

## Small Signal Zener Diodes


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**3D**  
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| PRIMARY CHARACTERISTICS      |               |      |
|------------------------------|---------------|------|
| PARAMETER                    | VALUE         | UNIT |
| V <sub>Z</sub> range nom.    | 2.4 to 75     | V    |
| Test current I <sub>ZT</sub> | 2.5; 5        | mA   |
| V <sub>Z</sub> specification | Pulse current |      |
| Circuit configuration        | Single        |      |

**FEATURES**

- Silicon planar Zener diodes
- The Zener voltages are graded according to the international E24 standard
- 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)

 AUTOMOTIVE  
GRADE  
Available

**RoHS**  
COMPLIANT

| ORDERING INFORMATION |                                     |                                |                        |
|----------------------|-------------------------------------|--------------------------------|------------------------|
| DEVICE NAME          | ORDERING CODE                       | TAPED UNITS PER REEL           | MINIMUM ORDER QUANTITY |
| BZT52-series         | BZT52C2V4-E3-08 to BZT52C75-E3-08   | 3000 (8 mm tape on 7" reel)    | 15 000/box             |
|                      | BZT52B2V4-E3-08 to BZT52B75-E3-08   |                                |                        |
|                      | BZT52C2V4-HE3-08 to BZT52C75-HE3-08 |                                |                        |
|                      | BZT52B2V4-HE3-08 to BZT52B75-HE3-08 |                                |                        |
|                      | BZT52C2V4-E3-18 to BZT52C75-E3-18   | 10 000 (8 mm tape on 13" reel) | 10 000/box             |
|                      | BZT52B2V4-E3-18 to BZT52B75-E3-18   |                                |                        |
|                      | BZT52C2V4-HE3-18 to BZT52C75-HE3-18 |                                |                        |
|                      | BZT52B2V4-HE3-18 to BZT52B75-HE3-18 |                                |                        |

| PACKAGE      |         |   |                                      |                          |
|--------------|---------|---|--------------------------------------|--------------------------|
| PACKAGE NAME | WEIGHT  | MOLDING COMPOUND<br>FLAMMABILITY RATING | MOISTURE SENSITIVITY<br>LEVEL        | SOLDERING CONDITIONS     |
| SOD-123      | 10.3 mg | UL 94 V-0                               | MSL level 1<br>(according J-STD-020) | 260 °C/10 s at terminals |

| ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified) |   |                   |             |      |  |
|---|---|-------------------|-------------|------|--|
| PARAMETER   | TEST CONDITION  | SYMBOL            | VALUE       | UNIT |  |
| Power dissipation   | Diode on ceramic substrate 0.7 mm;<br>5 mm <sup>2</sup> pad areas   | P <sub>tot</sub>  | 500         | mW   |  |
|   | Diode on ceramic substrate 0.7 mm;<br>2.5 mm <sup>2</sup> pad areas | P <sub>tot</sub>  | 410         | mW   |  |
| Zener current   | See table "Electrical Characteristics "                             |                   |             |      |  |
| Thermal resistance junction to ambient air                                      | Valid provided that electrodes are kept at<br>ambient temperature   | R <sub>thJA</sub> | 300         | K/W  |  |
| Junction temperature  |   | T <sub>j</sub>    | 150         | °C   |  |
| Storage temperature range   |   | T <sub>stg</sub>  | -65 to +150 | °C   |  |
| Operating temperature range   |   | T <sub>op</sub>   | -55 to +150 | °C   |  |



| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |              |                                    |      |      |              |           |                 |     |                      |                       |                            |   |   |
|--|--------------|------------------------------------|------|------|--------------|-----------|-----------------|-----|----------------------|-----------------------|----------------------------|---|---|
| PART NUMBER  | MARKING CODE | ZENER VOLTAGE RANGE <sup>(1)</sup> |      |      | TEST CURRENT |           | REVERSE VOLTAGE |     | DYNAMIC RESISTANCE   |                       | TEMP. COEFFICIENT          | ADMISSABLE ZENER CURRENT <sup>(4)</sup>         |   |
|  |              | $V_Z$ at $I_{ZT1}$                 |      |      | $I_{ZT1}$    | $I_{ZT2}$ | $V_R$ at $I_R$  |     | $Z_z$ at $I_{ZT1}$   | $Z_{zk}$ at $I_{ZT2}$ | $\alpha_{VZ}$              | $I_z$ at $T_{amb} = 45\text{ }^{\circ}\text{C}$ | $I_z$ at $T_{amb} = 25\text{ }^{\circ}\text{C}$ |
|  |              | V                                  |      |      | mA           |           | V               | nA  | $\Omega$             |                       | $10^{-4}/^{\circ}\text{C}$ | mA  |   |
|  |              | MIN.                               | NOM. | MAX. |              |           |                 |     |                      |                       |                            |   |   |
| BZT52C2V4  | W1           | 2.2                                | 2.4  | 2.6  | 5            | 1         | -               | -   | 85                   | 600                   | -9 to -4                   | -   | -   |
| BZT52C2V7  | W2           | 2.5                                | 2.7  | 2.9  | 5            | 1         | -               | -   | 75 (< 83)            | < 500                 | -9 to -4                   | 113   | 134   |
| BZT52C3V0  | W3           | 2.8                                | 3.0  | 3.2  | 5            | 1         | -               | -   | 80 (< 95)            | < 500                 | -9 to -3                   | 98  | 118   |
| BZT52C3V3  | W4           | 3.1                                | 3.3  | 3.5  | 5            | 1         | -               | -   | 80 (< 95)            | < 500                 | -8 to -3                   | 92  | 109   |
| BZT52C3V6  | W5           | 3.4                                | 3.6  | 3.8  | 5            | 1         | -               | -   | 80 (< 95)            | < 500                 | -8 to -3                   | 85  | 100   |
| BZT52C3V9  | W6           | 3.7                                | 3.9  | 4.1  | 5            | 1         | -               | -   | 80 (< 95)            | < 500                 | -7 to -3                   | 77  | 92  |
| BZT52C4V3  | W7           | 4                                  | 4.3  | 4.6  | 5            | 1         | -               | -   | 80 (< 95)            | < 500                 | -6 to -1                   | 71  | 84  |
| BZT52C4V7  | W8           | 4.4                                | 4.7  | 5    | 5            | 1         | -               | -   | 70 (< 78)            | < 500                 | -5 to +2                   | 64  | 76  |
| BZT52C5V1  | W9           | 4.8                                | 5.1  | 5.4  | 5            | 1         | > 0.8           | 100 | 30 (< 60)            | < 480                 | -3 to +4                   | 56  | 67  |
| BZT52C5V6  | WA           | 5.2                                | 5.6  | 6    | 5            | 1         | > 1             | 100 | 10 (< 40)            | < 400                 | -2 to +6                   | 50  | 59  |
| BZT52C6V2  | WB           | 5.8                                | 6.2  | 6.6  | 5            | 1         | > 2             | 100 | 4.8 (< 10)           | < 200                 | -1 to +7                   | 45  | 54  |
| BZT52C6V8  | WC           | 6.4                                | 6.8  | 7.2  | 5            | 1         | > 3             | 100 | 4.5 (< 8)            | < 150                 | +2 to +7                   | 41  | 49  |
| BZT52C7V5  | WD           | 7                                  | 7.5  | 7.9  | 5            | 1         | > 5             | 100 | 4 (< 7)              | < 50                  | +3 to +7                   | 37  | 44  |
| BZT52C8V2  | WE           | 7.7                                | 8.2  | 8.7  | 5            | 1         | > 6             | 100 | 4.5 (< 7)            | < 50                  | +4 to +7                   | 34  | 40  |
| BZT52C9V1  | WF           | 8.5                                | 9.1  | 9.6  | 5            | 1         | > 7             | 100 | 4.8 (< 10)           | < 50                  | +5 to +8                   | 30  | 36  |
