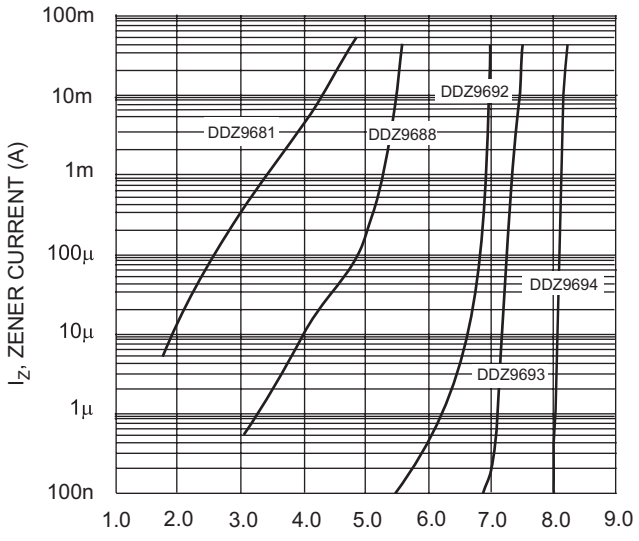



Fig. 4 Typical Reverse Characteristics, DDZ9681 - DDZ9694

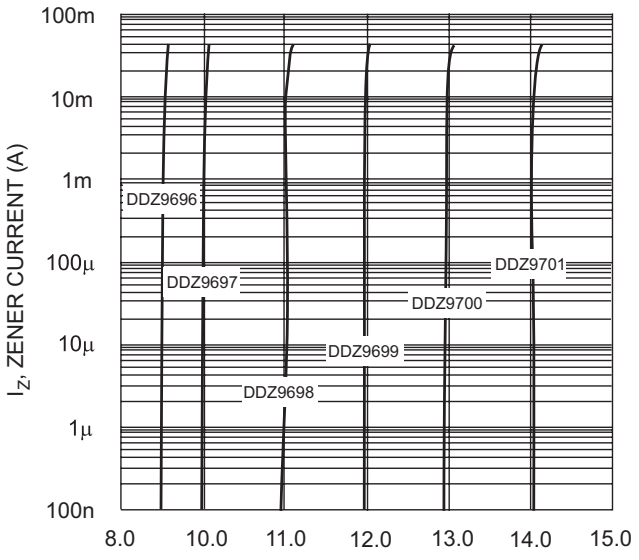



Fig. 5 Typical Reverse Characteristics, DDZ9696 - DDZ9701

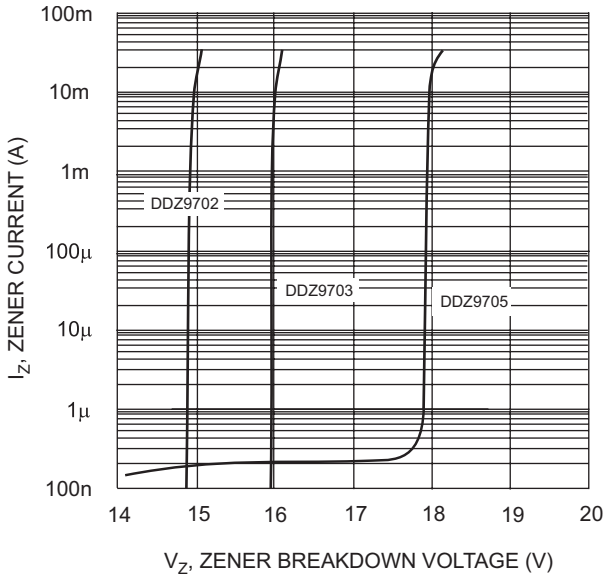



Fig. 6 Typical Reverse Characteristics, DDZ9702 - DDZ9705

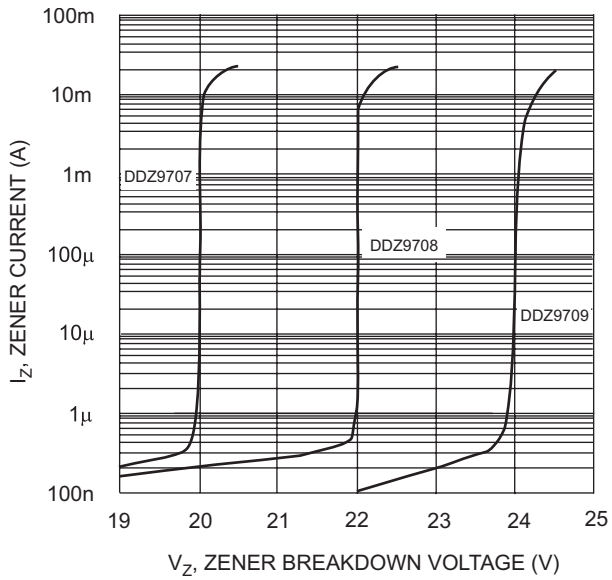



