



Micro Commercial Components  
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**1N5338B  
THRU  
1N5369B**

## Features

- Zener Voltage From 5.1V to 51V
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0 and MSL rating 1.
- Lead Free Finish/RoHS Compliant (Note1) ("P" Suffix designates Compliant. See ordering information)
- Marking : Cathode band and type number

## Maximum Ratings:

- Operating Temperature: -55°C to +150°C
- Storage Temperature: -55°C to +150°C
- 5 Watt DC Power Dissipation
- Maximum Forward Voltage @ 1A: 1.2 Volts
- Power Derating: 40 mW/°C Above 75°C
- Maximum thermal resistance: 25C/W from junction to ambient

## Mechanical Data

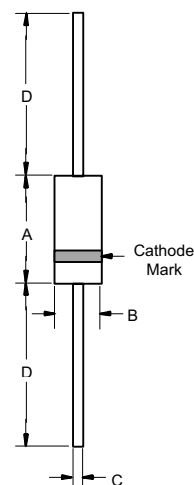
Case: JEDEC DO-15.

Terminals: Solder plated , solderable per MIL-STD-750, Method 2026.

Standard Packaging: 52mm tape

**5 Watt  
Zener Diode  
5.1 to 51 Volts**

DO-15



| DIMENSIONS |        |      |       |      |      |
|------------|--------|------|-------|------|------|
| DIM        | INCHES |      | MM    |      | NOTE |
|            | MIN    | MAX  | MIN   | MAX  |      |
| A          | .230   | .300 | 5.80  | 7.60 |      |
| B          | .104   | .140 | 2.60  | 3.60 |      |
| C          | .026   | .034 | .70   | .90  |      |
| D          | 1.000  | ---  | 25.40 | ---  |      |

Note: 1. High Temperature Solder Exemption Applied, see EU Directive Annex 7.

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ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C unless otherwise noted, V<sub>F</sub>=1.2 Max @ I<sub>F</sub>=1A for all types).

