

# SLD8S Series

## Surface Mount



### Agency Approvals

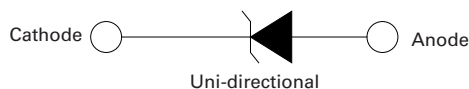
| Agency | Agency File Number |
|--------|--------------------|
|        | E230531            |

### Maximum Ratings and Thermal Characteristics

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

| Parameter  | Symbol          | Value      | Unit               |
|--|-----------------|------------|--------------------|
| Peak Pulse Power Dissipation<br>1. 10ms x 150ms test waveform            | $P_{PPM}$       | 2200       | W                  |
| 2. 10/1000 test waveform   |                 | 7000       | W                  |
| Power dissipation on infinite heatsink at<br>$T_C = 25^\circ\text{C}$    | $P_D$           | 8.0        | W                  |
| Maximum Instantaneous Forward Voltage<br>at 100A for Unidirectional only | $V_F$           | 1.8        | V                  |
| Peak forward surge current 8.3ms single<br>half sine-wave                | $I_{FSM}$       | 1000       | A                  |
| Operating Junction and Storage<br>Temperature Range                      | $T_J, T_{STG}$  | -55 to 175 | $^\circ\text{C}$   |
| Typical Thermal Resistance Junction to<br>case                           | $R_{\theta JC}$ | 0.9        | $^\circ\text{C/W}$ |

### Functional Diagram



## Description

The SLD8S 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 for severe Automotive Load Dump applications.

## Features & Benefits

- AEC-Q101 qualified
- SMT0-263 package, and foot print is compatible to industrial popular DO-218AB package
- Meet ISO7637-2 5a/5b protection and ISO16750 load dump test (refer to APP note for details)
- $V_{BR} @ T_J = V_{BR} @ 25^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$  ( $\alpha$ : Temperature Coefficient, typical value is 0.1%)
- Glass passivated chip junction in modified TO-263 package
- ESD protection of data lines in accordance with IEC 61000-4-2, 30kV(Air), 30kV(Contact)
- EFT protection of data lines in accordance with IEC 61000-4-4
- Fast response time: typically less than 1.0ps from 0 Volts to BV min
- Excellent clamping capability
- Low incremental surge resistance
- UL Recognized compound meeting flammability rating V-0
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 $^\circ\text{C}$
- For surface mounted applications to optimize board space
- Low profile package
- High temperature to reflow soldering guaranteed: 260 $^\circ\text{C}$ /10sec at terminals
- Matte tin lead-free plated
- 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


Designed to protect sensitive electronics from:

- Inductive Load Switching
- Alternator Load Dump

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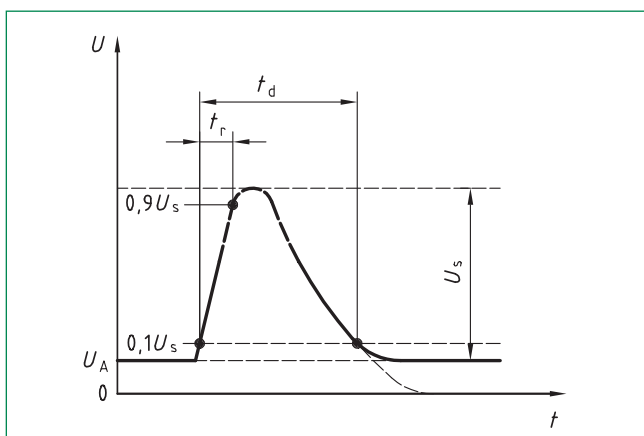
### Electrical Characteristics ( $T_A=25^\circ\text{C}$ unless otherwise noted)

