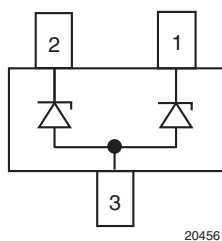


## Small Signal Zener Diodes, Dual



20456

### DESIGN SUPPORT TOOLS


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### PRIMARY CHARACTERISTICS

| PARAMETER             | VALUE             | UNIT |
|-----------------------|-------------------|------|
| $V_Z$ range nom.      | 2.7 to 51         | V    |
| Test current $I_{ZT}$ | 5                 | mA   |
| $V_Z$ specification   | Pulse current     |      |
| Circuit configuration | Dual common anode |      |

### FEATURES

- Dual silicon planar Zener diodes, common anode
- 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 2% tolerance.
- The parameters are valid for both diodes in one case.  $\Delta V_Z$  and  $\Delta R_{Zj}$  of the two diodes in one case is  $\leq 5\%$
- AEC-Q101 qualified available
- ESD capability according to AEC-Q101:  
Human body model > 8 kV  
Machine model > 800 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)



### ORDERING INFORMATION

| DEVICE NAME | ORDERING CODE                     | TAPED UNITS PER REEL           | MINIMUM ORDER QUANTITY |
|-------------|-----------------------------------|--------------------------------|------------------------|
| AZ23-series | AZ23C2V7-E3-08 to AZ23C51-E3-08   | 3000 (8 mm tape on 7" reel)    | 15 000                 |
|             | AZ23B2V7-E3-08 to AZ23B51-E3-08   |                                |                        |
|             | AZ23C2V7-HE3-08 to AZ23C51-HE3-08 |                                |                        |
|             | AZ23B2V7-HE3-08 to AZ23B51-HE3-08 |                                |                        |
|             | AZ23C2V7-E3-18 to AZ23C51-E3-18   | 10 000 (8 mm tape on 13" reel) | 10 000                 |
|             | AZ23B2V7-E3-18 to AZ23B51-E3-18   |                                |                        |
|             | AZ23C2V7-HE3-18 to AZ23C51-HE3-18 |                                |                        |
|             | AZ23B2V7-HE3-18 to AZ23B51-HE3-18 |                                |                        |

### PACKAGE

| PACKAGE NAME | WEIGHT | MOLDING COMPOUND FLAMMABILITY RATING | MOISTURE SENSITIVITY 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 ( $T_{amb} = 25\text{ °C}$ , unless otherwise specified)

