# Surface Mount Power Voltage-Regulating Diodes

**eSMP® Series**

**DO-220AA (SMP)**

## FEATURES

- Very low profile - typical height of 1.0 mm
- Ideal for automated placement
- Low Zener impedance
- Low regulation factor
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT
HALOGEN FREE

| PRIMARY CHARACTERISTICS | |
|---|---|
| $V_Z$ | 5.6 V to 43 V |
| $P_{tot}$ at $T_L$ = 75 °C | 1500 mW |
| $P_{tot}$ at $T_L$ = 25 °C | 500 mW |
| $T_J$ max. | 150 °C |
| $V_Z$ specification | Pulse current |
| Int. construction | Single |

## MECHANICAL DATA

**Case:** DO-220AA (SMP)
Molding compound meets UL 94 V-0 flammability rating Base P/N-M3 - halogen-free, RoHS-compliant, and commercial grade

**Terminals:** Matte tin plated leads, solderable per J-STD-002 and JESD 22-B102
M3 suffix meets JESD 201 class 1A whisker test

**Polarity:** Color band denotes cathode end

## TYPICAL APPLICATIONS

For general purpose regulation and protection applications.

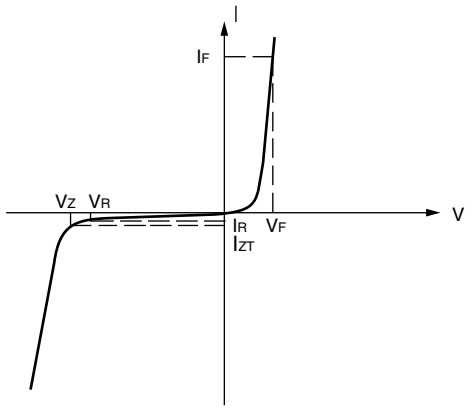
| PACKAGE | | | | |
|---|---|---|---|---|
| **PACKAGE NAME** | **WEIGHT** | **MOLDING COMPOUND FLAMMABILITY RATING** | **MOISTURE SENSITIVITY LEVEL** | **SOLDERING CONDITIONS** |
| DO-220AA (SMP) | 24 mg | UL 94 V-0 | MSL level 1 (according J-STD-020) | 260 °C/10 s at terminals |

| **MAXIMUM RATINGS** ($T_A$ = 25 °C unless otherwise noted) | | | |
|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **VALUE** | **UNIT** |
| Power dissipation at $T_L$ = 75 °C (fig. 1) (1) | $P_{tot}$ | 1500 | mW |
| Power dissipation at $T_A$ = 25 °C (fig. 1) (2) | $P_{tot}$ | 500 | mW |
| Maximum instantaneous forward voltage at 200 mA for all types (3) | $V_F$ | 1.5 | V |
| Operating junction and storage temperature range | $T_J$, $T_{STG}$ | - 65 to + 150 | °C |

**Notes**

(1) Mounted on PCB with 5.0 mm x 5.0 mm copper pads attached to each terminal
(2) Mounted on minimum recommended pad layout
(3) Pulse test: 300 µs pulse width, 1 % duty cycle

| ELECTRICAL CHARACTERISTICS | |
|---|---|
| **SYMBOL** | **PARAMETER** |
| $V_Z$ | Reverse Zener voltage at $I_{ZT}$ |
| $I_{ZT}$ | Reverse current |
| $Z_{ZT}$ | Maximum Zener impedance at $I_{ZT}$ |
| $I_{ZK}$ | Reverse current |
| $Z_{ZK}$ | Maximum Zener impedance at $I_{ZK}$ |
| $I_R$ | Reverse leakage current at $V_R$ |
| VR | Reverse voltage |
| $I_F$ | Forward current |
| $V_F$ | Forward voltage at $I_F$ |
| $I_{ZM}$ | Maximum DC Zener current |




