



# 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
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



RoHS COMPLIANT HALOGEN FREE

### LINKS TO ADDITIONAL RESOURCES



| PRIMARY CHARACTERISTICS      |                     |      |
|------------------------------|---------------------|------|
| PARAMETER                    | VALUE               | UNIT |
| V <sub>Z</sub> range nom.    | 2.4 to 75           | V    |
| Test current I <sub>ZT</sub> | 1.7 to 20           | mA   |
| V <sub>Z</sub> specification | Thermal equilibrium |      |
| Circuit configuration        | Single              |      |

### APPLICATIONS

- Voltage stabilization

| 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 (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 (DO-204AH) | 125 mg | UL 94 V-0                            | MSL level 1 (according J-STD-020) | Peak temperature max. 260 °C |

| ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified) |                                     |                   |                                  |      |
|---|-------------------------------------|-------------------|----------------------------------|------|
| PARAMETER   | TEST CONDITION                      | SYMBOL            | VALUE                            | UNIT |
| Power dissipation   | T <sub>L</sub> ≤ 25 °C              | P <sub>tot</sub>  | 500                              | mW   |
| Zener current   |                                     | I <sub>Z</sub>    | P <sub>tot</sub> /V <sub>Z</sub> | mA   |
| Thermal resistance junction to ambient air                                      | l = 4 mm, T <sub>L</sub> = constant | R <sub>thJA</sub> | 300                              | K/W  |
| Junction temperature  |                                     | T <sub>j</sub>    | 175                              | °C   |
| Storage temperature range   |                                     | T <sub>stg</sub>  | -65 to +175                      | °C   |
| Forward voltage (max.)  | I <sub>F</sub> = 200 mA             | V <sub>F</sub>    | 1.1                              | V    |



| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , 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

