

SOD-323 Plastic-Encapsulate Diodes

TVS3ZxxA Series Zener Transient Voltage Suppressor

DESCRIPTION

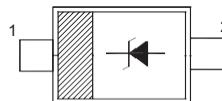
The TVS3ZxxA Series is designed to protect voltage sensitive components from high voltage, high energy transients. Excellent clamping capability, high surge capability, low zener impedance and fast response time. Because of its small size, it is ideal for use in cellular phones, portable devices, business machines, power supplies and many other industrial/consumer applications.

Features

- Stand-off Voltage: 5 – 170 Volts
- Peak Power – 200 Watts @ 1 ms (SMF5.0A – SMF58A)
– 175 Watts @ 1 ms (SMF60A – SMF170A)
- Maximum Clamp Voltage @ Peak Pulse Current
- Low Leakage
- Response Time is Typically < 1 ns
- ESD Rating of Class 3 (> 16 kV) per Human Body Model
IEC61000-4-2 Level 4 ESD Protection
IEC61000-4-4 40 A ESD Protection

PINNING

| PIN | DESCRIPTION |
|-----|-------------|
| 1 | Cathode |
| 2 | Anode |



Top View
Simplified outline SOD-323 and symbol

MAXIMUM RATINGS

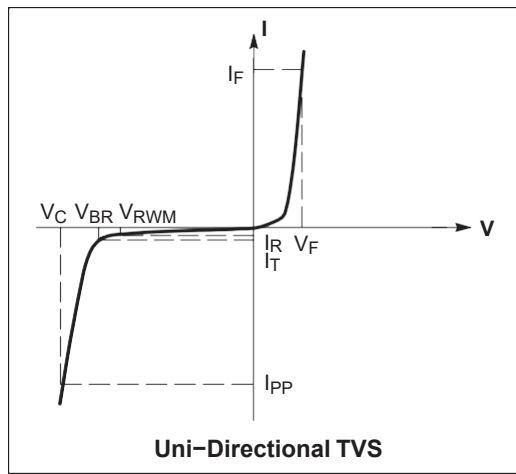
| Rating | Symbol | Value | Unit |
|--|-----------------------------------|-------------|-------------|
| Maximum P _{pk} Dissipation (PW-10/1000 µs) (Note 1) SMF60A – SMF170A | P _{pk} | 175 | W |
| Maximum P _{pk} Dissipation (PW-10/1000 µs) (Note 1) SMF5.0A – SMF58A | P _{pk} | 200 | W |
| Maximum P _{pk} Dissipation @ T _A = 25°C, (PW-8/20 µs) (Note 2) | P _{pk} | 1000 | W |
| DC Power Dissipation @ T _A = 25°C (Note 3) Derate above 25°C | P _D | 385 4.0 | mW mW/°C |
| Thermal Resistance, Junction-to-Ambient (Note 3) | R _{θJA} | 325 | °C/W |
| Thermal Resistance, Junction-to-Lead (Note 3) | R _{θJcathode} | 26 | °C/W |
| Operating and Storage Temperature Range | T _J , T _{stg} | -55 to +150 | °C |

1. Non-repetitive current pulse at T_A = 25°C, per waveform of Figure 2.
2. Non-repetitive current pulse at T_A = 25°C, per waveform of Figure 3.
3. Mounted with recommended minimum pad size, DC board FR-4.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted, V_F = 3.5 V Max. @ I_F (Note 4) = 12 A)

| Symbol | Parameter |
|------------------|--|
| I _{PP} | Maximum Reverse Peak Pulse Current |
| V _C | Clamping Voltage @ I _{PP} |
| V _{RWM} | Working Peak Reverse Voltage |
| I _R | Maximum Reverse Leakage Current @ V _{RWM} |
| V _{BR} | Breakdown Voltage @ I _T |
| I _T | Test Current |
| I _F | Forward Current |
| V _F | Forward Voltage @ I _F |

4. 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.



