# SM8S Series

ROHS

## Surface Mount Transient Voltage Suppressors

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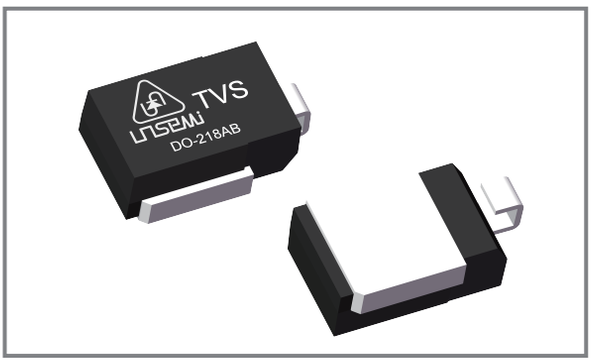
## Description

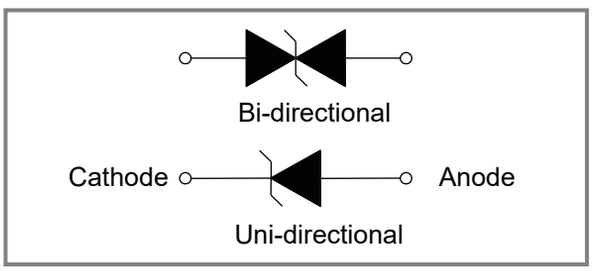
The SM8S series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.




## Features

- Junction passivation optimized design passivated anisotropic rectifier technology
- $T_J$=175°C capability suitable for high reliability and automotive requirement
- Available in uni-directional polarity only
- Low leakage current
- Low forward voltage drop
- High surge capability
- Meets ISO7637-2 surge specification (varied by test condition)
- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C
- AEC-Q101 qualified
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC
- IEC-61000-4-2 ESD 30kV(Air), 30kV (Contact)
- ESD protection of data lines in accordance with IEC 61000-4-2
- EFT protection of data lines in accordance with IEC 61000-4-4

## Functional Diagram




## Applications

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting, especially for automotive load dump protection application.

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

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Power Dissipation on Infinite Heat Sink at Tc=25°C | $P_D$ | 8.0 | W |
| Peak pulse current with 10/1000μs waveform | $I_{PPM}$ (1) | See Next Table | A |
| Peak forward surge current, 8.3ms single half sine-wave | $I_{FSM}$ | 700 | A |
| Operating junction and storage temperature range | $T_J$, $T_{STG}$ | - 55 to +175 | °C |
| Typical thermal resistance, junction to case | $R_{\theta JC}$ | 0.90 | °C/W |
| Typical thermal resistance, junction to ambient | $R_{\theta JA}$ | 12.0 | °C/W |