Fig. 7 Typical Reverse Characteristics, DDZ9707 - DDZ9709

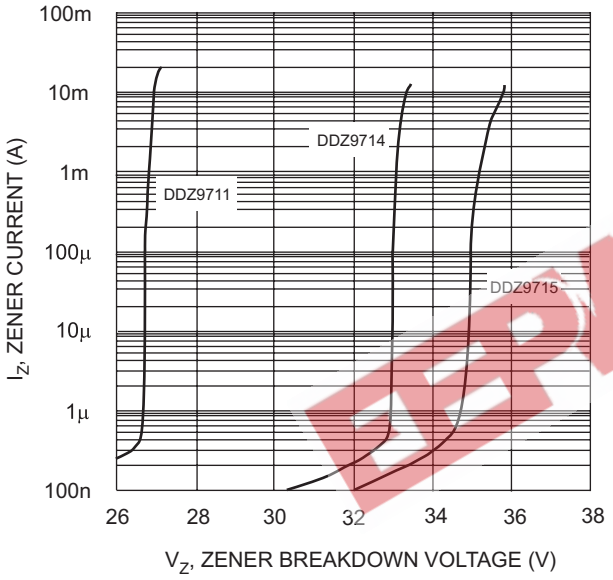



Fig. 8 Typical Reverse Characteristics, DDZ9711 - DDZ9715

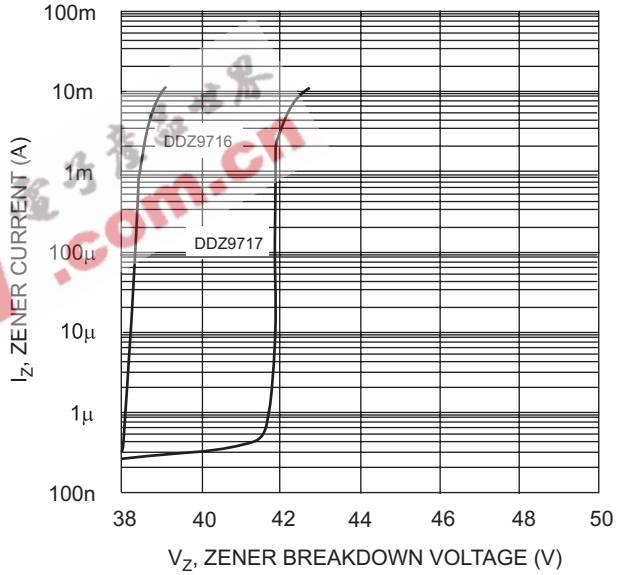



Fig. 9 Typical Reverse Characteristics, DDZ9716 - DDZ9717

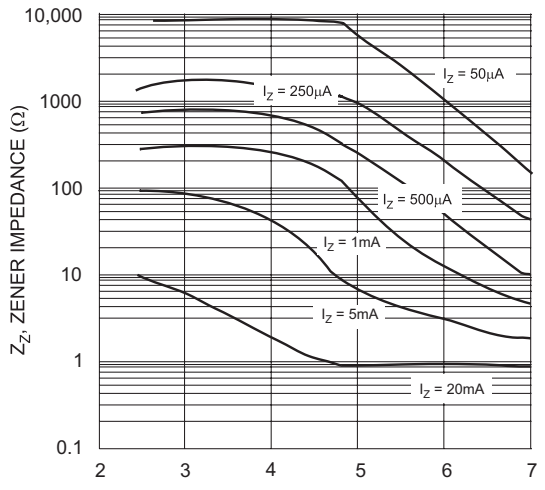



Fig. 10 Typical Zener Impedance Characteristics, DDZ9681 - DDZ9692

