·M·C·C·™

Micro Commercial Components

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# 1N5348BE THRU 1N5388BE

## 5 Watt Zener Diode 11 to 200 Volts

## Features

- Built Strain Relief
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- For Available Tolerances—See Note 1
- Marking : 1N5348~1N5388 part number and Cathode Band

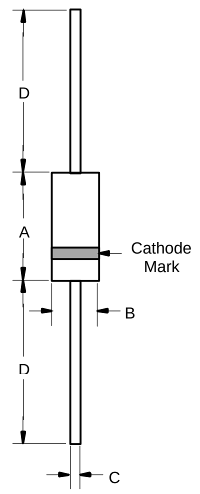
## Maximum Ratings:

- 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/℃ Above 75℃

## Mechanical Characteristics

Case: JEDEC DO-201AE.
Terminals: Solder plated , solderable per MIL-STD-750, Method 2026.
Standard Packaging: 52mm tape
Weight: 0.04 ounces , 1.1 gram (approx)

DO-201AE




| DIMENSIONS | | | | | |
|---|---|---|---|---|---|
| DIM | INCHES | | MM | | NOTE |
| | MIN | MAX | MIN | MAX | |
| A | 0.285 | 0.375 | 7.20 | 9.50 | |
| B | 0.190 | 0.210 | 4.80 | 5.30 | |
| C | 0.037 | 0.043 | 0.94 | 1.07 | |
| D | 1.000 | ----- | 25.40 | ----- | |

## 1N5348BE THRU 1N5388BE

ELECTRICAL CHARACTERISTICS ($T_A$=25℃unless otherwise noted, $V_F$=1.2 Max @ $I_F$=1A for all types).

