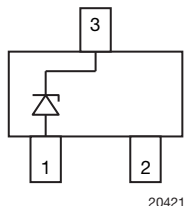
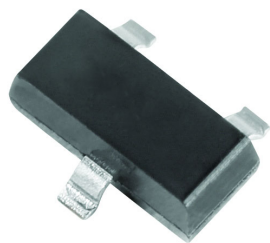


## Small Signal Zener Diodes



20421

### DESIGN SUPPORT TOOLS


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### FEATURES

- Silicon planar Zener diodes
- The Zener voltages are graded according to the international E24 standard. Standard Zener voltage tolerance is  $\pm 5\%$ , indicated by the "C" in the ordering code. Replace "C" with "B" for  $\pm 2\%$  tolerance.
- AEC-Q101 qualified available
- ESD capability acc. to AEC-Q101:  
human body model:  $> 8\text{ kV}$ ,  
machine model:  $> 800\text{ V}$
- Base P/N-E3 - RoHS-compliant, commercial grade
- Base P/N-HE3 - RoHS-compliant, AEC-Q101 qualified
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

### PRIMARY CHARACTERISTICS

| PARAMETER             | VALUE         | UNIT |
|-----------------------|---------------|------|
| $V_Z$ range nom.      | 2.4 to 75     | V    |
| Test current $I_{ZT}$ | 2; 5          | mA   |
| $V_Z$ specification   | Pulse current |      |
| Circuit configuration | Single        |      |

### ORDERING INFORMATION

| DEVICE NAME  | ORDERING CODE                       | TAPED UNITS PER REEL           | MINIMUM ORDER QUANTITY |
|--------------|-------------------------------------|--------------------------------|------------------------|
| BZX84-series | BZX84C2V4-E3-08 to BZX84C75-E3-08   | 3000 (8 mm tape on 7" reel)    | 15 000                 |
|              | BZX84B2V4-E3-08 to BZX84B75-E3-08   |                                |                        |
|              | BZX84C2V4-HE3-08 to BZX84C75-HE3-08 |                                |                        |
|              | BZX84B2V4-HE3-08 to BZX84B75-HE3-08 |                                |                        |
|              | BZX84C2V4-E3-18 to BZX84C75-E3-18   | 10 000 (8 mm tape on 13" reel) | 10 000                 |
|              | BZX84B2V4-E3-18 to BZX84B75-E3-18   |                                |                        |
|              | BZX84C2V4-HE3-18 to BZX84C75-HE3-18 |                                |                        |
|              | BZX84B2V4-HE3-18 to BZX84B75-HE3-18 |                                |                        |

### PACKAGE

| PACKAGE NAME | WEIGHT | MOLDING COMPOUND<br>FLAMMABILITY RATING | MOISTURE SENSITIVITY<br>LEVEL        | SOLDERING CONDITIONS     |
|--------------|--------|-----------------------------------------|--------------------------------------|--------------------------|
| SOT-23       | 8.8 mg | UL 94 V-0                               | MSL level 1<br>(according J-STD-020) | 260 °C/10 s at terminals |

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                  | TEST CONDITION                                                                   | SYMBOL     | VALUE       | UNIT |
|--------------------------------------------|----------------------------------------------------------------------------------|------------|-------------|------|
| Power dissipation                          | $T_{amb} = 25\text{ °C}$ , device on fiberglass substrate, acc. layout on page 7 | $P_{tot}$  | 300         | mW   |
| Thermal resistance junction to ambient air | $T_{amb} = 25\text{ °C}$ , device on fiberglass substrate, acc. layout on page 7 | $R_{thJA}$ | 420         | K/W  |
| Junction temperature                       |                                                                                  | $T_j$      | 150         | °C   |
| Storage temperature range                  |                                                                                  | $T_{stg}$  | -65 to +150 | °C   |
| Operating temperature range                |                                                                                  | $T_{op}$   | -55 to +150 | °C   |

