

SM8S Series Surface Mount



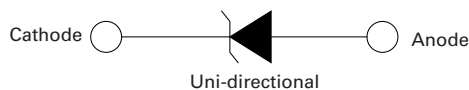
Agency Approvals

| Agency | Agency File Number |
|--------|--------------------|
| | TBD |

Maximum Ratings and Thermal Characteristics (T_A=25°C unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|--|-----------------------------------|------------|------|
| Peak Pulse Power Dissipation by 10/1000 μs test waveform | P _{PPM} | 7000 | W |
| Power dissipation on infinite heatsink at T _C = 25 °C | P _D | 8.0 | W |
| Maximum Instantaneous Forward Voltage at 100 A for Unidirectional only | V _F | 1.8 | V |
| Peak forward surge current 8.3 ms single half sine-wave | I _{FSM} | 1000 | A |
| Operating Junction and Storage Temperature Range | T _J , T _{STG} | -55 to 175 | °C |
| Typical Thermal Resistance Junction to Ambient | R _{θJA} | 55 | °C/W |
| Typical Thermal Resistance Junction to case | R _{θJC} | 0.9 | °C/W |

Functional Diagram



Description

The SM8S Series TVS Diode is housed in a SMT0-263 package with lead modifications. It is designed to protect sensitive electronics against lightning and inductive load switching voltage transient events.

Features & Benefits

- 7000 W peak pulse power capability at 10/1000 μs waveform, repetition rate (duty cycles):0.01 %
- SMTO-263 low profile surface mount package minimizing PCB footprint and foot print is compatible to industrial popular DO-218AB package
- Typical failure mode is short from over-specified voltage or current
- Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c pass class 1/2
- IEC 61000-4-2 ESD 30kV(Air), 30kV (Contact)
- Glass passivated chip junction
- Low dynamic resistance
- $V_{BR} @ T_J = V_{BR} @ 25\text{ }^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$ (αT: Temperature Coefficient, typical value is 0.1 %)
- Recognized compound meeting flammability rating UL94V-0
- Halogen free and RoHS compliant
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin (Sn) (IPC/JEDEC J-STD-609A.01)


Applications

TVS components are ideal for the protection of I/O interfaces, VCC bus and other vulnerable circuits used in telecom, computer, industrial and consumer electronic applications.

PRELIMINARY

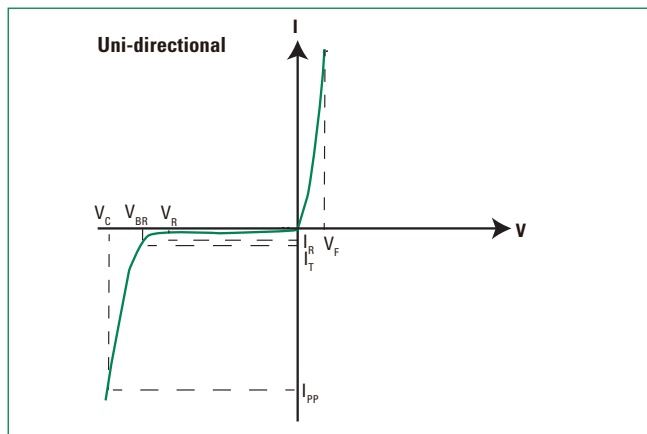
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Electrical Characteristics ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

