

## Small Signal Zener Diodes

### Features

- Silicon planar power Zener diodes
- Standard Zener voltage tolerance is  $\pm 5\%$
- These diodes are also available in Mini-MELF case with the type designation TZM5221 to TZM5267, SOT-23 case with the type designations MMBZ5225 to MMBZ5267 and SOD-123 case with the types designations MMSZ5225 to MMSZ5267
- AEC-Q101 qualified
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21 definition



94 9367

### Applications

- Voltage stabilization

### Mechanical Data

**Case:** DO-35

**Weight:** approx. 125 mg

**Cathode band color:** black

**Packaging codes/options:**

TAP/10K per ammpack (52 mm tape), 30K/box

TR/10K per 13" reel, 30K/box

### Absolute Maximum Ratings

$T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified

| Parameter         | Test condition                        | Symbol    | Value         | Unit |
|-------------------|---------------------------------------|-----------|---------------|------|
| Power dissipation | $T_L \leq 25\text{ }^{\circ}\text{C}$ | $P_{tot}$ | 500           | mW   |
| Z-current         |                                       | $I_Z$     | $P_{tot}/V_Z$ | mA   |

### Thermal Characteristics

$T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified

| Parameter                                  | Test condition                              | Symbol     | Value         | Unit               |
|--------------------------------------------|---------------------------------------------|------------|---------------|--------------------|
| Thermal resistance junction to ambient air | $l = 4\text{ mm}$ , $T_L = \text{constant}$ | $R_{thJA}$ | 300           | K/W                |
| Junction temperature                       |                                             | $T_j$      | 175           | $^{\circ}\text{C}$ |
| Storage temperature range                  |                                             | $T_{stg}$  | - 65 to + 175 | $^{\circ}\text{C}$ |

### Electrical Characteristics

$T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified

| Parameter       | Test condition        | Symbol | Min. | Typ. | Max. | Unit |
|-----------------|-----------------------|--------|------|------|------|------|
| Forward voltage | $I_F = 200\text{ mA}$ | $V_F$  |      |      | 1.1  | V    |