ELECTRICAL CHARACTERISTICS ($T_L = 30^\circ\text{C}$ unless otherwise noted, $V_F = 1.25$ Volts @ 200 mA)

| Device* | Marking | V_{RWM} (V) | $V_{BR} @ I_T$ (V) (Note 6) | | | I_T | $I_R @ V_{RWM}$ | $V_C(\text{Max})$ | $I_{PP(\text{Max})}$ (A) |
|-----------|---------|---------------|-----------------------------|-------|------|-------|-------------------|-------------------|--------------------------|
| | | (Note 5) | Min | Nom | Max | (mA) | (μA) | (V) | (Note 7) |
| TVS3Z5.0A | FE | 5 | 6.4 | 6.7 | 7 | 10 | 400 | 9.2 | 21.7 |
| TVS3Z6.0A | FG | 6 | 6.67 | 7.02 | 7.37 | 10 | 400 | 10.3 | 19.4 |
| TVS3Z6.5A | FK | 6.5 | 7.22 | 7.6 | 7.98 | 10 | 250 | 11.2 | 17.9 |
| TVS3Z7.0A | FM | 7 | 7.78 | 8.2 | 8.6 | 10 | 100 | 12 | 16.7 |
| TVS3Z7.5A | FP | 7.5 | 8.33 | 8.77 | 9.21 | 1 | 50 | 12.9 | 15.5 |
| TVS3Z8.0A | FR | 8 | 8.89 | 9.36 | 9.83 | 1 | 25 | 13.6 | 14.7 |
| TVS3Z8.5A | FT | 8.5 | 9.44 | 9.92 | 10.4 | 1 | 10 | 14.4 | 13.9 |
| TVS3Z9.0A | FV | 9 | 10 | 10.55 | 11.1 | 1 | 5 | 15.4 | 13.0 |
| TVS3Z10A | FX | 10 | 11.1 | 11.7 | 12.3 | 1 | 2.5 | 17 | 11.8 |
| TVS3Z11A | FZ | 11 | 12.2 | 12.85 | 13.5 | 1 | 2.5 | 18.2 | 11.0 |
| TVS3Z12A | HE | 12 | 13.3 | 14 | 14.7 | 1 | 2.5 | 19.9 | 10.1 |
| TVS3Z13A | HG | 13 | 14.4 | 15.15 | 15.9 | 1 | 1 | 21.5 | 9.3 |
| TVS3Z14A | HK | 14 | 15.6 | 16.4 | 17.2 | 1 | 1 | 23.2 | 8.6 |
| TVS3Z15A | HM | 15 | 16.7 | 17.6 | 18.5 | 1 | 1 | 24.4 | 8.2 |
| TVS3Z16A | HP | 16 | 17.8 | 18.75 | 19.7 | 1 | 1 | 26 | 7.7 |
| TVS3Z17A | HR | 17 | 18.9 | 19.9 | 20.9 | 1 | 1 | 27.6 | 7.2 |
| TVS3Z18A | HT | 18 | 20 | 21 | 22.1 | 1 | 1 | 29.2 | 6.8 |
| TVS3Z20A | HV | 20 | 22.2 | 23.35 | 24.5 | 1 | 1 | 32.4 | 6.2 |
| TVS3Z22A | HX | 22 | 24.4 | 25.6 | 26.9 | 1 | 1 | 35.5 | 5.6 |
