

**FEATURES**

- ZENER VOLTAGE 9.0V ± 5% (See Note 1)
- 1N935B, 937B, 938B, 939B, 940B HAVE JAN, JANTX, JANTXV, AND -1 QUALIFICATIONS TO MIL-S-19500/156
- S1N939A
- RADIATION HARDENED DEVICES AVAILABLE (SEE NOTE 5)
- JANS EQUIVALENT AVAILABLE VIA SCD

**MAXIMUM RATINGS**

Operating Temperature: -65°C to +175°C.  
Storage Temperature: -65°C to +175°C  
DC Power Dissipation: 500 mW @ 25°C.  
Power Derating: 3.33 mW/°C above 25°C.

**\*ELECTRICAL CHARACTERISTICS**

@ 25°C, unless otherwise specified

| JEDEC TYPE NUMBERS        | ZENER VOLTAGE $V_z$ @ $I_z$ (NOTE 1 & 4) | ZENER TEST CURRENT $I_z$ | MAXIMUM ZENER IMPEDANCE (NOTE 2) $Z_{zt}$ | VOLTAGE TEMPERATURE STABILITY (NOTE 3 & 4) $\Delta V_z$ MAXIMUM | TEMPERATURE RANGE                      | EFFECTIVE TEMPERATURE COEFFICIENT $\alpha_{Vz}$ |
|---------------------------|--|--------------------------|---|---|--|---|
|                           | VOLTS                                    | mA                       | OHMS                                      | mV  | °C                                     | %/°C  |
| 1N935<br>1N935A<br>1N935B | 8.55-9.45<br>8.55-9.45<br>8.55-9.45      | 7.5<br>7.5<br>7.5        | 20<br>20<br>20                            | 67<br>139<br>184  | 0 to +75<br>-55 to +100<br>-55 to +150 | 0.01<br>0.01<br>0.01                            |
| 1N936<br>1N936A<br>1N936B | 8.55-9.45<br>8.55-9.45<br>8.55-9.45      | 7.5<br>7.5<br>7.5        | 20<br>20<br>20                            | 33<br>69<br>92  | 0 to +75<br>-55 to +100<br>-55 to +150 | 0.005<br>0.005<br>0.005                         |
| 1N937<br>1N937A<br>1N937B | 8.55-9.45<br>8.55-9.45<br>8.55-9.45      | 7.5<br>7.5<br>7.5        | 20<br>20<br>20                            | 13<br>27<br>37  | 0 to +75<br>-55 to +100<br>-55 to +150 | 0.002<br>0.002<br>0.002                         |
| 1N938<br>1N938A<br>1N938B | 8.55-9.45<br>8.55-9.45<br>8.55-9.45      | 7.5<br>7.5<br>7.5        | 20<br>20<br>20                            | 6<br>13<br>18   | 0 to +75<br>-55 to +100<br>-55 to +150 | 0.001<br>0.001<br>0.001                         |
| 1N939<br>1N939A<br>1N939B | 8.55-9.45<br>8.55-9.45<br>8.55-9.45      | 7.5<br>7.5<br>7.5        | 20<br>20<br>20                            | 3<br>7<br>9   | 0 to +75<br>-55 to +100<br>-55 to +150 | 0.0005<br>0.0005<br>0.0005                      |
| 1N940<br>1N940A<br>1N940B | 8.55-9.45<br>8.55-9.45<br>8.55-9.45      | 7.5<br>7.5<br>7.5        | 20<br>20<br>20                            | 1.3<br>2.7<br>3.7   | 0 to +75<br>-55 to +100<br>-55 to +150 | 0.0002<br>0.0002<br>0.0002                      |

\*JEDEC Registered Data

**NOTE 1** When ordering devices with tighter tolerances than specified, use a nominal center voltage of 9.2V.

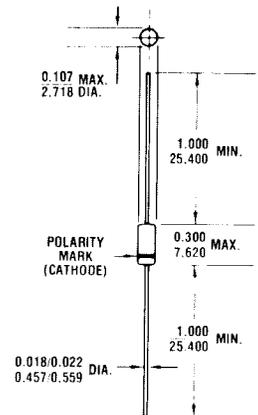
**NOTE 2** Measured by superimposing 0.75 mA ac rms on 7.5 mA DC @ 25°C.