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

| PART NUMBER | MARKING CODE | ZENER VOLTAGE RANGE |      |      | TEST CURRENT |           | REVERSE LEAKAGE CURRENT |      | DYNAMIC RESISTANCE<br>$f = 1\text{ kHz}$ |                       | TEMPERATURE COEFFICIENT    |      |
|-------------|--------------|---------------------|------|------|--------------|-----------|-------------------------|------|------------------------------------------|-----------------------|----------------------------|------|
|             |              | $V_Z$ at $I_{ZT1}$  |      |      | $I_{ZT1}$    | $I_{ZT2}$ | $I_R$ at $V_R$          |      | $Z_Z$ at $I_{ZT1}$                       | $Z_{ZK}$ at $I_{ZT2}$ | $\alpha_{VZ}$ at $I_{ZT1}$ |      |
|             |              | V                   |      |      | mA           |           | $\mu\text{A}$           | V    | $\Omega$                                 |                       | $10^{-4}/^{\circ}\text{C}$ |      |
|             |              | MIN.                | NOM. | MAX. |              |           |                         |      | MAX.                                     | MAX.                  | MIN.                       | MAX. |
| BZX84C2V4   | Z11          | 2.2                 | 2.4  | 2.6  | 5            | 1         | 50                      | 1    | 100                                      | 275                   | -9                         | -4   |
| BZX84C2V7   | Z12          | 2.5                 | 2.7  | 2.9  | 5            | 1         | 20                      | 1    | 100                                      | 600                   | -9                         | -4   |
| BZX84C3V0   | Z13          | 2.8                 | 3.0  | 3.2  | 5            | 1         | 10                      | 1    | 95                                       | 600                   | -9                         | -3   |
| BZX84C3V3   | Z14          | 3.1                 | 3.3  | 3.5  | 5            | 1         | 5                       | 1    | 95                                       | 600                   | -8                         | -3   |
| BZX84C3V6   | Z15          | 3.4                 | 3.6  | 3.8  | 5            | 1         | 5                       | 1    | 90                                       | 600                   | -8                         | -3   |
| BZX84C3V9   | Z16          | 3.7                 | 3.9  | 4.1  | 5            | 1         | 3                       | 1    | 90                                       | 600                   | -7                         | -3   |
| BZX84C4V3   | Z17          | 4.0                 | 4.3  | 4.6  | 5            | 1         | 3                       | 1    | 90                                       | 600                   | -6                         | -1   |
| BZX84C4V7   | Z1           | 4.4                 | 4.7  | 5.0  | 5            | 1         | 3                       | 2    | 80                                       | 500                   | -5                         | 2    |
| BZX84C5V1   | Z2           | 4.8                 | 5.1  | 5.4  | 5            | 1         | 2                       | 2    | 60                                       | 480                   | -3                         | 4    |
| BZX84C5V6   | Z3           | 5.2                 | 5.6  | 6.0  | 5            | 1         | 1                       | 2    | 40                                       | 400                   | -2                         | 6    |
| BZX84C6V2   | Z4           | 5.8                 | 6.2  | 6.6  | 5            | 1         | 3                       | 4    | 10                                       | 150                   | -1                         | 7    |
| BZX84C6V8   | Z5           | 6.4                 | 6.8  | 7.2  | 5            | 1         | 2                       | 4    | 15                                       | 80                    | 2                          | 7    |
| BZX84C7V5   | Z6           | 7.0                 | 7.5  | 7.9  | 5            | 1         | 1                       | 5    | 15                                       | 80                    | 3                          | 7    |
| BZX84C8V2   | Z7           | 7.7                 | 8.2  | 8.7  | 5            | 1         | 0.7                     | 5    | 15                                       | 80                    | 4                          | 7    |
| BZX84C9V1   | Z8           | 8.5                 | 9.1  | 9.6  | 5            | 1         | 0.5                     | 6    | 15                                       | 100                   | 5                          | 8    |
| BZX84C10    | Z9           | 9.4                 | 10   | 10.6 | 5            | 1         | 0.2                     | 7    | 20                                       | 150                   | 5                          | 8    |