| MCC PART NUMBER | REGULATOR VOLTAGE V <sub>Z</sub><br>(Note2) | TEST CURRENT I <sub>ZT</sub> | MAXIMUM DYNAMIC IMPEDANCE Z <sub>ZK</sub> (@I <sub>ZT</sub> )<br>(Note2) | MAXIMUM REVERSE CURRENT I <sub>R</sub> | TEST VOLTAGE V <sub>R</sub> | MAXIMUM REGULATOR CURRENT I <sub>ZM</sub><br>(Note5) | MAXIMUM DYNAMIC KNEE IMPEDANCE ZZK@ 1.0mA<br>(Note2) | MAXIMUM SURGE CURRENT I <sub>s</sub><br>(Note3) | MAXIMUM VOLTAGE REGULATION<br>(Note4) |
|-----------------|---------------------------------------------|------------------------------|--------------------------------------------------------------------------|----------------------------------------|-----------------------------|------------------------------------------------------|------------------------------------------------------|-------------------------------------------------|---------------------------------------|
|                 | VOLTS                                       | mA                           | OHMS                                                                     | μA                                     | VOLTS                       | mA                                                   | ohms                                                 | A                                               | VOLTS                                 |
| 1N5338B         | 5.1                                         | 240                          | 1.5                                                                      | 1.0                                    | 1.0                         | 930                                                  | 400                                                  | 14.4                                            | 0.39                                  |
| 1N5339B         | 5.6                                         | 220                          | 1.0                                                                      | 1.0                                    | 2.0                         | 865                                                  | 400                                                  | 13.4                                            | 0.25                                  |
| 1N5340B         | 6.0                                         | 200                          | 1.0                                                                      | 1.0                                    | 3.0                         | 790                                                  | 300                                                  | 12.7                                            | 0.19                                  |
| 1N5341B         | 6.2                                         | 200                          | 1.0                                                                      | 1.0                                    | 3.0                         | 765                                                  | 200                                                  | 12.4                                            | 0.10                                  |
| 1N5342B         | 6.8                                         | 175                          | 1.0                                                                      | 10                                     | 5.2                         | 700                                                  | 200                                                  | 11.5                                            | 0.15                                  |
| 1N5343B         | 7.5                                         | 175                          | 1.5                                                                      | 10                                     | 5.7                         | 630                                                  | 200                                                  | 10.7                                            | 0.15                                  |
| 1N5344B         | 8.2                                         | 150                          | 1.5                                                                      | 10                                     | 6.2                         | 580                                                  | 200                                                  | 10                                              | 0.20                                  |
| 1N5345B         | 8.7                                         | 150                          | 2.0                                                                      | 10                                     | 6.6                         | 545                                                  | 200                                                  | 9.5                                             | 0.20                                  |
| 1N5346B         | 9.1                                         | 150                          | 2.0                                                                      | 7.5                                    | 6.9                         | 520                                                  | 150                                                  | 9.2                                             | 0.22                                  |
| 1N5347B         | 10                                          | 125                          | 2.0                                                                      | 5.0                                    | 7.6                         | 475                                                  | 125                                                  | 8.6                                             | 0.22                                  |
| 1N5348B         | 11                                          | 125                          | 2.5                                                                      | 5.0                                    | 8.4                         | 430                                                  | 125                                                  | 8.0                                             | 0.25                                  |
| 1N5349B         | 12                                          | 100                          | 2.5                                                                      | 2.0                                    | 9.1                         | 395                                                  | 125                                                  | 7.5                                             | 0.25                                  |
| 1N5350B         | 13                                          | 100                          | 2.5                                                                      | 1.0                                    | 9.9                         | 365                                                  | 100                                                  | 7.0                                             | 0.25                                  |
| 1N5351B         | 14                                          | 100                          | 2.5                                                                      | 1.0                                    | 10.6                        | 340                                                  | 75                                                   | 6.7                                             | 0.25                                  |
| 1N5352B         | 15                                          | 75                           | 2.5                                                                      | 1.0                                    | 11.5                        | 315                                                  | 75                                                   | 6.3                                             | 0.25                                  |
| 1N5353B         | 16                                          | 75                           | 2.5                                                                      | 1.0                                    | 12.2                        | 295                                                  | 75                                                   | 6.0                                             | 0.30                                  |
| 1N5354B         | 17                                          | 70                           | 2.5                                                                      | 0.5                                    | 12.9                        | 280                                                  | 75                                                   | 5.8                                             | 0.35                                  |
| 1N5355B         | 18                                          | 65                           | 2.5                                                                      | 0.5                                    | 13.7                        | 264                                                  | 75                                                   | 5.5                                             | 0.40                                  |
| 1N5356B         | 19                                          | 65                           | 3.0                                                                      | 0.5                                    | 14.4                        | 250                                                  | 75                                                   | 5.3                                             | .040                                  |
| 1N5357B         | 20                                          | 65                           | 3.0                                                                      | 0.5                                    | 15.2                        | 237                                                  | 75                                                   | 5.1                                             | .040                                  |
| 1N5358B         | 22                                          | 50                           | 3.5                                                                      | 0.5                                    | 16.7                        | 216                                                  | 75                                                   | 4.7                                             | 0.45                                  |
| 1N5359B         | 24                                          | 50                           | 3.5                                                                      | 0.5                                    | 18.2                        | 198                                                  | 100                                                  | 4.4                                             | 0.55                                  |
| 1N5360B         | 25                                          | 50                           | 4.0                                                                      | 0.5                                    | 19                          | 190                                                  | 110                                                  | 4.3                                             | 0.55                                  |
| 1N5361B         | 27                                          | 50                           | 5.0                                                                      | 0.5                                    | 20.6                        | 176                                                  | 120                                                  | 4.1                                             | 0.60                                  |
| 1N5362B         | 28                                          | 50                           | 6.0                                                                      | 0.5                                    | 21.2                        | 170                                                  | 130                                                  | 3.9                                             | 0.60                                  |
| 1N5363B         | 30                                          | 40                           | 8.0                                                                      | 0.5                                    | 22.8                        | 158                                                  | 140                                                  | 3.7                                             | 0.60                                  |
| 1N5364B         | 33                                          | 40                           | 10                                                                       | 0.5                                    | 25.1                        | 144                                                  | 150                                                  | 3.5                                             | 0.60                                  |
| 1N5365B         | 36                                          | 30                           | 11                                                                       | 0.5                                    | 27.4                        | 132                                                  | 160                                                  | 3.3                                             | 0.65                                  |
| 1N5366B         | 39                                          | 30                           | 14                                                                       | 0.5                                    | 29.7                        | 122                                                  | 170                                                  | 3.1                                             | 0.65                                  |
| 1N5367B         | 43                                          | 30                           | 20                                                                       | 0.5                                    | 32.7                        | 110                                                  | 190                                                  | 2.8                                             | 0.70                                  |
| 1N5368B         | 47                                          | 25                           | 25                                                                       | 0.5                                    | 35.8                        | 100                                                  | 210                                                  | 2.7                                             | 0.80                                  |
| 1N5369B         | 51                                          | 25                           | 27                                                                       | 0.5                                    | 38.8                        | 93                                                   | 230                                                  | 2.5                                             | 0.90                                  |

