

## Small Signal Zener Diodes



### DESIGN SUPPORT TOOLS


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### FEATURES

- Very sharp reverse characteristic
- Low reverse current level
- Available with tighter tolerances
- Very high stability
- Low noise
- $V_Z$  - tolerance  $\pm 5\%$
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

### 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 |      |
| Circuit configuration | Single              |      |

### ORDERING INFORMATION

| DEVICE NAME          | ORDERING CODE                    | TAPED UNITS PER REEL  | MINIMUM ORDER QUANTITY |
|----------------------|----------------------------------|-----------------------|------------------------|
| TZQ5221B to TZQ5267B | TZQ5221B to TZQ5267-series-GS18  | 10 000 (per 13" reel) | 10 000/box             |
| TZQ5221B to TZQ5267B | TZQ5221B to TZQ5267B-series-GS08 | 2500 (per 7" reel)    | 12 500/box             |

### PACKAGE

| PACKAGE NAME        | WEIGHT | MOLDING COMPOUND<br>FLAMMABILITY RATING | MOISTURE SENSITIVITY<br>LEVEL        | SOLDERING CONDITIONS     |
|---------------------|--------|---|--------------------------------------|--------------------------|
| QuadroMELF (SOD-80) | 34 mg  | UL 94 V-0                               | MSL level 1<br>(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             | $R_{thJA} \leq 300\text{ K/W}$     | $P_{tot}$  | 500           | mW   |
| Zener current                 |                                    | $I_Z$      | $P_{tot}/V_Z$ | mA   |
| Junction to ambient air       | On PC board 50 mm x 50 mm x 1.6 mm | $R_{thJA}$ | 500           | K/W  |
| Junction temperature, maximum |                                    | $T_J$      | 175           | °C   |
| Storage temperature range     |                                    | $T_{stg}$  | -65 to +175   | °C   |
| Forward voltage (max.)        | $I_F = 200\text{ mA}$              | $V_F$      | 1.5           | V    |



| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                     |              |           |                         |     |                    |                       |                         |
|--|---------------------|--------------|-----------|-------------------------|-----|--------------------|-----------------------|-------------------------|
| PART NUMBER  | ZENER VOLTAGE RANGE | TEST CURRENT |           | REVERSE LEAKAGE CURRENT |     | DYNAMIC RESISTANCE |                       | TEMPERATURE COEFFICIENT |
|  | $V_Z$ at $I_{ZT1}$  | $I_{ZT1}$    | $I_{ZT2}$ | $I_R$ at $V_R$          |     | $Z_Z$ at $I_{ZT1}$ | $Z_{ZK}$ at $I_{ZT2}$ | $TK_{VZ}$               |
|  | V                   | mA           |           | $\mu\text{A}$           | V   | $\Omega$           |                       | %/K                     |
|  | NOM.                |              |           |                         |     |                    |                       |                         |
| TZQ5221B   | 2.4                 | 20           | 0.25      | < 100                   | 1   | < 30               | < 1200                | < -0.085                |
| TZQ5222B   | 2.5                 | 20           | 0.25      | < 100                   | 1   | < 30               | < 1250                | < -0.085                |
| TZQ5223B   | 2.7                 | 20           | 0.25      | < 75                    | 1   | < 30               | < 1300                | < -0.080                |
| TZQ5224B   | 2.8                 | 20           | 0.25      | < 75                    | 1   | < 30               | < 1400                | < -0.080                |
| TZQ5225B   | 3                   | 20           | 0.25      | < 50                    | 1   | < 29               | < 1600                | < -0.075                |
| TZQ5226B   | 3.3                 | 20           | 0.25      | < 25                    | 1   | < 28               | < 1600                | < -0.070                |
| TZQ5227B   | 3.6                 | 20           | 0.25      | < 15                    | 1   | < 24               | < 1700                | < -0.065                |
| TZQ5228B   | 3.9                 | 20           | 0.25      | < 10                    | 1   | < 23               | < 1900                | < -0.060                |
| TZQ5229B   | 4.3                 | 20           | 0.25      | < 5                     | 1   | < 22               | < 2000                | < $\pm 0.055$           |
| TZQ5230B   | 4.7                 | 20           | 0.25      | < 5                     | 2   | < 19               | < 1900                | < $\pm 0.030$           |
| TZQ5231B   | 5.1                 | 20           | 0.25      | < 5                     | 2   | < 17               | < 1600                | < $\pm 0.030$           |
| TZQ5232B   | 5.6                 | 20           | 0.25      | < 5                     | 3   | < 11               | < 1600                | < +0.038                |
| TZQ5233B   | 6                   | 20           | 0.25      | < 5                     | 3.5 | < 7                | < 1600                | < +0.038                |
| TZQ5234B   | 6.2                 | 20           | 0.25      | < 5                     | 4   | < 7                | < 1000                | < +0.045                |
| TZQ5235B   | 6.8                 | 20           | 0.25      | < 3                     | 5   | < 5                | < 750                 | < +0.050                |
| TZQ5236B   | 7.5                 | 20           | 0.25      | < 3                     | 6   | < 6                | < 500                 | < +0.058                |
| TZQ5237B   | 8.2                 | 20           | 0.25      | < 3                     | 6.5 | < 8                | < 500                 | < +0.062                |
| TZQ5238B   | 8.7                 | 20           | 0.25      | < 3                     | 6.5 | < 8                | < 600                 | < +0.065                |
| TZQ5239B   | 9.1                 | 20           | 0.25      | < 3                     | 7   | < 10               | < 600                 | < +0.068                |
| TZQ5240B   | 10                  | 20           | 0.25      | < 3                     | 8   | < 17               | < 600                 | < +0.075                |
| TZQ5241B   | 11                  | 20           | 0.25      | < 2                     | 8.4 | < 22               | < 600                 | < +0.076                |
| TZQ5242B   | 12                  | 20           | 0.25      | < 1                     | 9.1 | < 30               | < 600                 | < +0.077                |
| TZQ5243B   | 13                  | 9.5          | 0.25      | < 0.5                   | 9.9 | < 13               | < 600                 | < +0.079                |
| TZQ5244B   | 14                  | 9            | 0.25      | < 0.1                   | 10  | < 15               | < 600                 | < +0.082                |
| TZQ5245B   | 15                  | 8.5          | 0.25      | < 0.1                   | 11  | < 16               | < 600                 | < +0.082                |
| TZQ5246B   | 16                  | 7.8          | 0.25      | < 0.1                   | 12  | < 17               | < 600                 | < +0.083                |
| TZQ5247B   | 17                  | 7.4          | 0.25      | < 0.1                   | 13  | < 19               | < 600                 | < +0.084                |
| TZQ5248B   | 18                  | 7            | 0.25      | < 0.1                   | 14  | < 21               | < 600                 | < +0.085                |
| TZQ5249B   | 19                  | 6.6          | 0.25      | < 0.1                   | 14  | < 23               | < 600                 | < +0.086                |
| TZQ5250B   | 20                  | 6.2          | 0.25      | < 0.1                   | 15  | < 25               | < 600                 | < +0.086                |
| TZQ5251B   | 22                  | 5.6          | 0.25      | < 0.1                   | 17  | < 29               | < 600                 | < +0.087                |
| TZQ5252B   | 24                  | 5.2          | 0.25      | < 0.1                   | 18  | < 33               | < 600                 | < +0.088                |
| TZQ5253B   | 25                  | 5            | 0.25      | < 0.1                   | 19  | < 35               | < 600                 | < +0.089                |
| TZQ5254B   | 27                  | 4.6          | 0.25      | < 0.1                   | 21  | < 41               | < 600                 | < +0.090                |
| TZQ5255B   | 28                  | 4.5          | 0.25      | < 0.1                   | 21  | < 44               | < 600                 | < +0.091                |
| TZQ5256B   | 30                  | 4.2          | 0.25      | < 0.1                   | 23  | < 49               | < 600                 | < +0.091                |
| TZQ5257B   | 33                  | 3.8          | 0.25      | < 0.1                   | 25  | < 58               | < 700                 | < +0.092                |
| TZQ5258B   | 36                  | 3.4          | 0.25      | < 0.1                   | 27  | < 70               | < 700                 | < +0.093                |
| TZQ5259B   | 39                  | 3.2          | 0.25      | < 0.1                   | 30  | < 80               | < 800                 | < +0.094                |
| TZQ5260B   | 43                  | 3            | 0.25      | < 0.1                   | 33  | < 93               | < 900                 | < +0.095                |
| TZQ5261B   | 47                  | 2.7          | 0.25      | < 0.1                   | 36  | < 105              | < 1000                | < +0.095                |
| TZQ5262B   | 51                  | 2.5          | 0.25      | < 0.1                   | 39  | < 125              | < 1100                | < +0.096                |
| TZQ5263B   | 56                  | 2.2          | 0.25      | < 0.1                   | 43  | < 150              | < 1300                | < +0.096                |
| TZQ5264B   | 60                  | 2.1          | 0.25      | < 0.1                   | 46  | < 170              | < 1400                | < +0.097                |
| TZQ5265B   | 62                  | 2            | 0.25      | < 0.1                   | 47  | < 185              | < 1400                | < +0.097                |
| TZQ5266B   | 68                  | 1.8          | 0.25      | < 0.1                   | 52  | < 230              | < 1600                | < +0.097                |
| TZQ5267B   | 75                  | 1.7          | 0.25      | < 0.1                   | 56  | < 270              | < 1700                | < +0.098                |