# 1N5221B to 1N5267B



Vishay Semiconductors

## Electrical Characteristics

1N5221B...1N5267B

| Part number | Nominal Zener voltage <sup>1)</sup> | Test current | Maximum dynamic impedance <sup>1)</sup> | Maximum dynamic impedance      | Typical temperature of coefficient | Maximum reverse leakage current |       |
|-------------|-------------------------------------|--------------|-----------------------------------------|--------------------------------|------------------------------------|---------------------------------|-------|
|             | at $I_{ZT}$ , $V_Z$                 | $I_{ZT}$     | $Z_{ZT}$ at $I_{ZT}$                    | $Z_{ZK}$ at $I_{ZK} = 0.25$ mA | at $I_{ZT}$                        | $I_R$                           | $V_R$ |
|             | V                                   | mA           | $\Omega$                                | $\Omega$                       | $\alpha$ (%/K)                     | $\mu$ A                         | V     |
| 1N5221B     | 2.4                                 | 20           | 30                                      | 1200                           | - 0.085                            | 100                             | 1     |
| 1N5222B     | 2.5                                 | 20           | 30                                      | 1250                           | - 0.085                            | 100                             | 1     |
| 1N5223B     | 2.7                                 | 20           | 30                                      | 1300                           | - 0.080                            | 75                              | 1     |
| 1N5224B     | 2.8                                 | 20           | 30                                      | 1400                           | - 0.080                            | 75                              | 1     |
| 1N5225B     | 3                                   | 20           | 29                                      | 1600                           | - 0.075                            | 50                              | 1     |
| 1N5226B     | 3.3                                 | 20           | 28                                      | 1600                           | - 0.070                            | 25                              | 1     |
| 1N5227B     | 3.6                                 | 20           | 24                                      | 1700                           | - 0.065                            | 15                              | 1     |
| 1N5228B     | 3.9                                 | 20           | 23                                      | 1900                           | - 0.060                            | 10                              | 1     |
| 1N5229B     | 4.3                                 | 20           | 22                                      | 2000                           | + 0.055                            | 5                               | 1     |
| 1N5230B     | 4.7                                 | 20           | 19                                      | 1900                           | + 0.030                            | 5                               | 2     |
| 1N5231B     | 5.1                                 | 20           | 17                                      | 1600                           | + 0.030                            | 5                               | 2     |
| 1N5232B     | 5.6                                 | 20           | 11                                      | 1600                           | + 0.038                            | 5                               | 3     |
| 1N5233B     | 6                                   | 20           | 7                                       | 1600                           | + 0.038                            | 5                               | 3.5   |
| 1N5234B     | 6.2                                 | 20           | 7                                       | 1000                           | + 0.045                            | 5                               | 4     |
| 1N5235B     | 6.8                                 | 20           | 5                                       | 750                            | + 0.050                            | 3                               | 5     |
| 1N5236B     | 7.5                                 | 20           | 6                                       | 500                            | + 0.058                            | 3                               | 6     |
| 1N5237B     | 8.2                                 | 20           | 8                                       | 500                            | + 0.062                            | 3                               | 6.5   |
| 1N5238B     | 8.7                                 | 20           | 8                                       | 600                            | + 0.065                            | 3                               | 6.5   |
| 1N5239B     | 9.1                                 | 20           | 10                                      | 600                            | + 0.068                            | 3                               | 7     |
| 1N5240B     | 10                                  | 20           | 17                                      | 600                            | + 0.075                            | 3                               | 8     |
| 1N5241B     | 11                                  | 20           | 22                                      | 600                            | + 0.076                            | 2                               | 8.4   |
| 1N5242B     | 12                                  | 20           | 30                                      | 600                            | + 0.077                            | 1                               | 9.1   |
| 1N5243B     | 13                                  | 9.5          | 13                                      | 600                            | + 0.079                            | 0.5                             | 9.9   |
| 1N5244B     | 14                                  | 9            | 15                                      | 600                            | + 0.082                            | 0.1                             | 10    |
| 1N5245B     | 15                                  | 8.5          | 16                                      | 600                            | + 0.082                            | 0.1                             | 11    |
| 1N5246B     | 16                                  | 7.8          | 17                                      | 600                            | + 0.083                            | 0.1                             | 12    |
| 1N5247B     | 17                                  | 7.4          | 19                                      | 600                            | + 0.084                            | 0.1                             | 13    |
| 1N5248B     | 18                                  | 7            | 21                                      | 600                            | + 0.085                            | 0.1                             | 14    |
| 1N5249B     | 19                                  | 6.6          | 23                                      | 600                            | + 0.086                            | 0.1                             | 14    |
| 1N5250B     | 20                                  | 6.2          | 25                                      | 600                            | + 0.086                            | 0.1                             | 15    |
| 1N5251B     | 22                                  | 5.6          | 29                                      | 600                            | + 0.087                            | 0.1                             | 17    |
| 1N5252B     | 24                                  | 5.2          | 33                                      | 600                            | + 0.088                            | 0.1                             | 18    |
| 1N5253B     | 25                                  | 5            | 35                                      | 600                            | + 0.089                            | 0.1                             | 19    |
| 1N5254B     | 27                                  | 4.6          | 41                                      | 600                            | + 0.090                            | 0.1                             | 21    |
| 1N5255B     | 28                                  | 4.5          | 44                                      | 600                            | + 0.091                            | 0.1                             | 21    |
| 1N5256B     | 30                                  | 4.2          | 49                                      | 600                            | + 0.091                            | 0.1                             | 23    |
| 1N5257B     | 33                                  | 3.8          | 58                                      | 700                            | + 0.092                            | 0.1                             | 25    |
| 1N5258B     | 36                                  | 3.4          | 70                                      | 700                            | + 0.093                            | 0.1                             | 27    |
| 1N5259B     | 39                                  | 3.2          | 80                                      | 800                            | + 0.094                            | 0.1                             | 30    |
| 1N5260B     | 43                                  | 3            | 93                                      | 900                            | + 0.095                            | 0.1                             | 33    |
| 1N5261B     | 47                                  | 2.7          | 105                                     | 1000                           | + 0.095                            | 0.1                             | 36    |
| 1N5262B     | 51                                  | 2.5          | 125                                     | 1100                           | + 0.096                            | 0.1                             | 39    |
| 1N5263B     | 56                                  | 2.2          | 150                                     | 1300                           | + 0.096                            | 0.1                             | 43    |
| 1N5264B     | 60                                  | 2.1          | 170                                     | 1400                           | + 0.097                            | 0.1                             | 46    |