| BZT52C10   | WG           | 9.4                                | 10   | 10.6 | 5            | 1         | > 7.5           | 100 | 5.2 (< 15)           | < 70                  | +5 to +8                   | 28  | 33  |
| BZT52C11   | WH           | 10.4                               | 11   | 11.6 | 5            | 1         | > 8.5           | 100 | 6 (< 20)             | < 70                  | +5 to +9                   | 25  | 30  |
| BZT52C12   | WI           | 11.4                               | 12   | 12.7 | 5            | 1         | > 9             | 100 | 7 (< 20)             | < 90                  | +6 to +9                   | 23  | 28  |
| BZT52C13   | WK           | 12.4                               | 13   | 14.1 | 5            | 1         | > 10            | 100 | 9 (< 25)             | < 110                 | +7 to +9                   | 21  | 25  |
| BZT52C15   | WL           | 13.8                               | 15   | 15.6 | 5            | 1         | > 11            | 100 | 11 (< 30)            | < 110                 | +7 to +9                   | 19  | 23  |
| BZT52C16   | WM           | 15.3                               | 16   | 17.1 | 5            | 1         | > 12            | 100 | 13 (< 40)            | < 170                 | +8 to +9.5                 | 17  | 20  |
| BZT52C18   | WN           | 16.8                               | 18   | 19.1 | 5            | 1         | > 14            | 100 | 18 (< 50)            | < 170                 | +8 to +9.5                 | 15  | 18  |
| BZT52C20   | WO           | 18.8                               | 20   | 21.2 | 5            | 1         | > 15            | 100 | 20 (< 50)            | < 220                 | +8 to +10                  | 14  | 17  |
| BZT52C22   | WP           | 20.8                               | 22   | 23.3 | 5            | 1         | > 17            | 100 | 25 (< 55)            | < 220                 | +8 to +10                  | 13  | 16  |
| BZT52C24   | WR           | 22.8                               | 24   | 25.6 | 5            | 1         | > 18            | 100 | 28 (< 80)            | < 220                 | +8 to +10                  | 11  | 13  |
| BZT52C27   | WS           | 25.1                               | 27   | 28.9 | 5            | 1         | > 20            | 100 | 30 (< 80)            | < 250                 | +8 to +10                  | 10  | 12  |
| BZT52C30   | WT           | 28                                 | 30   | 32   | 5            | 1         | > 22.5          | 100 | 35 (< 80)            | < 250                 | +8 to +10                  | 9   | 10  |
| BZT52C33   | WU           | 31                                 | 33   | 35   | 5            | 1         | > 25            | 100 | 40 (< 80)            | < 250                 | +8 to +10                  | 8   | 9   |
| BZT52C36   | WW           | 34                                 | 36   | 38   | 5            | 1         | > 27            | 100 | 40 (< 90)            | < 250                 | +8 to +10                  | 8   | 9   |
| BZT52C39   | WX           | 37                                 | 39   | 41   | 5            | 1         | > 29            | 100 | 50 (< 90)            | < 300                 | +10 to +12                 | 7   | 8   |
| BZT52C43   | WY           | 40                                 | 43   | 46   | 5            | 1         | > 32            | 100 | 60 (< 100)           | < 700                 | +10 to +12                 | 6   | 7   |
| BZT52C47   | WZ           | 44                                 | 47   | 50   | 5            | 1         | > 35            | 100 | 70 (< 100)           | < 750                 | +10 to +12                 | 5   | 6   |
| BZT52C51   | X1           | 48                                 | 51   | 54   | 5            | 1         | > 38            | 100 | 70 (< 100)           | < 750                 | +10 to +12                 | 5   | 6   |
| BZT52C56   | X2           | 52                                 | 56   | 60   | 2.5          | 0.5       | -               | -   | < 135 <sup>(2)</sup> | < 1000 <sup>(3)</sup> | typ. +10 <sup>(2)</sup>    | -   | -   |
| BZT52C62   | X3           | 58                                 | 62   | 66   | 2.5          | 0.5       | -               | -   | < 150 <sup>(2)</sup> | < 1000 <sup>(3)</sup> | typ. +10 <sup>(2)</sup>    | -   | -   |
| BZT52C68   | X4           | 64                                 | 68   | 72   | 2.5          | 0.5       | -               | -   | < 200 <sup>(2)</sup> | < 1000 <sup>(3)</sup> | typ. +10 <sup>(2)</sup>    | -   | -   |
| BZT52C75   | X5           | 70                                 | 75   | 79   | 2.5          | 0.5       | -               | -   | < 250 <sup>(2)</sup> | < 1500 <sup>(3)</sup> | typ. +10 <sup>(2)</sup>    | -   | -   |

