

Small Signal Zener Diodes



FEATURES

- Very sharp reverse characteristic
- Low reverse current level
- Very high stability
- Low noise
- TZMC - V_Z -tolerance $\pm 5\%$
- TZMB - V_Z -tolerance $\pm 2\%$
- AEC-Q101 qualified
- Material categorization: For definitions of compliance please see 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; 5 | mA |
| V_Z specification | Pulse current | |
| Int. construction | Single | |

APPLICATIONS

- Voltage stabilization

| ORDERING INFORMATION | | | |
|----------------------|-----------------|--------------------------------|------------------------|
| DEVICE NAME | ORDERING CODE | TAPED UNITS PER REEL | MINIMUM ORDER QUANTITY |
| TZM-series | TZM-series-GS18 | 10 000 (8 mm tape on 13" reel) | 10 000/box |
| TZM-series | TZM-series-GS08 | 2500 (8 mm tape on 7" reel) | 12 500/box |

| PACKAGE | | | | |
|-----------------|--------|--------------------------------------|-----------------------------------|--------------------------|
| PACKAGE NAME | WEIGHT | MOLDING COMPOUND FLAMMABILITY RATING | MOISTURE SENSITIVITY LEVEL | SOLDERING CONDITIONS |
| MiniMELF SOD-80 | 31 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 | $R_{thJA} \leq 300\text{ K/W}$ | P_{tot} | 500 | mW |
| Zener current | | I_Z | P_{tot}/V_Z | mA |
| Junction to ambient air | On PC board 50 mm x 50 mm x 1.6 mm | R_{thJA} | 500 | K/W |
| Junction temperature | | T_j | 175 | °C |
| Storage temperature range | | T_{stg} | - 65 to + 175 | °C |
| Forward voltage (max.) | $I_F = 200\text{ mA}$ | V_F | 1.5 | V |



| ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | | | | | | | | |
|--|---------------------|------|------|--------------|-----------|-------------------------|-----|----------------------|-----|--------------------|-----------------------|--|--------|
| PART NUMBER | ZENER VOLTAGE RANGE | | | TEST CURRENT | | REVERSE LEAKAGE CURRENT | | | | DYNAMIC RESISTANCE | | TEMPERATURE COEFFICIENT OF ZENER VOLTAGE | |
| | V_Z at I_{ZT1} | | | I_{ZT1} | I_{ZT2} | I_R at V_R | | $I_R^{(1)}$ at V_R | | Z_Z at I_{ZT1} | Z_{ZK} at I_{ZT2} | TK_{VZ} | |
| | V | | | mA | | μA | V | μA | V | Ω | | $\%/K$ | |
| | MIN. | NOM. | MAX. | | | | | | | TYP. | TYP. | MIN. | MAX. |
| TZMC2V4 | 2.28 | 2.4 | 2.56 | 5 | 1 | < 50 | 1 | < 100 | 1 | < 85 | < 600 | - 0.09 | - 0.06 |
| TZMC2V7 | 2.5 | 2.7 | 2.9 | 5 | 1 | < 10 | 1 | < 50 | 1 | < 85 | < 600 | - 0.09 | - 0.06 |
| TZMC3V0 | 2.8 | 3.0 | 3.2 | 5 | 1 | < 4 | 1 | < 40 | 1 | < 90 | < 600 | - 0.08 | - 0.05 |
| TZMC3V3 | 3.1 | 3.3 | 3.5 | 5 | 1 | < 2 | 1 | < 40 | 1 | < 90 | < 600 | - 0.08 | - 0.05 |
| TZMC3V6 | 3.4 | 3.6 | 3.8 | 5 | 1 | < 2 | 1 | < 40 | 1 | < 90 | < 600 | - 0.08 | - 0.05 |
| TZMC3V9 | 3.7 | 3.9 | 4.1 | 5 | 1 | < 2 | 1 | < 40 | 1 | < 90 | < 600 | - 0.08 | - 0.05 |
| TZMC4V3 | 4 | 4.3 | 4.6 | 5 | 1 | < 1 | 1 | < 20 | 1 | < 90 | < 600 | - 0.06 | - 0.03 |
| TZMC4V7 | 4.4 | 4.7 | 5 | 5 | 1 | < 0.5 | 1 | < 10 | 1 | < 80 | < 600 | - 0.05 | 0.02 |
| TZMC5V1 | 4.8 | 5.1 | 5.4 | 5 | 1 | < 0.1 | 1 | < 2 | 1 | < 60 | < 550 | - 0.02 | 0.02 |
| TZMC5V6 | 5.2 | 5.6 | 6 | 5 | 1 | < 0.1 | 1 | < 2 | 1 | < 40 | < 450 | - 0.05 | 0.05 |
| TZMC6V2 | 5.8 | 6.2 | 6.6 | 5 | 1 | < 0.1 | 2 | < 2 | 2 | < 10 | < 200 | 0.03 | 0.06 |
| TZMC6V8 | 6.4 | 6.8 | 7.2 | 5 | 1 | < 0.1 | 3 | < 2 | 3 | < 8 | < 150 | 0.03 | 0.07 |
| TZMC7V5 | 7 | 7.5 | 7.9 | 5 | 1 | < 0.1 | 5 | < 2 | 5 | < 7 | < 50 | 0.03 | 0.07 |
| TZMC8V2 | 7.7 | 8.2 | 8.7 | 5 | 1 | < 0.1 | 6.2 | < 2 | 6.2 | < 7 | < 50 | 0.03 | 0.08 |
| TZMC9V1 | 8.5 | 9.1 | 9.6 | 5 | 1 | < 0.1 | 6.8 | < 2 | 6.8 | < 10 | < 50 | 0.03 | 0.09 |
| TZMC10 | 9.4 | 10 | 10.6 | 5 | 1 | < 0.1 | 7.5 | < 2 | 7.5 | < 15 | < 70 | 0.03 | 0.1 |
| TZMC11 | 10.4 | 11 | 11.6 | 5 | 1 | < 0.1 | 8.2 | < 2 | 8.2 | < 20 | < 70 | 0.03 | 0.11 |
| TZMC12 | 11.4 | 12 | 12.7 | 5 | 1 | < 0.1 | 9.1 | < 2 | 9.1 | < 20 | < 90 | 0.03 | 0.11 |
| TZMC13 | 12.4 | 13 | 14.1 | 5 | 1 | < 0.1 | 10 | < 2 | 10 | < 26 | < 110 | 0.03 | 0.11 |
| TZMC15 | 13.8 | 15 | 15.6 | 5 | 1 | < 0.1 | 11 | < 2 | 11 | < 30 | < 110 | 0.03 | 0.11 |
| TZMC16 | 15.3 | 16 | 17.1 | 5 | 1 | < 0.1 | 12 | < 2 | 12 | < 40 | < 170 | 0.03 | 0.11 |
| TZMC18 | 16.8 | 18 | 19.1 | 5 | 1 | < 0.1 | 13 | < 2 | 13 | < 50 | < 170 | 0.03 | 0.11 |
| TZMC20 | 18.8 | 20 | 21.2 | 5 | 1 | < 0.1 | 15 | < 2 | 15 | < 55 | < 220 | 0.03 | 0.11 |
| TZMC22 | 20.8 | 22 | 23.3 | 5 | 1 | < 0.1 | 16 | < 2 | 16 | < 55 | < 220 | 0.04 | 0.12 |
| TZMC24 | 22.8 | 24 | 25.6 | 5 | 1 | < 0.1 | 18 | < 2 | 18 | < 80 | < 220 | 0.04 | 0.12 |
| TZMC27 | 25.1 | 27 | 28.9 | 5 | 1 | < 0.1 | 20 | < 2 | 20 | < 80 | < 220 | 0.04 | 0.12 |
| TZMC30 | 28 | 30 | 32 | 5 | 1 | < 0.1 | 22 | < 2 | 22 | < 80 | < 220 | 0.04 | 0.12 |
| TZMC33 | 31 | 33 | 35 | 5 | 1 | < 0.1 | 24 | < 2 | 24 | < 80 | < 220 | 0.04 | 0.12 |
| TZMC36 | 34 | 36 | 38 | 5 | 1 | < 0.1 | 27 | < 2 | 27 | < 80 | < 220 | 0.04 | 0.12 |
| TZMC39 | 37 | 39 | 41 | 2.5 | 0.5 | < 0.1 | 30 | < 5 | 30 | < 90 | < 500 | 0.04 | 0.12 |
| TZMC43 | 40 | 43 | 46 | 2.5 | 0.5 | < 0.1 | 33 | < 5 | 33 | < 90 | < 600 | 0.04 | 0.12 |
| TZMC47 | 44 | 47 | 50 | 2.5 | 0.5 | < 0.1 | 36 | < 5 | 36 | < 110 | < 700 | 0.04 | 0.12 |
| TZMC51 | 48 | 51 | 54 | 2.5 | 0.5 | < 0.1 | 39 | < 10 | 39 | < 125 | < 700 | 0.04 | 0.12 |
| TZMC56 | 52 | 56 | 60 | 2.5 | 0.5 | < 0.1 | 43 | < 10 | 43 | < 135 | < 1000 | 0.04 | 0.12 |
| TZMC62 | 58 | 62 | 66 | 2.5 | 0.5 | < 0.1 | 47 | < 10 | 47 | < 150 | < 1000 | 0.04 | 0.12 |
| TZMC68 | 64 | 68 | 72 | 2.5 | 0.5 | < 0.1 | 51 | < 10 | 51 | < 200 | < 1000 | 0.04 | 0.12 |
| TZMC75 | 70 | 75 | 79 | 2.5 | 0.5 | < 0.1 | 56 | < 10 | 56 | < 250 | < 1500 | 0.04 | 0.12 |