| Part number | Nominal Zener voltage <sup>1)</sup> | Test current | Maximum dynamic impedance <sup>1)</sup> | Maximum dynamic impedance      | Typical temperature of coefficient | Maximum reverse leakage current |       |
|-------------|-------------------------------------|--------------|-----------------------------------------|--------------------------------|------------------------------------|---------------------------------|-------|
|             | at $I_{ZT}$ , $V_Z$                 | $I_{ZT}$     | $Z_{ZT}$ at $I_{ZT}$                    | $Z_{ZK}$ at $I_{ZK} = 0.25$ mA | at $I_{ZT}$                        | $I_R$                           | $V_R$ |
|             | V                                   | mA           | $\Omega$                                | $\Omega$                       | $\alpha$ (%/K)                     | $\mu$ A                         | V     |
| 1N5265B     | 62                                  | 2            | 185                                     | 1400                           | + 0.097                            | 0.1                             | 47    |
| 1N5266B     | 68                                  | 1.8          | 230                                     | 1600                           | + 0.097                            | 0.1                             | 52    |
| 1N5267B     | 75                                  | 1.7          | 270                                     | 1700                           | + 0.098                            | 0.1                             | 56    |

<sup>1)</sup> Based on dc-measurement at thermal equilibrium; lead length = 9.5 (3/8 "); thermal resistance of heat sink = 30 K/W

## Typical Characteristics

$T_{amb} = 25^\circ\text{C}$ , unless otherwise specified

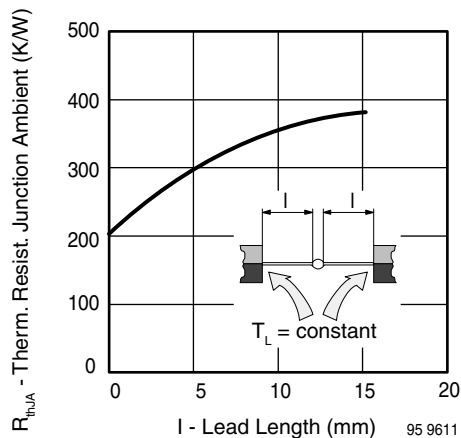


Figure 1. Thermal Resistance vs. Lead Length

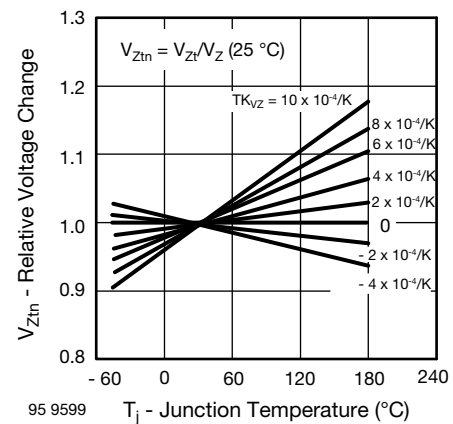


Figure 3. Typical Change of Working Voltage vs. Junction Temperature

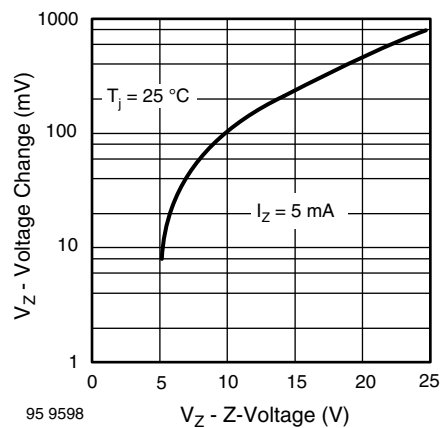


Figure 2. Typical Change of Working Voltage under Operating Conditions at  $T_{amb} = 25^\circ\text{C}$