| Type No. (Note 1.) | Nominal Zener Voltage Vz @ $I_{ZT}$ volts (Note 2.) | Test current $I_{ZT}$ mA | Maximum Zener Impedance | | Max reverse Leakage Current | | Max Surge Current Ir Amps (Note 3.) | Max Voltage Regulation Vz, Volts (Note 4.) | Maximum Regulator Current $I_{ZM}$ mA (Note 5.) |
|---|---|---|---|---|---|---|---|---|---|
| | | | $Z_{ZT}$ @ $I_{ZT}$ Ohms (Note 2.) | $Z_{Zk}$ @ $I_{ZK}$ = 1 mA Ohms (Note 2.) | $I_R$ uA | $V_R$ Volts | | | |
| 1N5348BE | 11 | 125 | 2.5 | 125 | 5 | 8.4 | 8 | 0.25 | 430 |
| 1N5349BE | 12 | 100 | 2.5 | 125 | 2 | 9.1 | 7.5 | 0.25 | 395 |
| 1N5350BE | 13 | 100 | 2.5 | 100 | 1 | 9.9 | 7 | 0.25 | 365 |
| 1N5351BE | 14 | 100 | 2.5 | 75 | 1 | 10.6 | 6.7 | 0.25 | 340 |
| 1N5352BE | 15 | 75 | 2.5 | 75 | 1 | 11.5 | 6.3 | 0.25 | 315 |
| 1N5353BE | 16 | 75 | 2.5 | 75 | 1 | 12.2 | 6 | 0.3 | 295 |
| 1N5354BE | 17 | 70 | 2.5 | 75 | 0.5 | 12.9 | 5.8 | 0.35 | 280 |
| 1N5355BE | 18 | 65 | 2.5 | 75 | 0.5 | 13.7 | 5.5 | 0.4 | 265 |
| 1N5356BE | 19 | 65 | 3 | 75 | 0.5 | 14.4 | 5.3 | 0.4 | 250 |
| 1N5357BE | 20 | 65 | 3 | 75 | 0.5 | 15.2 | 5.1 | 0.4 | 237 |
| 1N5358BE | 22 | 50 | 3.5 | 75 | 0.5 | 16.7 | 4.7 | 0.45 | 216 |
| 1N5359BE | 24 | 50 | 3.5 | 100 | 0.5 | 18.2 | 4.4 | 0.55 | 198 |
| 1N5360BE | 25 | 50 | 4 | 110 | 0.5 | 19 | 4.3 | 0.55 | 190 |
| 1N5361BE | 27 | 50 | 5 | 120 | 0.5 | 20.6 | 4.1 | 0.6 | 176 |
| 1N5362BE | 28 | 50 | 6 | 130 | 0.5 | 21.2 | 3.9 | 0.6 | 170 |
| 1N5363BE | 30 | 40 | 8 | 140 | 0.5 | 22.8 | 3.7 | 0.6 | 158 |
| 1N5364BE | 33 | 40 | 10 | 150 | 0.5 | 25.1 | 3.5 | 0.6 | 144 |
| 1N5365BE | 36 | 30 | 11 | 160 | 0.5 | 27.4 | 3.3 | 0.65 | 132 |
| 1N5366BE | 39 | 30 | 14 | 170 | 0.5 | 29.7 | 3.1 | 0.65 | 122 |
| 1N5367BE | 43 | 30 | 20 | 190 | 0.5 | 32.7 | 2.8 | 0.7 | 110 |
| 1N5368BE | 47 | 25 | 25 | 210 | 0.5 | 35.8 | 2.7 | 0.8 | 100 |
| 1N5369BE | 51 | 25 | 27 | 230 | 0.5 | 38.8 | 2.5 | 0.9 | 93 |
| 1N5370BE | 56 | 20 | 35 | 280 | 0.5 | 42.6 | 2.3 | 1 | 86 |
| 1N5371BE | 60 | 20 | 40 | 350 | 0.5 | 45.5 | 2.2 | 1.2 | 79 |
| 1N5372BE | 62 | 20 | 42 | 400 | 0.5 | 47.1 | 2.1 | 1.35 | 76 |
| 1N5373BE | 68 | 20 | 44 | 500 | 0.5 | 51.7 | 2 | 1.5 | 70 |
| 1N5374BE | 75 | 20 | 45 | 620 | 0.5 | 56 | 1.9 | 1.6 | 63 |
| 1N5375BE | 82 | 15 | 65 | 720 | 0.5 | 62.2 | 1.8 | 1.8 | 58 |
| 1N5376BE | 87 | 15 | 75 | 760 | 0.5 | 66 | 1.7 | 2 | 54.5 |
| 1N5377BE | 91 | 15 | 75 | 760 | 0.5 | 69.2 | 1.6 | 2.2 | 52.5 |
| 1N5378BE | 100 | 12 | 90 | 800 | 0.5 | 76 | 1.5 | 2.5 | 47.5 |
| 1N5379BE | 110 | 12 | 125 | 1000 | 0.5 | 83.6 | 1.4 | 2.5 | 43 |
| 1N5380BE | 120 | 10 | 170 | 1150 | 0.5 | 91.2 | 1.3 | 2.5 | 39.5 |
| 1N5381BE | 130 | 10 | 190 | 1250 | 0.5 | 98.8 | 1.2 | 2.5 | 36.6 |
| 1N5382BE | 140 | 8 | 230 | 1500 | 0.5 | 106 | 1.2 | 2.5 | 34 |
| 1N5383BE | 150 | 8 | 330 | 1500 | 0.5 | 114 | 1.1 | 3 | 31.6 |
| 1N5384BE | 160 | 8 | 35 0 | 1650 | 0.5 | 122 | 1.1 | 3 | 29.4 |
| 1N5385BE | 170 | 8 | 380 | 1750 | 0.5 | 129 | 1 | 3 | 28 |
| 1N5386BE | 180 | 5 | 430 | 1750 | 0.5 | 137 | 1 | 4 | 26.4 |
| 1N5387BE | 190 | 5 | 450 | 1850 | 0.5 | 144 | 0.9 | 5 | 25 |
| 1N5388BE | 200 | 5 | 480 | 1850 | 0.5 | 152 | 0.9 | 5 | 23.6 |

NOTE:

1. TOLERANCE AND VOLTAGE DESIGNATION - The JEDEC type numbers shown indicate a tolerance of+/-10% with guaranteed limits on only Vz, $I_R$, $I_r$, and $V_F$ 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 (Vz) AND IMPEDANCE ($Z_{ZT}$ & $Z_{ZK}$) - Test conditions for Zener voltage and impedance are as follows; Iz 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.($T_A$=25℃ ).

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ELECTRICAL CHARACTERISTICS

3. SURGE CURRENT (Ir) - 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 quare 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 and 200V zeners, are shown in Figure 6. Mounting contact located as specified in Note 3. ($T_A$=25 ℃ ).
4. VOLTAGE REGULATION (Vz) - Test conditions for voltage regulation are as follows: Vz measurements are made at 10% and then at 50% of the Iz 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 druation for each Vz measurement is 40 10 ms. ($T_A$=25 ). Mounting contact located as specified in Note2.
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 Vz of the device. $T_L$=75 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:

$$T_L = th_{LA} P_D + T_A$$

th $_{LA}$ is the lead-to-ambient thermal resistance ( /W) and $P_D$ is the power dissipation.