**Notes**

- $I_{ZT1} = 5\text{ mA}$ ,  $I_{ZT2} = 1\text{ mA}$
- (1) Measured with pulses  $t_p = 5\text{ ms}$
- (2)  $I_{ZT1} = 2.5\text{ mA}$
- (3)  $I_{ZT2} = 0.5\text{ mA}$
- (4) Valid provided that electrodes are kept at ambient temperature



| ELECTRICAL CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified) |              |                                    |      |      |                  |                  |                                  |     |                                    |                                     |                         |  |  |
|---|--------------|------------------------------------|------|------|------------------|------------------|----------------------------------|-----|------------------------------------|-------------------------------------|-------------------------|--|--|
| PART NUMBER   | MARKING CODE | ZENER VOLTAGE RANGE <sup>(1)</sup> |      |      | TEST CURRENT     |                  | REVERSE VOLTAGE                  |     | DYNAMIC RESISTANCE                 |                                     | TEMP. COEFFICIENT       | ADMISSABLE ZENER CURRENT <sup>(4)</sup>    |  |
|   |              | V <sub>Z</sub> at I <sub>ZT1</sub> |      |      | I <sub>ZT1</sub> | I <sub>ZT2</sub> | V <sub>R</sub> at I <sub>R</sub> |     | Z <sub>Z</sub> at I <sub>ZT1</sub> | Z <sub>ZK</sub> at I <sub>ZT2</sub> | α <sub>VZ</sub>         | I <sub>Z</sub> at T <sub>amb</sub> = 45 °C | I <sub>Z</sub> at T <sub>amb</sub> = 25 °C |
|   |              | V                                  |      |      | mA               |                  | V                                | nA  | Ω                                  |                                     | 10 <sup>-4</sup> /°C    | mA   |  |
|   |              | MIN.                               | NOM. | MAX. |                  |                  |                                  |     |                                    |                                     |                         |  |  |
| BZT52B2V4   | W1           | 2.35                               | 2.4  | 2.45 | 5                | 1                | -                                | -   | 85                                 | 600                                 | -9 to -4                | -  | -  |
| BZT52B2V7   | W2           | 2.65                               | 2.7  | 2.75 | 5                | 1                | -                                | -   | 75 (< 83)                          | < 500                               | -9 to -4                | 113  | 134  |
| BZT52B3V0   | W3           | 2.94                               | 3.0  | 3.06 | 5                | 1                | -                                | -   | 80 (< 95)                          | < 500                               | -9 to -3                | 98   | 118  |
| BZT52B3V3   | W4           | 3.23                               | 3.3  | 3.37 | 5                | 1                | -                                | -   | 80 (< 95)                          | < 500                               | -8 to -3                | 92   | 109  |
| BZT52B3V6   | W5           | 3.53                               | 3.6  | 3.67 | 5                | 1                | -                                | -   | 80 (< 95)                          | < 500                               | -8 to -3                | 85   | 100  |
| BZT52B3V9   | W6           | 3.82                               | 3.9  | 3.98 | 5                | 1                | -                                | -   | 80 (< 95)                          | < 500                               | -7 to -3                | 77   | 92   |
| BZT52B4V3   | W7           | 4.21                               | 4.3  | 4.39 | 5                | 1                | -                                | -   | 80 (< 95)                          | < 500                               | -6 to -1                | 71   | 84   |
| BZT52B4V7   | W8           | 4.61                               | 4.7  | 4.79 | 5                | 1                | -                                | -   | 70 (< 78)                          | < 500                               | -5 to +2                | 64   | 76   |
| BZT52B5V1   | W9           | 5                                  | 5.1  | 5.2  | 5                | 1                | > 0.8                            | 100 | 30 (< 60)                          | < 480                               | -3 to +4                | 56   | 67   |
| BZT52B5V6   | WA           | 5.49                               | 5.6  | 5.71 | 5                | 1                | > 1                              | 100 | 10 (< 40)                          | < 400                               | -2 to +6                | 50   | 59   |
| BZT52B6V2   | WB           | 6.08                               | 6.2  | 6.32 | 5                | 1                | > 2                              | 100 | 4.8 (< 10)                         | < 200                               | -1 to +7                | 45   | 54   |
| BZT52B6V8   | WC           | 6.66                               | 6.8  | 6.94 | 5                | 1                | > 3                              | 100 | 4.5 (< 8)                          | < 150                               | +2 to +7                | 41   | 49   |
| BZT52B7V5   | WD           | 7.35                               | 7.5  | 7.65 | 5                | 1                | > 5                              | 100 | 4 (< 7)                            | < 50                                | +3 to +7                | 37   | 44   |
| BZT52B8V2   | WE           | 8.04                               | 8.2  | 8.36 | 5                | 1                | > 6                              | 100 | 4.5 (< 7)                          | < 50                                | +4 to +7                | 34   | 40   |
| BZT52B9V1   | WF           | 8.92                               | 9.1  | 9.28 | 5                | 1                | > 7                              | 100 | 4.8 (< 10)                         | < 50                                | +5 to +8                | 30   | 36   |