| PARAMETER                                   | TEST CONDITION                                       | SYMBOL     | VALUE       | UNIT |
|---------------------------------------------|------------------------------------------------------|------------|-------------|------|
| Power dissipation                           | Device on fiberglass substrate, see layout on page 6 | $P_{tot}$  | 300         | mW   |
| Thermal resistance, junction to ambient air | Device on fiberglass substrate, see layout on page 6 | $R_{thJA}$ | 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 <sup>(1)</sup> |      |      | TEST CURRENT |           | REVERSE VOLTAGE |     | DYNAMIC RESISTANCE |                       | TEMPERATURE COEFFICIENT OF ZENER VOLTAGE |      |
|-------------|--------------|------------------------------------|------|------|--------------|-----------|-----------------|-----|--------------------|-----------------------|------------------------------------------|------|
|             |              | $V_Z$ at $I_{ZT1}$                 |      |      | $I_{ZT1}$    | $I_{ZT2}$ | $V_R$ at $I_R$  |     | $Z_Z$ at $I_{ZT1}$ | $Z_{ZK}$ at $I_{ZT2}$ | $\alpha_{VZ}$ at $I_{ZT}$                |      |
|             |              | V                                  |      |      | mA           |           | V               | nA  | $\Omega$           |                       | $10^{-4}/^{\circ}\text{C}$               |      |
|             |              | MIN.                               | NOM. | MAX. |              |           |                 |     |                    |                       | MIN.                                     | MAX. |
| AZ23C2V7    | D1           | 2.5                                | 2.7  | 2.9  | 5            | 1         | -               | -   | 75 (< 83)          | < 500                 | -9                                       | -4   |
| AZ23C3V0    | D2           | 2.8                                | 3.0  | 3.2  | 5            | 1         | -               | -   | 80 (< 95)          | < 500                 | -9                                       | -3   |
| AZ23C3V3    | D3           | 3.1                                | 3.3  | 3.5  | 5            | 1         | -               | -   | 80 (< 95)          | < 500                 | -8                                       | -3   |
| AZ23C3V6    | D4           | 3.4                                | 3.6  | 3.8  | 5            | 1         | -               | -   | 80 (< 95)          | < 500                 | -8                                       | -3   |
| AZ23C3V9    | D5           | 3.7                                | 3.9  | 4.1  | 5            | 1         | -               | -   | 80 (< 95)          | < 500                 | -7                                       | -3   |
| AZ23C4V3    | D6           | 4                                  | 4.3  | 4.6  | 5            | 1         | -               | -   | 80 (< 95)          | < 500                 | -6                                       | -1   |
| AZ23C4V7    | D7           | 4.4                                | 4.7  | 5    | 5            | 1         | -               | -   | 70 (< 78)          | < 500                 | -5                                       | 2    |
| AZ23C5V1    | D8           | 4.8                                | 5.1  | 5.4  | 5            | 1         | > 0.8           | 100 | 30 (< 60)          | < 480                 | -3                                       | 4    |
| AZ23C5V6    | D9           | 5.2                                | 5.6  | 6    | 5            | 1         | > 1             | 100 | 10 (< 40)          | < 400                 | -2                                       | 6    |
| AZ23C6V2    | D10          | 5.8                                | 6.2  | 6.6  | 5            | 1         | > 2             | 100 | 4.8 (< 10)         | < 200                 | -1                                       | 7    |
| AZ23C6V8    | D11          | 6.4                                | 6.8  | 7.2  | 5            | 1         | > 3             | 100 | 4.5 (< 8)          | < 150                 | 2                                        | 7    |
| AZ23C7V5    | D12          | 7                                  | 7.5  | 7.9  | 5            | 1         | > 5             | 100 | 4 (< 7)            | < 50                  | 3                                        | 7    |
