



## Silicon 5 Watt Zener Diodes

### DESCRIPTION

The 1N5334Be3 through 1N5388Be3 JEDEC registered series of axial-leaded 5.0 watt Zeners provides a voltage selection of 3.6 V to 200 V with different tolerances as identified by a suffix letter on a part number. These plastic encapsulated Zeners have a moisture classification of level 1 with no dry pack required. They may be operated at high maximum dc currents with adequate heat sinking due to their comparatively low thermal resistance design. DO-201AE comes in tape and reel only, TR7 and TR13.

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### FEATURES

- JEDEC registered 1N5336 through 1N5388 numbers
- Zener voltage available 3.6 volts to 200 volts
- Plus/minus 10%, 5% and 2% voltage tolerances available.  
(See [Part Nomenclature](#) for all available options.)
- Low inductance
- RoHS compliant
- Plastic package classification 94V-0

### APPLICATIONS / BENEFITS

- Built-in strain relief
- Flexible axial lead mounting terminals
- Minimal changes of voltage vs current
- Regulates voltage over broad operating current and temperature ranges

### MAXIMUM RATINGS @ 25 °C unless otherwise stated

| Parameters/Test Conditions                                                                                                   | Symbol              | Value       | Unit |
|------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------|------|
| Junction and Storage Temperature                                                                                             | $T_J$ and $T_{STG}$ | -65 to +150 | °C   |
| Thermal Resistance Junction-to-Lead <sup>(1)</sup>                                                                           | $R_{\theta JL}$     | 25          | °C/W |
| Thermal Resistance Junction-to-Ambient <sup>(2)</sup>                                                                        | $R_{\theta JA}$     | 85          | °C/W |
| DC Power Dissipation @ $T_L=75^\circ\text{C}$ , measured at zero lead length. Derate above $75^\circ\text{C}$ <sup>(3)</sup> | $P_D$               | 5           | W    |
| Solder Temperature @ 10 s                                                                                                    | $T_{SP}$            | 260         | °C   |

- Notes:**
1. At 3/8" (10 mm) lead length from body.
  2. Mounted on 100 mm<sup>2</sup> copper pads to each terminal.



### DO-201AE Package

Also available in:

#### T-18 Package

(lead alternative)



[1N5333B – 1N5388B](#)

#### MSC – Lawrence

6 Lake Street,  
Lawrence, MA 01841  
Tel: 1-800-446-1158 or  
(978) 620-2600  
Fax: (978) 689-0803

#### MSC – Ireland

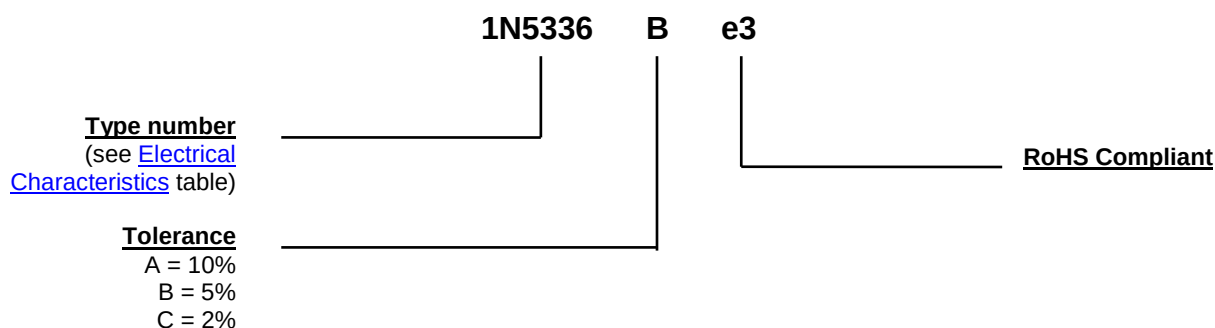
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**MECHANICAL and PACKAGING**