| BZT52B10  | WG           | 9.8                                | 10   | 10.2 | 5                | 1                | > 7.5                            | 100 | 5.2 (< 15)                         | < 70                                | +5 to +8                | 28   | 33   |
| BZT52B11  | WH           | 10.8                               | 11   | 11.2 | 5                | 1                | > 8.5                            | 100 | 6 (< 20)                           | < 70                                | +5 to +9                | 25   | 30   |
| BZT52B12  | WI           | 11.8                               | 12   | 12.2 | 5                | 1                | > 9                              | 100 | 7 (< 20)                           | < 90                                | +6 to +9                | 23   | 28   |
| BZT52B13  | WK           | 12.7                               | 13   | 13.3 | 5                | 1                | > 10                             | 100 | 9 (< 25)                           | < 110                               | +7 to +9                | 21   | 25   |
| BZT52B15  | WL           | 14.7                               | 15   | 15.3 | 5                | 1                | > 11                             | 100 | 11 (< 30)                          | < 110                               | +7 to +9                | 19   | 23   |
| BZT52B16  | WM           | 15.7                               | 16   | 16.3 | 5                | 1                | > 12                             | 100 | 13 (< 40)                          | < 170                               | +8 to +9.5              | 17   | 20   |
| BZT52B18  | WN           | 17.6                               | 18   | 18.4 | 5                | 1                | > 14                             | 100 | 18 (< 50)                          | < 170                               | +8 to +9.5              | 15   | 18   |
| BZT52B20  | WO           | 19.6                               | 20   | 20.4 | 5                | 1                | > 15                             | 100 | 20 (< 50)                          | < 220                               | +8 to +10               | 14   | 17   |
| BZT52B22  | WP           | 21.6                               | 22   | 22.4 | 5                | 1                | > 17                             | 100 | 25 (< 55)                          | < 220                               | +8 to +10               | 13   | 16   |
| BZT52B24  | WR           | 23.5                               | 24   | 24.5 | 5                | 1                | > 18                             | 100 | 28 (< 80)                          | < 220                               | +8 to +10               | 11   | 13   |
| BZT52B27  | WS           | 26.5                               | 27   | 27.5 | 5                | 1                | > 20                             | 100 | 30 (< 80)                          | < 250                               | +8 to +10               | 10   | 12   |
| BZT52B30  | WT           | 29.4                               | 30   | 30.6 | 5                | 1                | > 22.5                           | 100 | 35 (< 80)                          | < 250                               | +8 to +10               | 9  | 10   |
| BZT52B33  | WU           | 32.3                               | 33   | 33.7 | 5                | 1                | > 25                             | 100 | 40 (< 80)                          | < 250                               | +8 to +10               | 8  | 9  |
| BZT52B36  | WW           | 35.3                               | 36   | 36.7 | 5                | 1                | > 27                             | 100 | 40 (< 90)                          | < 250                               | +8 to +10               | 8  | 9  |
| BZT52B39  | WX           | 38.2                               | 39   | 39.8 | 5                | 1                | > 29                             | 100 | 50 (< 90)                          | < 300                               | +10 to +12              | 7  | 8  |
| BZT52B43  | WY           | 42.1                               | 43   | 43.9 | 5                | 1                | > 32                             | 100 | 60 (< 100)                         | < 700                               | +10 to +12              | 6  | 7  |
| BZT52B47  | WZ           | 46.1                               | 47   | 47.9 | 5                | 1                | > 35                             | 100 | 70 (< 100)                         | < 750                               | +10 to +12              | 5  | 6  |
| BZT52B51  | X1           | 50                                 | 51   | 52   | 5                | 1                | > 38                             | 100 | 70 (< 100)                         | < 750                               | +10 to +12              | 5  | 6  |
| BZT52B56  | X2           | 54.9                               | 56   | 57.1 | 2.5              | 0.5              | -                                | -   | < 135 <sup>(2)</sup>               | < 1000 <sup>(3)</sup>               | typ. +10 <sup>(2)</sup> | -  | -  |
| BZT52B62  | X3           | 60.8                               | 62   | 63.2 | 2.5              | 0.5              | -                                | -   | < 150 <sup>(2)</sup>               | < 1000 <sup>(3)</sup>               | typ. +10 <sup>(2)</sup> | -  | -  |
| BZT52B68  | X4           | 66.6                               | 68   | 69.4 | 2.5              | 0.5              | -                                | -   | < 200 <sup>(2)</sup>               | < 1000 <sup>(3)</sup>               | typ. +10 <sup>(2)</sup> | -  | -  |
| BZT52B75  | X5           | 73.5                               | 75   | 76.5 | 2.5              | 0.5              | -                                | -   | < 250 <sup>(2)</sup>               | < 1500 <sup>(3)</sup>               | typ. +10 <sup>(2)</sup> | -  | -  |