**NOTE 3** The maximum allowable change observed over the entire temperature range i.e., the diode voltage will not exceed the specified mV change at any discrete temperature between the established limits.

**NOTE 4** Voltage measurements to be performed 15 seconds after application of DC current.

**NOTE 5** Designate Radiation Hardened devices with "RH" prefix instead of "1N", i.e. RH938A instead of 1N938A.

**9.0 VOLT  
TEMPERATURE  
COMPENSATED  
ZENER REFERENCE  
DIODES**



**FIGURE 1**

All dimensions in INCH  
m.m.

**MECHANICAL CHARACTERISTICS**

**CASE:** Hermetically sealed glass case. DO-7.

**FINISH:** All external surfaces are corrosion resistant and leads solderable.

**THERMAL RESISTANCE:** 300°C/W (Typical) junction to lead at 0.375-inches from body.

**POLARITY:** Diode to be operated with the banded end positive with respect to the opposite end.

**WEIGHT:** 0.2 grams.

**MOUNTING POSITION:** Any.

# 1N935 thru 1N940B

## NOTE 5

The curve shown in Fig. 3 is typical of the diode series and greatly simplifies the estimation of the Temperature Coefficient (TC) when the diode is operated at currents other than 7.5 mA.

EXAMPLE: A diode in this series is operated at a current of 7.5 mA and has specified Temperature Coefficient (TC) limits of  $\pm 0.005\%/^{\circ}\text{C}$ . To obtain the typical Temperature Coefficient limits for this same diode operated at a current of 6.0 mA, the new TC limits ( $\%/^{\circ}\text{C}$ ) can be estimated using the graph in FIGURE 3.

At a test current of 6.0 mA the change in Temperature Coefficient (TC) is approximately  $-0.0009\%/^{\circ}\text{C}$ . The algebraic sum of  $\pm 0.005\%/^{\circ}\text{C}$  and  $-0.0009\%/^{\circ}\text{C}$  gives the new limits of  $+0.0041\%/^{\circ}\text{C}$  and  $-0.0059\%/^{\circ}\text{C}$ .

## NOTE 6

The curve in Figure 4 illustrates the change of diode voltage arising from the effect of impedance. It is, in effect, an exploded view of the zener operating region of the I-V characteristic.

In conjunction with Fig. 3 this curve can be used to estimate total voltage regulation under conditions of both varying temperature and current.

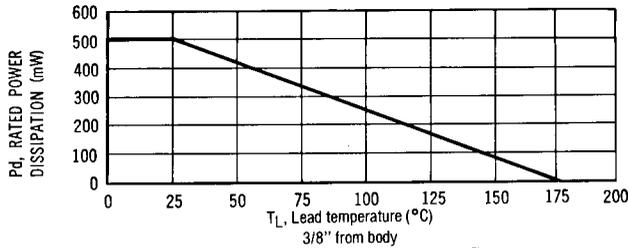


FIGURE 2 Power Derating Curve

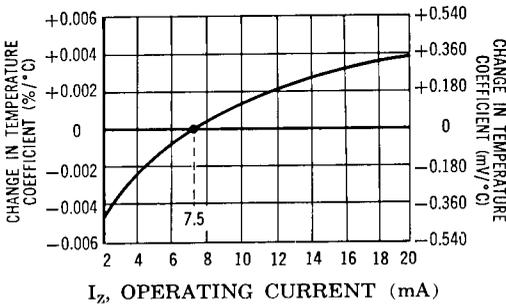


FIGURE 3 Typical change of Temperature Coefficient with Change in Operating Current.

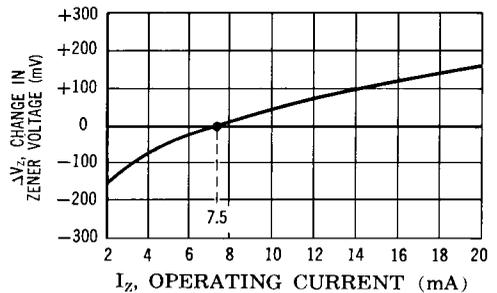


FIGURE 4 Typical change of Zener Voltage with Change in Operating Current.