| BZX84C11    | Y1           | 10.4                | 11   | 11.6 | 5            | 1         | 0.1                     | 8    | 20                                       | 150                   | 5                          | 9    |
| BZX84C12    | Y2           | 11.4                | 12   | 12.7 | 5            | 1         | 0.1                     | 8    | 25                                       | 150                   | 6                          | 9    |
| BZX84C13    | Y3           | 12.4                | 13   | 14.1 | 5            | 1         | 0.1                     | 8    | 30                                       | 170                   | 7                          | 9    |
| BZX84C15    | Y4           | 13.8                | 15   | 15.6 | 5            | 1         | 0.05                    | 10.5 | 30                                       | 200                   | 7                          | 9    |
| BZX84C16    | Y5           | 15.3                | 16   | 17.1 | 5            | 1         | 0.05                    | 11.2 | 40                                       | 200                   | 8                          | 9.5  |
| BZX84C18    | Y6           | 16.8                | 18   | 19.1 | 5            | 1         | 0.05                    | 12.6 | 45                                       | 225                   | 8                          | 9.5  |
| BZX84C20    | Y7           | 18.8                | 20   | 21.2 | 5            | 1         | 0.05                    | 14.0 | 55                                       | 225                   | 8                          | 10   |
| BZX84C22    | Y8           | 20.8                | 22   | 23.3 | 5            | 1         | 0.05                    | 15.4 | 55                                       | 250                   | 8                          | 10   |
| BZX84C24    | Y9           | 22.8                | 24   | 25.6 | 5            | 1         | 0.05                    | 16.8 | 70                                       | 250                   | 8                          | 10   |
| BZX84C27    | Y10          | 25.1                | 27   | 28.9 | 2            | 0.5       | 0.05                    | 18.9 | 80                                       | 300                   | 8                          | 10   |
| BZX84C30    | Y11          | 28                  | 30   | 32   | 2            | 0.5       | 0.05                    | 21.0 | 80                                       | 300                   | 8                          | 10   |
| BZX84C33    | Y12          | 31                  | 33   | 35   | 2            | 0.5       | 0.05                    | 23.1 | 80                                       | 325                   | 8                          | 10   |
| BZX84C36    | Y13          | 34                  | 36   | 38   | 2            | 0.5       | 0.05                    | 25.2 | 90                                       | 350                   | 8                          | 10   |
| BZX84C39    | Y14          | 37                  | 39   | 41   | 2            | 0.5       | 0.05                    | 27.3 | 130                                      | 350                   | 10                         | 12   |
| BZX84C43    | Y15          | 40                  | 43   | 46   | 2            | 0.5       | 0.05                    | 30.1 | 150                                      | 375                   | 10                         | 12   |
| BZX84C47    | Y16          | 44                  | 47   | 50   | 2            | 0.5       | 0.05                    | 32.9 | 170                                      | 375                   | 10                         | 12   |
| BZX84C51    | Y17          | 48                  | 51   | 54   | 2            | 0.5       | 0.05                    | 35.7 | 180                                      | 400                   | 10                         | 12   |
| BZX84C56    | Y18          | 52                  | 56   | 60   | 2            | 0.5       | 0.05                    | 39.2 | 200                                      | 425                   | 9                          | 11   |
| BZX84C62    | Y19          | 58                  | 62   | 66   | 2            | 0.5       | 0.05                    | 43.4 | 215                                      | 450                   | 9                          | 12   |
| BZX84C68    | Y20          | 64                  | 68   | 72   | 2            | 0.5       | 0.05                    | 47.6 | 240                                      | 475                   | 10                         | 12   |
| BZX84C75    | Y21          | 70                  | 75   | 79   | 2            | 0.5       | 0.05                    | 52.5 | 255                                      | 500                   | 10                         | 12   |