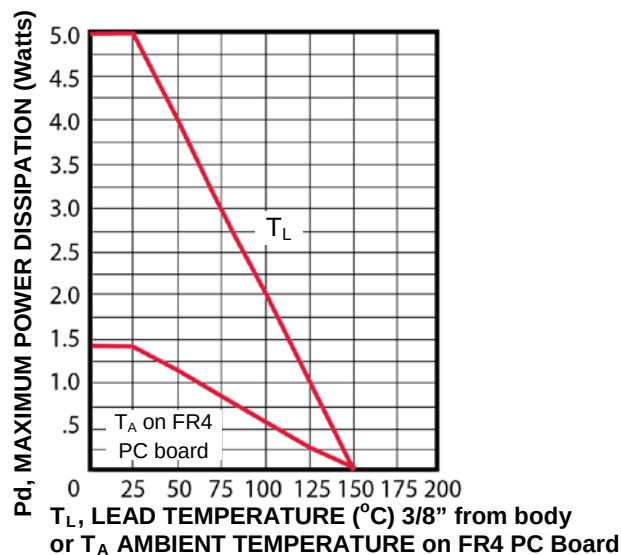
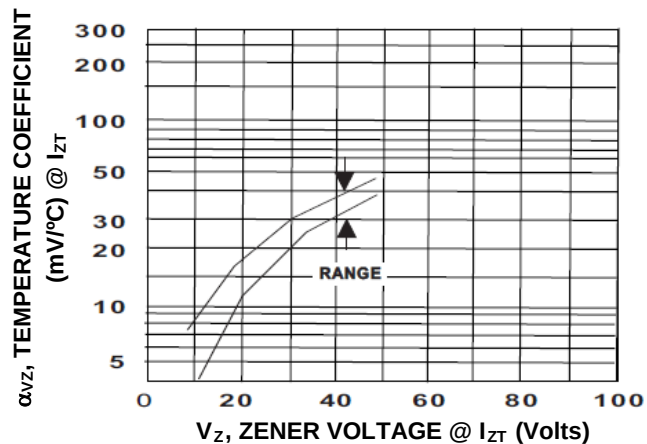
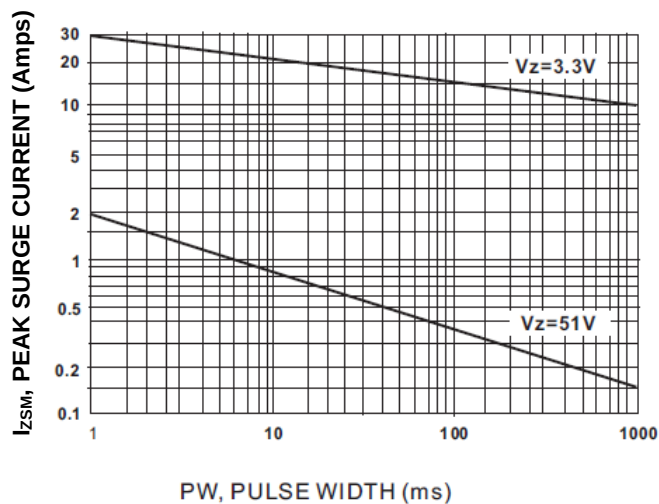
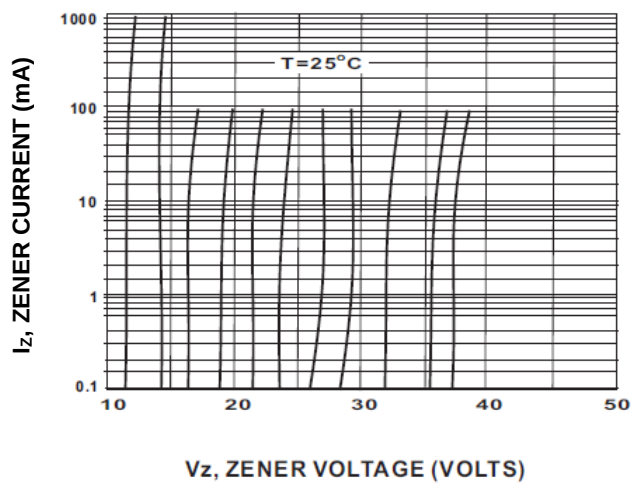
- CASE: JEDEC DO-201AE molded plastic body in compliance with specification 94V-0
- TERMINALS: RoHS compliant matte/tin plated axial leads. Solderable per MIL-STD-750, method 2026.
- MARKING: Part number
- POLARITY: Cathode indicated by band. (Diode to be operated with the banded end positive with respect to the opposite end.)
- TAPE & REEL option: Seven and thirteen inch reel sizes (add "TR" suffix to part number, TR7 or TR13, e.g. 1N5352Be3/TR13). Consult factory for quantities.
- WEIGHT: Approximately 1.122 grams
- See [Package Dimensions](#) on last page.