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

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

$T_{JL}$ is the increase in junction temperature above the lead temperature and may be found from Figure 3 for a train of power pulses or from Figure 4 for dc power.

$$T_{JL} = \ _{JL} P_D$$

For worst-case design, using expected limits of Iz, limits of $P_D$ and the extremes of $T_{J(}T_J)$ may be estimated. Changes in voltage, Vz, can then be found from:

, the zener voltage temperature coefficient, is fount from Figures 2.

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

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.

RATING AND CHARACTERISTICS CURVES
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## TEMPERATURE COEFFICIENTS

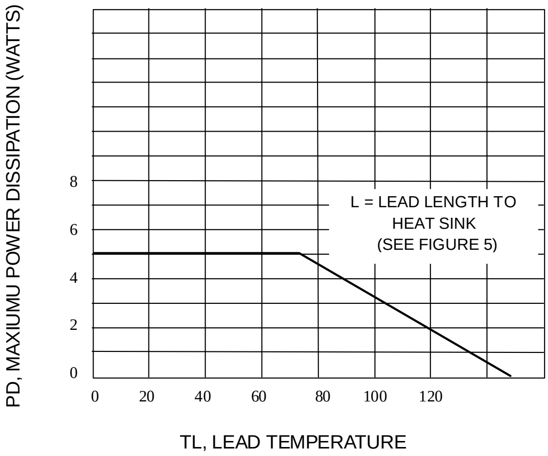


Fig. 1-POWER TEMPERATURE DERATING CURVE

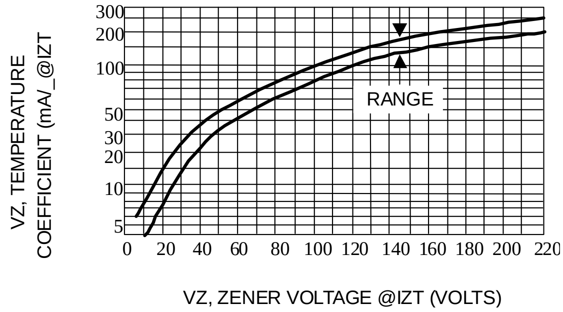


Fig. 2-TEMPERATURE COEFFICIENT-RANGE FOR UNITS 6 TO 220 VOLTS

