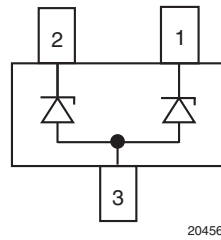


Small Signal Zener Diodes, Dual



20456

DESIGN SUPPORT TOOLS
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3D
Models
Available

| 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. ΔV_Z and ΔR_{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

 AUTOMOTIVE
GRADE
Available

RoHS
COMPLIANT

| 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 (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 ⁽¹⁾ | | | 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} | α_{VZ} at I_{ZT} | |
| | | V | | | mA | | V | nA | Ω | | $10^{-4}/^{\circ}\text{C}$ | |
| | | 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

⁽¹⁾ 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 ⁽¹⁾ | | | 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} | α_{VZ} at I_{ZT} | |
| | | V | | | mA | | V | nA | Ω | | $10^{-4}/^{\circ}\text{C}$ | |
| | | 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

⁽¹⁾ Tested with pulses $t_p = 5\text{ ms}$

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

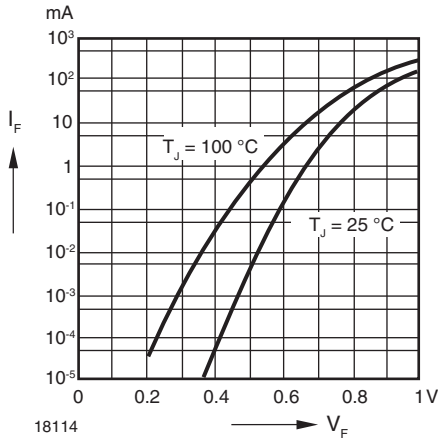


Fig. 1 - Forward Characteristics

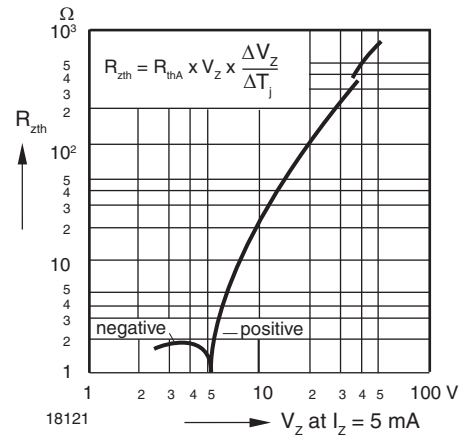