| Part Number (Uni) | Marking | Breakdown Voltage V_{BR} @ I_T (V) | | Test Current I_T (mA) | Reverse Stand off Voltage V_R (V) | Maximum Reverse Leakage I_R @ V_R (μA) | $T_J = 150\text{ }^\circ\text{C}$ Max. Reverse Leakage I_R @ V_R (μA) | Maximum Peak Pulse Surge Current I_{PP} (A) | Maximum Clamping Voltage V_C @ I_{PP} (V) | Agency Approval  |
|-------------------|---------|--|------|-------------------------|-------------------------------------|---|--|---|---|---|
| | | Min | Max | | | | | | | |
| SM8S14A | SM8S14A | 15.6 | 17.2 | 5.0 | 14 | 10 | 50 | 301 | 23.2 | - |
| SM8S15A | SM8S15A | 16.7 | 18.5 | 5.0 | 15 | 10 | 50 | 286 | 24.4 | - |
| SM8S16A | SM8S16A | 17.8 | 19.7 | 5.0 | 16 | 2.0 | 50 | 269 | 26.0 | - |
| SM8S17A | SM8S17A | 18.9 | 20.9 | 5.0 | 17 | 2.0 | 50 | 253 | 27.6 | - |
| SM8S18A | SM8S18A | 20.0 | 22.1 | 5.0 | 18 | 2.0 | 50 | 240 | 29.2 | - |
| SM8S20A | SM8S20A | 22.2 | 24.5 | 5.0 | 20 | 2.0 | 50 | 216 | 32.4 | - |
| SM8S22A | SM8S22A | 24.4 | 26.9 | 5.0 | 22 | 2.0 | 50 | 197 | 35.5 | - |
| SM8S24A | SM8S24A | 26.7 | 29.5 | 5.0 | 24 | 2.0 | 50 | 180 | 38.9 | - |
| SM8S26A | SM8S26A | 28.9 | 31.9 | 5.0 | 26 | 2.0 | 50 | 167 | 42.1 | - |
| SM8S27A | SM8S27A | 29.9 | 33.1 | 5.0 | 27 | 2.0 | 50 | 160 | 43.6 | - |
| SM8S28A | SM8S28A | 31.1 | 34.4 | 5.0 | 28 | 2.0 | 50 | 154 | 45.4 | - |
| SM8S30A | SM8S30A | 33.3 | 36.8 | 5.0 | 30 | 2.0 | 50 | 144 | 48.4 | - |
| SM8S33A | SM8S33A | 36.7 | 40.6 | 5.0 | 33 | 2.0 | 50 | 132 | 53.3 | - |
| SM8S36A | SM8S36A | 40.0 | 44.2 | 5.0 | 36 | 2.0 | 50 | 121 | 58.1 | - |
| SM8S40A | SM8S40A | 44.4 | 49.1 | 5.0 | 40 | 2.0 | 50 | 108 | 64.5 | - |
| SM8S43A | SM8S43A | 47.8 | 52.8 | 5.0 | 43 | 2.0 | 50 | 101 | 69.4 | - |
| SM8S45A | SM8S45A | 50.0 | 55.3 | 5.0 | 45 | 2.0 | 50 | 96.3 | 72.7 | - |
| SM8S48A | SM8S48A | 53.3 | 58.9 | 5.0 | 48 | 2.0 | 50 | 89.7 | 77.4 | - |
| SM8S51A | SM8S51A | 56.7 | 62.7 | 5.0 | 51 | 2.0 | 50 | 85.0 | 82.4 | - |
| SM8S57A | SM8S57A | 63.8 | 69.9 | 5.0 | 57 | 2.0 | 50 | 75.5 | 92.7 | - |
| SM8S60A | SM8S60A | 66.7 | 73.7 | 5.0 | 60 | 2.0 | 50 | 72.3 | 96.8 | - |
| SM8S64A | SM8S64A | 71.1 | 78.6 | 5.0 | 64 | 2.0 | 50 | 68.0 | 103.0 | - |

Notes:
Surge current waveform per 10/1000 exponential wave and derated per Fig. 5

I-V Curve Characteristics



- P_{PPM} Peak Pulse Power Dissipation ($I_{PP} \times V_C$)** - Max power dissipation
- V_R Stand-off Voltage** - Maximum voltage that can be applied to the TVS without operation
- V_{BR} Breakdown Voltage** - Maximum voltage that flows though the TVS at a specified test current (I_T)
- V_C Clamping Voltage** - Peak voltage measured across the TVS at a specified I_{PPM} (peak impulse current)
- I_R Reverse Leakage Current** - Current measured at V_R
- V_F Forward Voltage Drop for Uni-directional**