| AZ23C8V2    | D13          | 7.7                                | 8.2  | 8.7  | 5            | 1         | > 6             | 100 | 4.5 (< 7)          | < 50                  | 4                                        | 7    |
| AZ23C9V1    | D14          | 8.5                                | 9.1  | 9.6  | 5            | 1         | > 7             | 100 | 4.8 (< 10)         | < 50                  | 5                                        | 8    |
| AZ23C10     | D15          | 9.4                                | 10   | 10.6 | 5            | 1         | > 7.5           | 100 | 5.2 (< 15)         | < 70                  | 5                                        | 8    |
| AZ23C11     | D16          | 10.4                               | 11   | 11.6 | 5            | 1         | > 8.5           | 100 | 6 (< 20)           | < 70                  | 5                                        | 9    |
| AZ23C12     | D17          | 11.4                               | 12   | 12.7 | 5            | 1         | > 9             | 100 | 7 (< 20)           | < 90                  | 6                                        | 9    |
| AZ23C13     | D18          | 12.4                               | 13   | 14.1 | 5            | 1         | > 10            | 100 | 9 (< 25)           | < 110                 | 7                                        | 9    |
| AZ23C15     | D19          | 13.8                               | 15   | 15.6 | 5            | 1         | > 11            | 100 | 11 (< 30)          | < 110                 | 7                                        | 9    |
| AZ23C16     | D20          | 15.3                               | 16   | 17.1 | 5            | 1         | > 12            | 100 | 13 (< 40)          | < 170                 | 8                                        | 9.5  |
| AZ23C18     | D21          | 16.8                               | 18   | 19.1 | 5            | 1         | > 14            | 100 | 18 (< 50)          | < 170                 | 8                                        | 9.5  |
| AZ23C20     | D22          | 18.8                               | 20   | 21.2 | 5            | 1         | > 15            | 100 | 20 (< 50)          | < 220                 | 8                                        | 10   |
| AZ23C22     | D23          | 20.8                               | 22   | 23.3 | 5            | 1         | > 17            | 100 | 25 (< 55)          | < 220                 | 8                                        | 10   |
| AZ23C24     | D24          | 22.8                               | 24   | 25.6 | 5            | 1         | > 18            | 100 | 28 (< 80)          | < 220                 | 8                                        | 10   |
| AZ23C27     | D25          | 25.1                               | 27   | 28.9 | 5            | 1         | > 20            | 100 | 30 (< 80)          | < 250                 | 8                                        | 10   |
| AZ23C30     | D26          | 28                                 | 30   | 32   | 5            | 1         | > 22.5          | 100 | 35 (< 80)          | < 250                 | 8                                        | 10   |
| AZ23C33     | D27          | 31                                 | 33   | 35   | 5            | 1         | > 25            | 100 | 40 (< 80)          | < 250                 | 8                                        | 10   |
| AZ23C36     | D28          | 34                                 | 36   | 38   | 5            | 1         | > 27            | 100 | 40 (< 90)          | < 250                 | 8                                        | 10   |
| AZ23C39     | D29          | 37                                 | 39   | 41   | 5            | 1         | > 29            | 100 | 50 (< 90)          | < 300                 | 10                                       | 12   |
| AZ23C43     | D30          | 40                                 | 43   | 46   | 5            | 1         | > 32            | 100 | 60 (< 100)         | < 700                 | 10                                       | 12   |
| AZ23C47     | D31          | 44                                 | 47   | 50   | 5            | 1         | > 35            | 100 | 70 (< 100)         | < 750                 | 10                                       | 12   |
| AZ23C51     | D32          | 48                                 | 51   | 54   | 5            | 1         | > 38            | 100 | 70 (< 100)         | < 750                 | 10                                       | 12   |