Notes

- I<sub>ZT1</sub> = 5 mA, I<sub>ZT2</sub> = 1 mA
- (1) Measured with pulses t<sub>p</sub> = 5 ms
- (2) I<sub>ZT1</sub> = 2.5 mA
- (3) I<sub>ZT2</sub> = 0.5 mA
- (4) Valid provided that electrodes are kept at ambient temperature

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



Fig. 1 - Forward characteristics

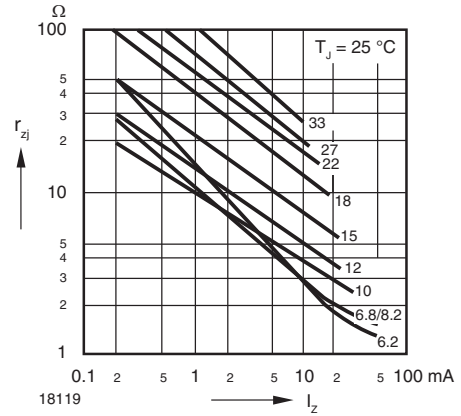


Fig. 4 - Dynamic Resistance vs. Zener Current

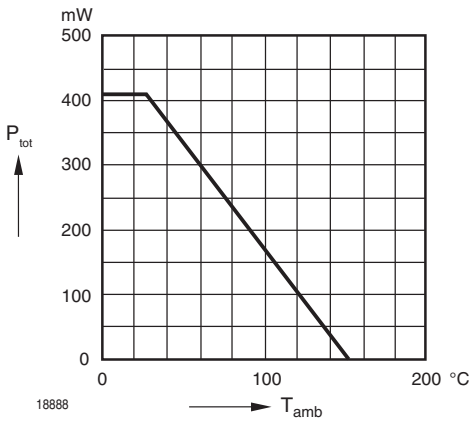


Fig. 2 - Admissible Power Dissipation vs. Ambient Temperature

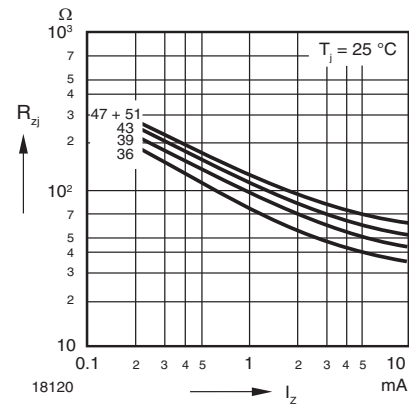


Fig. 5 - Dynamic Resistance vs. Zener Current

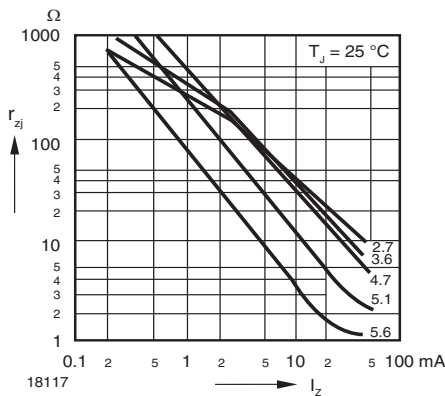


Fig. 3 - Dynamic Resistance vs. Zener Current

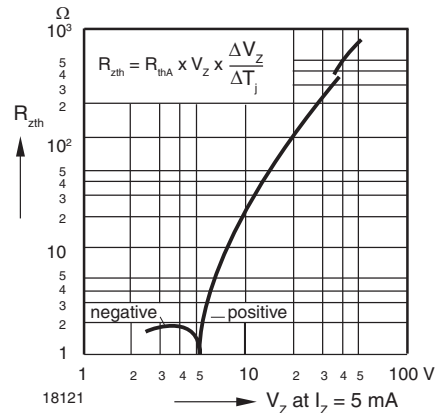