| Part Number (Uni) | Breakdown Voltage $V_{BR}$ @ $I_T$ (V) |      | Test Current $I_T$ (mA) | Reverse Stand off Voltage $V_R$ (Volts) | Maximum Reverse Leakage $I_R$ @ $V_R$ ( $\mu\text{A}$ ) | $T_J=150^\circ\text{C}$ 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  |                         |   |   |  |   |   |   |
| SLD8S14A          | 15.6                                   | 17.2 | 5.0                     | 14                                      | 10  | 50   | 301   | 23.2  | X   |
| SLD8S15A          | 16.7                                   | 18.5 | 5.0                     | 15                                      | 10  | 50   | 286   | 24.4  | X   |
| SLD8S16A          | 17.8                                   | 19.7 | 5.0                     | 16                                      | 2.0   | 50   | 269   | 26.0  | X   |
| SLD8S17A          | 18.9                                   | 20.9 | 5.0                     | 17                                      | 2.0   | 50   | 253   | 27.6  | X   |
| SLD8S18A          | 20.0                                   | 22.1 | 5.0                     | 18                                      | 2.0   | 50   | 240   | 29.2  | X   |
| SLD8S20A          | 22.2                                   | 24.5 | 5.0                     | 20                                      | 2.0   | 50   | 216   | 32.4  | X   |
| SLD8S22A          | 24.4                                   | 26.9 | 5.0                     | 22                                      | 2.0   | 50   | 197   | 35.5  | X   |
| SLD8S24A          | 26.7                                   | 29.5 | 5.0                     | 24                                      | 2.0   | 50   | 180   | 38.9  | X   |
| SLD8S26A          | 28.9                                   | 31.9 | 5.0                     | 26                                      | 2.0   | 50   | 167   | 42.1  | X   |
| SLD8S27A          | 29.9                                   | 33.1 | 5.0                     | 27                                      | 2.0   | 50   | 160   | 43.6  | X   |
| SLD8S28A          | 31.1                                   | 34.4 | 5.0                     | 28                                      | 2.0   | 50   | 154   | 45.4  | X   |
| SLD8S30A          | 33.3                                   | 36.8 | 5.0                     | 30                                      | 2.0   | 50   | 144   | 48.4  | X   |
| SLD8S33A          | 36.7                                   | 40.6 | 5.0                     | 33                                      | 2.0   | 50   | 132   | 53.3  | X   |
| SLD8S36A          | 40.0                                   | 44.2 | 5.0                     | 36                                      | 2.0   | 50   | 121   | 58.1  | X   |
| SLD8S40A          | 44.4                                   | 49.1 | 5.0                     | 40                                      | 2.0   | 50   | 108   | 64.5  | X   |
| SLD8S43A          | 47.8                                   | 52.8 | 5.0                     | 43                                      | 2.0   | 50   | 101   | 69.4  | X   |
| SLD8S48A          | 53.3                                   | 58.9 | 5.0                     | 48                                      | 2.0   | 50   | 89.7  | 77.4  | X   |
| SLD8S57A          | 63.8                                   | 69.9 | 5.0                     | 57                                      | 2.0   | 50   | 75.5  | 92.7  | X   |
| SLD8S60A          | 66.7                                   | 73.7 | 5.0                     | 60                                      | 2.0   | 50   | 72.3  | 96.8  | X   |
| SLD8S64A          | 71.1                                   | 78.6 | 5.0                     | 64                                      | 2.0   | 50   | 68.0  | 103.0   | X   |

#### Notes:

- $V_{BR}$  measured after  $I_T$  applied for 300 $\mu\text{s}$ ,  $I_T$ = square wave pulse or equivalent.
- Surge current waveform per 10/1000 exponential wave and derated per Fig. 2
- All terms and symbols are consistent with ANSI/IEEE C62.35.

### Load Dump Test Wave Form



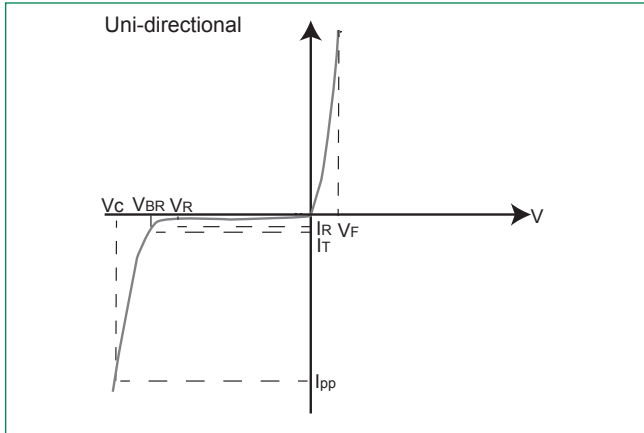
Note: LF use  $t_d=400\text{ms}$  for 12V system test;  $t_d=350\text{ms}$  for 24V system

| Parameter | 12V system                 | 24V system               |
|-----------|----------------------------|--------------------------|
| $U_s$     | 65v to 87V                 | 123V to 174V             |
| $R_l$     | 0.5 $\Omega$ to 4 $\Omega$ | 1 $\Omega$ to 8 $\Omega$ |
| $t_d$     | 40 ms to 400 ms            | 100 ms to 350 ms         |
| $t_r$     | (10 $^{0.5}$ )ms           |                          |