| TVS3Z24A | HZ | 24 | 26.7 | 28.1 | 29.5 | 1 | 1 | 38.9 | 5.1 |
| TVS3Z26A | JE | 26 | 28.9 | 30.4 | 31.9 | 1 | 1 | 42.1 | 4.8 |
| TVS3Z28A | JG | 28 | 31.1 | 32.8 | 34.4 | 1 | 1 | 45.4 | 4.4 |
| TVS3Z30A | JK | 30 | 33.3 | 35.1 | 36.8 | 1 | 1 | 48.4 | 4.1 |
| TVS3Z33A | JM | 33 | 36.7 | 38.7 | 40.6 | 1 | 1 | 53.3 | 3.8 |
| TVS3Z36A | JP | 36 | 40 | 42.1 | 44.2 | 1 | 1 | 58.1 | 3.4 |
| TVS3Z40A | JR | 40 | 44.4 | 46.8 | 49.1 | 1 | 1 | 64.5 | 3.1 |
| TVS3Z43A | JT | 43 | 47.8 | 50.3 | 52.8 | 1 | 1 | 69.4 | 2.9 |
| TVS3Z45A | JV | 45 | 50 | 52.65 | 55.3 | 1 | 1 | 72.7 | 2.8 |
| TVS3Z48A | JX | 48 | 53.3 | 56.1 | 58.9 | 1 | 1 | 77.4 | 2.6 |
| TVS3Z51A | JZ | 51 | 56.7 | 59.7 | 62.7 | 1 | 1 | 82.4 | 2.4 |
| TVS3Z54A | XE | 54 | 60 | 63.15 | 66.3 | 1 | 1 | 87.1 | 2.3 |
| TVS3Z58A | XG | 58 | 64.4 | 67.8 | 71.2 | 1 | 1 | 93.6 | 2.1 |
| TVS3Z60A | XK | 60 | 66.7 | 70.2 | 73.7 | 1 | 1 | 96.8 | 1.8 |
| TVS3Z64A | XM | 64 | 71.1 | 74.85 | 78.6 | 1 | 1 | 103 | 1.7 |
| TVS3Z70A | XP | 70 | 77.8 | 81.9 | 86 | 1 | 1 | 113 | 1.5 |
| TVS3Z75A | XR | 75 | 83.3 | 87.7 | 92.1 | 1 | 1 | 121 | 1.4 |
| TVS3Z78A | XT | 78 | 86.7 | 91.25 | 95.8 | 1 | 1 | 126 | 1.4 |
| TVS3Z85A | XV | 85 | 94.4 | 99.2 | 104 | 1 | 1 | 137 | 1.3 |
| TVS3Z90A | XX | 90 | 100 | 105.5 | 111 | 1 | 1 | 146 | 1.2 |
| TVS3Z100A | XZ | 100 | 111 | 117 | 123 | 1 | 1 | 162 | 1.1 |
| TVS3Z110A | TE | 110 | 122 | 128.5 | 135 | 1 | 1 | 177 | 1.0 |
| TVS3Z120A | TG | 120 | 133 | 140 | 147 | 1 | 1 | 193 | 0.9 |
| TVS3Z130A | TK | 130 | 144 | 151.5 | 159 | 1 | 1 | 209 | 0.8 |
| TVS3Z150A | TM | 150 | 167 | 176 | 185 | 1 | 1 | 243 | 0.7 |
| TVS3Z160A | TP | 160 | 178 | 187.5 | 197 | 1 | 1 | 259 | 0.7 |
| TVS3Z170A | TR | 170 | 189 | 199 | 209 | 1 | 1 | 275 | 0.6 |

5. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V_{RWM}) which should be equal to or greater than the DC or continuous peak operating voltage level.

6. V_{BR} measured at pulse test current I_T at ambient temperature of 25°C .

7. Surge current waveform per Figure 2 and derate per Figure 3.

Typical Characteristics

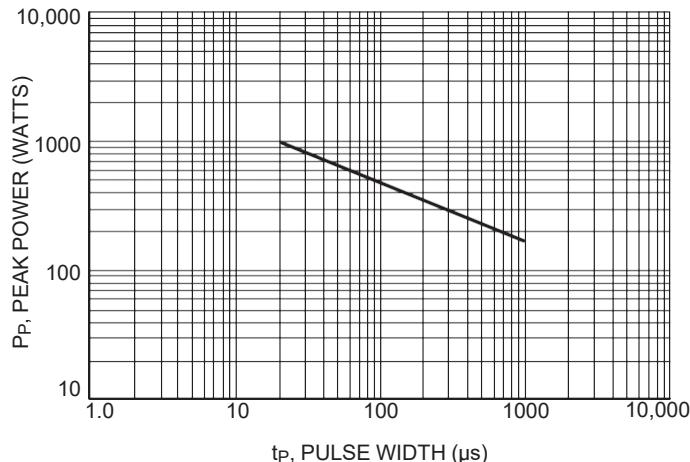


Figure 1. Pulse Rating Curve

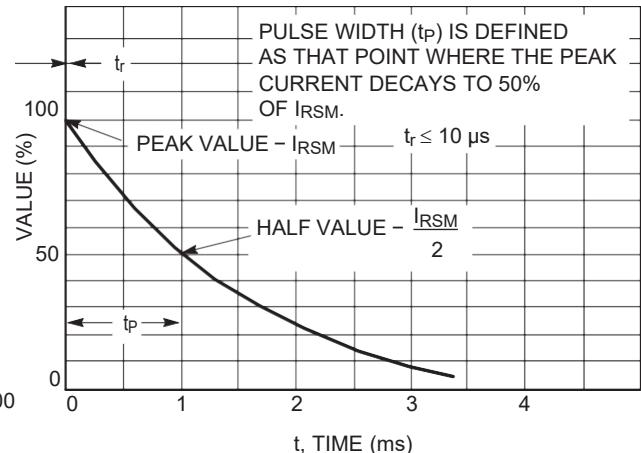


Figure 2. 10 X 1000 μ s Pulse Waveform

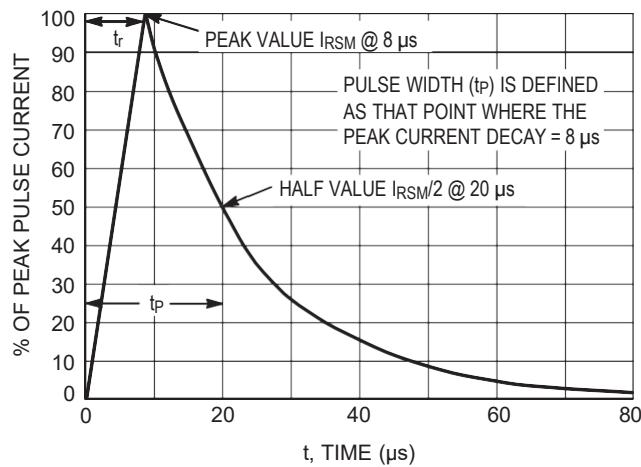