Notes

- Additional measurement of voltage group TZMC9V1 to TZMC75, I_R at 95 % $V_{Zmin.} \leq 35\text{ nA}$ at $T_j = 25\text{ }^{\circ}\text{C}$
- (1) at $T_j = 150\text{ }^{\circ}\text{C}$



| ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | | | | | | | | |
|--|---------------------|------|-------|--------------|-----------|-------------------------|-----|----------------------|-----|--------------------|-----------------------|--|--------|
| PART NUMBER | ZENER VOLTAGE RANGE | | | TEST CURRENT | | REVERSE LEAKAGE CURRENT | | | | DYNAMIC RESISTANCE | | TEMPERATURE COEFFICIENT OF ZENER VOLTAGE | |
| | V_Z at I_{ZT1} | | | I_{ZT1} | I_{ZT2} | I_R at V_R | | $I_R^{(1)}$ at V_R | | Z_Z at I_{ZT1} | Z_{ZK} at I_{ZT2} | TK_{VZ} | |
| | V | | | mA | | μA | V | μA | V | Ω | | % / K | |
| | MIN. | NOM. | MAX. | | | | | | | TYP. | TYP. | MIN. | MAX. |
| TZMB2V4 | 2.35 | 2.4 | 2.45 | 5 | 1 | < 50 | 1 | < 100 | 1 | < 85 | < 600 | - 0.09 | - 0.06 |
| TZMB2V7 | 2.64 | 2.7 | 2.76 | 5 | 1 | < 10 | 1 | < 50 | 1 | < 85 | < 600 | - 0.09 | - 0.06 |
| TZMB3V0 | 2.94 | 3.0 | 3.06 | 5 | 1 | < 4 | 1 | < 40 | 1 | < 90 | < 600 | - 0.08 | - 0.05 |
| TZMB3V3 | 3.24 | 3.3 | 3.36 | 5 | 1 | < 2 | 1 | < 40 | 1 | < 90 | < 600 | - 0.08 | - 0.05 |
| TZMB3V6 | 3.52 | 3.6 | 3.68 | 5 | 1 | < 2 | 1 | < 40 | 1 | < 90 | < 600 | - 0.08 | - 0.05 |
| TZMB3V9 | 3.82 | 3.9 | 3.98 | 5 | 1 | < 2 | 1 | < 40 | 1 | < 90 | < 600 | - 0.08 | - 0.05 |
| TZMB4V3 | 4.22 | 4.3 | 4.38 | 5 | 1 | < 1 | 1 | < 20 | 1 | < 90 | < 600 | - 0.06 | - 0.03 |
| TZMB4V7 | 4.6 | 4.7 | 4.8 | 5 | 1 | < 0.5 | 1 | < 10 | 1 | < 80 | < 600 | - 0.05 | 0.02 |
| TZMB5V1 | 5 | 5.1 | 5.2 | 5 | 1 | < 0.1 | 1 | < 2 | 1 | < 60 | < 550 | - 0.02 | 0.02 |
| TZMB5V6 | 5.48 | 5.6 | 5.72 | 5 | 1 | < 0.1 | 1 | < 2 | 1 | < 40 | < 450 | - 0.05 | 0.05 |
| TZMB6V2 | 6.08 | 6.2 | 6.32 | 5 | 1 | < 0.1 | 2 | < 2 | 2 | < 10 | < 200 | 0.03 | 0.06 |
| TZMB6V8 | 6.66 | 6.8 | 6.94 | 5 | 1 | < 0.1 | 3 | < 2 | 3 | < 8 | < 150 | 0.03 | 0.07 |
| TZMB7V5 | 7.35 | 7.5 | 7.65 | 5 | 1 | < 0.1 | 5 | < 2 | 5 | < 7 | < 50 | 0.03 | 0.07 |
| TZMB8V2 | 8.04 | 8.2 | 8.36 | 5 | 1 | < 0.1 | 6.2 | < 2 | 6.2 | < 7 | < 50 | 0.03 | 0.08 |
| TZMB9V1 | 8.92 | 9.1 | 9.28 | 5 | 1 | < 0.1 | 6.8 | < 2 | 6.8 | < 10 | < 50 | 0.03 | 0.09 |
| TZMB10 | 9.8 | 10 | 10.2 | 5 | 1 | < 0.1 | 7.5 | < 2 | 7.5 | < 15 | < 70 | 0.03 | 0.1 |
| TZMB11 | 10.78 | 11 | 11.22 | 5 | 1 | < 0.1 | 8.2 | < 2 | 8.2 | < 20 | < 70 | 0.03 | 0.11 |
| TZMB12 | 11.76 | 12 | 12.24 | 5 | 1 | < 0.1 | 9.1 | < 2 | 9.1 | < 20 | < 90 | 0.03 | 0.11 |
| TZMB13 | 12.74 | 13 | 13.26 | 5 | 1 | < 0.1 | 10 | < 2 | 10 | < 26 | < 110 | 0.03 | 0.11 |
| TZMB15 | 14.7 | 15 | 15.3 | 5 | 1 | < 0.1 | 11 | < 2 | 11 | < 30 | < 110 | 0.03 | 0.11 |