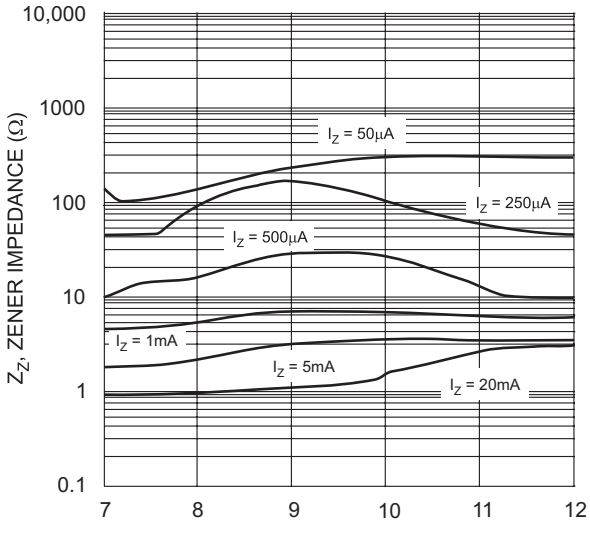



Fig. 11 Typical Zener Impedance Characteristics, DDZ9693 - DDZ9699

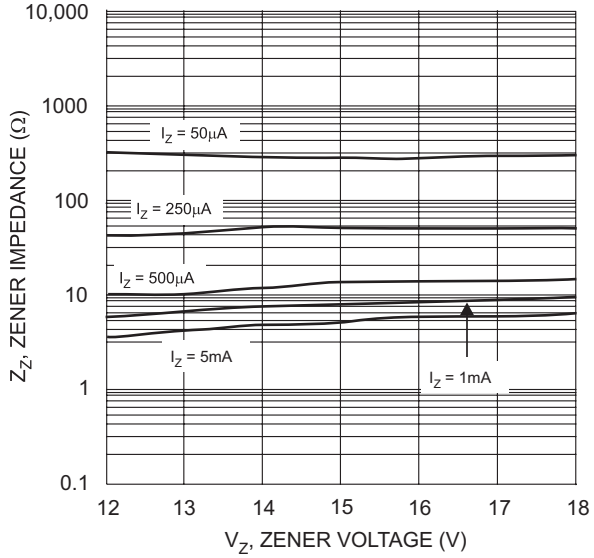



Fig. 12 Typical Zener Impedance Characteristics, DDZ9699 - DDZ9705

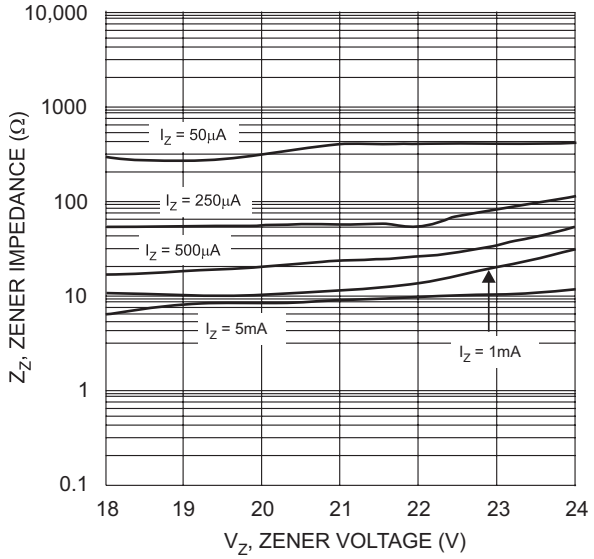



Fig. 13 Typical Zener Impedance Characteristics, DDZ9705 - DDZ9709