**Note**<sup>(1)</sup> Tested with pulses  $t_p = 5\text{ ms}$

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

| PART NUMBER | MARKING CODE | ZENER VOLTAGE RANGE <sup>(1)</sup> |      |      | TEST CURRENT |           | REVERSE VOLTAGE |     | DYNAMIC RESISTANCE |                       | TEMPERATURE COEFFICIENT OF ZENER VOLTAGE |      |
|-------------|--------------|------------------------------------|------|------|--------------|-----------|-----------------|-----|--------------------|-----------------------|------------------------------------------|------|
|             |              | $V_Z$ at $I_{ZT1}$                 |      |      | $I_{ZT1}$    | $I_{ZT2}$ | $V_R$ at $I_R$  |     | $Z_Z$ at $I_{ZT1}$ | $Z_{ZK}$ at $I_{ZT2}$ | $\alpha_{VZ}$ at $I_{ZT}$                |      |
|             |              | V                                  |      |      | mA           |           | V               | nA  | $\Omega$           |                       | $10^{-4}/^{\circ}\text{C}$               |      |
|             |              | MIN.                               | NOM. | MAX. |              |           |                 |     |                    |                       | MIN.                                     | MAX. |
| AZ23B2V7    | D1           | 2.65                               | 2.7  | 2.75 | 5            | 1         | -               | -   | 75 (< 83)          | < 500                 | -9                                       | -4   |
| AZ23B3V0    | D2           | 2.94                               | 3.0  | 3.06 | 5            | 1         | -               | -   | 80 (< 95)          | < 500                 | -9                                       | -3   |
| AZ23B3V3    | D3           | 3.23                               | 3.3  | 3.37 | 5            | 1         | -               | -   | 80 (< 95)          | < 500                 | -8                                       | -3   |
| AZ23B3V6    | D4           | 3.53                               | 3.6  | 3.67 | 5            | 1         | -               | -   | 80 (< 95)          | < 500                 | -8                                       | -3   |
| AZ23B3V9    | D5           | 3.82                               | 3.9  | 3.98 | 5            | 1         | -               | -   | 80 (< 95)          | < 500                 | -7                                       | -3   |
| AZ23B4V3    | D6           | 4.21                               | 4.3  | 4.39 | 5            | 1         | -               | -   | 80 (< 95)          | < 500                 | -6                                       | -1   |
| AZ23B4V7    | D7           | 4.61                               | 4.7  | 4.79 | 5            | 1         | -               | -   | 70 (< 78)          | < 500                 | -5                                       | 2    |
| AZ23B5V1    | D8           | 5                                  | 5.1  | 5.2  | 5            | 1         | > 0.8           | 100 | 30 (< 60)          | < 480                 | -3                                       | 4    |
| AZ23B5V6    | D9           | 5.49                               | 5.6  | 5.71 | 5            | 1         | > 1             | 100 | 10 (< 40)          | < 400                 | -2                                       | 6    |
| AZ23B6V2    | D10          | 6.08                               | 6.2  | 6.32 | 5            | 1         | > 2             | 100 | 4.8 (< 10)         | < 200                 | -1                                       | 7    |
| AZ23B6V8    | D11          | 6.66                               | 6.8  | 6.94 | 5            | 1         | > 3             | 100 | 4.5 (< 8)          | < 150                 | 2                                        | 7    |
| AZ23B7V5    | D12          | 7.35                               | 7.5  | 7.65 | 5            | 1         | > 5             | 100 | 4 (< 7)            | < 50                  | 3                                        | 7    |
| AZ23B8V2    | D13          | 8.04                               | 8.2  | 8.36 | 5            | 1         | > 6             | 100 | 4.5 (< 7)          | < 50                  | 4                                        | 7    |