**Zener Voltage Regulator**

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25 °C unless otherwise noted)

| PART NUMBER | DEVICE MARKING CODE | ZENER VOLTAGE RANGE | | | TEST CURRENT | | MAXIMUM ZENER IMPEDANCE | | MAXIMUM REVERSE LEAKAGE CURRENT | | MAXIMUM ZENER CURRENT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $V_Z$ at $I_{ZT}$ | | | $I_{ZT}$ | $I_{ZK}$ | $Z_{ZT}$ AT $I_{ZT}$ | $Z_{ZK}$ AT $I_{ZK}$ | $I_R$ AT $V_R$ | | $I_{ZM}$ |
| | | V | | | mA | | Ω | | µA | V | mA |
| | | MIN. | NOM. | MAX. | | | MAX. | MAX. | MAX. | | MAX. |
| SMPZ3919B | 19B | 5.32 | 5.6 | 5.88 | 66.9 | 1.0 | 5.0 | 700 | 200 | 3.0 | 268 |
| SMPZ3920B | 20B | 5.89 | 6.2 | 6.51 | 60.5 | 1.0 | 2.0 | 700 | 200 | 4.0 | 242 |
| SMPZ3921B | 21B | 6.46 | 6.8 | 7.14 | 55.1 | 1.0 | 2.5 | 400 | 200 | 5.2 | 221 |
| SMPZ3922B | 22B | 7.12 | 7.5 | 7.88 | 50.0 | 0.5 | 3.0 | 400 | 150 | 6.0 | 200 |
| SMPZ3923B | 23B | 7.79 | 8.2 | 8.61 | 45.7 | 0.5 | 3.5 | 400 | 50 | 6.5 | 183 |
| SMPZ3924B | 24B | 8.64 | 9.1 | 9.56 | 41.2 | 0.5 | 4.0 | 500 | 10 | 7.0 | 165 |
| SMPZ3925B | 25B | 9.5 | 10 | 10.5 | 37.5 | 0.25 | 4.5 | 500 | 2.5 | 8.0 | 150 |
| SMPZ3926B | 26B | 10.5 | 11 | 11.6 | 34.1 | 0.25 | 5.5 | 550 | 0.5 | 8.4 | 136 |
| SMPZ3927B | 27B | 11.4 | 12 | 12.6 | 31.2 | 0.25 | 6.5 | 550 | 0.5 | 9.1 | 125 |
| SMPZ3928B | 28B | 12.4 | 13 | 13.7 | 28.8 | 0.25 | 7.0 | 550 | 0.5 | 9.9 | 115 |
| SMPZ3929B | 29B | 14.3 | 15 | 15.8 | 25 | 0.25 | 9.0 | 600 | 0.5 | 11.4 | 100 |
| SMPZ3930B | 30B | 15.2 | 16 | 16.8 | 23.4 | 0.25 | 10.0 | 600 | 0.5 | 12.2 | 94 |
| SMPZ3931B | 31B | 17.1 | 18 | 18.9 | 20.8 | 0.25 | 12.0 | 650 | 0.5 | 13.7 | 83 |
| SMPZ3932B | 32B | 19.0 | 20 | 21 | 18.7 | 0.25 | 14.0 | 650 | 0.5 | 15.2 | 75 |
| SMPZ3933B | 33B | 20.9 | 22 | 23.1 | 17.0 | 0.25 | 17.5 | 650 | 0.5 | 16.7 | 68 |
| SMPZ3934B | 34B | 22.8 | 24 | 25.2 | 15.6 | 0.25 | 19.0 | 700 | 0.5 | 18.2 | 63 |
| SMPZ3935B | 35B | 25.7 | 27 | 28.4 | 13.9 | 0.25 | 23.0 | 700 | 0.5 | 20.6 | 56 |
| SMPZ3936B | 36B | 28.5 | 30 | 31.5 | 12.5 | 0.25 | 26.0 | 750 | 0.5 | 22.8 | 50 |
| SMPZ3937B | 37B | 31.4 | 33 | 34.7 | 11.4 | 0.25 | 33.0 | 800 | 0.5 | 25.1 | 45 |
| SMPZ3938B | 38B | 34.2 | 36 | 37.8 | 10.4 | 0.25 | 38.0 | 850 | 0.5 | 27.4 | 42 |
| SMPZ3939B | 39B | 37.1 | 39 | 41 | 9.6 | 0.25 | 45.0 | 900 | 0.5 | 29.7 | 38 |
| SMPZ3940B | 40B | 40.9 | 43 | 45.2 | 8.7 | 0.25 | 53.0 | 950 | 0.5 | 32.7 | 35 |