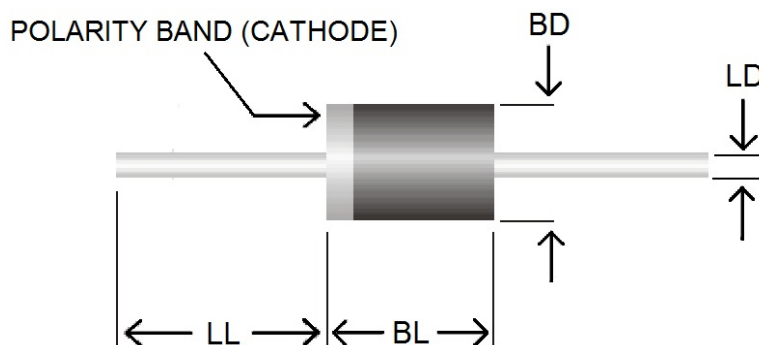
**PART NOMENCLATURE**

**SYMBOLS & DEFINITIONS**

| Symbol                | Definition                                                                                                                                                                                                                                            |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $\alpha_{VZ}$         | Temperature Coefficient of Regulator Voltage: The change in regulator voltage divided by the change in temperature that caused it expressed in %/C or mV/°C.                                                                                          |
| $I_R$                 | Reverse Current: The dc current flowing from the external circuit into the cathode terminal at the specified voltage $V_R$ .                                                                                                                          |
| $I_Z, I_{ZT}, I_{ZK}$ | Regulator Current: The dc regulator current ( $I_Z$ ), at a specified test point ( $I_{ZT}$ ), near breakdown knee ( $I_{ZK}$ ).                                                                                                                      |
| $I_{ZSM}$             | Reverse Surge Current, Nonrepetitive Peak: The peak reverse current in the breakdown region including all nonrepetitive transient currents but excluding all repetitive transients (also known as maximum Zener surge current).                       |
| $P_D$                 | Steady-State Power Dissipation: The dc power resulting from the product of $V_Z \times I_Z$ .                                                                                                                                                         |
| $V_R$                 | Reverse Voltage: A positive dc cathode-anode voltage below the breakdown region.                                                                                                                                                                      |
| $V_Z$                 | Zener Voltage: The Zener voltage the device will exhibit at a specified current ( $I_Z$ ) in its breakdown region.                                                                                                                                    |
| $Z_Z$ or $Z_{ZK}$     | Regulator Impedance: The small signal impedance of the diode when biased to operate in its breakdown region with $I_{ZT}$ applied at $I_Z$ or $I_{ZK}$ respectively. This has also been known as Zener or dynamic impedance ( $Z_{ZT}$ or $Z_{ZK}$ ). |

