

# SM8S Series

Surface Mount - SMT0-263 - 7000 W



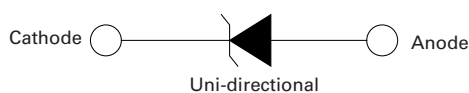
## Agency Approvals

Agency	Agency File Number
	E230531

## Maximum Ratings and Thermal Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak pulse power dissipation by 10/1000 μs test waveform	P <sub>PPM</sub>	7000	W
Power dissipation on infinite heatsink at T <sub>C</sub> = 25 °C	P <sub>D</sub>	8.0	W
Maximum instantaneous forward voltage at 100 A for unidirectional only	V <sub>F</sub>	1.8	V
Peak forward surge current 8.3 ms single half sine-wave	I <sub>FSM</sub>	1000	A
Operating junction and storage temperature range	T <sub>J</sub> , T <sub>STG</sub>	-55 to 175	°C
Typical thermal resistance junction to ambient	R <sub>θJA</sub>	55	°C/W
Typical thermal resistance junction to case	R <sub>θJC</sub>	0.9	°C/W

## Functional Diagram



## Description

The SM8S Series TVS Diode utilizes an SMT0-263 package with lead modifications. It protects 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 %
- SMT0-263 low-profile, surface-mount package minimizing PCB
- 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 and Class 2
- IEC 61000-4-2 ESD 30kV(Air), 30kV (Contact)
- Glass passivated chip junction
- Low dynamic resistance
- $V_{BR} @ T_J = V_{BR} @ 25\text{ °C} \times (1 + \alpha T \times (T_J - 25))$  (α: Temperature Coefficient, typical value is 0.1 %)
- UL recognized compound meeting flammability rating V-0
- Halogen-free and RoHS-compliant
- Pb-free E3 means 2<sup>nd</sup> level interconnect is Pb-free and the terminal finish material is tin (Sn) (IPC/JEDEC J-STD-609A.01)
- Recognized to UL 497B as an Isolated Loop Circuit Protector

## 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.

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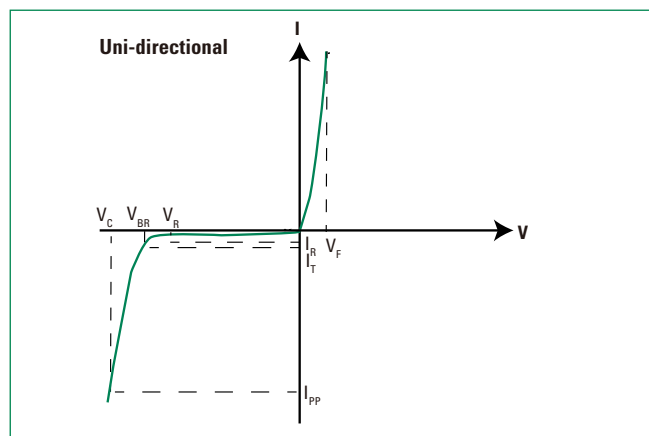
### Electrical Characteristics ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

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

#### Notes:

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

### I-V Curve Characteristics



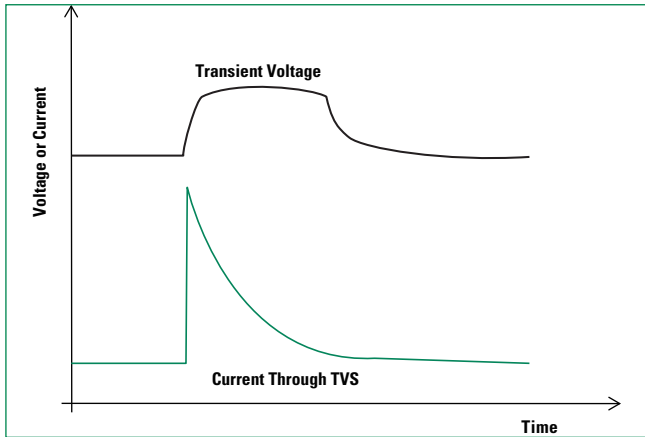
- $P_{PPM}$  Peak Pulse Power Dissipation ( $I_{PP} \times V_C$ )** - Max power dissipation
- $V_R$  Stand-off Voltage** - Maximum voltage that can be applied to the TVS without operation
- $V_{BR}$  Breakdown Voltage** - Maximum voltage that flows though the TVS at a specified test current ( $I_T$ )
- $V_C$  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**