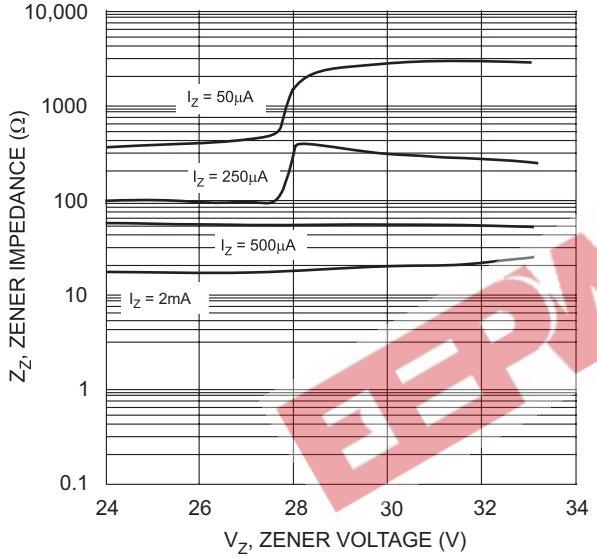



Fig. 14 Typical Zener Impedance Characteristics, DDZ9709 - DDZ9714

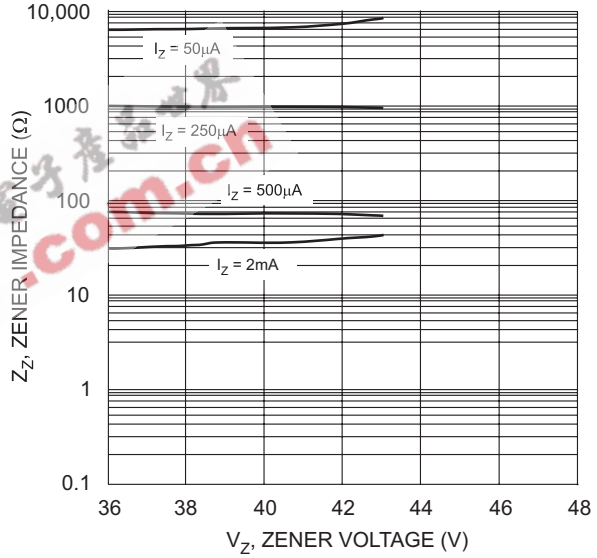



Fig. 15 Typical Zener Impedance Characteristics, DDZ9715 - DDZ9717

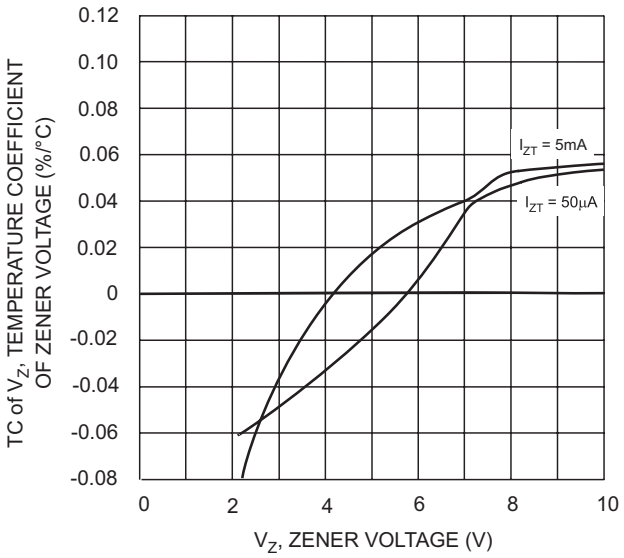



Fig. 16 Typical Temperature Coefficient of Zener Voltage vs. Zener Voltage, DDZ9681 - DDZ9697