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

| PART NUMBER | MARKING CODE | ZENER VOLTAGE RANGE |      |      | TEST CURRENT |           | REVERSE LEAKAGE CURRENT |      | DYNAMIC RESISTANCE<br>$f = 1\text{ kHz}$ |                       | TEMPERATURE COEFFICIENT    |      |
|-------------|--------------|---------------------|------|------|--------------|-----------|-------------------------|------|------------------------------------------|-----------------------|----------------------------|------|
|             |              | $V_Z$ at $I_{ZT1}$  |      |      | $I_{ZT1}$    | $I_{ZT2}$ | $I_R$ at $V_R$          |      | $Z_Z$ at $I_{ZT1}$                       | $Z_{ZK}$ at $I_{ZT2}$ | $\alpha_{VZ}$ at $I_{ZT1}$ |      |
|             |              | V                   |      |      | mA           |           | $\mu\text{A}$           | V    | $\Omega$                                 |                       | $10^{-4}/^{\circ}\text{C}$ |      |
|             |              | MIN.                | NOM. | MAX. |              |           |                         |      | MAX.                                     | MAX.                  | MIN.                       | MAX. |
| BZX84B2V4   | Z50          | 2.35                | 2.4  | 2.45 | 5            | 1         | 50                      | 1    | 100                                      | 275                   | -9                         | -4   |
| BZX84B2V7   | Z51          | 2.65                | 2.7  | 2.75 | 5            | 1         | 20                      | 1    | 100                                      | 600                   | -9                         | -4   |
| BZX84B3V0   | Z52          | 2.94                | 3.0  | 3.06 | 5            | 1         | 10                      | 1    | 95                                       | 600                   | -9                         | -3   |
| BZX84B3V3   | Z53          | 3.23                | 3.3  | 3.37 | 5            | 1         | 5                       | 1    | 95                                       | 600                   | -8                         | -3   |
| BZX84B3V6   | Z54          | 3.53                | 3.6  | 3.67 | 5            | 1         | 5                       | 1    | 90                                       | 600                   | -8                         | -3   |
| BZX84B3V9   | Z55          | 3.82                | 3.9  | 3.98 | 5            | 1         | 3                       | 1    | 90                                       | 600                   | -7                         | -3   |
| BZX84B4V3   | Z56          | 4.21                | 4.3  | 4.39 | 5            | 1         | 3                       | 1    | 90                                       | 600                   | -6                         | -1   |
| BZX84B4V7   | Z57          | 4.61                | 4.7  | 4.79 | 5            | 1         | 3                       | 2    | 80                                       | 500                   | -5                         | 2    |
| BZX84B5V1   | Z58          | 5.0                 | 5.1  | 5.2  | 5            | 1         | 2                       | 2    | 60                                       | 480                   | -3                         | 4    |
| BZX84B5V6   | Z59          | 5.49                | 5.6  | 5.71 | 5            | 1         | 1                       | 2    | 40                                       | 400                   | -2                         | 6    |
| BZX84B6V2   | Z60          | 6.08                | 6.2  | 6.32 | 5            | 1         | 3                       | 4    | 10                                       | 150                   | -1                         | 7    |
| BZX84B6V8   | Z61          | 6.66                | 6.8  | 6.94 | 5            | 1         | 2                       | 4    | 15                                       | 80                    | 2                          | 7    |
| BZX84B7V5   | Z62          | 7.35                | 7.5  | 7.65 | 5            | 1         | 1                       | 5    | 15                                       | 80                    | 3                          | 7    |
| BZX84B8V2   | Z63          | 8.04                | 8.2  | 8.36 | 5            | 1         | 0.7                     | 5    | 15                                       | 80                    | 4                          | 7    |
| BZX84B9V1   | Z64          | 8.92                | 9.1  | 9.28 | 5            | 1         | 0.5                     | 6    | 15                                       | 100                   | 5                          | 8    |
| BZX84B10    | Z65          | 9.8                 | 10   | 10.2 | 5            | 1         | 0.2                     | 7    | 20                                       | 150                   | 5                          | 8    |