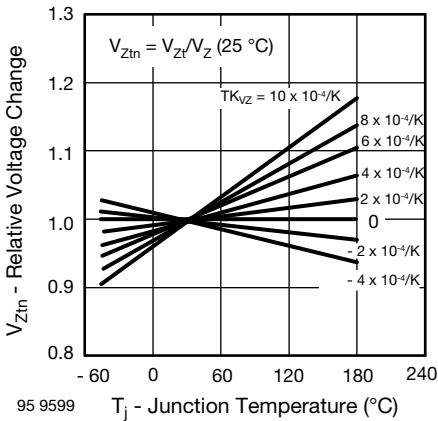


Fig. 3 - Typical Change of Working Voltage vs. Junction Temperature

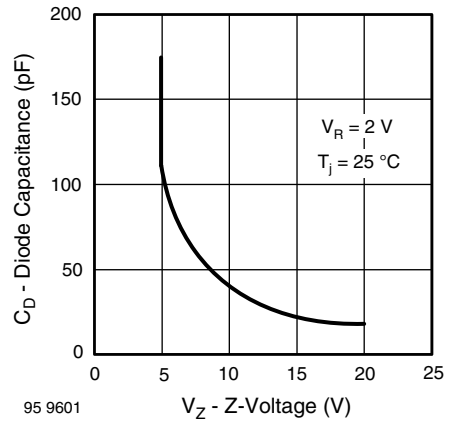


Fig. 6 - Diode Capacitance vs. Z-Voltage



Fig. 7 - Forward Current vs. Forward Voltage

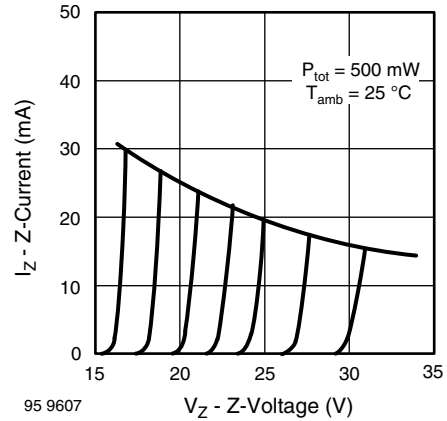


Fig. 9 - Z-Current vs. Z-Voltage

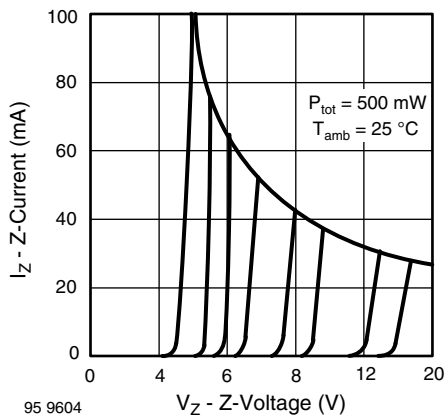


Fig. 8 - Z-Current vs. Z-Voltage

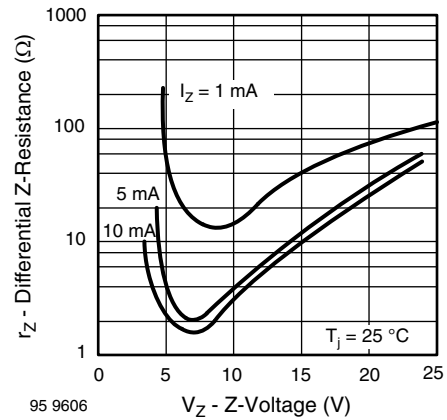


Fig. 10 - Differential Z-Resistance vs. Z-Voltage

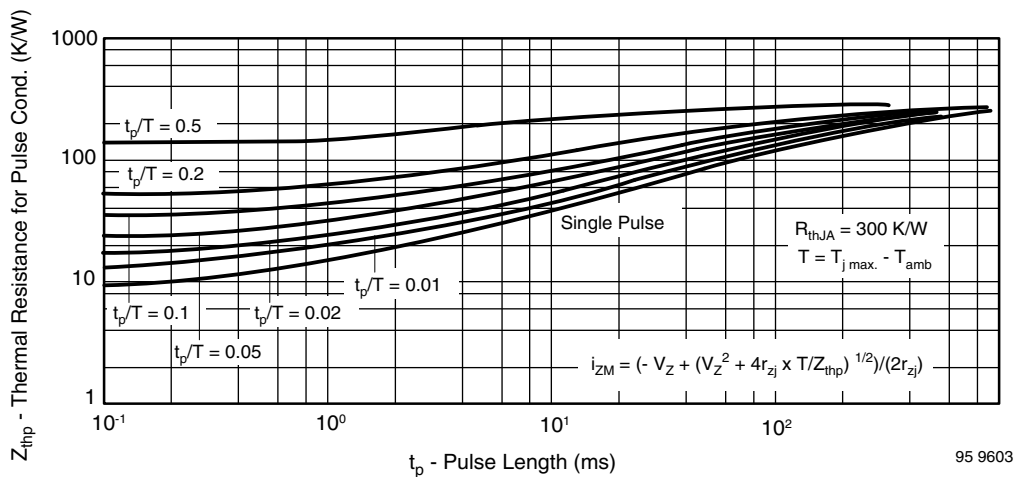
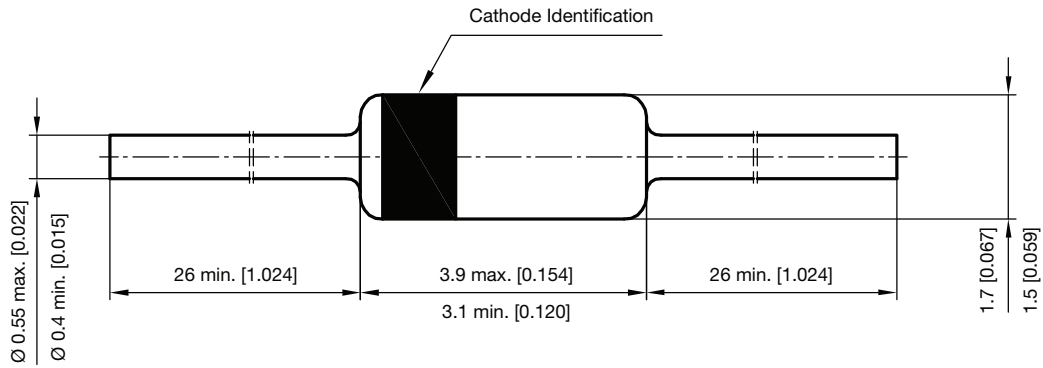


Fig. 11 - Thermal Response



**PACKAGE DIMENSIONS** in millimeters (inches): **DO-35 (DO-204AH)\_1N52xx**



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