## NOTE:

1. TOLERANCE AND VOLTAGE DESIGNATION - The JEDEC type numbers shown indicate a tolerance of +/-10% with guaranteed limits on only V<sub>Z</sub>, I<sub>R</sub>, I<sub>s</sub>, and V<sub>F</sub> as shown in the electrical characteristics table. Units with guaranteed limits on all seven parameters are indicated by suffix "B" for +/-5% tolerance.
2. ZENER VOLTAGE (V<sub>Z</sub>) AND IMPEDANCE (Z<sub>ZT</sub> & Z<sub>ZK</sub>) - Test conditions for Zener voltage and impedance are as follows; I<sub>Z</sub> is applied 40+/-10 ms prior to reading. Mounting contacts are located from the inside edge of mounting clips to the body of the diode(T<sub>a</sub>=25°C )

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3. **SURGE CURRENT ( $I_r$ )** - Surge current is specified as the maximum allowable peak, non-recurrent square-wave current with a pulse width, PW, of 8.3 ms. The data given in Figure 5 may be used to find the maximum surge current for a square wave of any pulse width between 1 ms and 1000ms by plotting the applicable points on logarithmic paper. Examples of this, using the 6.8v, is shown in Figure 6. Mounting contact located as specified in Note 3. ( $T_A=25^\circ\text{C}$ ).
4. **VOLTAGE REGULATION ( $V_z$ )** - Test conditions for voltage regulation are as follows:  $V_z$  measurements are made at 10% and then at 50% of the  $I_z$  max value listed in the electrical characteristics table. The test currents are the same for the 5% and 10% tolerance devices. The test current time duration for each  $V_z$  measurement is 40+/- 10 ms. ( $T_A=25^\circ\text{C}$ ). Mounting contact located as specified in Note 2.
5. **MAXIMUM REGULATOR CURRENT ( $I_{ZM}$ )** - The maximum current shown is based on the maximum voltage of a 5% type unit. Therefore, it applies only to the B-suffix device. The actual  $I_{ZM}$  for any device may not exceed the value of 5 watts divided by the actual  $V_z$  of the device.  $T_L=75^\circ\text{C}$  at maximum from the device body.

**APPLICATION NOTE:**

Since the actual voltage available from a given Zener diode is temperature dependent, it is necessary to determine junction temperature under any set of operating conditions in order to calculate its value. The following procedure is recommended:

Lead Temperature,  $T_L$ , should be determined from:

$$T_L = \theta_{LA} P_D + T_A$$

$\theta_{LA}$  is the lead-to-ambient thermal resistance and  $P_D$  is the power dissipation.

Junction Temperature,  $T_J$ , may be found from:

$$T_J = T_L + \Delta T_{JL}$$

$\Delta T_{JL}$  is the increase in junction temperature above the lead temperature and may be found from Figure 4 for a train of power pulses or from Figure 1 for dc power.

$$\Delta T_{JL} = \theta_{JL} P_D$$

For worst-case design, using expected limits of  $I_Z$ , limits of  $P_D$  and the extremes of  $T_J$  ( $\Delta T_J$ ) may be estimated. Changes in voltage,  $V_Z$ , can then be found from:

$$\Delta V = \theta_{VZ} \Delta T_J$$

$\theta_{VZ}$ , the Zener voltage temperature coefficient, is found from Figures 2 and 3.

Under high power-pulse operation, the Zener voltage will vary with time and may also be affected significantly by the zener resistance. For best regulation, keep current excursions as low as possible.

Data of Figure 4 should not be used to compute surge capability. Surge limitations are given in Figure 5. They are lower than would be expected by considering only junction temperature, as current crowding effects cause temperatures to be extremely high in small spots resulting in device degradation should the limits of Figure 5 be exceeded.