| BZX84B11    | Z66          | 10.8                | 11   | 11.2 | 5            | 1         | 0.1                     | 8    | 20                                       | 150                   | 5                          | 9    |
| BZX84B12    | Z67          | 11.8                | 12   | 12.2 | 5            | 1         | 0.1                     | 8    | 25                                       | 150                   | 6                          | 9    |
| BZX84B13    | Z68          | 12.7                | 13   | 13.3 | 5            | 1         | 0.1                     | 8    | 30                                       | 170                   | 7                          | 9    |
| BZX84B15    | Z69          | 14.7                | 15   | 15.3 | 5            | 1         | 0.05                    | 10.5 | 30                                       | 200                   | 7                          | 9    |
| BZX84B16    | Z70          | 15.7                | 16   | 16.3 | 5            | 1         | 0.05                    | 11.2 | 40                                       | 200                   | 8                          | 9.5  |
| BZX84B18    | Z71          | 17.6                | 18   | 18.4 | 5            | 1         | 0.05                    | 12.6 | 45                                       | 225                   | 8                          | 9.5  |
| BZX84B20    | Z72          | 19.6                | 20   | 20.4 | 5            | 1         | 0.05                    | 14   | 55                                       | 225                   | 8                          | 10   |
| BZX84B22    | Z73          | 21.6                | 22   | 22.4 | 5            | 1         | 0.05                    | 15.4 | 55                                       | 250                   | 8                          | 10   |
| BZX84B24    | Z74          | 23.5                | 24   | 24.5 | 5            | 1         | 0.05                    | 16.8 | 70                                       | 250                   | 8                          | 10   |
| BZX84B27    | Z75          | 26.5                | 27   | 27.5 | 2            | 0.5       | 0.05                    | 18.9 | 80                                       | 300                   | 8                          | 10   |
| BZX84B30    | Z76          | 29.4                | 30   | 30.6 | 2            | 0.5       | 0.05                    | 21   | 80                                       | 300                   | 8                          | 10   |
| BZX84B33    | Z77          | 32.3                | 33   | 33.7 | 2            | 0.5       | 0.05                    | 23.1 | 80                                       | 325                   | 8                          | 10   |
| BZX84B36    | Z78          | 35.3                | 36   | 36.7 | 2            | 0.5       | 0.05                    | 25.2 | 90                                       | 350                   | 8                          | 10   |
| BZX84B39    | Z79          | 38.2                | 39   | 39.8 | 2            | 0.5       | 0.05                    | 27.3 | 130                                      | 350                   | 10                         | 12   |
| BZX84B43    | Z80          | 42.1                | 43   | 43.9 | 2            | 0.5       | 0.05                    | 30.1 | 150                                      | 375                   | 10                         | 12   |
| BZX84B47    | Z81          | 46.1                | 47   | 47.9 | 2            | 0.5       | 0.05                    | 32.9 | 170                                      | 375                   | 10                         | 12   |
| BZX84B51    | Z82          | 50                  | 51   | 52   | 2            | 0.5       | 0.05                    | 35.7 | 180                                      | 400                   | 10                         | 12   |
| BZX84B56    | Z83          | 54.9                | 56   | 57.1 | 2            | 0.5       | 0.05                    | 39.2 | 200                                      | 425                   | 9                          | 11   |
| BZX84B62    | Z84          | 60.8                | 62   | 63.2 | 2            | 0.5       | 0.05                    | 43.4 | 215                                      | 450                   | 9                          | 12   |
| BZX84B68    | Z85          | 66.6                | 68   | 69.4 | 2            | 0.5       | 0.05                    | 47.6 | 240                                      | 475                   | 10                         | 12   |
| BZX84B75    | Z86          | 73.5                | 75   | 76.5 | 2            | 0.5       | 0.05                    | 52.5 | 255                                      | 500                   | 10                         | 12   |