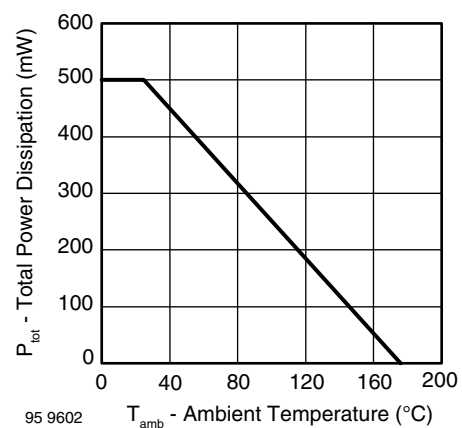


Figure 4. Total Power Dissipation vs. Ambient Temperature

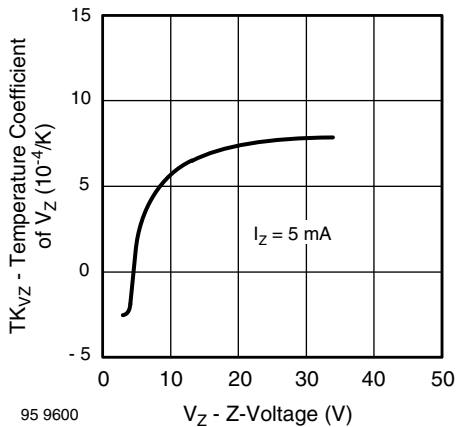


Figure 5. Temperature Coefficient of  $V_Z$  vs. Z-Voltage

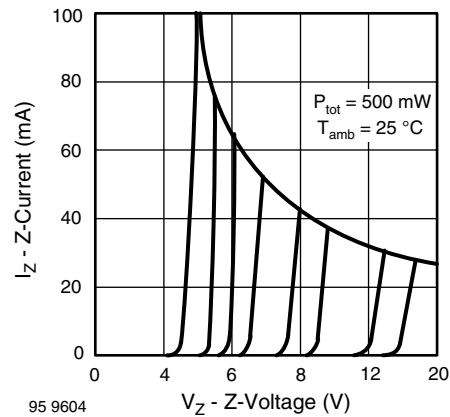


Figure 8. Z-Current vs. Z-Voltage

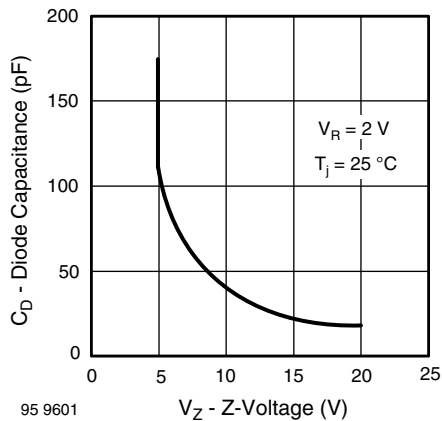


Figure 6. Diode Capacitance vs. Z-Voltage

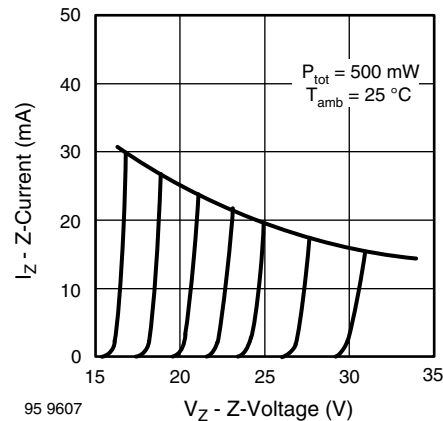


