

## Surface Mount Power Voltage-Regulating Diodes

### eSMP® Series


**SMP (DO-220AA)**

Anode Cathode


**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### 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](http://www.vishay.com/doc?99912)

### TYPICAL APPLICATIONS

For general purpose regulation, industrial, and protection applications.

### MECHANICAL DATA

**Case:** SMP (DO-220AA)

Molding compound meets UL 94 V-0 flammability rating  
Base P/N-M3 - halogen-free, RoHS-compliant, and industrial 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

### LINKS TO ADDITIONAL RESOURCES



| PRIMARY CHARACTERISTICS           |                |
|-----------------------------------|----------------|
| $V_Z$                             | 5.6 V to 43 V  |
| $P_{tot}$ at $T_L = 75\text{ °C}$ | 1500 mW        |
| $P_{tot}$ at $T_L = 25\text{ °C}$ | 500 mW         |
| $T_J$ max.                        | 150 °C         |
| $V_Z$ specification               | Pulse current  |
| Package                           | SMP (DO-220AA) |
| Circuit configuration             | Single         |

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

| MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)               |                |             |      |
|--|----------------|-------------|------|
| PARAMETER  | SYMBOL         | VALUE       | UNIT |
| Power dissipation at $T_L = 75\text{ °C}$ (fig. 1) <sup>(1)</sup>            | $P_{tot}$      | 1500        | mW   |
| Power dissipation at $T_A = 25\text{ °C}$ (fig. 1) <sup>(2)</sup>            | $P_{tot}$      | 500         | mW   |
| Maximum instantaneous forward voltage at 200 mA for all types <sup>(3)</sup> | $V_F$          | 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  $\mu$ s 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 $V_R$    |
| $V_R$                      | Reverse voltage                     |
| $I_F$                      | Forward current                     |
| $V_F$                      | Forward voltage at $I_F$            |
| $I_{ZM}$                   | Maximum DC Zener current            |



Zener Voltage Regulator

| ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ 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           |          | $\Omega$                |                      | $\mu\text{A}$                   | 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 ( $T_A = 25^\circ\text{C}$ unless otherwise noted) |                 |       |                    |
|--|-----------------|-------|--------------------|
| PARAMETER  | SYMBOL          | LIMIT | UNIT               |
| Typical thermal resistance, junction to lead <sup>(1)</sup>                | $R_{\theta JL}$ | 50    | $^\circ\text{C/W}$ |
| Typical thermal resistance, junction to ambient <sup>(2)</sup>             | $R_{\theta JA}$ | 250   | $^\circ\text{C/W}$ |

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** ( $T_A = 25\text{ }^\circ\text{C}$  unless otherwise noted)