Fig. 6 - Thermal Differential Resistance vs. Zener Voltage



Fig. 7 - Dynamic Resistance vs. Zener Voltage



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

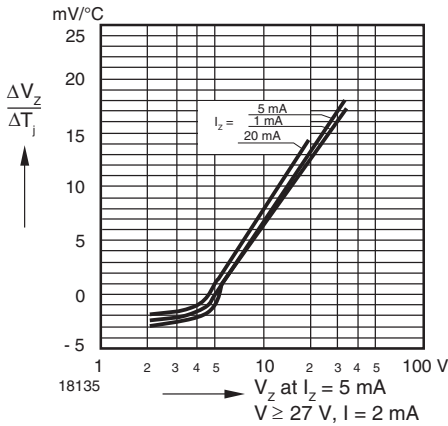


Fig. 8 - Temperature Dependence of Zener Voltage vs. Zener Voltage



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

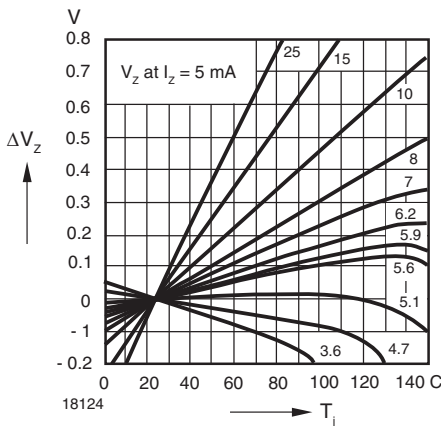


Fig. 9 - Change of Zener Voltage vs. Junction Temperature

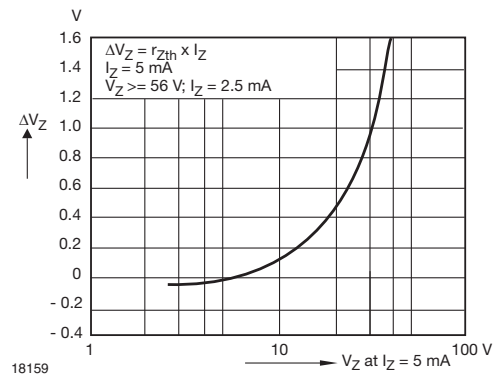


Fig. 12 - Change of Zener Voltage from Turn-on up to the Point of Thermal Equilibrium vs. Zener Voltage

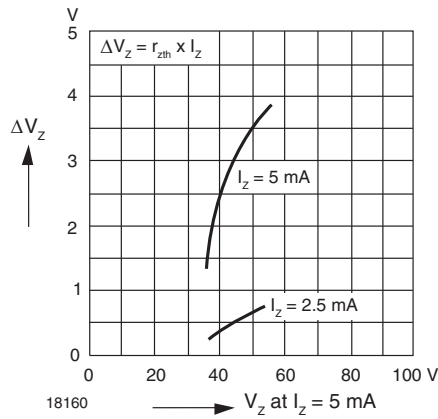


Fig. 13 - Change of Zener Voltage from Turn-on up to the Point of Thermal Equilibrium vs. Zener Voltage