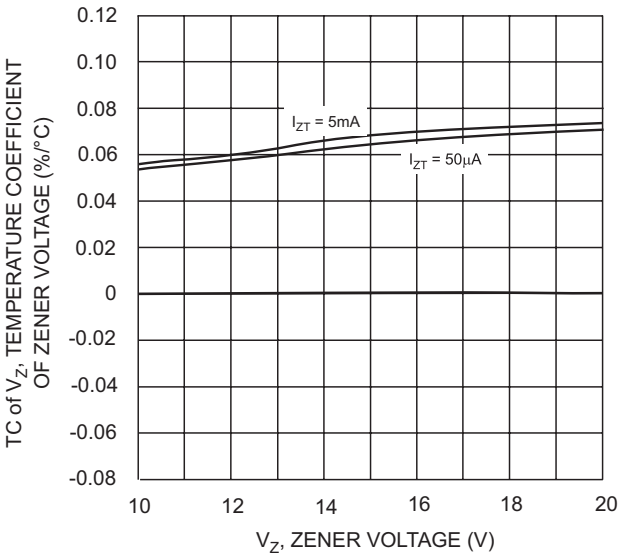



Fig. 17 Typical Temperature Coefficient of Zener Voltage vs. Zener Voltage, DDZ9697 - DDZ9707