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Ratings and Characteristic Curves ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Figure 1 - Peak Pulse Power Rating Curve



Figure 2 - Peak Pulse Power Derating Curve

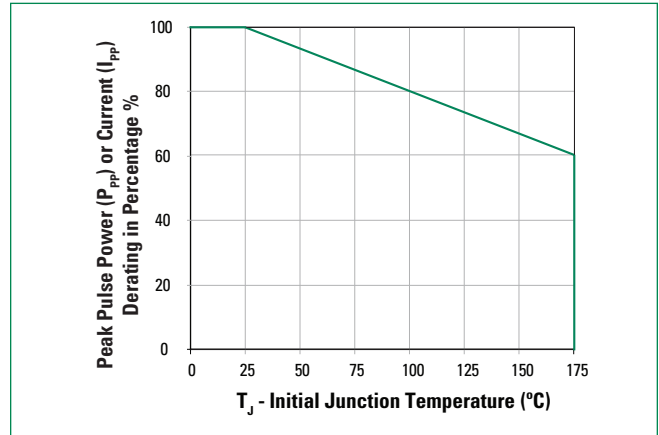


Figure 3 - Typical Transient Thermal Impedance

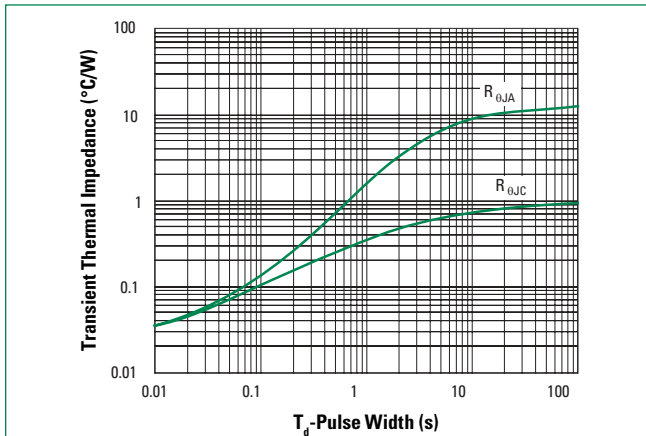


Figure 4 - Typical Junction Capacitance

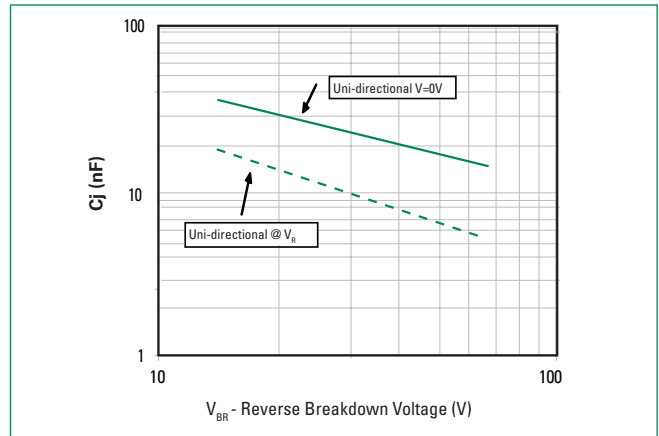
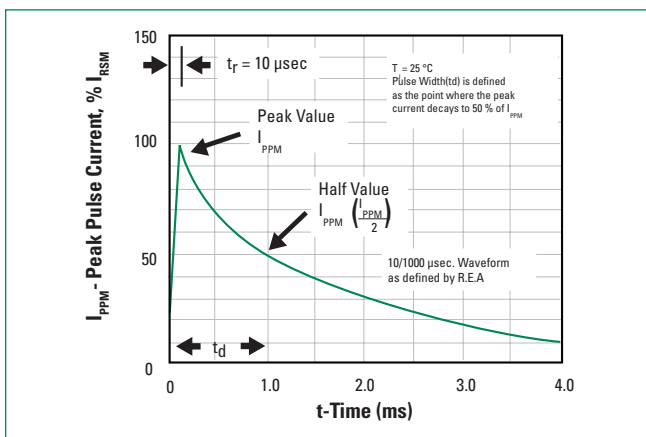