Figure 9. Z-Current vs. Z-Voltage

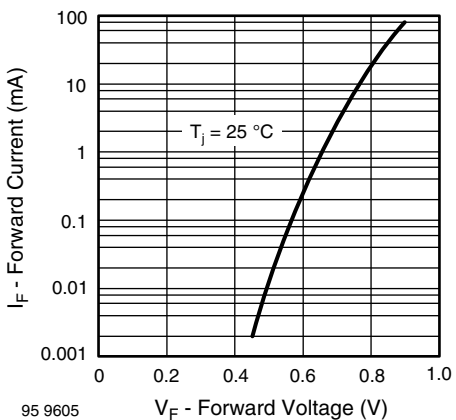


Figure 7. Forward Current vs. Forward Voltage

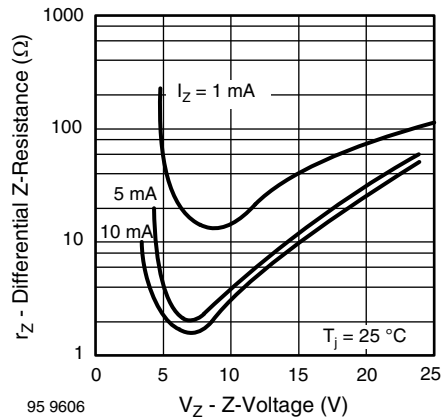
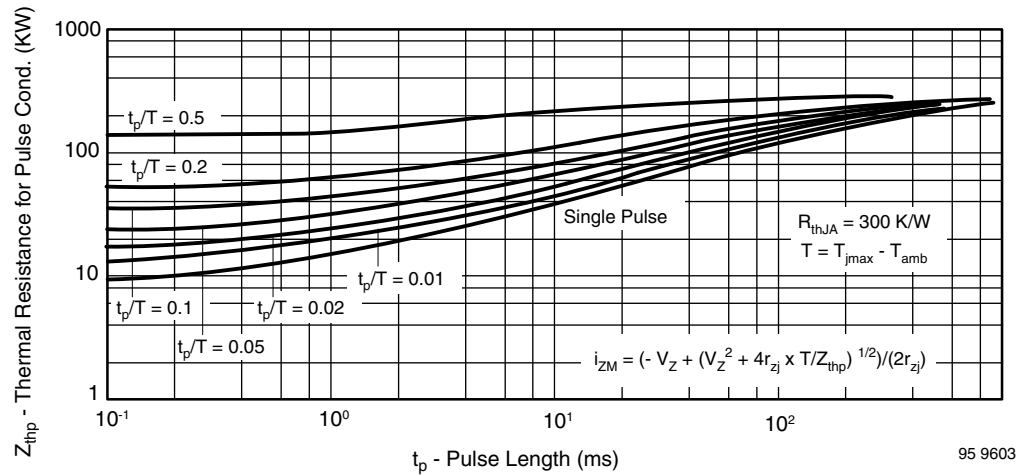
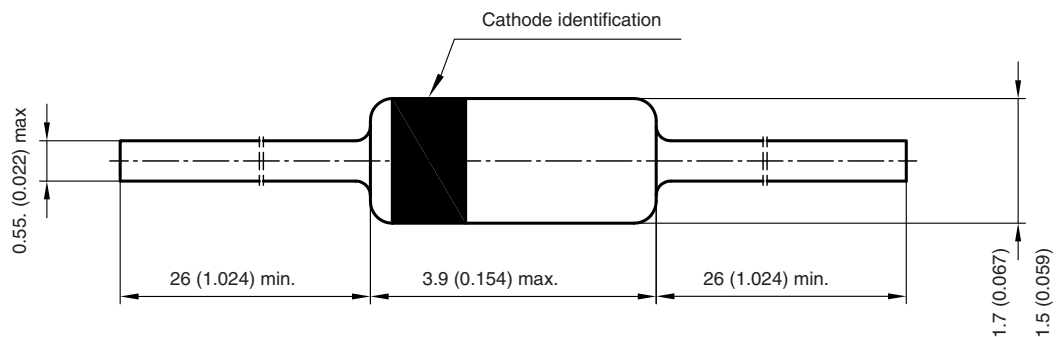


Figure 10. Differential Z-Resistance vs. Z-Voltage



## Package Dimensions in millimeters (inches): DO-35



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