# RATING AND CHARACTERISTICS CURVES

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## TEMPERATURE COEFFICIENTS

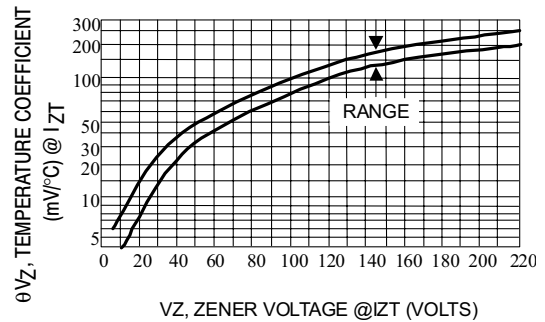
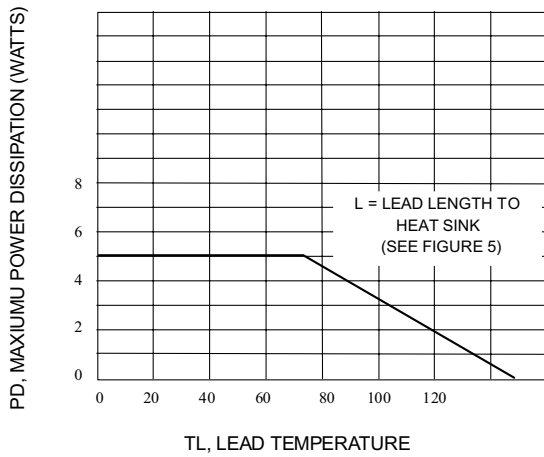