**Note**

- Based on DC measurement at thermal equilibrium; case temperature maintained at  $30\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$

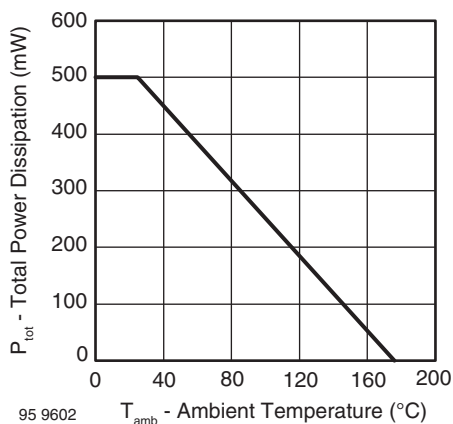
**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Total Power Dissipation vs. Ambient Temperature

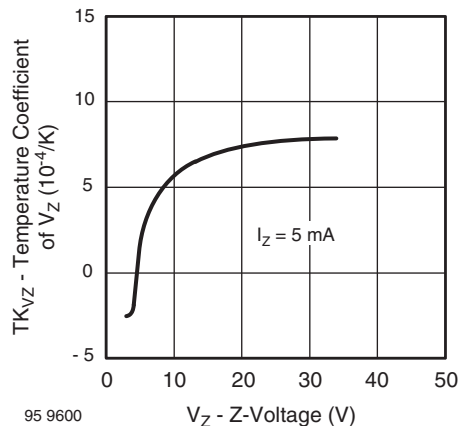
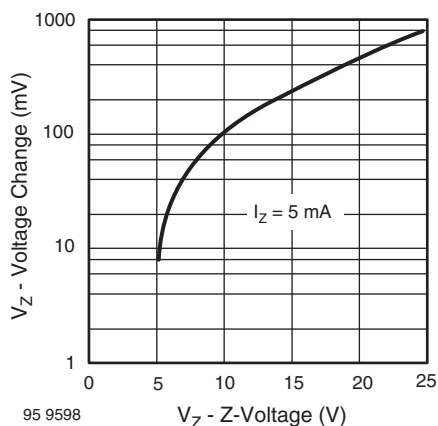
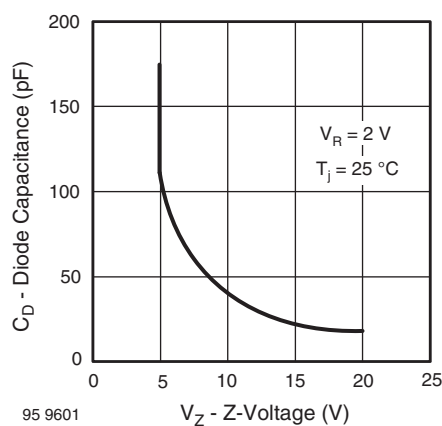