| AZ23B9V1    | D14          | 8.92                               | 9.1  | 9.28 | 5            | 1         | > 7             | 100 | 4.8 (< 10)         | < 50                  | 5                                        | 8    |
| AZ23B10     | D15          | 9.8                                | 10   | 10.2 | 5            | 1         | > 7.5           | 100 | 5.2 (< 15)         | < 70                  | 5                                        | 8    |
| AZ23B11     | D16          | 10.8                               | 11   | 11.2 | 5            | 1         | > 8.5           | 100 | 6 (< 20)           | < 70                  | 5                                        | 9    |
| AZ23B12     | D17          | 11.8                               | 12   | 12.2 | 5            | 1         | > 9             | 100 | 7 (< 20)           | < 90                  | 6                                        | 9    |
| AZ23B13     | D18          | 12.7                               | 13   | 13.3 | 5            | 1         | > 10            | 100 | 9 (< 25)           | < 110                 | 7                                        | 9    |
| AZ23B15     | D19          | 14.7                               | 15   | 15.3 | 5            | 1         | > 11            | 100 | 11 (< 30)          | < 110                 | 7                                        | 9    |
| AZ23B16     | D20          | 15.7                               | 16   | 16.3 | 5            | 1         | > 12            | 100 | 13 (< 40)          | < 170                 | 8                                        | 9.5  |
| AZ23B18     | D21          | 17.6                               | 18   | 18.4 | 5            | 1         | > 14            | 100 | 18 (< 50)          | < 170                 | 8                                        | 9.5  |
| AZ23B20     | D22          | 19.6                               | 20   | 20.4 | 5            | 1         | > 15            | 100 | 20 (< 50)          | < 220                 | 8                                        | 10   |
| AZ23B22     | D23          | 21.6                               | 22   | 22.4 | 5            | 1         | > 17            | 100 | 25 (< 55)          | < 220                 | 8                                        | 10   |
| AZ23B24     | D24          | 23.5                               | 24   | 24.5 | 5            | 1         | > 18            | 100 | 28 (< 80)          | < 220                 | 8                                        | 10   |
| AZ23B27     | D25          | 26.5                               | 27   | 27.5 | 5            | 1         | > 20            | 100 | 30 (< 80)          | < 250                 | 8                                        | 10   |
| AZ23B30     | D26          | 29.4                               | 30   | 30.6 | 5            | 1         | > 22.5          | 100 | 35 (< 80)          | < 250                 | 8                                        | 10   |
| AZ23B33     | D27          | 32.3                               | 33   | 33.7 | 5            | 1         | > 25            | 100 | 40 (< 80)          | < 250                 | 8                                        | 10   |
| AZ23B36     | D28          | 35.3                               | 36   | 36.7 | 5            | 1         | > 27            | 100 | 40 (< 90)          | < 250                 | 8                                        | 10   |
| AZ23B39     | D29          | 38.2                               | 39   | 39.8 | 5            | 1         | > 29            | 100 | 50 (< 90)          | < 300                 | 10                                       | 12   |
| AZ23B43     | D30          | 42.1                               | 43   | 43.9 | 5            | 1         | > 32            | 100 | 60 (< 100)         | < 700                 | 10                                       | 12   |
| AZ23B47     | D31          | 46.1                               | 47   | 47.9 | 5            | 1         | > 35            | 100 | 70 (< 100)         | < 750                 | 10                                       | 12   |
| AZ23B51     | D32          | 50                                 | 51   | 52   | 5            | 1         | > 38            | 100 | 70 (< 100)         | < 750                 | 10                                       | 12   |