**ELECTRICAL CHARACTERISTICS @  $T_A = 25^\circ\text{C}$  unless otherwise noted**

| PART<br>NUMBER | Nominal Zener Voltage |       |       | Maximum<br>Zener Test<br>Current | Maximum Zener Impedance |                   |    | Maximum Leakage<br>Current |      |
|----------------|-----------------------|-------|-------|----------------------------------|-------------------------|-------------------|----|----------------------------|------|
|                | $V_Z @ I_{ZT}$        |       |       | $I_{ZT}$                         | $Z_{ZT} @ I_{ZT}$       | $Z_{ZK} @ I_{ZK}$ |    | $I_R @ V_R$                |      |
|                | Nom V                 | Min V | Max V | mA                               | $\Omega$                | $\Omega$          | mA | $\mu\text{A}$              | V    |
| 1N5334Be3      | 3.6                   | 3.42  | 3.79  | 350                              | 2.5                     | 500               | 1  | 150                        | 1    |
| 1N5335Be3      | 3.9                   | 3.70  | 4.09  | 320                              | 2                       | 500               | 1  | 50                         | 1    |
| 1N5336Be3      | 4.3                   | 4.08  | 4.52  | 290                              | 2                       | 500               | 1  | 10                         | 1    |
| 1N5337Be3      | 4.7                   | 4.47  | 4.94  | 260                              | 2                       | 450               | 1  | 5                          | 1    |
| 1N5338Be3      | 5.1                   | 4.84  | 5.35  | 240                              | 1.5                     | 400               | 1  | 1                          | 1    |
| 1N5339Be3      | 5.6                   | 5.32  | 5.88  | 220                              | 1                       | 400               | 1  | 1                          | 2    |
| 1N5340Be3      | 6                     | 5.70  | 6.31  | 200                              | 1                       | 300               | 1  | 1                          | 3    |
| 1N5341Be3      | 6.2                   | 5.89  | 6.51  | 200                              | 1                       | 200               | 1  | 1                          | 3    |
| 1N5342Be3      | 6.8                   | 6.46  | 7.14  | 175                              | 1                       | 200               | 1  | 10                         | 5.2  |
| 1N5343Be3      | 7.5                   | 7.12  | 7.89  | 175                              | 1.5                     | 200               | 1  | 10                         | 5.7  |
| 1N5344Be3      | 8.2                   | 7.79  | 8.61  | 150                              | 1.5                     | 200               | 1  | 10                         | 6.2  |
| 1N5345Be3      | 8.7                   | 8.26  | 9.14  | 150                              | 2                       | 200               | 1  | 10                         | 6.6  |
| 1N5346Be3      | 9.1                   | 8.64  | 9.56  | 150                              | 2                       | 150               | 1  | 7.5                        | 6.9  |
| 1N5347Be3      | 10                    | 9.50  | 10.50 | 125                              | 2                       | 125               | 1  | 5                          | 7.6  |
| 1N5348Be3      | 11                    | 10.45 | 11.55 | 125                              | 2.5                     | 125               | 1  | 5                          | 8.4  |
| 1N5349Be3      | 12                    | 11.40 | 12.60 | 100                              | 2.5                     | 125               | 1  | 2                          | 9.1  |
| 1N5350Be3      | 13                    | 12.35 | 13.65 | 100                              | 2.5                     | 100               | 1  | 1                          | 9.9  |
| 1N5351Be3      | 14                    | 13.30 | 14.70 | 100                              | 2.5                     | 75                | 1  | 1                          | 10.6 |
| 1N5352Be3      | 15                    | 14.25 | 15.75 | 75                               | 2.5                     | 75                | 1  | 1                          | 11.5 |
| 1N5353Be3      | 16                    | 15.20 | 16.80 | 75                               | 2.5                     | 75                | 1  | 1                          | 12.2 |
| 1N5354Be3      | 17                    | 16.15 | 17.85 | 70                               | 2.5                     | 75                | 1  | 0.5                        | 12.9 |
| 1N5355Be3      | 18                    | 17.10 | 18.90 | 65                               | 2.5                     | 75                | 1  | 0.5                        | 13.7 |
| 1N5356Be3      | 19                    | 18.05 | 19.95 | 65                               | 3                       | 75                | 1  | 0.5                        | 14.4 |
| 1N5357Be3      | 20                    | 19.00 | 21.00 | 65                               | 3                       | 75                | 1  | 0.5                        | 15.2 |
| 1N5358Be3      | 22                    | 20.90 | 23.10 | 50                               | 3.5                     | 75                | 1  | 0.5                        | 16.7 |
| 1N5359Be3      | 24                    | 22.80 | 25.20 | 50                               | 3.5                     | 100               | 1  | 0.5                        | 18.2 |
| 1N5360Be3      | 25                    | 23.75 | 26.25 | 50                               | 4                       | 110               | 1  | 0.5                        | 19   |