Fig. 1-POWER TEMPERATURE DERATING CURVE

Fig. 2-TEMPERATURE COEFFICIENT-RANGE FOR UNITS 6 TO 51 VOLTS

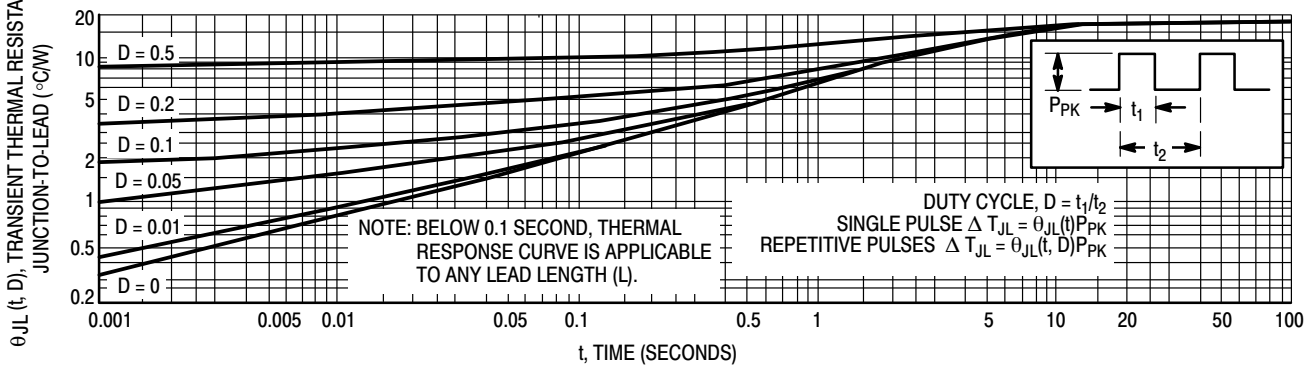


Figure 3. Typical Thermal Response  
L, Lead Length = 3/8 Inch

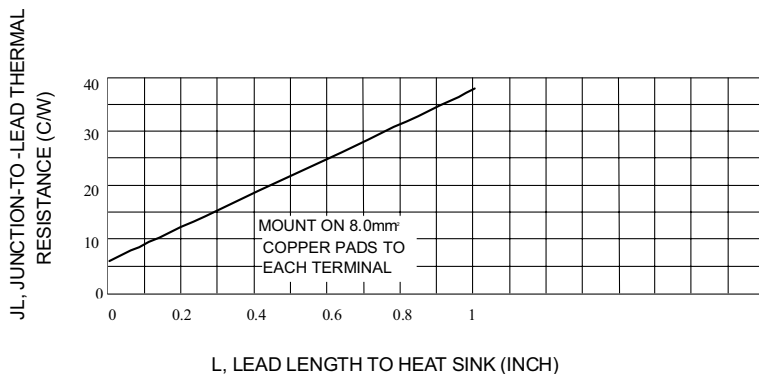


Fig. 4-TYPICAL THERMAL RESISTANCE

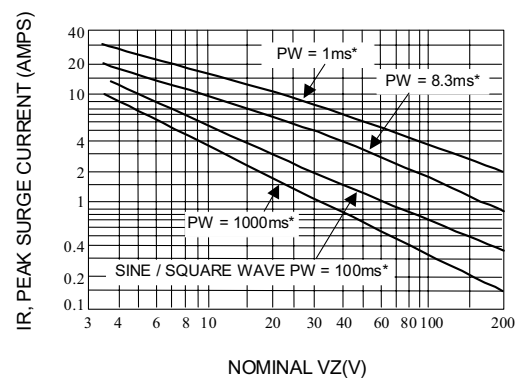


Fig. 5-MAXIMUM NON-REPETITIVE SURGE CURRENT VERSUS NOMINAL ZENER VOLTAGE (SEE NOTE 3)

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ZENER VOLTAGE VERSUS ZENER CURRENT  
(FIGURES 7,8)

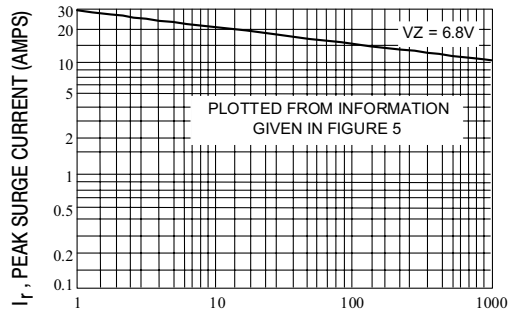


Fig. 6-PEAK SURGE CURRENT VERSUS PULSE WIDTH(SEE NOTE 3)

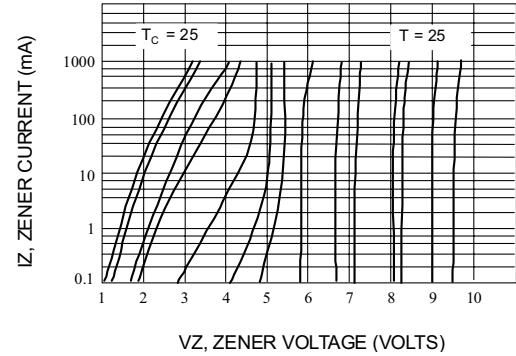


Fig. 7-ZENER VOLTAGE VERSUS ZENER CURRENT  
V\_Z = 6.8 THRU 10 VOLTS

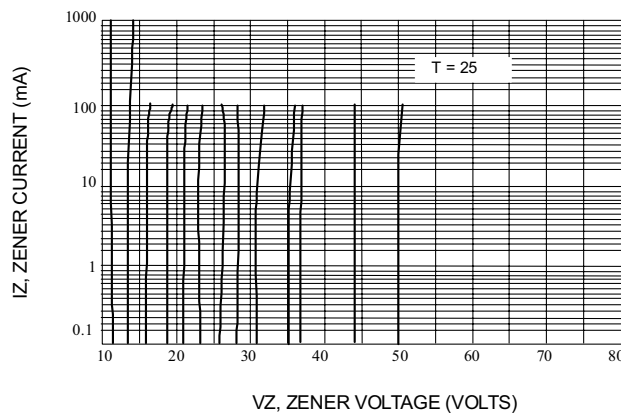


Fig. 8-ZENER VOLTAGE VERSUS ZENER CURRENT  
V\_Z = 11 THRU 51 VOLTS

\*\*\* Data of Figure 3 should not be used to compute surge capability. Surge limitations are given in Figure 5. They are lower than would be expected by considering only junction temperature, as current crowding effects cause temperatures to be extremely high in small spots resulting in device degradation should the limits of Figure. 5 be exceeded

## Ordering Information

| Device           | Packing                    |
|------------------|----------------------------|
| (Part Number)-TP | Tape&Reel; 4Kpcs/Reel      |
| (Part Number)-AP | Ammo Packing;3Kpcs/AmmoBox |
| (Part Number)-BP | Bulk;500pcs/Box            |

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