Notes:1. Non-repetitive current pulse derated above $T_A$=25°C

## Electrical Characteristics ( @ 25°C Unless Otherwise Specified )

| Part Number | | Stand-Off Voltage $V_{RMW}$ (V) | Breakdown Voltage $V_{BR}$ (V) | | Test Current $I_T$ (mA) | Maximum Reverse Leakage at $V_{RMW}$ $I_D$(μA) | Maximum Reverse at $V_{RMW}$ $T_J$=175°C $I_D$(μA) | Maximum Peak Pulse Current at 10/1000μs Waveform (A) | Maximum Clamping Voltage at $I_{PPM}$ $V_C$(V) |
|---|---|---|---|---|---|---|---|---|---|
| Uni | Bi | | MIN | MAX | | | | | |
| SM8S10A | -- | 10.0 | 11.1 | 12.3 | 5.0 | 5.0 | 250 | 388.0 | 17.0 |
| SM8S11A | -- | 11.0 | 12.2 | 13.5 | 5.0 | 5.0 | 150 | 363.0 | 18.2 |
| SM8S12A | SM8S12CA | 12.0 | 13.3 | 14.7 | 5.0 | 5.0 | 150 | 332.0 | 19.9 |
| SM8S13A | SM8S13CA | 13.0 | 14.4 | 15.9 | 5.0 | 5.0 | 150 | 307.0 | 21.5 |
| SM8S14A | SM8S14CA | 14.0 | 15.6 | 17.2 | 5.0 | 5.0 | 150 | 284.0 | 23.2 |
| SM8S15A | SM8S15CA | 15.0 | 16.7 | 18.5 | 5.0 | 5.0 | 150 | 270.0 | 24.4 |
| SM8S16A | SM8S16CA | 16.0 | 17.8 | 19.7 | 5.0 | 5.0 | 150 | 253.0 | 26.0 |
| SM8S17A | SM8S17CA | 17.0 | 18.9 | 20.9 | 5.0 | 5.0 | 150 | 239.0 | 27.6 |
| SM8S18A | SM8S18CA | 18.0 | 20.0 | 22.1 | 5.0 | 5.0 | 150 | 226.0 | 29.2 |
| SM8S20A | SM8S20CA | 20.0 | 22.2 | 24.5 | 5.0 | 5.0 | 150 | 204.0 | 32.4 |
| SM8S22A | SM8S22CA | 22.0 | 24.4 | 26.9 | 5.0 | 5.0 | 150 | 186.0 | 35.5 |
| SM8S24A | SM8S24CA | 24.0 | 26.7 | 29.5 | 5.0 | 5.0 | 150 | 170.0 | 38.9 |
| SM8S26A | SM8S26CA | 26.0 | 28.9 | 31.9 | 5.0 | 5.0 | 150 | 157.0 | 42.1 |
| SM8S28A | SM8S28CA | 28.0 | 31.1 | 34.4 | 5.0 | 5.0 | 150 | 145.0 | 45.4 |
| SM8S30A | SM8S30CA | 30.0 | 33.3 | 36.8 | 5.0 | 5.0 | 150 | 136.0 | 48.4 |
| SM8S32A | SM8S32CA | 32.0 | 35.5 | 39.4 | 5.0 | 5.0 | 150 | 128.5 | 51.4 |
| SM8S33A | SM8S33CA | 33.0 | 36.7 | 40.6 | 5.0 | 5.0 | 150 | 124.0 | 53.3 |
| SM8S36A | SM8S36CA | 36.0 | 40.0 | 44.2 | 5.0 | 5.0 | 150 | 114.0 | 58.1 |
| SM8S40A | SM8S40CA | 40.0 | 44.4 | 49.1 | 5.0 | 5.0 | 150 | 102.0 | 64.5 |
| SM8S43A | SM8S43CA | 43.0 | 47.8 | 52.8 | 5.0 | 5.0 | 150 | 95.1 | 69.4 |

Note: (1) For all types maximum VF = 1.8V at IF = 100A measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum.