# SM8S Series

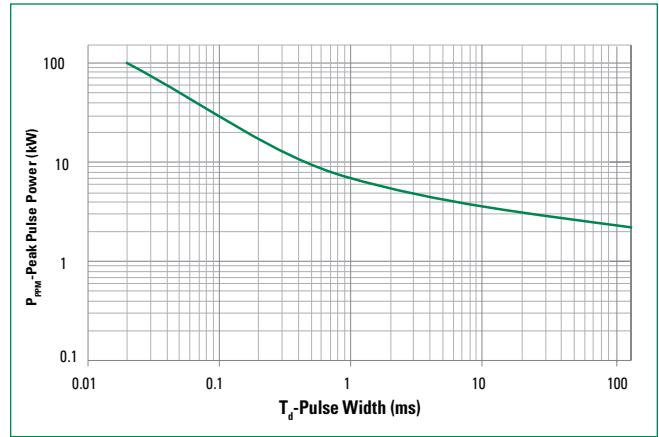
Surface Mount - SMT0-263 - 7000 W

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

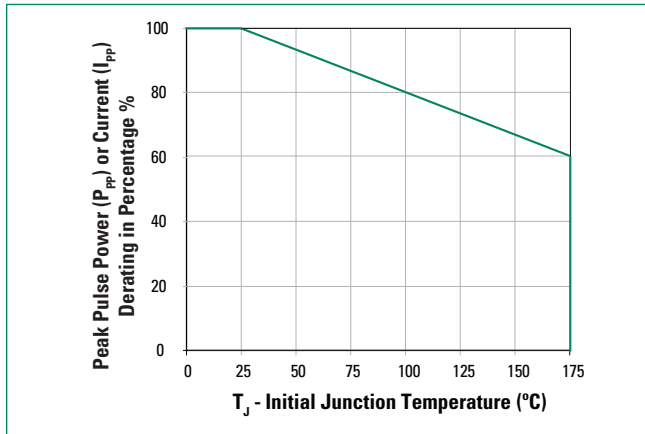
**Figure 1 - TVS Transients Clamping Waveform**



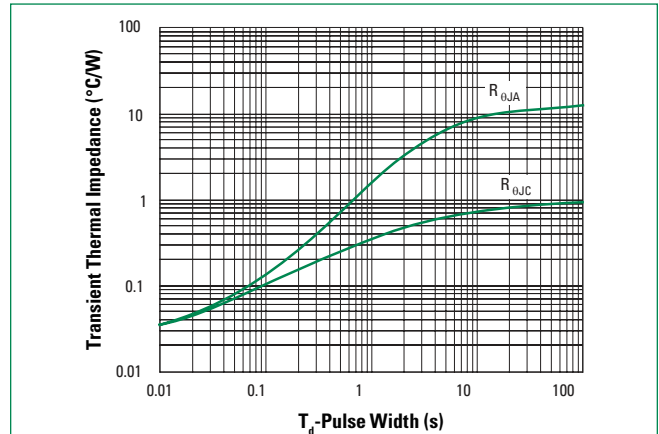
**Figure 2 - Peak Pulse Power Rating Curve**



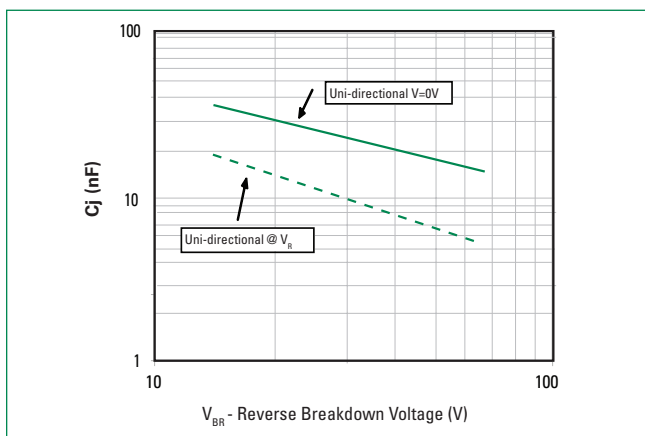
**Figure 3 - Peak Pulse Power Derating Curve**



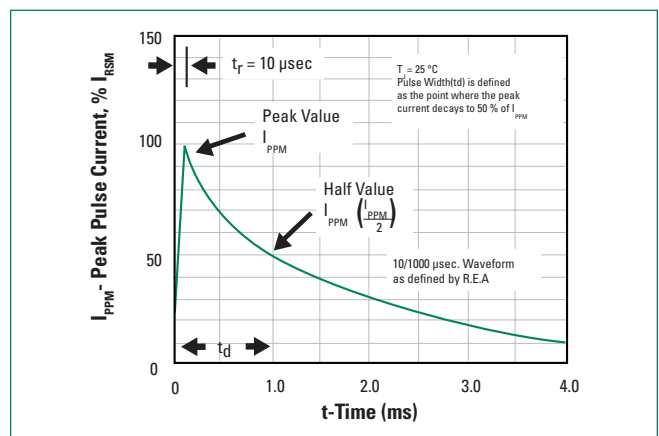
**Figure 4 - Typical Transient Thermal Impedance**