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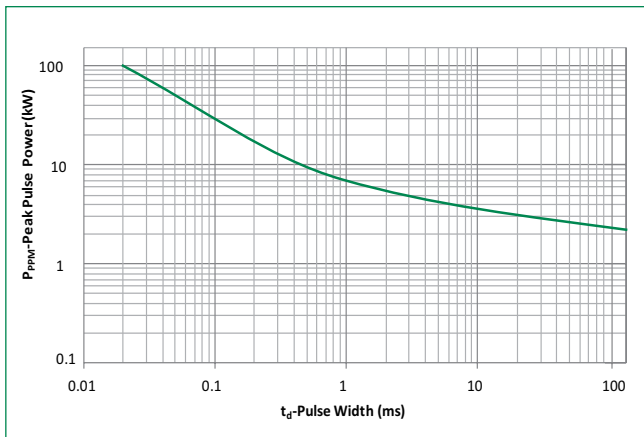
### I-V Curve Characteristics



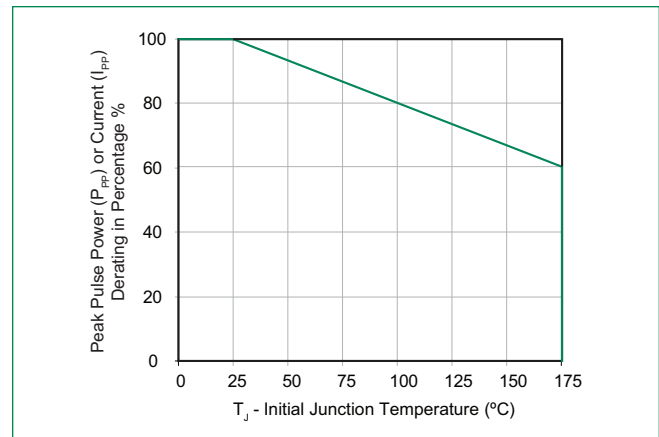
- $P_{PPM}$  Peak Pulse Power Dissipation** – Max power dissipation
- $V_R$  Stand-off Voltage** – Maximum voltage that can be applied to the TVS without operation
- $V_{BR}$  Breakdown Voltage** – Maximum voltage that flows through the TVS at a specified test current ( $I_T$ )
- $V_C$  Clamping Voltage**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

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

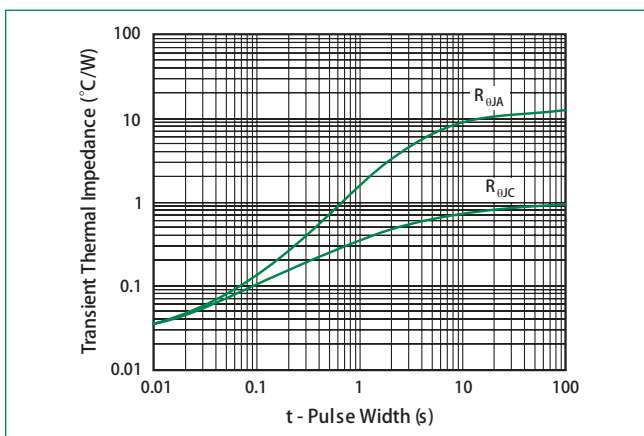
**Figure 1 - Peak Pulse Power Rating Curve**



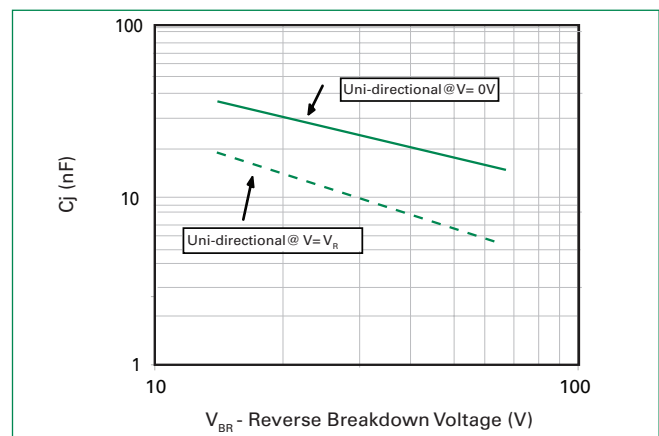
**Figure 2 - Peak Pulse Power Derating Curve**