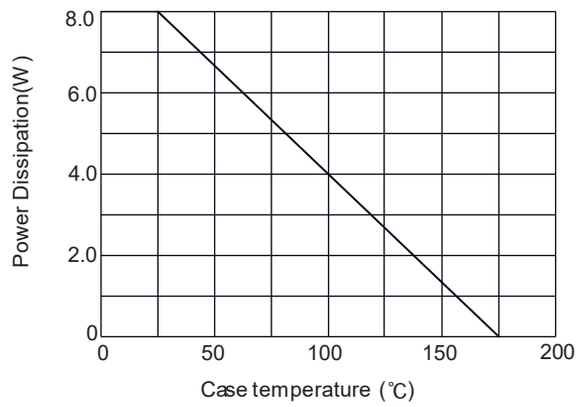
(2) Surge waveform: 10/1000μs

## Primary Characteristics

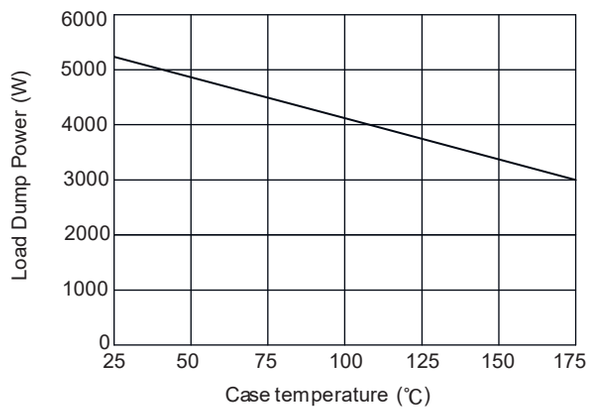
| | |
|---|---|
| VWM | 10V to 43V |
| $P_{PPM}$ (10/1000μs) | 6600W |
| $P_{PPM}$ (10 /10000μs) | 5200W |
| $P_D$ | 8W |
| $I_{FSM}$ | 700A |
| $T_J$ max. | 175°C |

