

## Small Signal Zener Diodes



### FEATURES

- Silicon planar power Zener diodes
- Standard Zener voltage tolerance is  $\pm 5\%$  with a "B" suffix in the ordering code (e.g.: 1N5221B), suffix "C" is  $\pm 2\%$  tolerance
- These diodes are also available in MiniMELF 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
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### APPLICATIONS

- Voltage stabilization

### PRIMARY CHARACTERISTICS

| PARAMETER             | VALUE               | UNIT |
|-----------------------|---------------------|------|
| $V_Z$ range nom.      | 2.4 to 75           | V    |
| Test current $I_{ZT}$ | 1.7 to 20           | mA   |
| $V_Z$ specification   | Thermal equilibrium |      |
| Int. construction     | Single              |      |

### ORDERING INFORMATION

| DEVICE NAME        | ORDERING CODE                 | TAPED UNITS PER REEL               | MINIMUM ORDER QUANTITY |
|--------------------|-------------------------------|------------------------------------|------------------------|
| 1N5221B to 1N5267B | 1N5221B to 1N5267B-series-TR  | 10 000 per 13" reel                | 30 000/box             |
| 1N5221C to 1N5267C | 1N5221C to 1N5267C-series-TR  |                                    |                        |
| 1N5221B to 1N5267B | 1N5221B to 1N5267B-series-TAP | 10 000 per ammpack<br>(52 mm tape) |                        |
| 1N5221C to 1N5267C | 1N5221C to 1N5267C-series-TAP |                                    |                        |

### PACKAGE

| PACKAGE NAME | WEIGHT | MOLDING COMPOUND FLAMMABILITY RATING | MOISTURE SENSITIVITY LEVEL        | SOLDERING CONDITIONS     |
|--------------|--------|--------------------------------------|-----------------------------------|--------------------------|
| DO-35        | 125 mg | UL 94 V-0                            | MSL level 1 (according J-STD-020) | 260 °C/10 s at terminals |

### ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25\text{ °C}$ , unless otherwise specified)

| PARAMETER                                  | TEST CONDITION                              | SYMBOL     | VALUE         | UNIT |
|--------------------------------------------|---------------------------------------------|------------|---------------|------|
| Power dissipation                          | $T_L \leq 25\text{ °C}$                     | $P_{tot}$  | 500           | mW   |
| Zener current                              |                                             | $I_Z$      | $P_{tot}/V_Z$ | mA   |
| Thermal resistance junction to ambient air | $l = 4\text{ mm}$ , $T_L = \text{constant}$ | $R_{thJA}$ | 300           | K/W  |
| Junction temperature                       |                                             | $T_j$      | 175           | °C   |
| Storage temperature range                  |                                             | $T_{stg}$  | -65 to +175   | °C   |
| Forward voltage (max.)                     | $I_F = 200\text{ mA}$                       | $V_F$      | 1.1           | V    |

**ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

| PART NUMBER | ZENER VOLTAGE RANGE <sup>(1)</sup> | TEST CURRENT |           | REVERSE LEAKAGE CURRENT |     | DYNAMIC RESISTANCE $f = 1\text{ kHz}$ |                       | TEMPERATURE COEFFICIENT |
|-------------|------------------------------------|--------------|-----------|-------------------------|-----|---------------------------------------|-----------------------|-------------------------|
|             | $V_Z$ at $I_{ZT1}$                 | $I_{ZT1}$    | $I_{ZT2}$ | $I_R$ at $V_R$          |     | $Z_Z$ at $I_{ZT1}$ <sup>(1)</sup>     | $Z_{ZK}$ at $I_{ZT2}$ | $\alpha_{VZ}$           |
|             | V                                  | mA           |           | $\mu\text{A}$           | V   | $\Omega$                              |                       | %/K                     |
|             | NOM.                               |              |           | MAX.                    |     | MAX.                                  | MAX.                  | TYP.                    |
| 1N5221      | 2.4                                | 20           | 0.25      | 100                     | 1   | 30                                    | 1200                  | - 0.085                 |
| 1N5222      | 2.5                                | 20           | 0.25      | 100                     | 1   | 30                                    | 1250                  | - 0.085                 |
| 1N5223      | 2.7                                | 20           | 0.25      | 75                      | 1   | 30                                    | 1300                  | - 0.08                  |
| 1N5224      | 2.8                                | 20           | 0.25      | 75                      | 1   | 30                                    | 1400                  | - 0.08                  |
| 1N5225      | 3                                  | 20           | 0.25      | 50                      | 1   | 29                                    | 1600                  | - 0.075                 |
| 1N5226      | 3.3                                | 20           | 0.25      | 25                      | 1   | 28                                    | 1600                  | - 0.07                  |
| 1N5227      | 3.6                                | 20           | 0.25      | 15                      | 1   | 24                                    | 1700                  | - 0.065                 |
| 1N5228      | 3.9                                | 20           | 0.25      | 10                      | 1   | 23                                    | 1900                  | - 0.06                  |
| 1N5229      | 4.3                                | 20           | 0.25      | 5                       | 1   | 22                                    | 2000                  | 0.055                   |
| 1N5230      | 4.7                                | 20           | 0.25      | 5                       | 2   | 19                                    | 1900                  | 0.03                    |
| 1N5231      | 5.1                                | 20           | 0.25      | 5                       | 2   | 17                                    | 1600                  | 0.03                    |
| 1N5232      | 5.6                                | 20           | 0.25      | 5                       | 3   | 11                                    | 1600                  | 0.038                   |
| 1N5233      | 6                                  | 20           | 0.25      | 5                       | 3.5 | 7                                     | 1600                  | 0.038                   |
| 1N5234      | 6.2                                | 20           | 0.25      | 5                       | 4   | 7                                     | 1000                  | 0.045                   |
| 1N5235      | 6.8                                | 20           | 0.25      | 3                       | 5   | 5                                     | 750                   | 0.05                    |
| 1N5236      | 7.5                                | 20           | 0.25      | 3                       | 6   | 6                                     | 500                   | 0.058                   |
| 1N5237      | 8.2                                | 20           | 0.25      | 3                       | 6.5 | 8                                     | 500                   | 0.062                   |
| 1N5238      | 8.7                                | 20           | 0.25      | 3                       | 6.5 | 8                                     | 600                   | 0.065                   |
| 1N5239      | 9.1                                | 20           | 0.25      | 3                       | 7   | 10                                    | 600                   | 0.068                   |
| 1N5240      | 10                                 | 20           | 0.25      | 3                       | 8   | 17                                    | 600                   | 0.075                   |
| 1N5241      | 11                                 | 20           | 0.25      | 2                       | 8.4 | 22                                    | 600                   | 0.076                   |