**THERMAL CHARACTERISTICS** ($T_A$ = 25 °C unless otherwise noted)

| PARAMETER | SYMBOL | LIMIT | UNIT |
|---|---|---|---|
| Typical thermal resistance, junction to lead (1) | $R_{\theta JL}$ | 50 | °C/W |
| Typical thermal resistance, junction to ambient (2) | $R_{\theta JA}$ | 250 | °C/W |

**Notes**

(1) Mounted on PCB with 5.0 mm x 5.0 mm copper pad areas attached to each terminal

(2) Mounted on minimum recommended pad layout

| ORDERING INFORMATION (Example) | | | | |
|---|---|---|---|---|
| PREFERRED P/N | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| SMPZ3919B-M3/84A | 0.024 | 84A | 3000 | 7" diameter plastic tape and reel |
| SMPZ3919B-M3/85A | 0.024 | 85A | 10 000 | 13" diameter plastic tape and reel |

## RATINGS AND CHARACTERISTICS CURVES

($T_A$ = 25 °C unless otherwise noted)

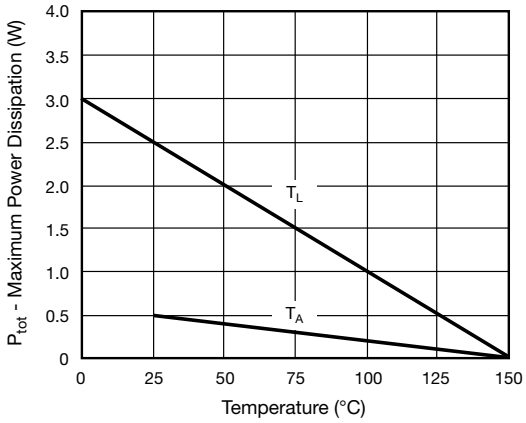



Fig. 1 - Steady State Power Derating

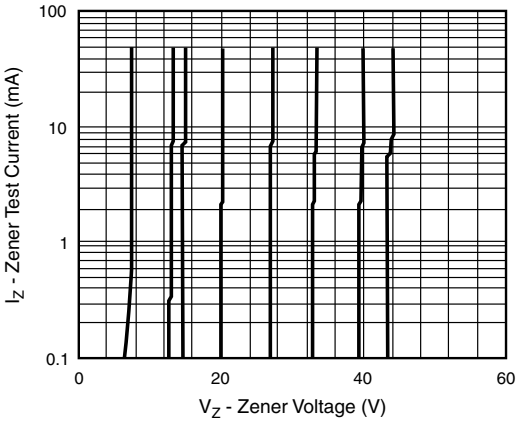



Fig. 3 - Typical Zener Voltage

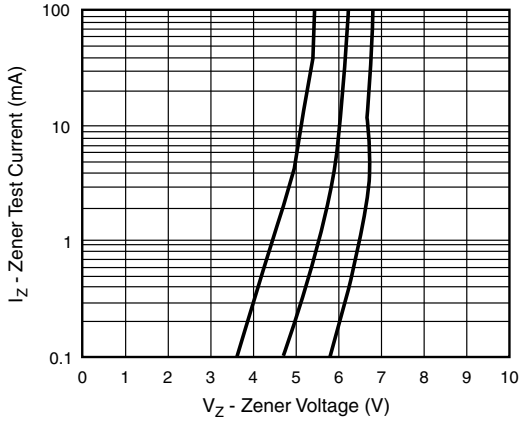



Fig. 2 - Typical Zener Voltage

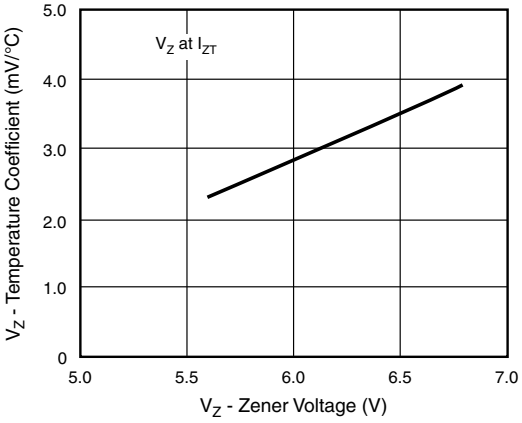



Fig. 4 - Typical temperature Coefficients

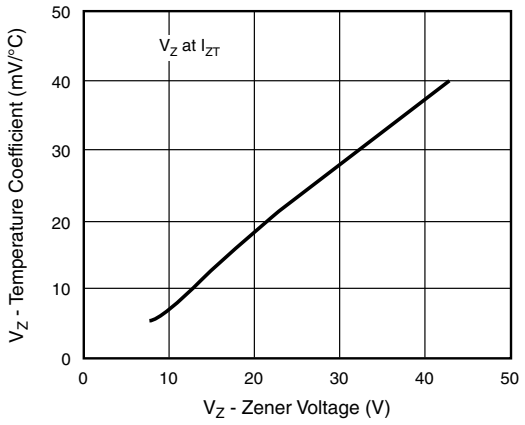



Fig. 5 - Typical Transient Temperature Coefficients

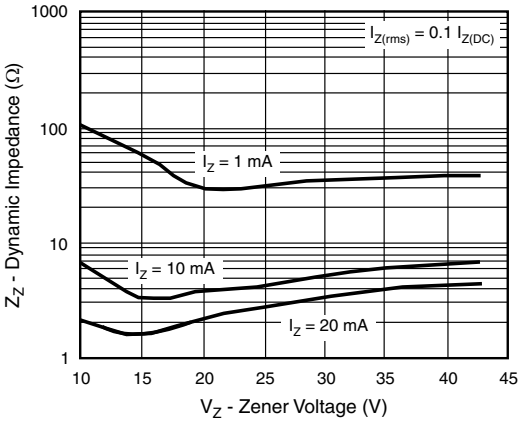



Fig. 7 - Typical Zener Impedance

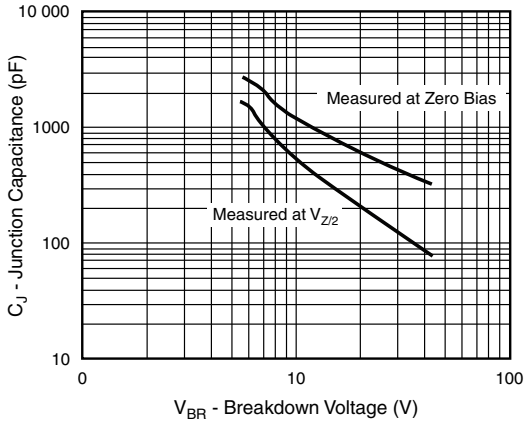
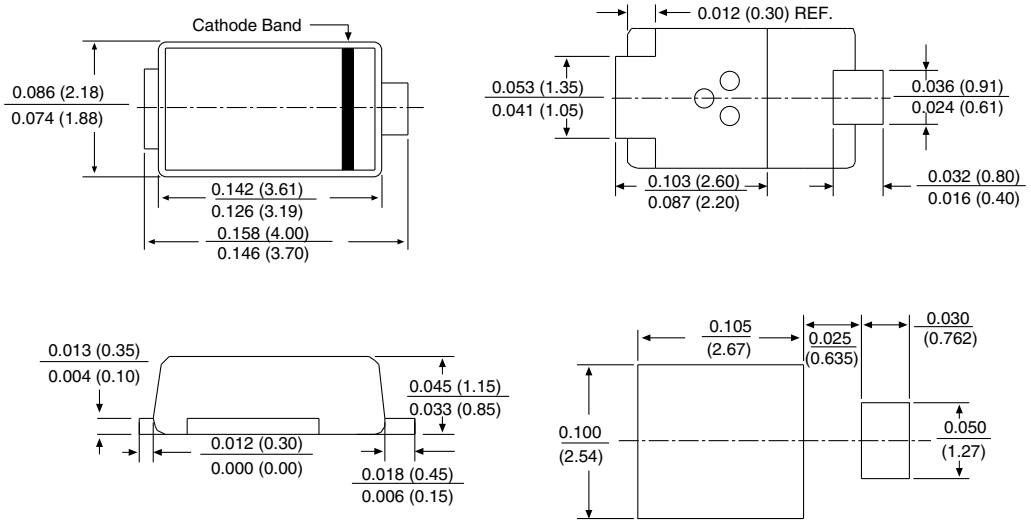



Fig. 6 - Typical Junction Capacitance

## **PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)

**DO-220AA (SMP)**



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