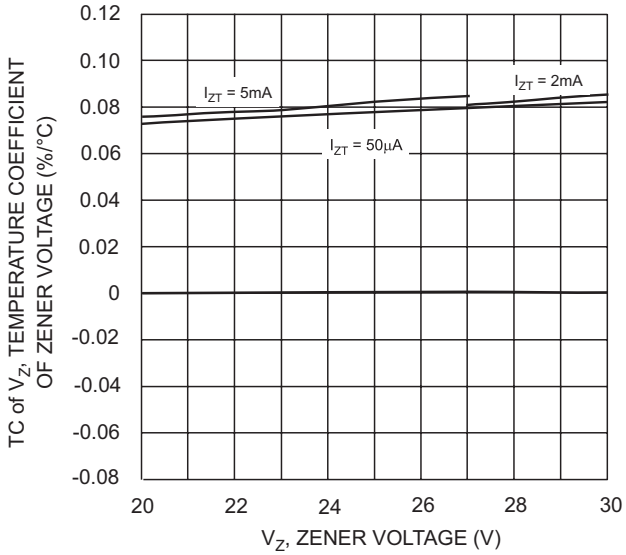



Fig. 18 Typical Temperature Coefficient of Zener Voltage, DDZ9707 - DDZ9713

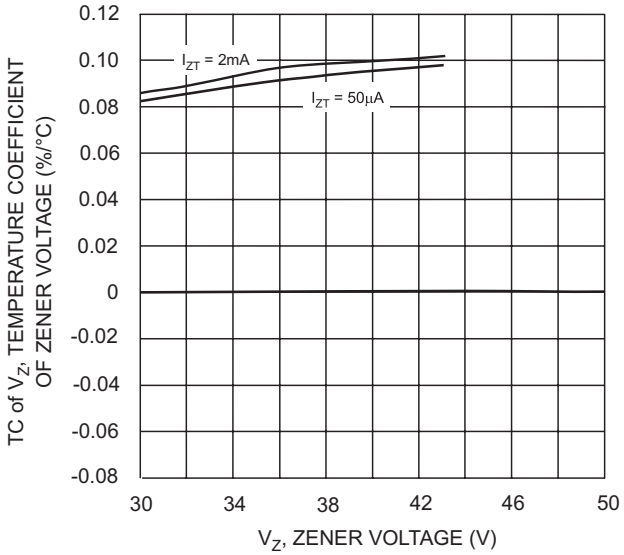



Fig. 19 Typical Temperature Coefficient of Zener Voltage, DDZ9713 - DDZ9717

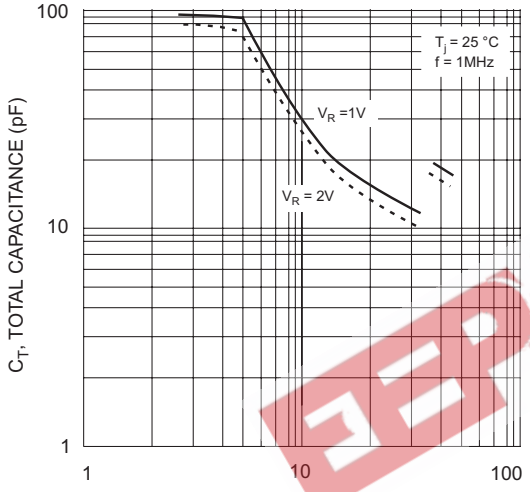



Fig. 20 Total Capacitance vs Nominal Zener Voltage

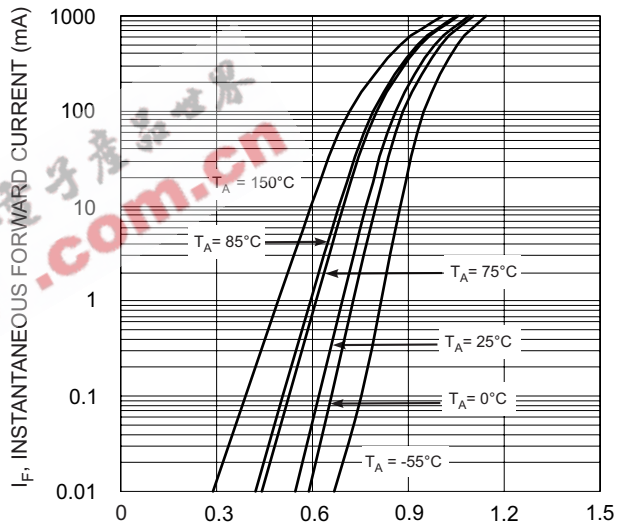



Fig. 21 Typical Forward Characteristics, DDZ9681

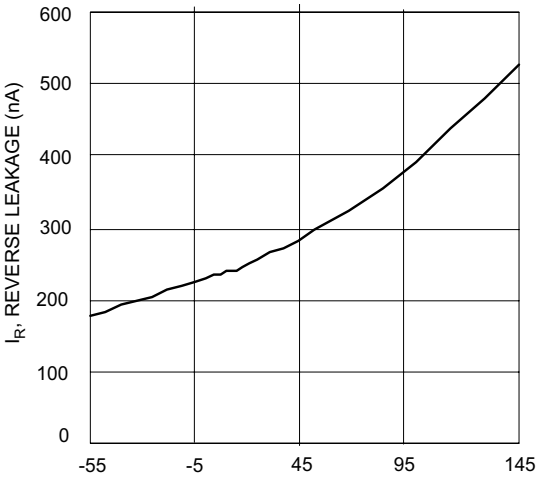


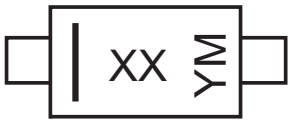

Fig. 22 Typical Leakage vs. Ambient Temperature, DDZ9681

## Ordering Information (Note 5)

| Device | Packaging | Shipping |
|---|---|---|
| (Type Number)-7* | SOD-123 | 3000/Tape & Reel |

* Example: The part number for the 6.2 Volt device would be DDZ9691-7.
Note : 5. For Packaging Details, go to our website at http://www.diodes.com/datasheets/ap02007.pdf.

## Marking Information




XX = Product Type Marking Code (See Table 1)
YM = Date Code Marking
Y = Year (ex: T = 2006)
M = Month (ex: 9 = September)

Date Code Key

| Year | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|
| Code | T | U | V | W | X | Y | Z |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | O | N | D |