| 1N5242      | 12                                 | 20           | 0.25      | 1                       | 9.1 | 30                                    | 600                   | 0.077                   |
| 1N5243      | 13                                 | 9.5          | 0.25      | 0.5                     | 9.9 | 13                                    | 600                   | 0.079                   |
| 1N5244      | 14                                 | 9            | 0.25      | 0.1                     | 10  | 15                                    | 600                   | 0.082                   |
| 1N5245      | 15                                 | 8.5          | 0.25      | 0.1                     | 11  | 16                                    | 600                   | 0.082                   |
| 1N5246      | 16                                 | 7.8          | 0.25      | 0.1                     | 12  | 17                                    | 600                   | 0.083                   |
| 1N5247      | 17                                 | 7.4          | 0.25      | 0.1                     | 13  | 19                                    | 600                   | 0.084                   |
| 1N5248      | 18                                 | 7            | 0.25      | 0.1                     | 14  | 21                                    | 600                   | 0.085                   |
| 1N5249      | 19                                 | 6.6          | 0.25      | 0.1                     | 14  | 23                                    | 600                   | 0.086                   |
| 1N5250      | 20                                 | 6.2          | 0.25      | 0.1                     | 15  | 25                                    | 600                   | 0.086                   |
| 1N5251      | 22                                 | 5.6          | 0.25      | 0.1                     | 17  | 29                                    | 600                   | 0.087                   |
| 1N5252      | 24                                 | 5.2          | 0.25      | 0.1                     | 18  | 33                                    | 600                   | 0.088                   |
| 1N5253      | 25                                 | 5            | 0.25      | 0.1                     | 19  | 35                                    | 600                   | 0.089                   |
| 1N5254      | 27                                 | 4.6          | 0.25      | 0.1                     | 21  | 41                                    | 600                   | 0.09                    |
| 1N5255      | 28                                 | 4.5          | 0.25      | 0.1                     | 21  | 44                                    | 600                   | 0.091                   |
| 1N5256      | 30                                 | 4.2          | 0.25      | 0.1                     | 23  | 49                                    | 600                   | 0.091                   |
| 1N5257      | 33                                 | 3.8          | 0.25      | 0.1                     | 25  | 58                                    | 700                   | 0.092                   |
| 1N5258      | 36                                 | 3.4          | 0.25      | 0.1                     | 27  | 70                                    | 700                   | 0.093                   |
| 1N5259      | 39                                 | 3.2          | 0.25      | 0.1                     | 30  | 80                                    | 800                   | 0.094                   |
| 1N5260      | 43                                 | 3            | 0.25      | 0.1                     | 33  | 93                                    | 900                   | 0.095                   |
| 1N5261      | 47                                 | 2.7          | 0.25      | 0.1                     | 36  | 105                                   | 1000                  | 0.095                   |
| 1N5262      | 51                                 | 2.5          | 0.25      | 0.1                     | 39  | 125                                   | 1100                  | 0.096                   |
| 1N5263      | 56                                 | 2.2          | 0.25      | 0.1                     | 43  | 150                                   | 1300                  | 0.096                   |
| 1N5264      | 60                                 | 2.1          | 0.25      | 0.1                     | 46  | 170                                   | 1400                  | 0.097                   |
| 1N5265      | 62                                 | 2            | 0.25      | 0.1                     | 47  | 185                                   | 1400                  | 0.097                   |
| 1N5266      | 68                                 | 1.8          | 0.25      | 0.1                     | 52  | 230                                   | 1600                  | 0.097                   |
| 1N5267      | 75                                 | 1.7          | 0.25      | 0.1                     | 56  | 270                                   | 1700                  | 0.098                   |