**Note**<sup>(1)</sup> Tested with pulses  $t_p = 5\text{ ms}$

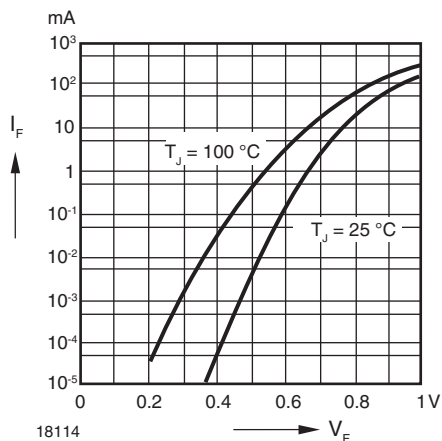
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Forward Characteristics

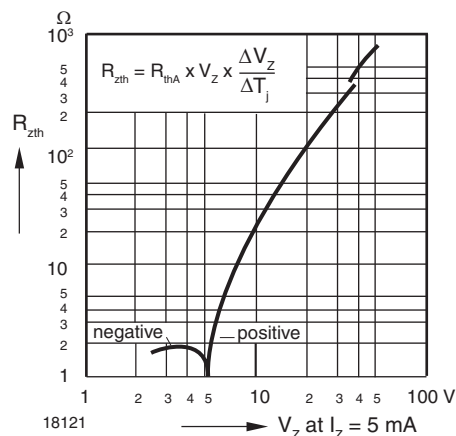


Fig. 4 - Thermal Differential Resistance vs. Zener Voltage

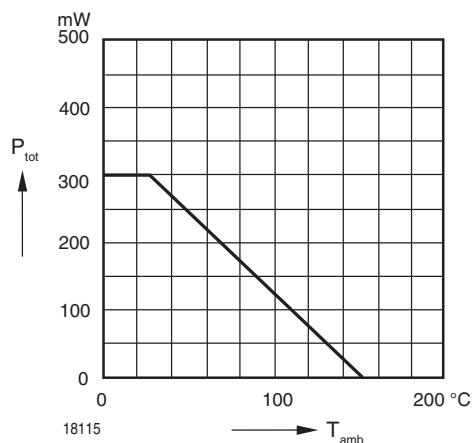


Fig. 2 - Admissible Power Dissipation vs. Ambient Temperature

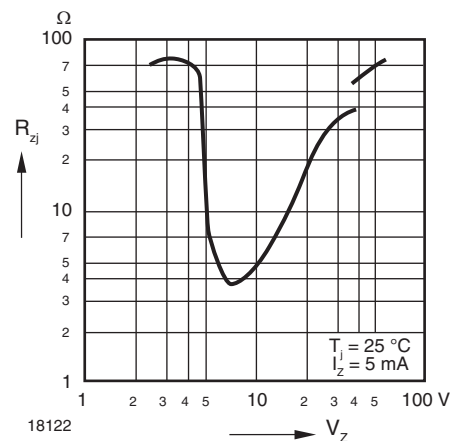


Fig. 5 - Dynamic Resistance vs. Zener Voltage

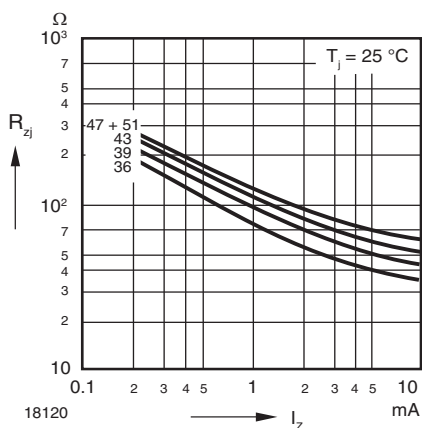


Fig. 3 - Dynamic Resistance vs. Zener Current

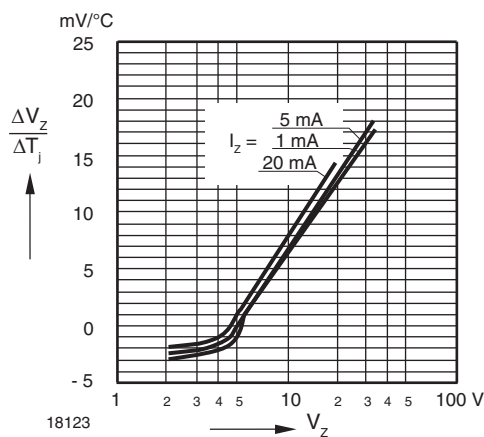


Fig. 6 - Temperature Dependence of Zener Voltage vs. Zener Voltage

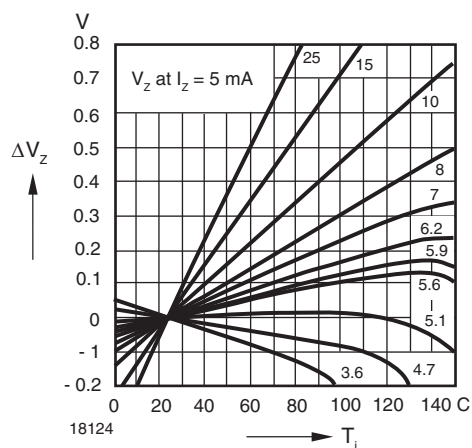


Fig. 7 - Change of Zener Voltage vs. Junction Temperature

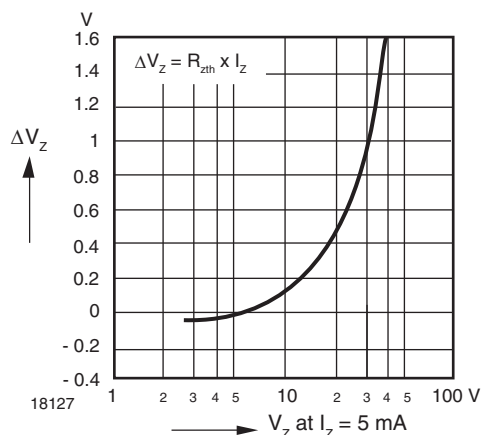


Fig. 10 - Change of Zener Voltage from Turn-on up to the Point of Thermal Equilibrium vs. Zener Voltage