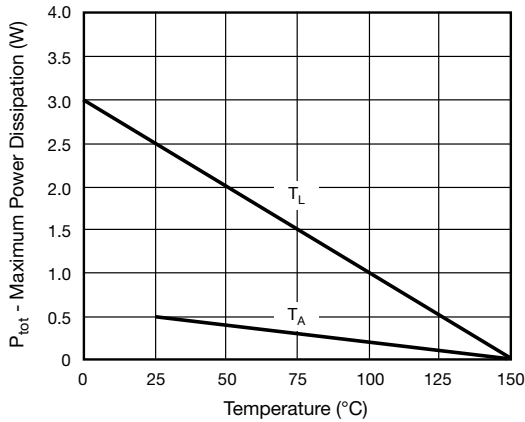


Fig. 1 - Steady State Power Derating

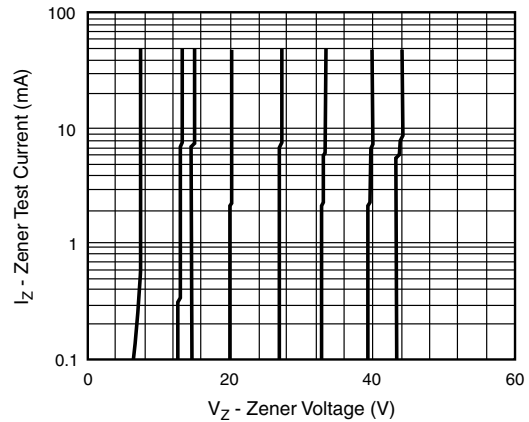


Fig. 3 - Typical Zener Voltage

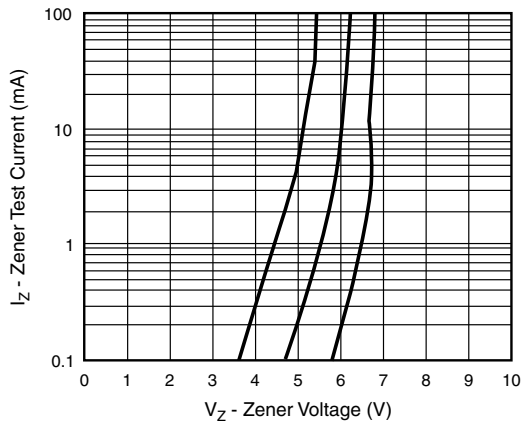


Fig. 2 - Typical Zener Voltage

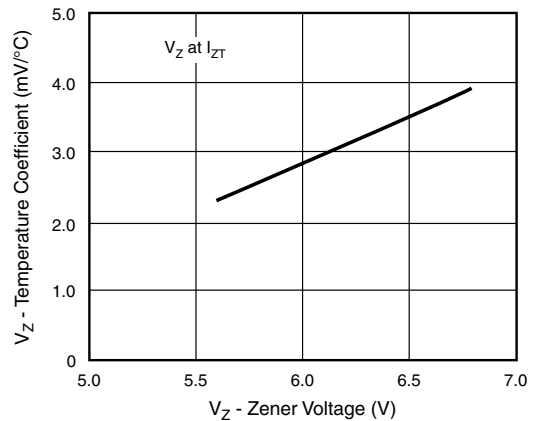


Fig. 4 - Typical temperature Coefficients

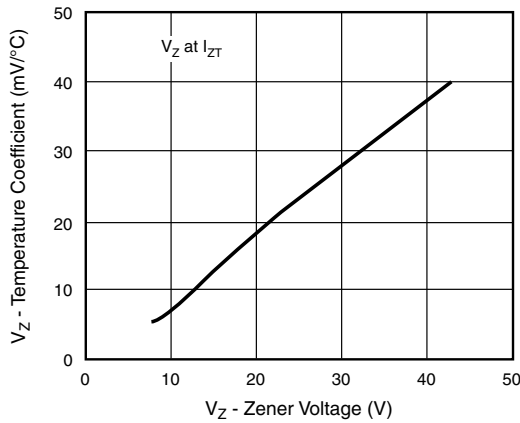


Fig. 5 - Typical Transient Temperature Coefficients

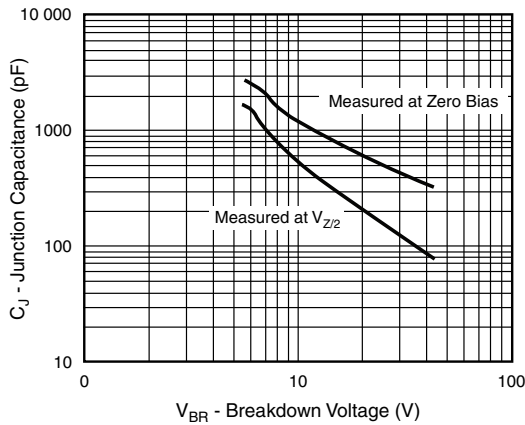


Fig. 6 - Typical Junction Capacitance

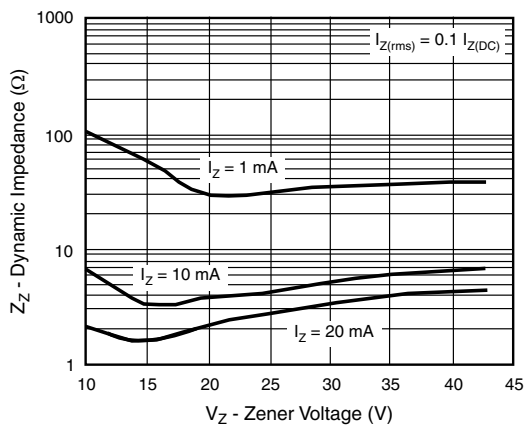
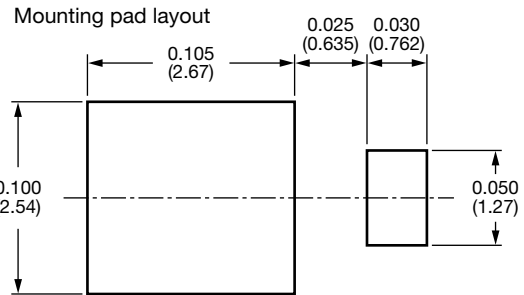
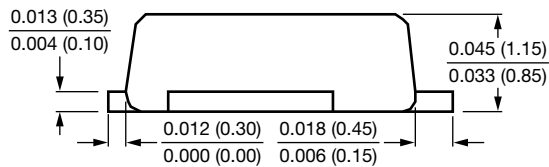
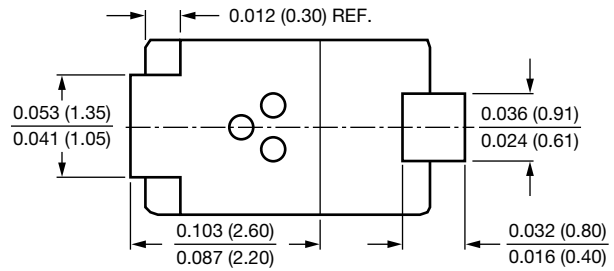
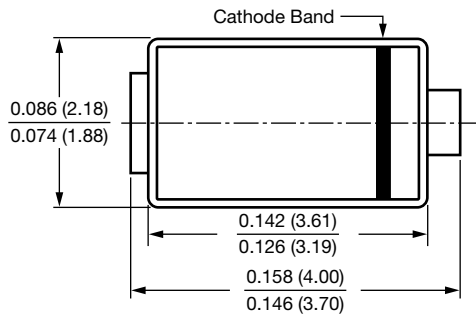


Fig. 7 - Typical Zener Impedance



### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

#### SMP (DO-220AA)





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