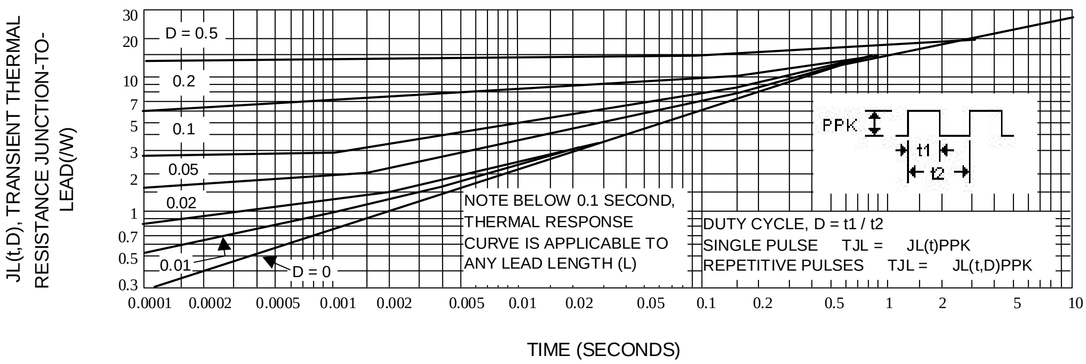


Fig. 3-TYPICAL THERMAL RESPONSE

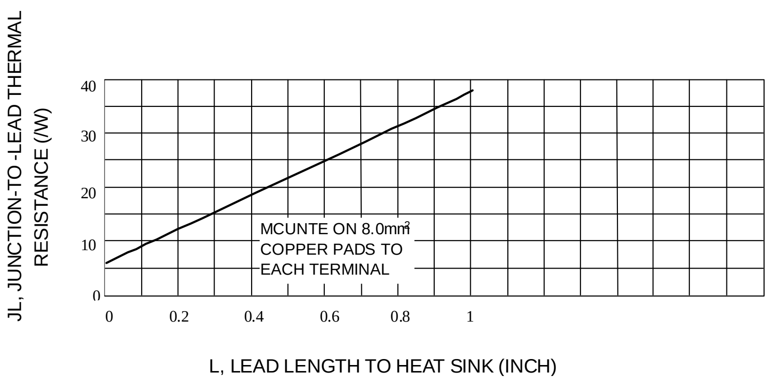


Fig. 4-TYPICAL THERMAL RESISTANCE

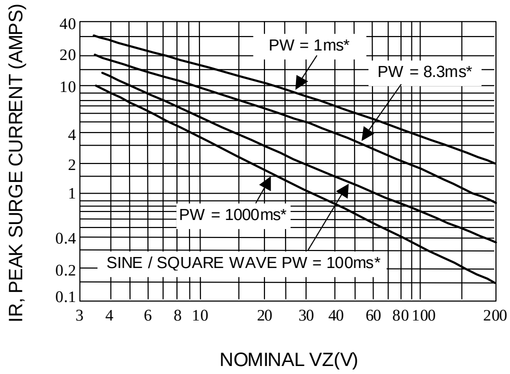


Fig. 5-MAXIMUM NON-REPETITIVE SURGE CURRENT VERSUS NOMINAL ZENER VOLTAGE (SEE NOTE 3)

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ZENER VOLTAGE VERSUS ZENER CURRENT
(FIGURES 7,8, AND 9)

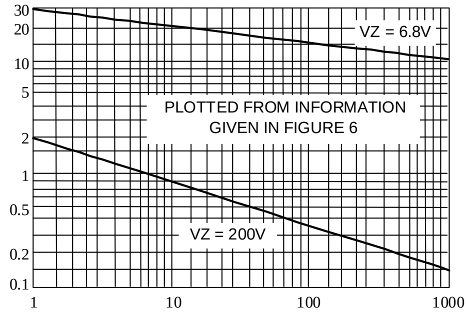


Fig. 6-PEAK SURGE CURRENT VERSUS PULSE WIDTH(SEE NOTE 3)

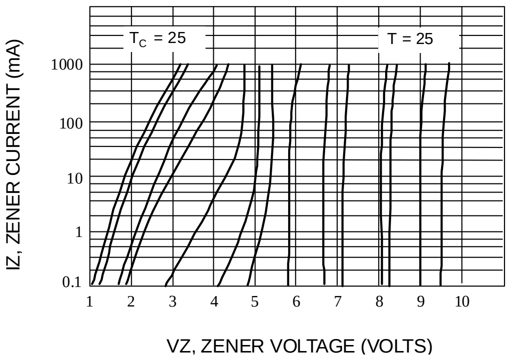


Fig. 7-ZENER VOLTAGE VERSUS ZENER CURRENT VZ = 6.8 THRU 10 VOLTS

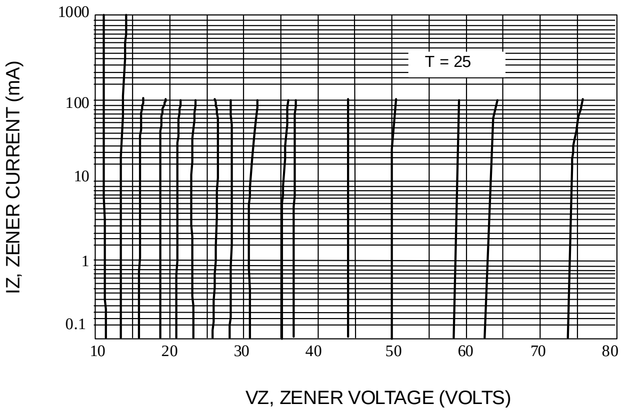


Fig. 8-ZENER VOLTAGE VERSUS ZENER CURRENT VZ = 11 THRU 75 VOLTS

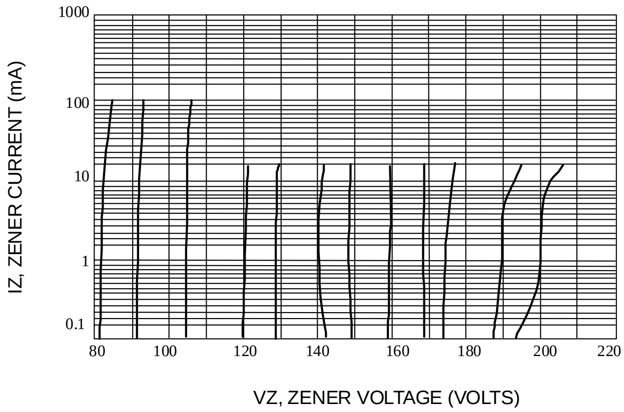


Fig. 9-ZENER VOLTAGE VERSUS ZENER CURRENT VZ = 82 THRU 200 VOLTS

*** 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

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