Fig. 4 - Temperature Coefficient of  $V_Z$  vs. Z-Voltage

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


Fig. 5 - Diode Capacitance vs. Z-Voltage

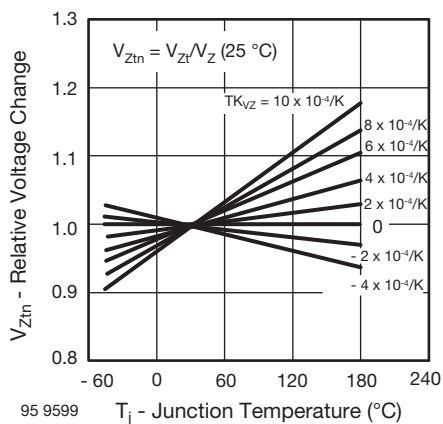


Fig. 3 - Typical Change of Working Voltage vs. Junction Temperature

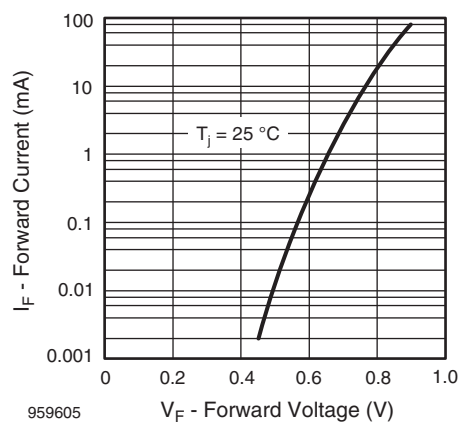


Fig. 6 - Forward Current vs. Forward Voltage

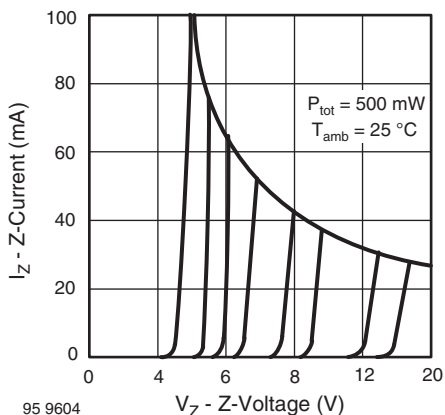


Fig. 7 - Z-Current vs. Z-Voltage

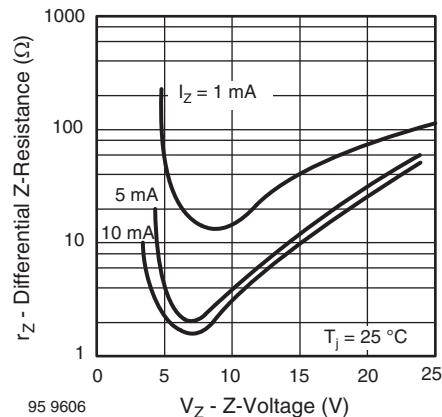