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

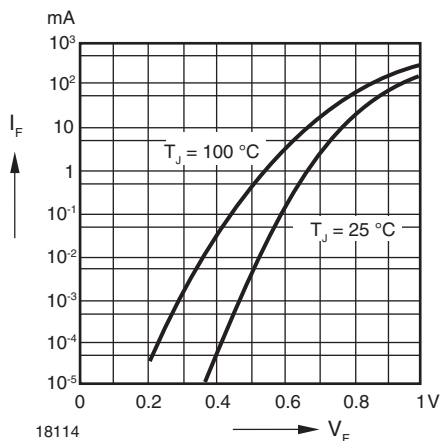


Fig. 1 - Forward Characteristics

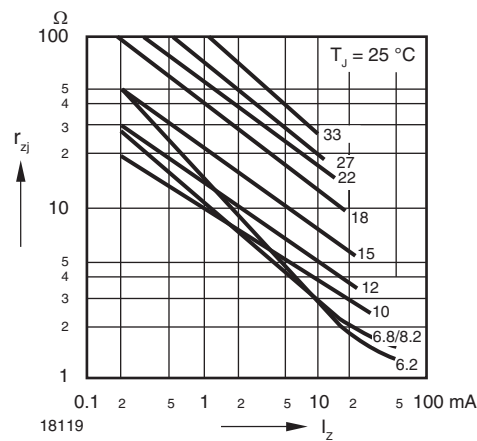


Fig. 4 - Dynamic Resistance vs. Zener Current

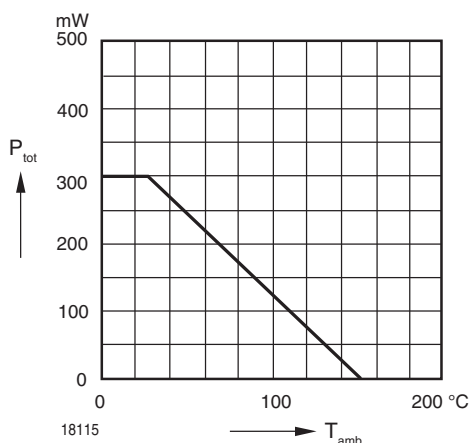


Fig. 2 - Admissible Power Dissipation vs. Ambient Temperature

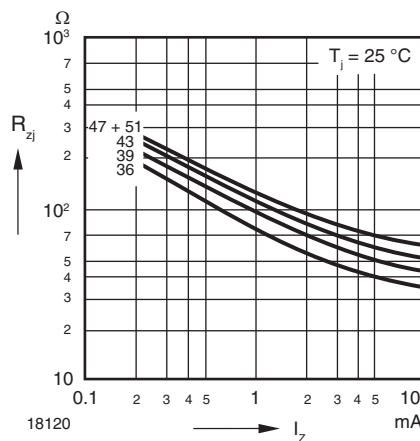


Fig. 5 - Dynamic Resistance vs. Zener Current

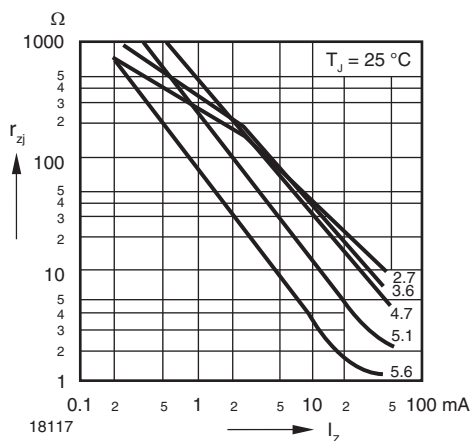


Fig. 3 - Dynamic Resistance vs. Zener Current

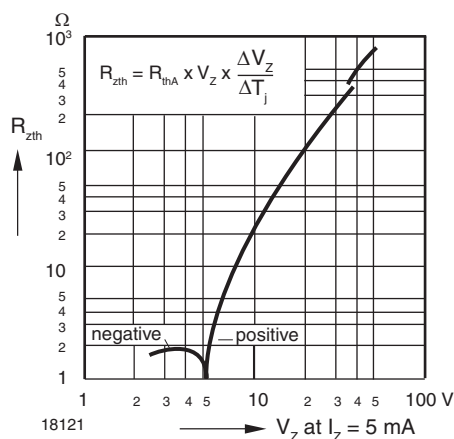


Fig. 6 - Thermal Differential Resistance vs. Zener Voltage

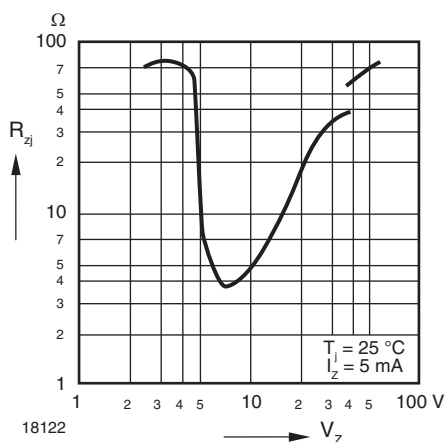


Fig. 7 - Dynamic Resistance vs. Zener Voltage