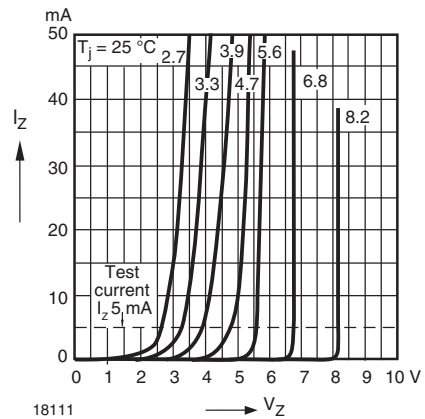


Fig. 14 - Breakdown Characteristics

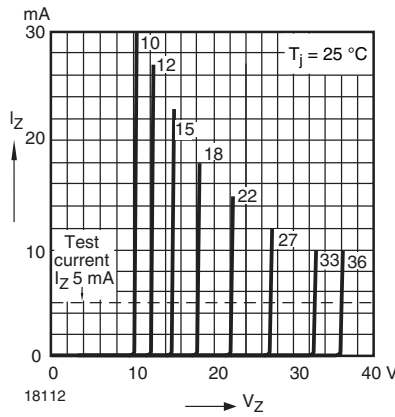


Fig. 15 - Breakdown Characteristics

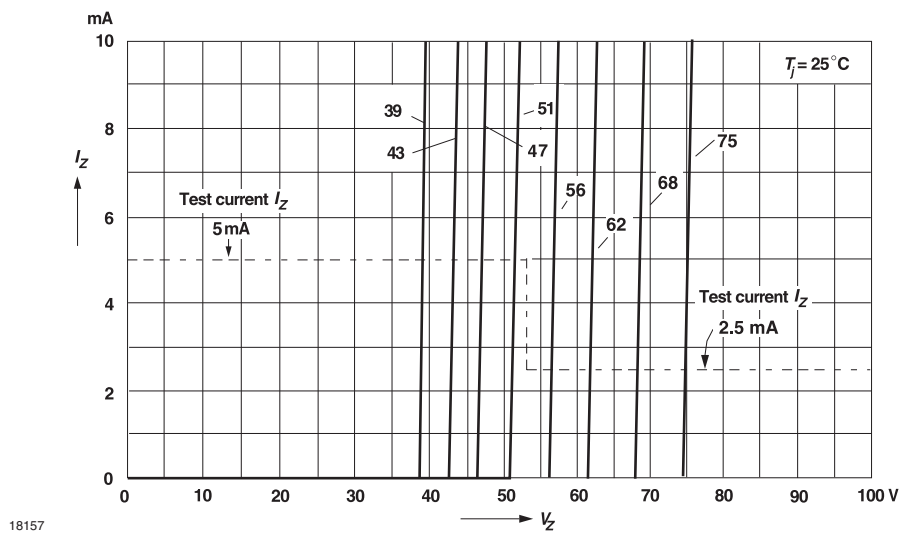
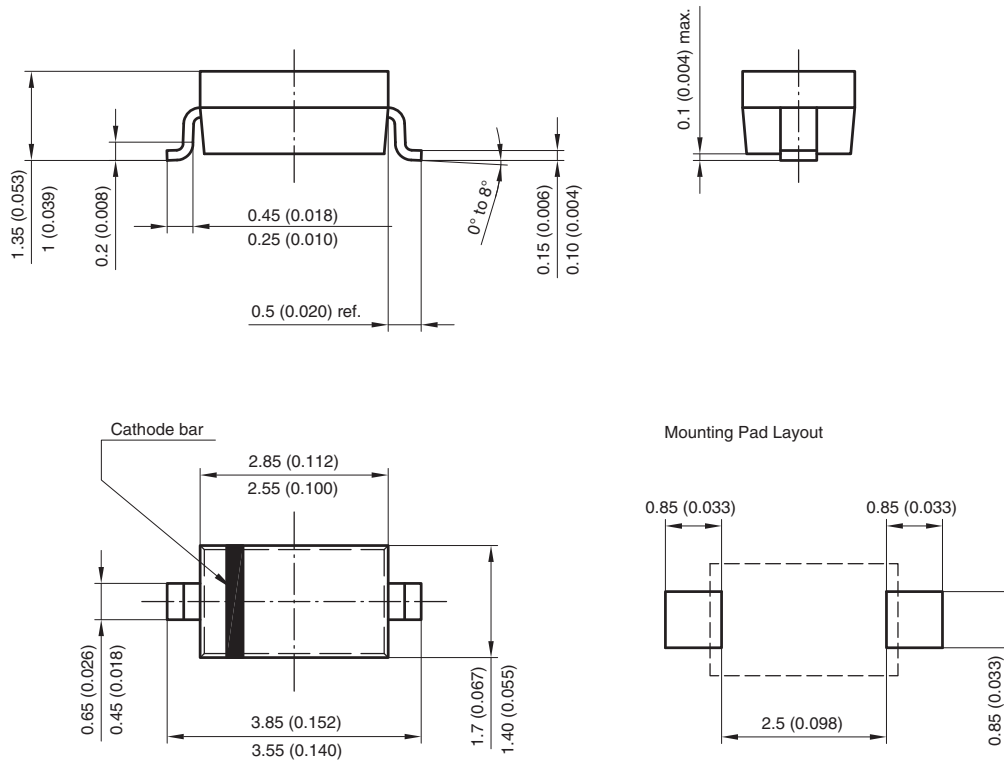


Fig. 16 - Breakdown Characteristics



**PACKAGE DIMENSIONS** in millimeters (inches): **SOD-123**



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