**Figure 3 - Typical Transient Thermal Impedance**



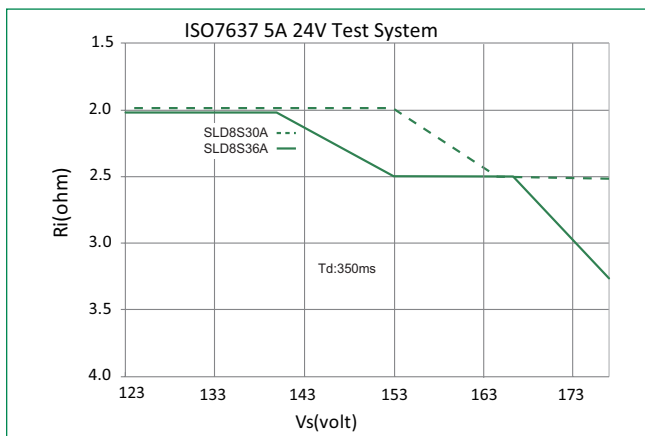
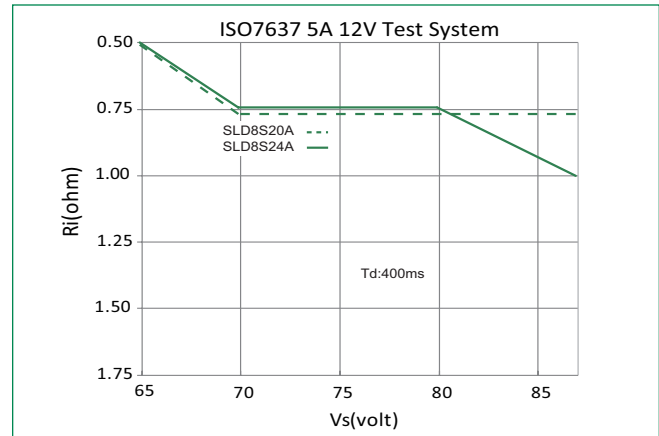
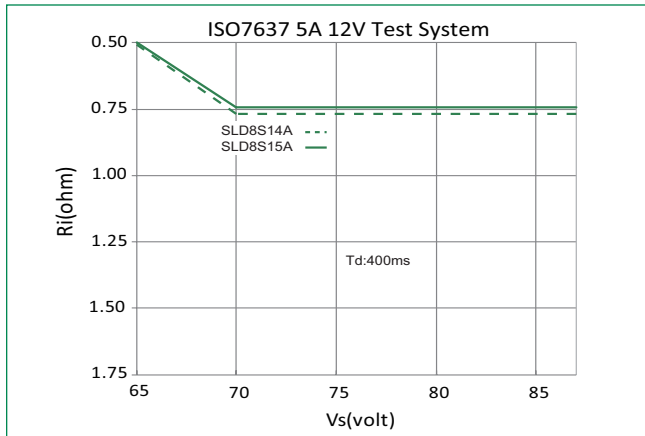
**Figure 4 - Typical Junction Capacitance**



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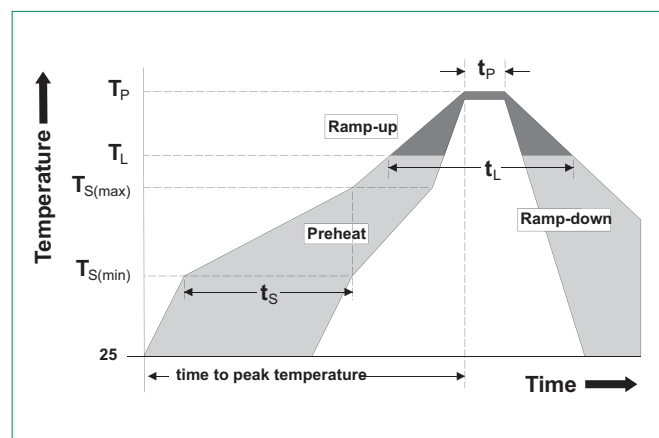
Figure 5 - Typical SOA Chart



Note: SOA (Safe Operation Area) refer to the area which below the curve line and refer to APP note for details.