**Note**

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

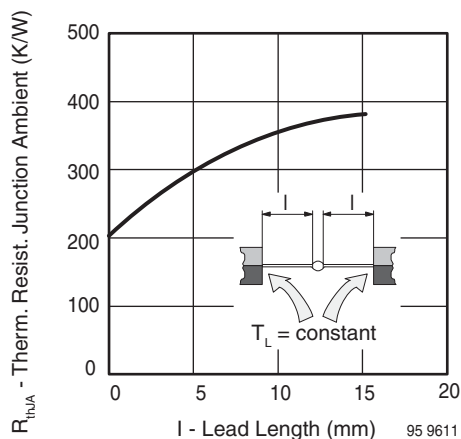
**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Thermal Resistance vs. Lead Length

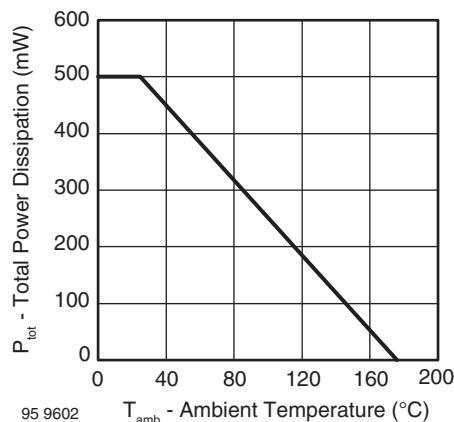


Fig. 4 - Total Power Dissipation vs. Ambient Temperature

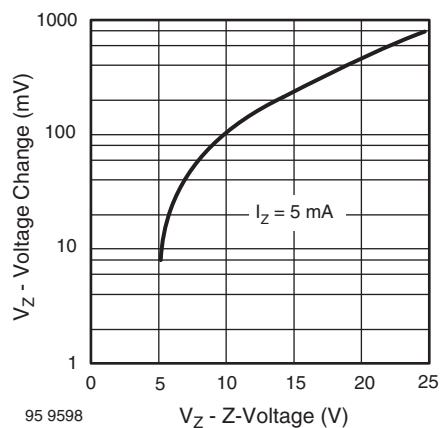
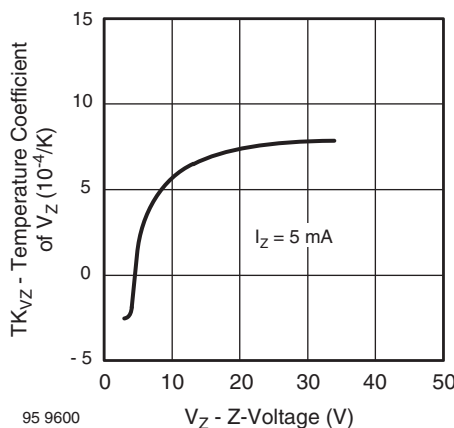
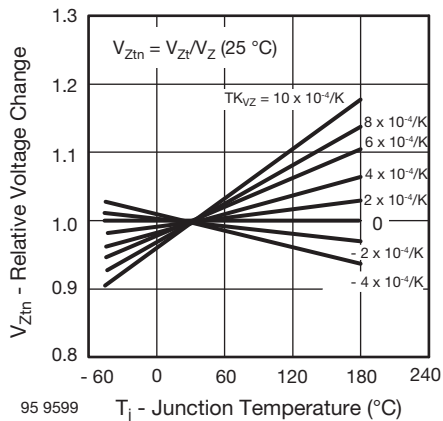

Fig. 2 - Typical Change of Working Voltage under Operating Conditions at  $T_{amb} = 25\text{ }^{\circ}\text{C}$ 