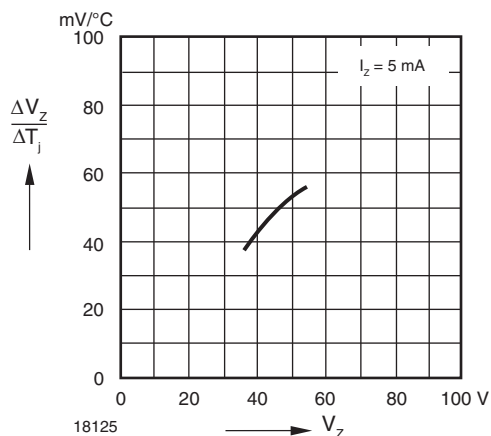


Fig. 8 - Temperature Dependence of Zener Voltage vs. Zener Voltage

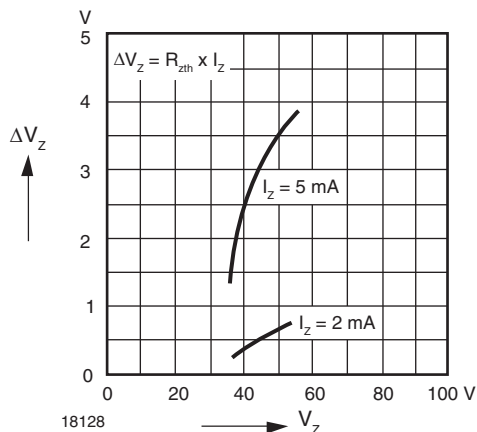


Fig. 11 - Change of Zener Voltage from Turn-on up to the Point of Thermal Equilibrium vs. Zener Voltage