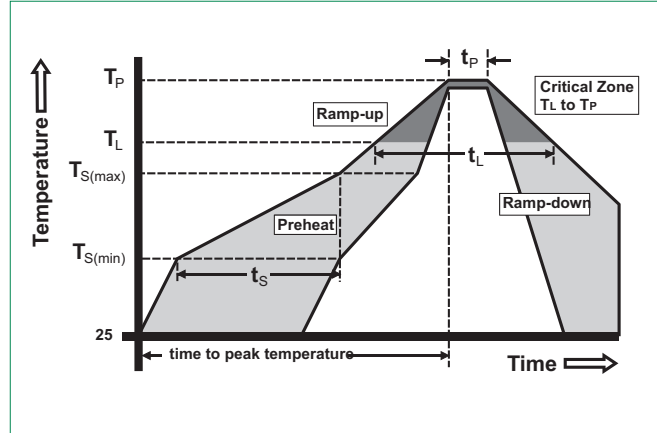
Figure 5: 10/1000 μs Pulse Waveform



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Soldering Parameters

| | | |
|--|------------------------------------|-------------------------|
| Reflow Condition | | Pb – free assembly |
| Pre Heat | - Temperature Min ($T_{s(min)}$) | 150 °C |
| | - Temperature Max ($T_{s(max)}$) | 200 °C |
| | - Time (min to max) (t_s) | 60 – 120 seconds |
| Average Ramp Up Rate (Liquidus Temp) (T_L) to Peak | | 5 °C/second max |
| $T_{s(max)}$ to T_L - Ramp-up Rate | | 5 °C/second max |
| Reflow | - Temperature (T_L) (Liquidus) | 217 °C |
| | - Time (min to max) (T_{s_i}) | 60 – 150 seconds |
| Peak Temperature (T_p) | | 260 ^{+0/-5} °C |
| Time Within 5°C of Actual Peak Temperature (t_p) | | 30 seconds |
| Ramp-down Rate | | 5 °C/second max |
| Time 25°C to Peak Temperature (T_p) | | 8 minutes max |
| Do Not Exceed | | 260 °C |



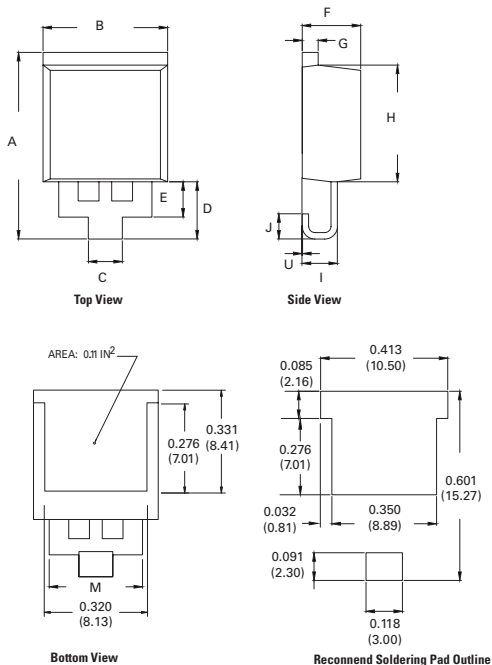
Physical Specifications

| | |
|-----------------|--|
| Weight | Contact manufacturer |
| Case | SMTO-263 Molded component over glass passivated junction |
| Polarity | Uni-directional products are denoted with a cathode band |
| Terminal | Matte Tin-plated leads, Solderable per JESD22-B102 |