Fig. 4 - Thermal Differential Resistance vs. Zener Voltage

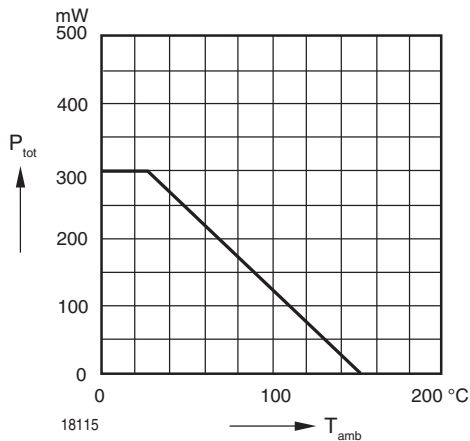


Fig. 2 - Admissible Power Dissipation vs. Ambient Temperature

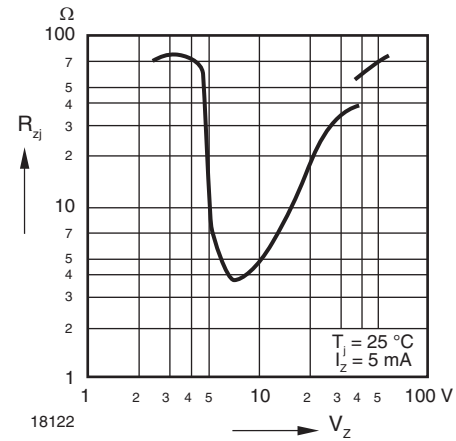


Fig. 5 - Dynamic Resistance vs. Zener Voltage

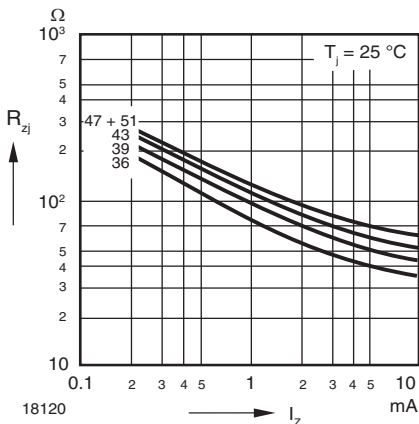


Fig. 3 - Dynamic Resistance vs. Zener Current

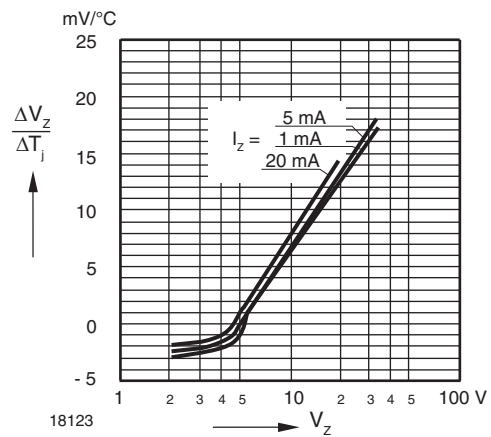


Fig. 6 - Temperature Dependence of Zener Voltage vs. Zener Voltage



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

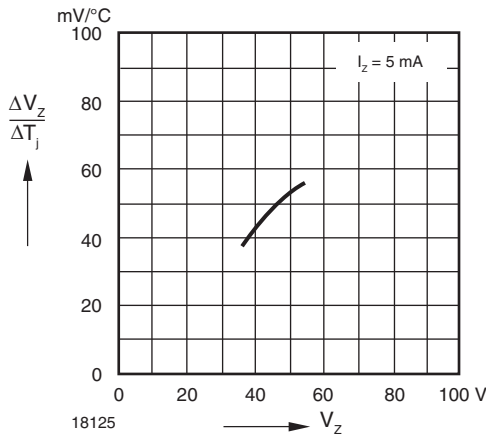


Fig. 8 - Temperature Dependence of Zener Voltage vs. Zener Voltage



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

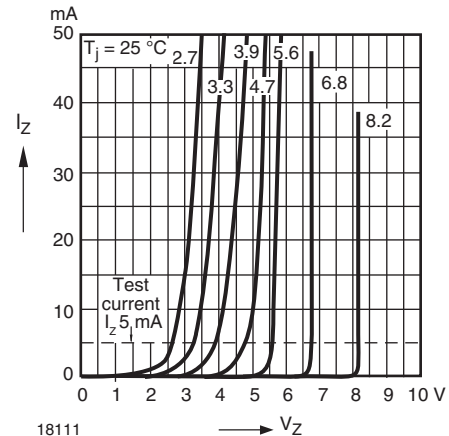


Fig. 12 - Breakdown Characteristics



Fig. 13 - Breakdown Characteristics

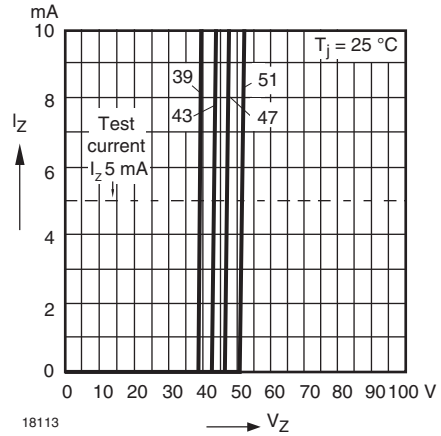
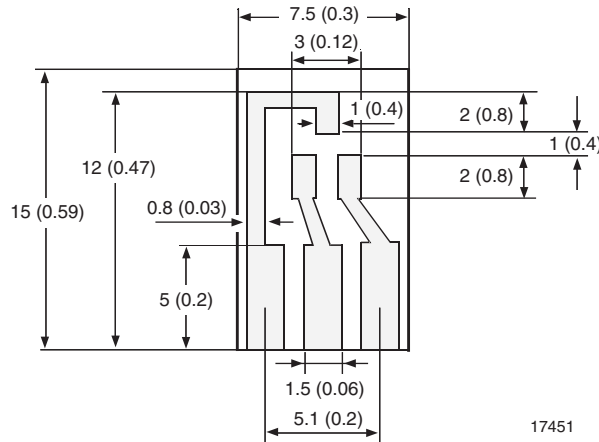


Fig. 14 - Breakdown Characteristics

LAYOUT FOR R_{thJA} TEST

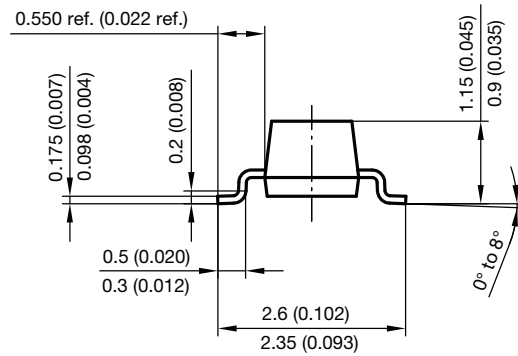
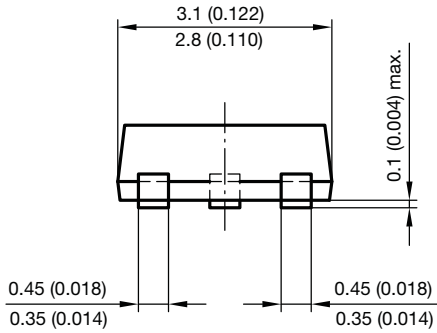
Thickness: fiberglass 0.059" (1.5 mm)

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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