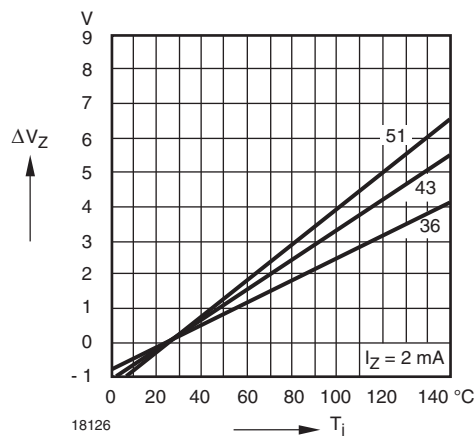


Fig. 9 - Change of Zener Voltage vs. Junction Temperature

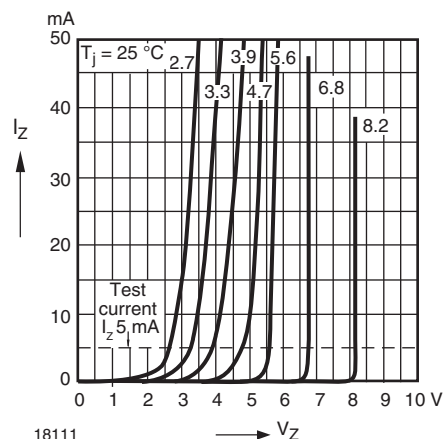


Fig. 12 - Breakdown Characteristics

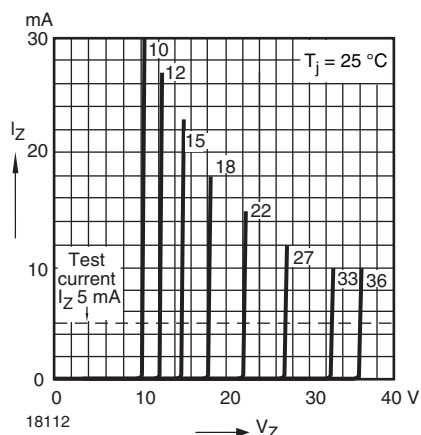


Fig. 13 - Breakdown Characteristics

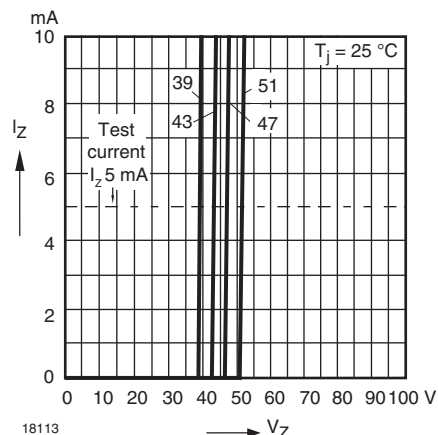
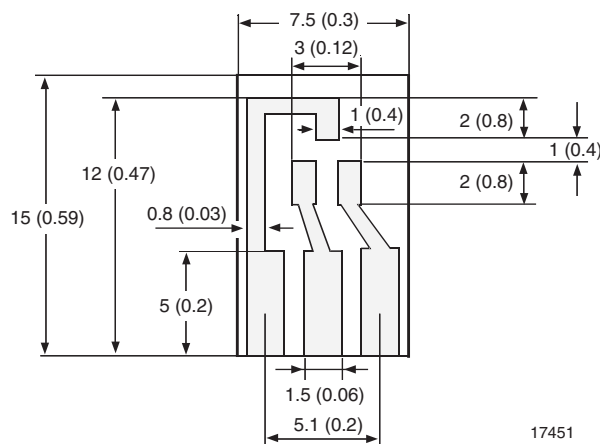


Fig. 14 - Breakdown Characteristics

## LAYOUT FOR $R_{thJA}$ TEST

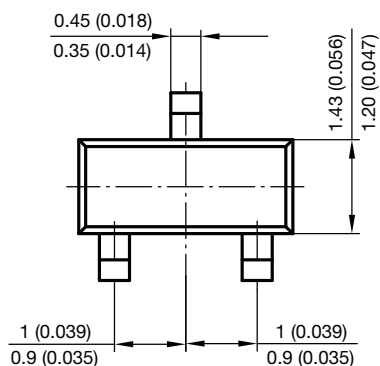
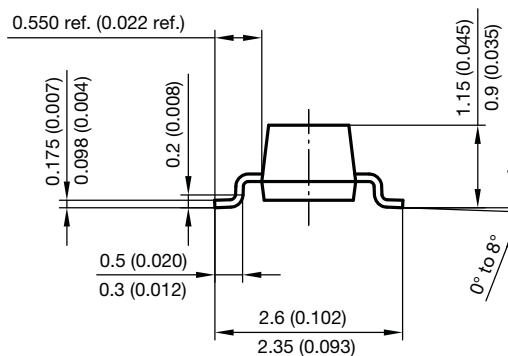
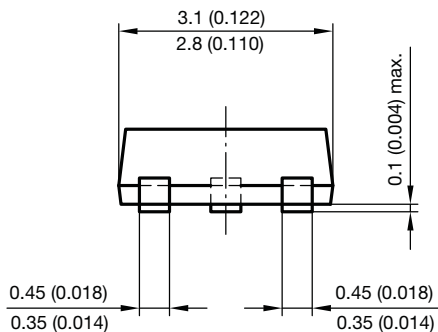
Thickness: fiberglass 0.059" (1.5 mm)

Copper leads 0.012" (0.3 mm)

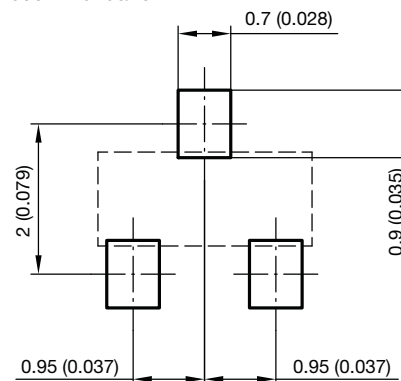




**PACKAGE DIMENSIONS** in millimeters (inches): **SOT-23**



Foot print recommendation:



Document no.: 6.541-5014.01-4  
Rev. 8 - Date: 23.Sept.2009  
17418



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