| TZMB16 | 15.7 | 16 | 16.3 | 5 | 1 | < 0.1 | 12 | < 2 | 12 | < 40 | < 170 | 0.03 | 0.11 |
| TZMB18 | 17.64 | 18 | 18.36 | 5 | 1 | < 0.1 | 13 | < 2 | 13 | < 50 | < 170 | 0.03 | 0.11 |
| TZMB20 | 19.6 | 20 | 20.4 | 5 | 1 | < 0.1 | 15 | < 2 | 15 | < 55 | < 220 | 0.03 | 0.11 |
| TZMB22 | 21.55 | 22 | 22.45 | 5 | 1 | < 0.1 | 16 | < 2 | 16 | < 55 | < 220 | 0.04 | 0.12 |
| TZMB24 | 23.5 | 24 | 24.5 | 5 | 1 | < 0.1 | 18 | < 2 | 18 | < 80 | < 220 | 0.04 | 0.12 |
| TZMB27 | 26.4 | 27 | 27.6 | 5 | 1 | < 0.1 | 20 | < 2 | 20 | < 80 | < 220 | 0.04 | 0.12 |
| TZMB30 | 29.4 | 30 | 30.6 | 5 | 1 | < 0.1 | 22 | < 2 | 22 | < 80 | < 220 | 0.04 | 0.12 |
| TZMB33 | 32.4 | 33 | 33.6 | 5 | 1 | < 0.1 | 24 | < 2 | 24 | < 80 | < 220 | 0.04 | 0.12 |
| TZMB36 | 35.3 | 36 | 36.7 | 5 | 1 | < 0.1 | 27 | < 2 | 27 | < 80 | < 220 | 0.04 | 0.12 |
| TZMB39 | 38.2 | 39 | 39.8 | 2.5 | 1 | < 0.1 | 30 | < 5 | 30 | < 90 | < 500 | 0.04 | 0.12 |
| TZMB43 | 42.1 | 43 | 43.9 | 2.5 | 0.5 | < 0.1 | 33 | < 5 | 33 | < 90 | < 600 | 0.04 | 0.12 |
| TZMB47 | 46.1 | 47 | 47.9 | 2.5 | 0.5 | < 0.1 | 36 | < 5 | 36 | < 110 | < 700 | 0.04 | 0.12 |
| TZMB51 | 50 | 51 | 52 | 2.5 | 0.5 | < 0.1 | 39 | < 10 | 39 | < 125 | < 700 | 0.04 | 0.12 |
| TZMB56 | 54.9 | 56 | 57.1 | 2.5 | 0.5 | < 0.1 | 43 | < 10 | 43 | < 135 | < 1000 | 0.04 | 0.12 |
| TZMB62 | 60.8 | 62 | 63.2 | 2.5 | 0.5 | < 0.1 | 47 | < 10 | 47 | < 150 | < 1000 | 0.04 | 0.12 |
| TZMB68 | 66.6 | 68 | 69.4 | 2.5 | 0.5 | < 0.1 | 51 | < 10 | 51 | < 200 | < 1000 | 0.04 | 0.12 |
| TZMB75 | 73.5 | 75 | 76.5 | 2.5 | 0.5 | < 0.1 | 56 | < 10 | 56 | < 250 | < 1500 | 0.04 | 0.12 |

Notes

- Additional measurement of voltage group TZMB9V1 to TZMB75, I_R at 95 % $V_{Zmin.} \leq 35\text{ nA}$ at $T_j = 25\text{ }^{\circ}\text{C}$
- (1) at $T_j = 150\text{ }^{\circ}\text{C}$

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



Fig. 1 - Total Power Dissipation vs. Ambient Temperature



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



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



Fig. 5 - Diode Capacitance vs. Z-Voltage



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



Fig. 6 - Forward Current vs. Forward Voltage



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



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



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



Fig. 10 - Thermal Response

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



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

Foot print recommendation:



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Material Category Policy

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

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Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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