| 1N5361Be3      | 27                    | 25.65 | 28.35 | 50                               | 5                       | 120               | 1  | 0.5                        | 20.6 |
| 1N5362Be3      | 28                    | 26.60 | 29.40 | 50                               | 6                       | 130               | 1  | 0.5                        | 21.2 |
| 1N5363Be3      | 30                    | 28.50 | 31.50 | 40                               | 8                       | 140               | 1  | 0.5                        | 22.8 |
| 1N5364Be3      | 33                    | 31.35 | 34.65 | 40                               | 10                      | 150               | 1  | 0.5                        | 25.1 |
| 1N5365Be3      | 36                    | 34.20 | 37.80 | 30                               | 11                      | 160               | 1  | 0.5                        | 27.4 |
| 1N5366Be3      | 39                    | 37.05 | 40.65 | 30                               | 14                      | 170               | 1  | 0.5                        | 29.7 |
| 1N5367Be3      | 43                    | 40.85 | 45.15 | 30                               | 20                      | 190               | 1  | 0.5                        | 32.7 |
| 1N5368Be3      | 47                    | 44.65 | 49.35 | 25                               | 25                      | 210               | 1  | 0.5                        | 35.8 |
| 1N5369Be3      | 51                    | 48.45 | 53.55 | 25                               | 27                      | 230               | 1  | 0.5                        | 38.8 |
| 1N5370Be3      | 56                    | 53.20 | 58.80 | 25                               | 35                      | 280               | 1  | 0.5                        | 42.6 |
| 1N5371Be3      | 60                    | 57.00 | 63.00 | 20                               | 40                      | 350               | 1  | 0.5                        | 45.5 |
| 1N5372Be3      | 62                    | 58.90 | 65.10 | 20                               | 42                      | 400               | 1  | 0.5                        | 47.1 |
| 1N5373Be3      | 68                    | 64.60 | 71.40 | 20                               | 44                      | 500               | 1  | 0.5                        | 51.7 |
| 1N5374Be3      | 75                    | 71.25 | 78.75 | 20                               | 45                      | 620               | 1  | 0.5                        | 56   |
| 1N5375Be3      | 82                    | 77.90 | 86.10 | 15                               | 65                      | 720               | 1  | 0.5                        | 62.2 |
| 1N5376Be3      | 87                    | 82.65 | 91.35 | 15                               | 75                      | 760               | 1  | 0.5                        | 66   |
| 1N5377Be3      | 91                    | 86.45 | 95.55 | 15                               | 75                      | 760               | 1  | 0.5                        | 69.2 |
| 1N5378Be3      | 100                   | 95.00 | 105.0 | 12                               | 90                      | 800               | 1  | 0.5                        | 76   |
| 1N5379Be3      | 110                   | 104.5 | 115.5 | 12                               | 125                     | 1000              | 1  | 0.5                        | 83.6 |
| 1N5380Be3      | 120                   | 114.0 | 126.0 | 10                               | 170                     | 1150              | 1  | 0.5                        | 91.2 |
| 1N5381Be3      | 130                   | 123.5 | 136.5 | 10                               | 190                     | 1250              | 1  | 0.5                        | 98.8 |
| 1N5382Be3      | 140                   | 133.0 | 147.0 | 8                                | 230                     | 1500              | 1  | 0.5                        | 106  |
| 1N5383Be3      | 150                   | 142.5 | 157.5 | 8                                | 330                     | 1500              | 1  | 0.5                        | 114  |
| 1N5384Be3      | 160                   | 152.0 | 168.0 | 8                                | 350                     | 1650              | 1  | 0.5                        | 122  |
| 1N5385Be3      | 170                   | 161.5 | 178.5 | 8                                | 380                     | 1750              | 1  | 0.5                        | 129  |
| 1N5386Be3      | 180                   | 171.0 | 189.0 | 5                                | 430                     | 1750              | 1  | 0.5                        | 137  |
| 1N5387Be3      | 190                   | 180.5 | 199.5 | 5                                | 450                     | 1850              | 1  | 0.5                        | 144  |
| 1N5388Be3      | 200                   | 190.0 | 210.0 | 5                                | 480                     | 1850              | 1  | 0.5                        | 152  |

**GRAPHS**

**Figure 1 – Power temperature Derating Curve**

**Figure 2 – V<sub>Z</sub> Temperature Coefficient**

**Figure 3 – Peak Surge Current vs. Pulse Width**

**Figure 4 – Zener Voltage vs Zener Current  
V<sub>Z</sub> = 11 through 39 Volts**

**PACKAGE DIMENSIONS**


| Ltr       | Dimensions |       |             |      |
|-----------|------------|-------|-------------|------|
|           | Inch       |       | Millimeters |      |
|           | Min        | Max   | Min         | Max  |
| <b>LL</b> | 1.00       | -     | 25.4        | -    |
| <b>BL</b> | 0.285      | 0.375 | 7.2         | 9.5  |
| <b>BD</b> | 0.188      | 0.210 | 4.8         | 5.3  |
| <b>LD</b> | 0.037      | 0.042 | 0.94        | 1.07 |

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