### 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 – 180 secs           |
| <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) ( $T_s$ )      | 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>   |                                    | 20 – 40 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                   |



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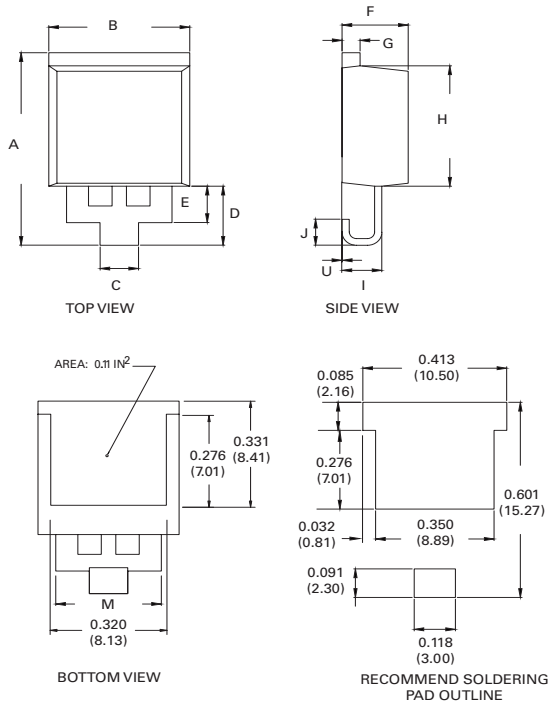
### Physical Specifications

|                        |  |
|------------------------|--|
| <b>Terminal Finish</b> | 100% Matte Tin-plated                                  |
| <b>Body Material</b>   | UL Recognized compound meeting flammability rating V-0 |
| <b>Lead Material</b>   | Copper Alloy   |

### Environmental Specifications

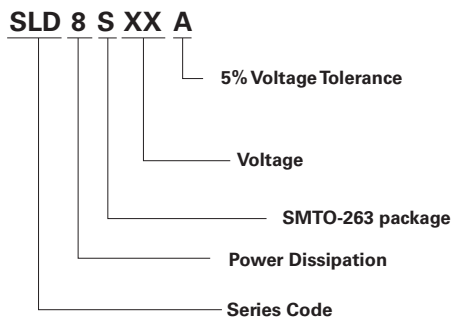
|                            |                          |
|----------------------------|--------------------------|
| <b>High Temp. Storage</b>  | JESD22-A103              |
| <b>HTRB</b>                | JESD22-A108              |
| <b>Temperature Cycling</b> | JESD22-A104              |
| <b>MSL</b>                 | JEDEC-J-STD-020, LEVEL 1 |
| <b>H3TRB</b>               | JESD22-A101              |
| <b>RSH</b>                 | JESD22-A111              |

### Dimensions

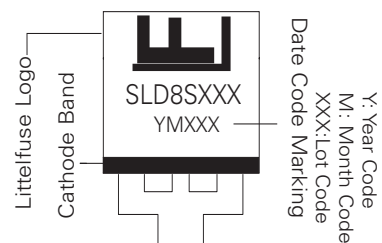


| Dimensions | Inches |       | Millimeters |       |
|------------|--------|-------|-------------|-------|
|            | Min    | Max   | Min         | Max   |
| <b>A</b>   | 0.568  | 0.600 | 14.44       | 15.24 |
| <b>B</b>   | 0.380  | 0.420 | 9.65        | 10.67 |
| <b>C</b>   | 0.098  | 0.114 | 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  |

### Part Numbering System



### Part Marking System



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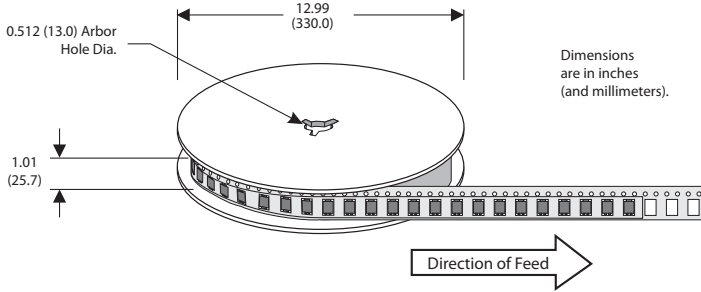
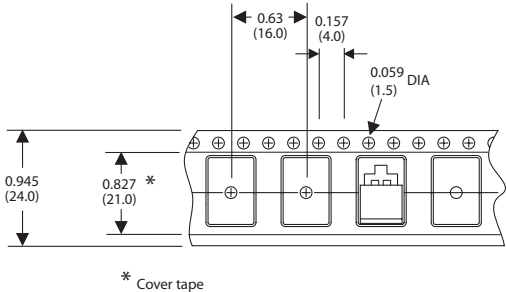
## Surface Mount

### Packaging

| Part Number | Component Package | Quantity | Packaging Option |
|-------------|-------------------|----------|------------------|
| SLD8SxxA    | SMTO-263          | 500      | Embossed Carrier |

### SMTO-263 Embossed Carrier Reel Pack (RP) Specifications

Meets all EIA-481-2 Standards



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