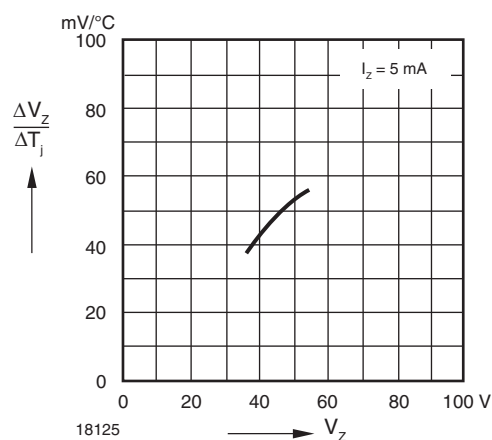


Fig. 10 - Temperature Dependence of Zener Voltage vs. Zener Voltage

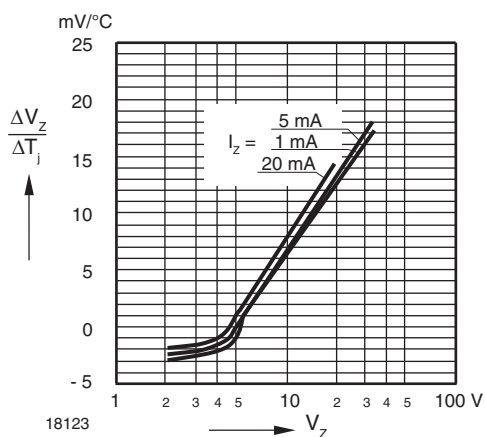


Fig. 8 - Temperature Dependence of Zener Voltage vs. Zener Voltage

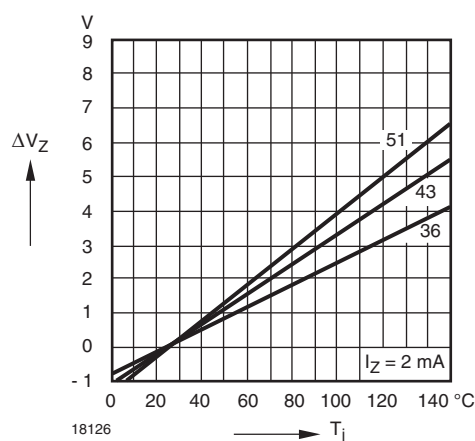


Fig. 11 - Change of Zener Voltage vs. Junction Temperature

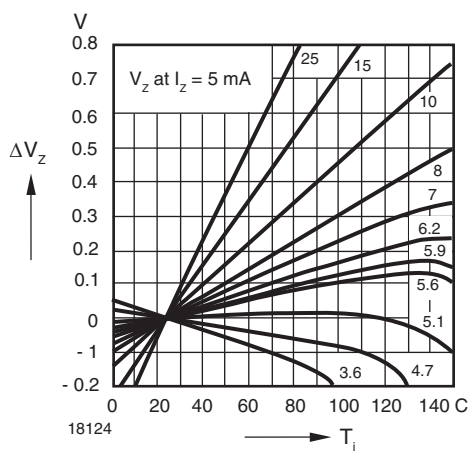


Fig. 9 - Change of Zener Voltage vs. Junction Temperature

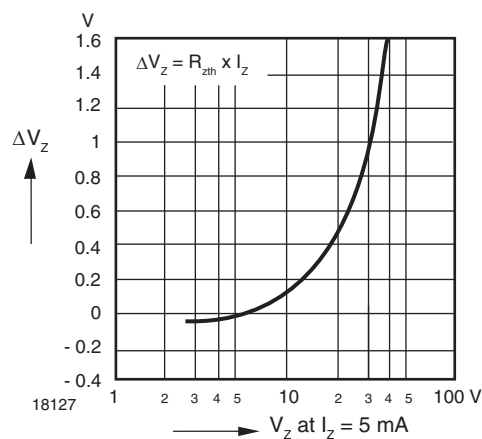


Fig. 12 - Change of Zener Voltage from Turn-on up to the Point of Thermal Equilibrium vs. Zener Voltage

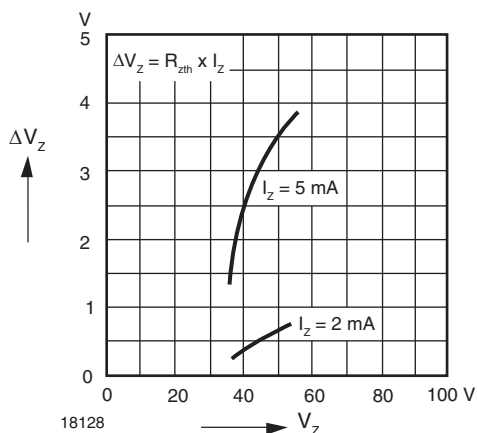


Fig. 13 - Change of Zener Voltage from Turn-on up to the Point of Thermal Equilibrium vs. Zener Voltage