Fig. 9 - Differential Z-Resistance vs. Z-Voltage

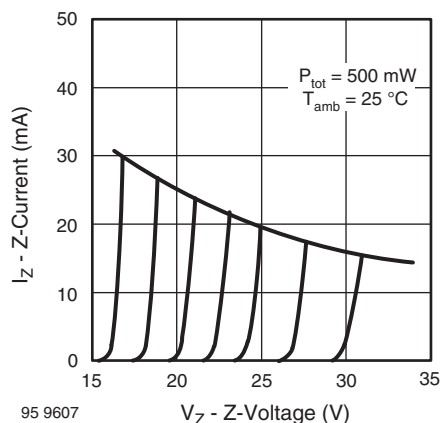


Fig. 8 - Z-Current vs. Z-Voltage

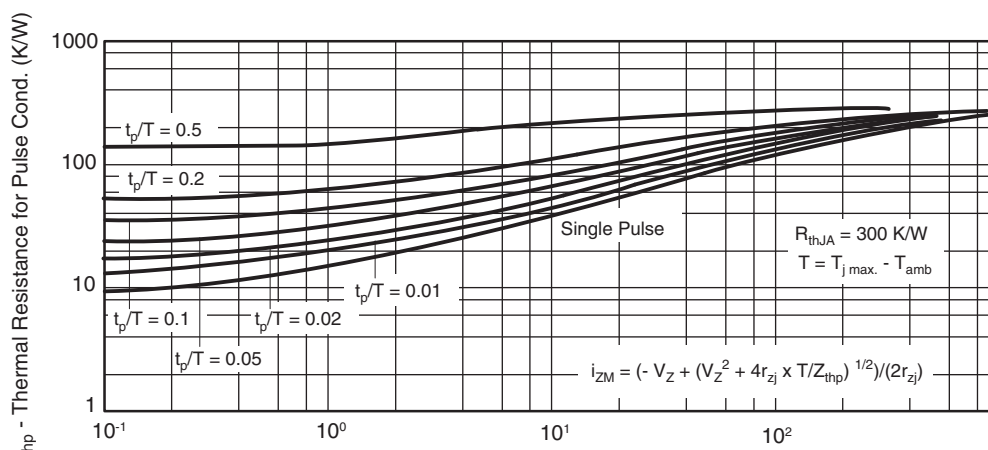
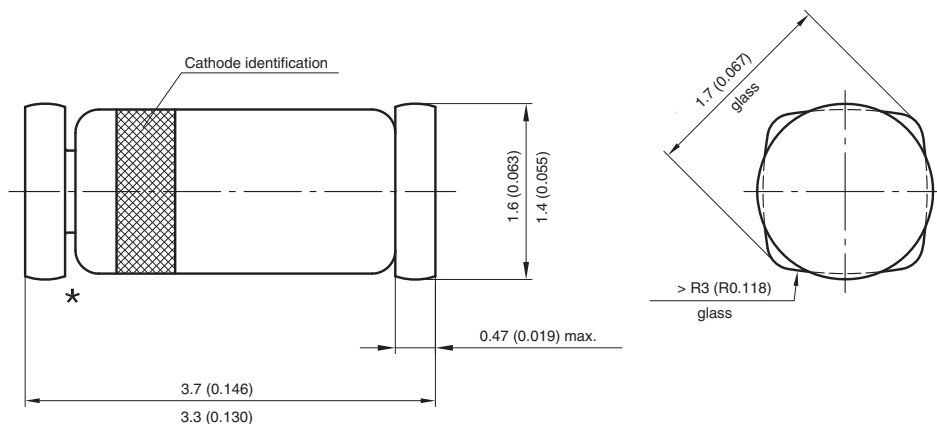


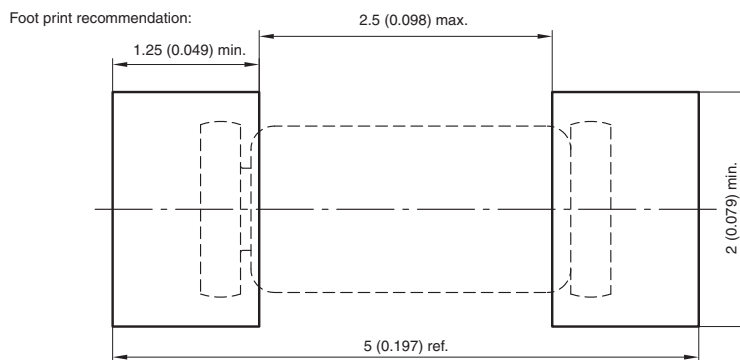
Fig. 10 - Thermal Response



**PACKAGE DIMENSIONS** in millimeters (inches): **QuadroMELF SOD-80**



★ The gap between plug and glass can be either on cathode or anode side



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