## Ratings and Characteristics Curves ($T_A$=25°C unless otherwise noted)

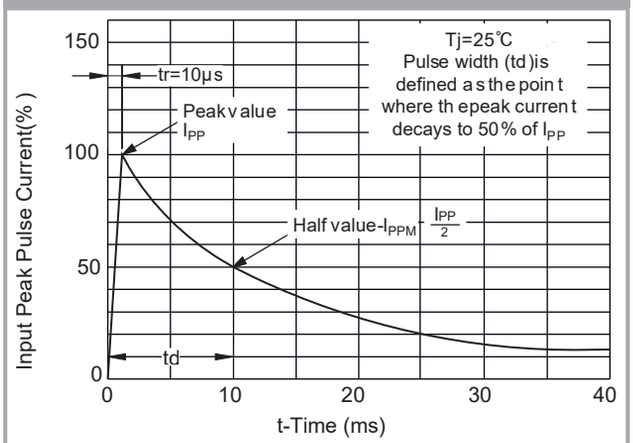
### Figure 1 - Power Derating Curve



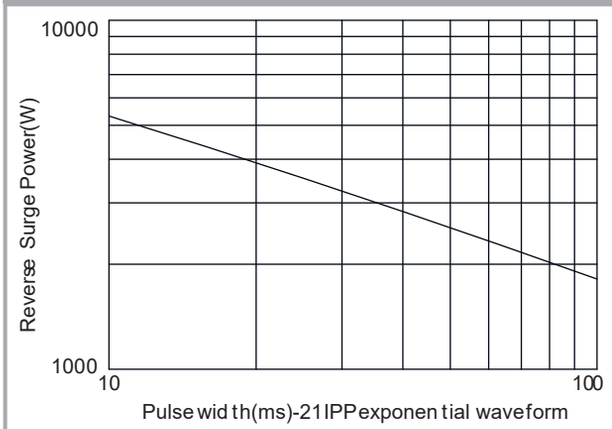

### Figure 2 - Load Dump Power Characteristics (10 ms Exponential Waveform)



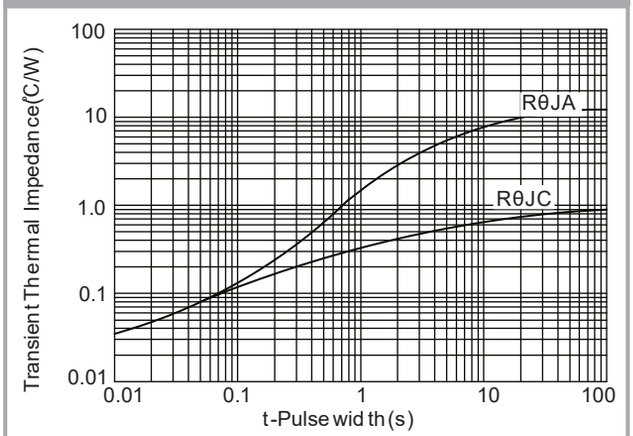

### Figure 3 - Pulse Waveform



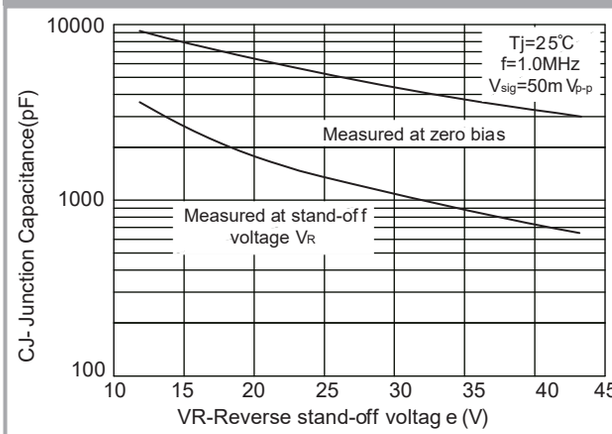

### Figure 4 - Reverse Power Capability




### Figure 5 - Typical transient thermal impedance




### Figure 6 - Typical Junction Capacitance

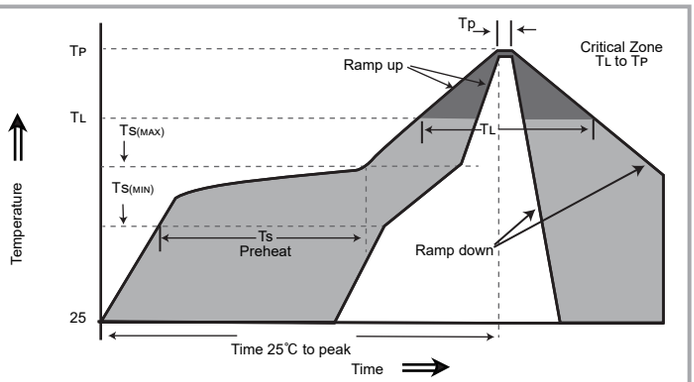


## Part Numbering

**SM8S XXX C A**

- A: 5% $V_{BR}$ Voltage Tolerance
- C: Bi-Directional
- XXX: $V_R$ Voltage
- SM8S: Series

## Soldering Parameters

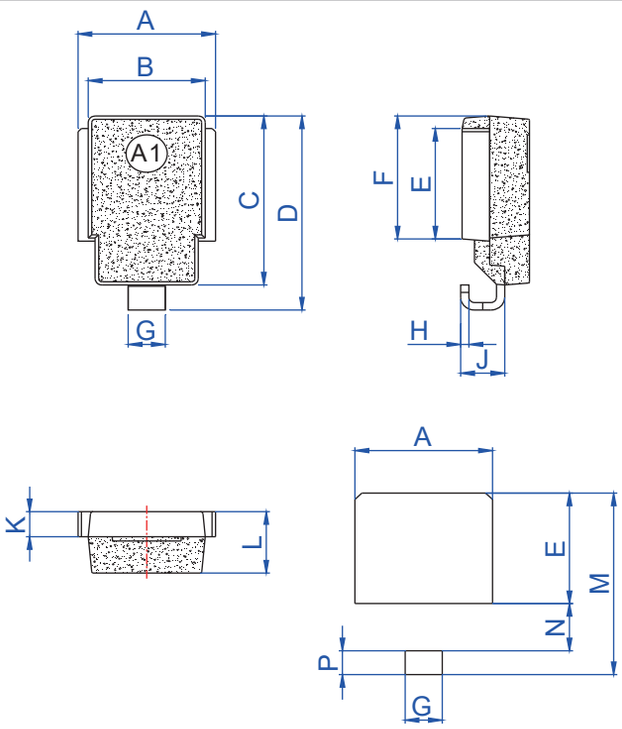



| Reflow Condition | | Lead–free assembly |
|---|---|---|
| Pre Heat | -Temperature Min ($T_{S(min)}$) | 150°C |
| | -Temperature Max ($T_{S(max)}$) | 200°C |
| | - Time (min to max) ($T_S$) | 60 -180 Seconds |
| Average ramp up rate ( Liquidus Temp $T_L$) to peak | | 3°C/second max |
| $T_{S(max)}$ to $T_L$ - Ramp-up Rate | | 3°C/second max |
| Reflow | - Temperature ($T_L$) (Liquidus) | 217°C |
| | - Time (min to max) ($T_S$) | 60 -150 Seconds |
| Peak Temperature ($T_P$) | | 260 +0/-5°C |
| Time within 5°C of actual peak Temperature ($T_P$) | | 20 - 40 Seconds |
| Ramp-down Rate | | 6°C/second max |
| Time 25°C to peak Temperature ($T_P$) | | 8 minutes Max |
| Do not exceed | | 280°C |