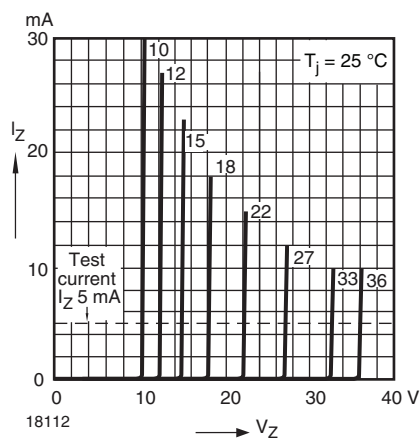


Fig. 15 - Breakdown Characteristics

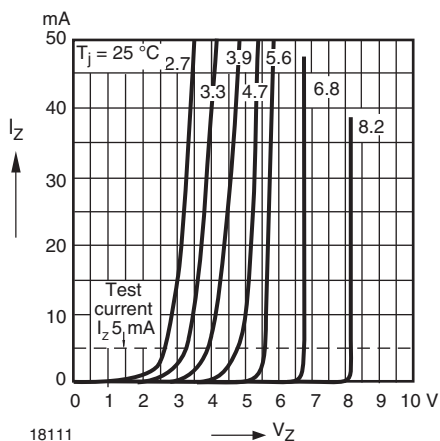


Fig. 14 - Breakdown Characteristics

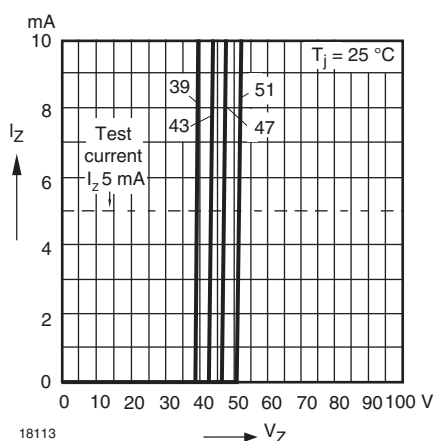


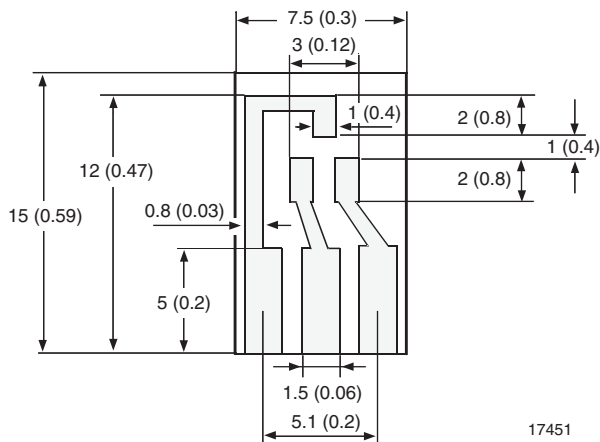
Fig. 16 - Breakdown Characteristics



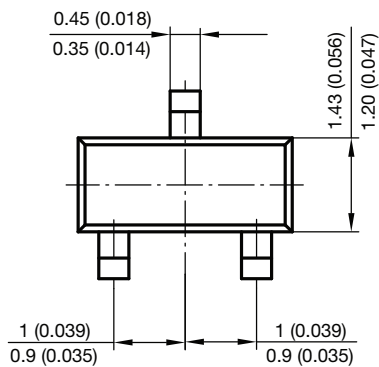
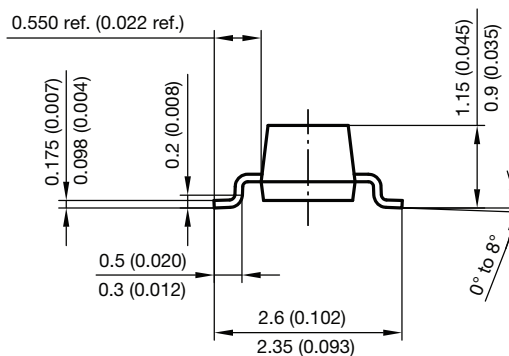
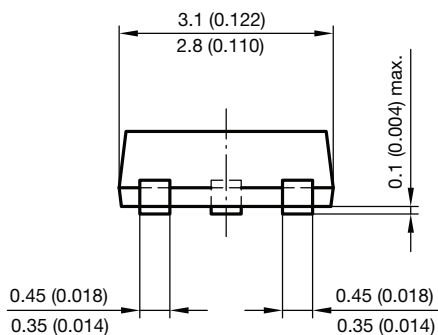
### LAYOUT FOR $R_{thJA}$ TEST

Thickness: fiberglass 0.059" (1.5 mm)

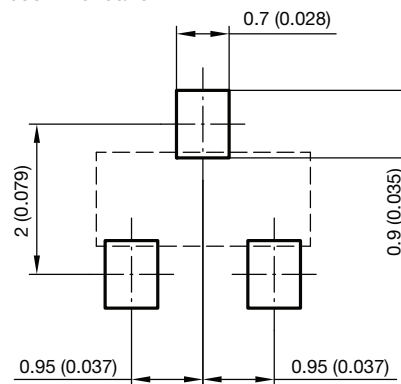
Copper leads 0.012" (0.3 mm)



### PACKAGE DIMENSIONS in millimeters (inches): SOT-23



Foot print recommendation:





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