**Figure 5 - Typical Junction Capacitance**



**Figure 6: 10/1000  $\mu\text{s}$  Pulse Waveform**

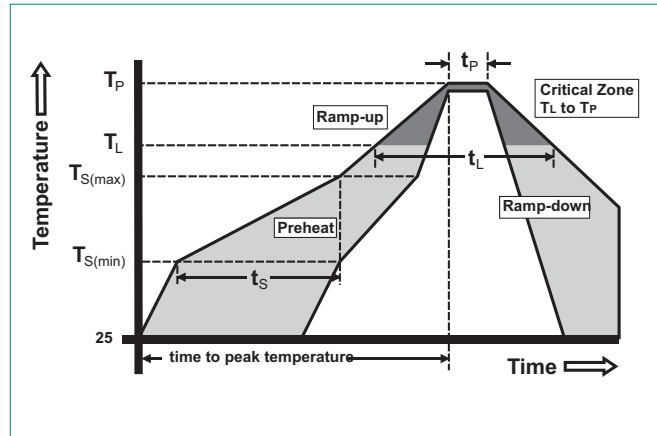


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### Soldering Parameters

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



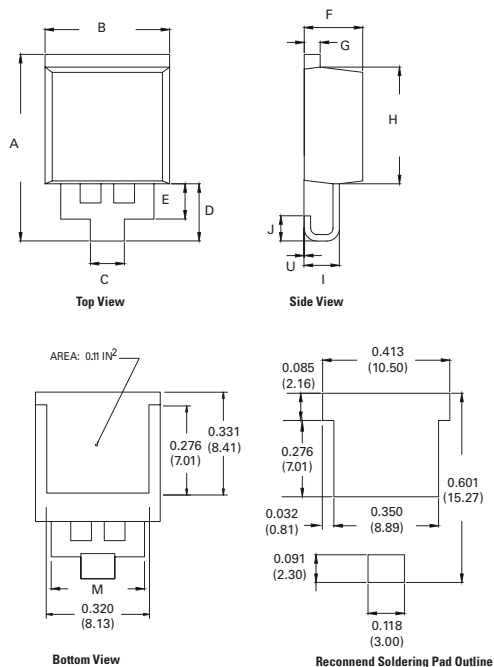
### Physical Specifications

<b>Weight</b>	0.069 ounce, 1.95 grams
<b>Case</b>	SMT0-263 molded component over glass passivated junction
<b>Polarity</b>	Uni-directional products are denoted with a cathode band
<b>Terminal</b>	Matte tin-plated leads, Solderable per JESD22-B102

### Environmental Specifications

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

### Dimensions

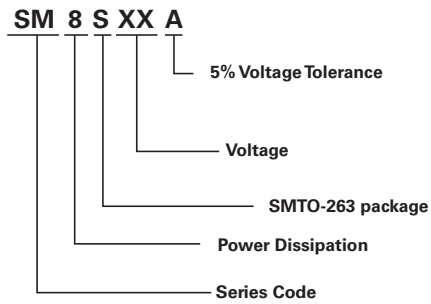


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
<b>A</b>	0.568	0.600	14.44	15.24
<b>B</b>	0.380	0.420	9.65	10.67
<b>C</b>	0.098	0.114	2.50	2.90
<b>D</b>	0.169	0.189	4.30	4.80
<b>E</b>	0.102	0.118	2.60	3.00
<b>F</b>	0.178	0.188	4.52	4.78
<b>G</b>	0.045	0.060	1.14	1.52
<b>H</b>	0.360	0.370	9.14	9.40
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

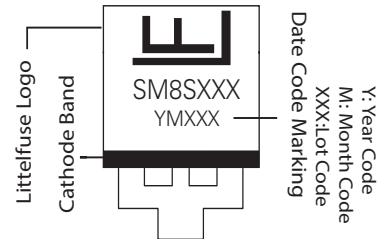
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### Part Numbering System



### Part Marking System

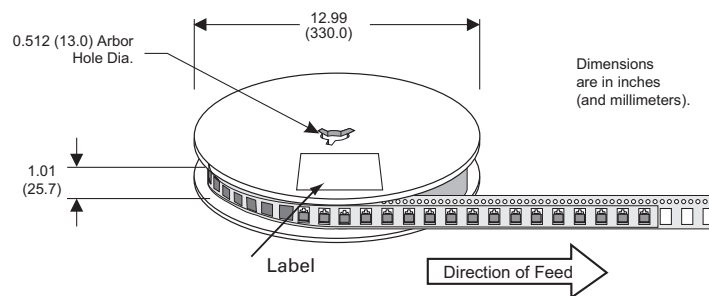
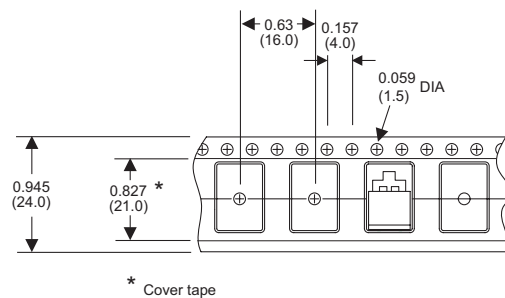


### Packaging

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



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