Figure 3. 8 X 20 μ s Pulse Waveform

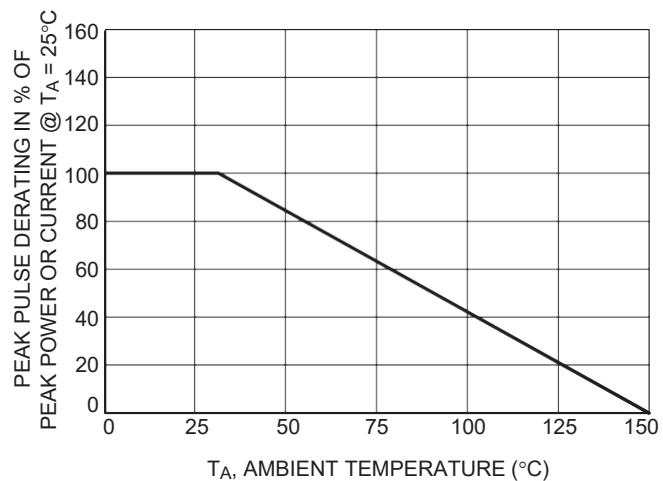


Figure 4. Pulse Derating Curve

Typical Characteristics

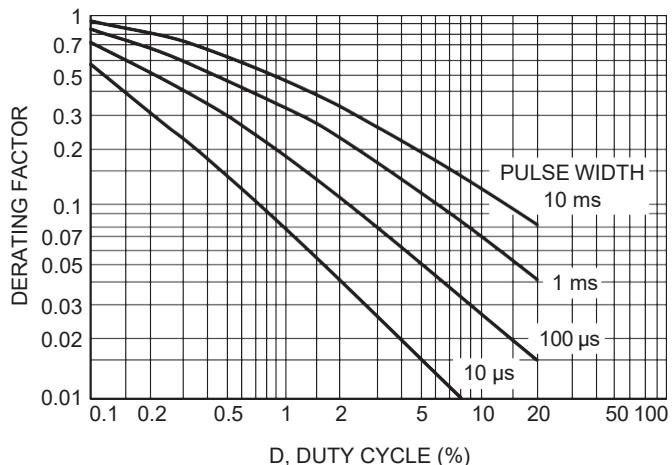


Figure 5. Typical Derating Factor for Duty Cycle

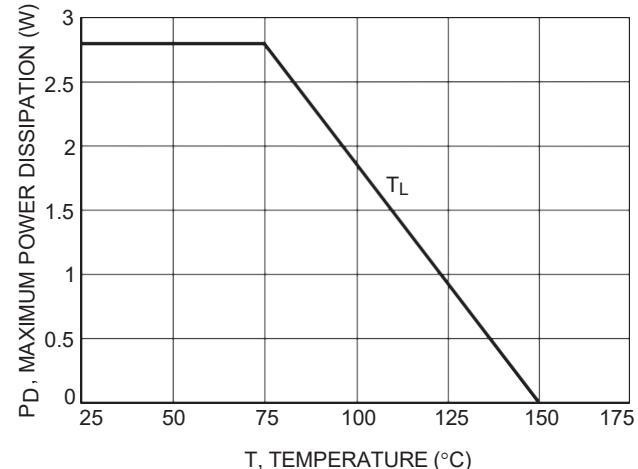


Figure 6. Steady State Power Derating

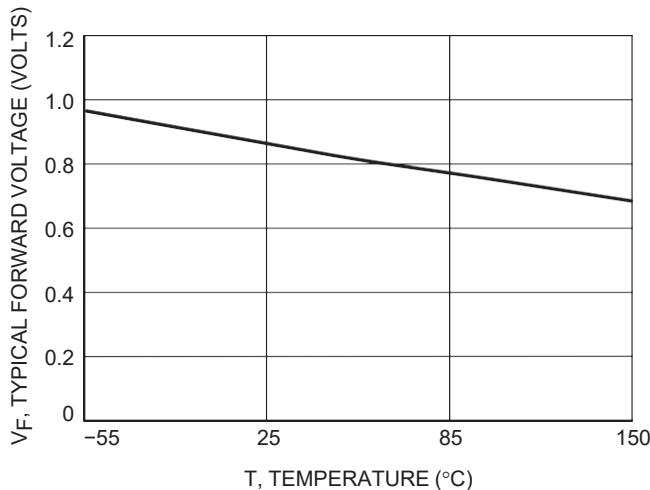


Figure 7. Forward Voltage

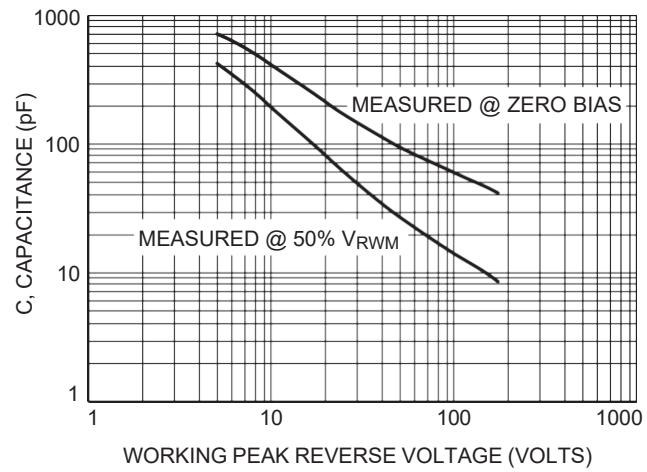


Figure 8. Capacitance versus Working Peak Reverse Voltage

PACKAGE OUTLINE

Plastic surface mounted package; 2 leads

SOD-323