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


Fig. 3 - Typical Change of Working Voltage vs. Junction Temperature

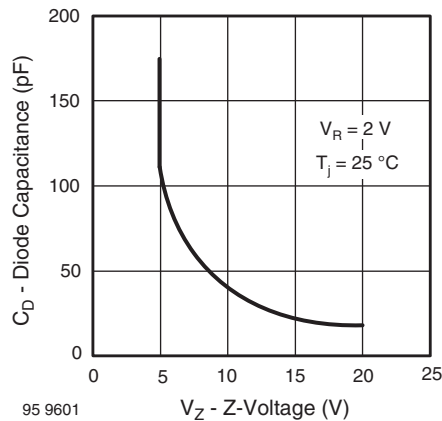


Fig. 6 - Diode Capacitance vs. Z-Voltage

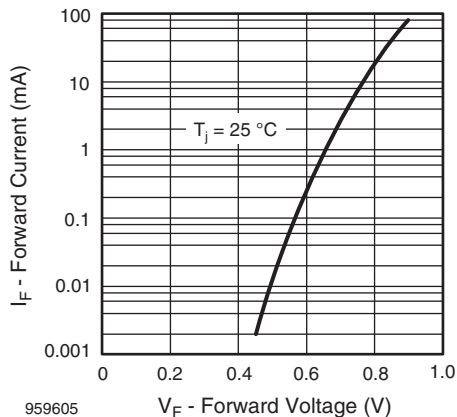


Fig. 7 - Forward Current vs. Forward Voltage

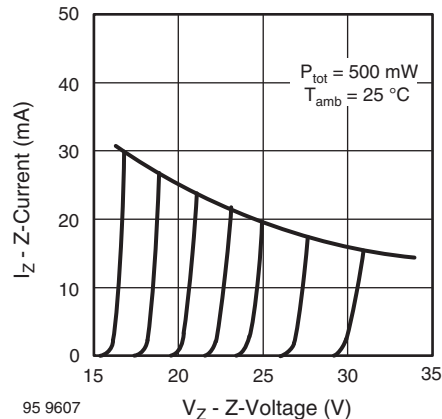


Fig. 9 - Z-Current vs. Z-Voltage

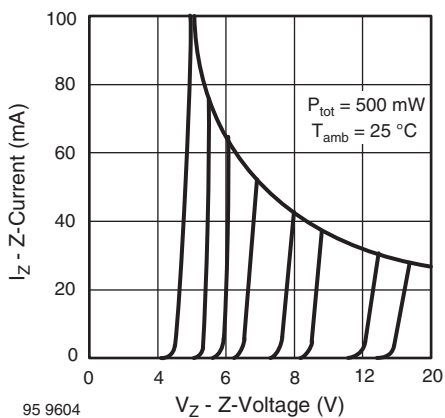


Fig. 8 - Z-Current vs. Z-Voltage

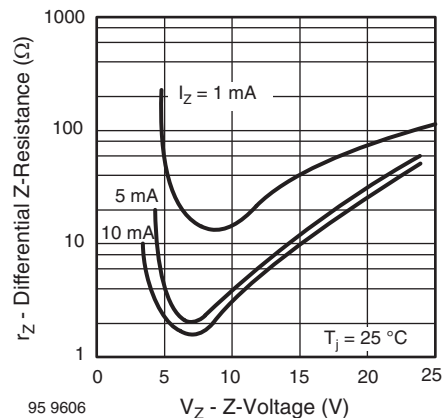


Fig. 10 - Differential Z-Resistance vs. Z-Voltage

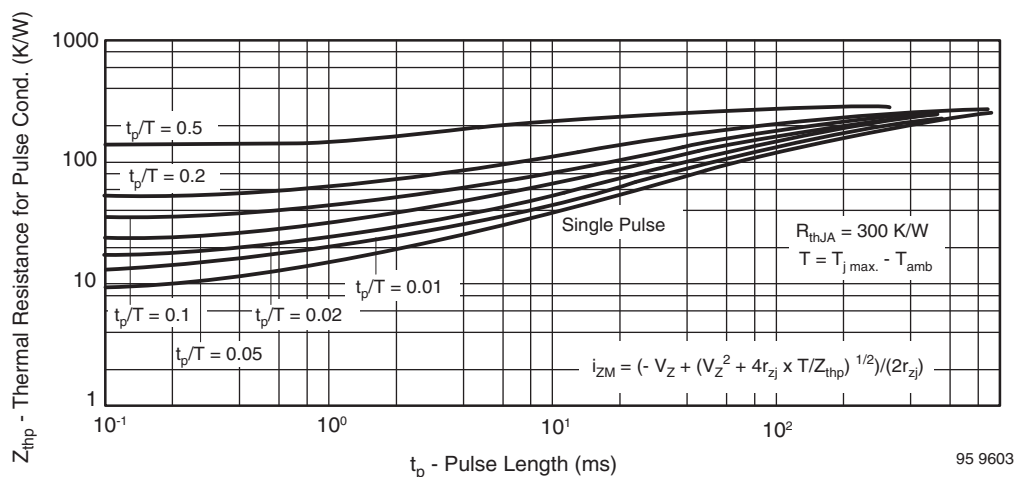
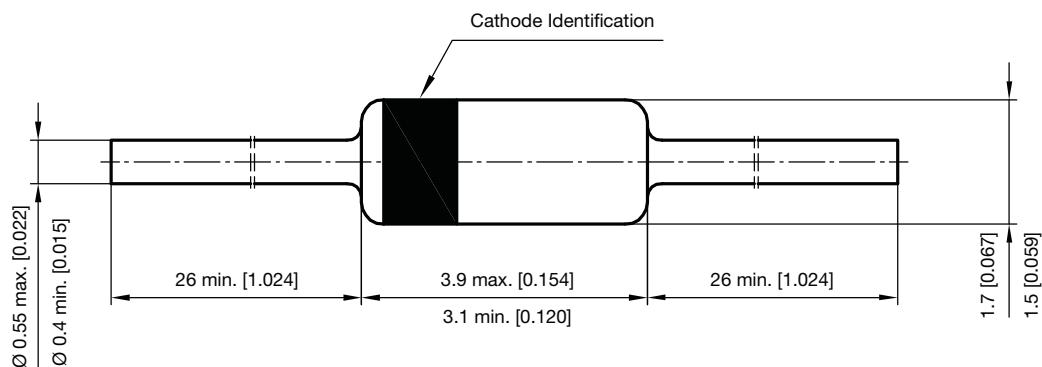


Fig. 11 - Thermal Response



**PACKAGE DIMENSIONS** in millimeters (inches): **DO-35\_1N52xx**



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