Environmental Specifications

| | |
|---|--|
| High Temp Voltage Blocking (HTRB) | 100 % DC reverse voltage rated 150°C, 1000 hrs. JEDEC, JESD22-A-108 |
| Biased Temp & Humidity (H3TRB) | 1008 hours at $T_A = 85$ °C/85 % RH with part reverse biased at 80 % of rated breakdown voltage. JEDEC, JESD22-A-101 |
| UAHST | 96 hours at $T_A = 130$ °C/85 %RH. JEDEC, JESD22-A-118 |
| Temp Cycle (TC) | -55 °C to +150 °C, 15min. dwell, 1000 cycles. JEDEC, JESD22-A104 |
| Resistance to soldering heat (RSH) | +260°C, 30 secs. JEDEC JESD22-A111 |
| Moisture Sensitivity Level (MSL) | 85 %RH, +85 °C, 168 hrs., 3 reflow cycles (+260 °C Peak). JEDEC-J-STD-020, Level 1 |

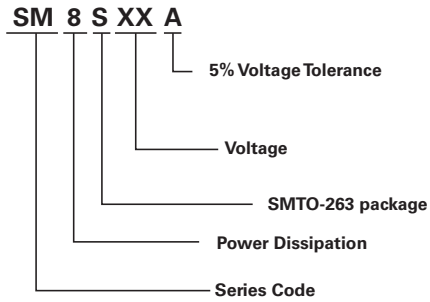
Dimensions



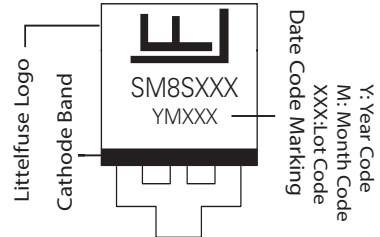
| Dimensions | Inches | | Millimeters | |
|------------|--------|-------|-------------|-------|
| | Min | Max | Min | Max |
| A | 0.568 | 0.600 | 14.44 | 15.24 |
| B | 0.380 | 0.420 | 9.65 | 10.67 |
| C | 0.098 | 0.114 | 2.50 | 2.90 |
| D | 0.169 | 0.189 | 4.30 | 4.80 |
| E | 0.102 | 0.118 | 2.60 | 3.00 |
| F | 0.178 | 0.188 | 4.52 | 4.78 |
| G | 0.045 | 0.060 | 1.14 | 1.52 |
| H | 0.360 | 0.370 | 9.14 | 9.40 |
| I | 0.106 | 0.122 | 2.69 | 3.09 |
| J | 0.069 | 0.089 | 1.75 | 2.25 |
| M | 0.284 | 0.300 | 7.22 | 7.62 |
| U | 0 | 0.010 | 0 | 0.25 |

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Part Numbering System



Part Marking System

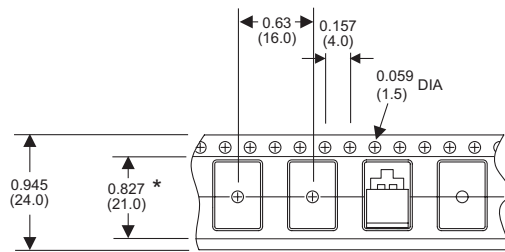


Packaging

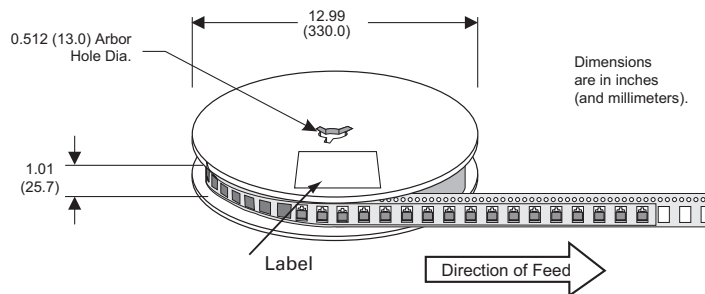
| Part Number | Component Package | Quantity | Packaging Option |
|-------------|-------------------|----------|------------------|
| SM8SxxA | SMT0-263 | 500 | Embossed Carrier |

SMT0-263 Embossed Carrier Reel Pack (RP) Specifications

Meets all EIA-481-2 Standards



* Cover tape



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