## Ordering Information

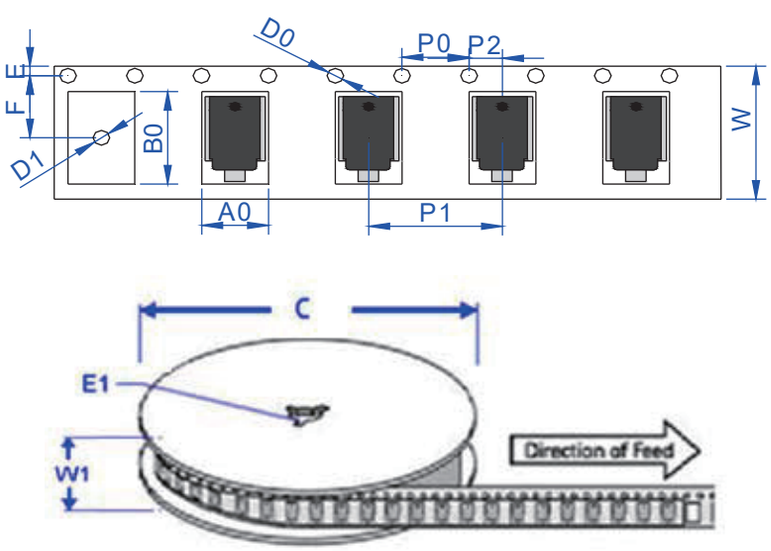
| Device | Package | Quantity | Reel Size |
|---|---|---|---|
| SM8S Series | DO-218AB | 750pcs/Reel | 13 inch |

## Package Outline Dimensions Unit: inches (millimeters)




| Ref. | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min | Max | Min | Max |
| A | 9.5 | 10.5 | 0.374 | 0.413 |
| B | 8.3 | 8.7 | 0.327 | 0.342 |
| C | 13.3 | 13.7 | 0.524 | 0.539 |
| D | 15.0 | 16.0 | 0.592 | 0.628 |
| E | 8.5 | 9.1 | 0.335 | 0.358 |
| F | 9.5 | 10.1 | 0.374 | 0.398 |
| G | 2.4 | 3.0 | 0.094 | 0.118 |
| H | 0.5 | 0.7 | 0.020 | 0.028 |
| J | 2.7 | 3.7 | 0.106 | 0.146 |
| K | 1.9 | 2.1 | 0.075 | 0.083 |
| L | 4.7 | 5.1 | 0.185 | 0.201 |
| M | 14.2 | 14.8 | 0.559 | 0.583 |
| N | 3.5 | 4.1 | 0.138 | 0.161 |
| P | 1.6 | 2.2 | 0.063 | 0.087 |

## Surface Mount Tape and Reel Packaging




| Ref. | Dimensions | |
|---|---|---|
| | Millimeters | Inches |
| A0 | 10.80±0.3 | 0.425±0.012 |
| B0 | 16.13±0.3 | 0.635±0.012 |
| C | 330.0±0.3 | 13.0±0.012 |
| D0 | 1.55±0.2 | 0.061±0.008 |
| D1 | 1.55±0.2 | 0.061±0.008 |
| E | 1.75±0.2 | 0.069±0.008 |
| E1 | 13.30±0.2 | 0.524±0.008 |
| F | 11.50±0.2 | 0.453±0.008 |
| P0 | 4.00±0.2 | 0.157±0.008 |
| P1 | 16.00±0.2 | 0.630±0.008 |
| P2 | 2.00±0.2 | 0.079±0.008 |
| W | 24.00±0.2 | 0.945±0.008 |
| W1 | 25.85±0.2 | 1.018±0.008 |

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