

# SLD263 Uni-directional Series

## Surface Mount - 7000 W - TO-263



### Web Resources



Download ECAD models, order samples, and find technical resources at [www.littelfuse.com](http://www.littelfuse.com)

### 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. 10/150 ms test waveform                   | $P_{PPM}$       | 1400       | W                  |
| 2. 10/1000 $\mu\text{s}$ test waveform<br>(Note 1)                           |                 | 7000       | W                  |
| Power Dissipation on Infinite<br>Heatsink at $T_C = 25^\circ\text{C}$        | $P_D$           | 9          | W                  |
| Maximum Instantaneous Forward<br>Voltage at 100 A for Un-directional<br>Only | $V_F$           | 1.8        | V                  |
| Peak Forward Surge Current 8.3 m<br>Single Half Sine-wave                    | $I_{FSM}$       | 650        | A                  |
| Operating Junction and Storage<br>Temperature Range                          | $T_J, T_{STG}$  | -55 to 150 | $^\circ\text{C}$   |
| Typical Thermal Resistance Junction<br>to Case                               | $R_{\theta JC}$ | 1.3        | $^\circ\text{C/W}$ |

**Note 1:** Products  $V_R \geq 25\text{ V}$ , peak pulse power dissipation is 6000 W

### Description

The SLD263 uni-directional TVS diode series is housed in a TO-263 package with lead modifications. It is designed to protect sensitive electronics against ESD, EFT, 10/1000  $\mu\text{s}$  surge events and inductive load switching voltage transient events for severe automotive load dump applications.

### Features & Benefits

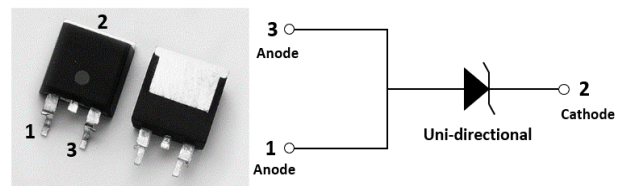
- AEC-Q101 qualified and PPAP capable
- Meet ISO7637-2 5a/5b protection, ISO16750 and JASO D-001 load dump test (refer to APP note for details)
- Reverse standoff voltage range 14 V ~ 40 V
- $V_{BR} @ T_J = V_{BR} @ 25^\circ\text{C} \times (1 + \alpha_T \times (T_J - 25))$  ( $\alpha_T$ : temperature 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, 30 kV(Air), 30 kV (Contact)
- EFT protection of data lines in accordance with IEC 61000-4-4
- Fast response time: typically less than 1.0 ps from 0 volts to  $V_{BR\text{ min}}$
- Excellent clamping capability
- Low incremental surge resistance
- UL recognized compound meeting flammability rating UL94 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 reflow soldering guaranteed:  $260^\circ\text{C}/10\text{ sec}$  at terminals
- Matte tin lead-free plated
- 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)

### Applications

Designed to protect sensitive electronics from:

- Inductive load switching
- Alternator load dump

### Functional Diagram



# SLD263 Uni-directional Series

## Surface Mount - 7000 W - TO-263

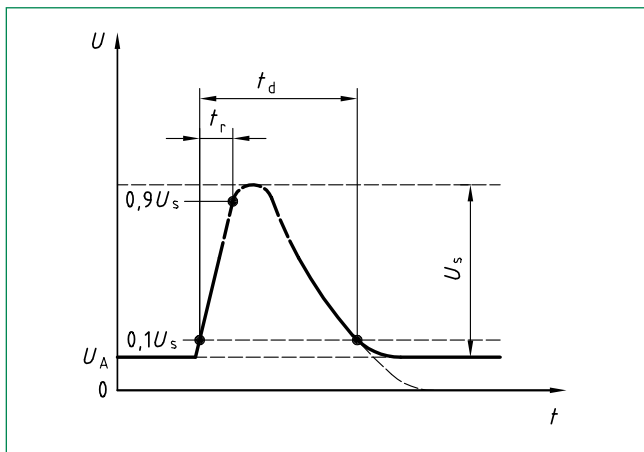
### Electrical Characteristics ( $T_A = 25\text{ }^{\circ}\text{C}$ unless otherwise noted)

| 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  |                         |                                     |                                                         |                                                                                          |                                               |                                               |                                                                                                     |
| SLD263-14A        | 263-14A | 15.6                                   | 17.2 | 5                       | 14                                  | 10                                                      | 50                                                                                       | 301                                           | 23.2                                          | x                                                                                                   |
| SLD263-15A        | 263-15A | 16.7                                   | 18.5 | 5                       | 15                                  | 10                                                      | 50                                                                                       | 286                                           | 24.4                                          | x                                                                                                   |
| SLD263-16A        | 263-16A | 17.8                                   | 19.7 | 5                       | 16                                  | 2                                                       | 50                                                                                       | 269                                           | 26                                            | x                                                                                                   |
| SLD263-17A        | 263-17A | 18.9                                   | 20.9 | 5                       | 17                                  | 2                                                       | 50                                                                                       | 253                                           | 27.6                                          | x                                                                                                   |
| SLD263-18A        | 263-18A | 20                                     | 22.1 | 5                       | 18                                  | 2                                                       | 50                                                                                       | 240                                           | 28.2                                          | x                                                                                                   |
| SLD263-20A        | 263-20A | 22.2                                   | 24.5 | 5                       | 20                                  | 2                                                       | 50                                                                                       | 216                                           | 32.4                                          | x                                                                                                   |
| SLD263-22A        | 263-22A | 24.4                                   | 26.9 | 5                       | 22                                  | 2                                                       | 50                                                                                       | 197                                           | 35.5                                          | x                                                                                                   |
| SLD263-24A        | 263-24A | 26.7                                   | 29.5 | 5                       | 24                                  | 2                                                       | 50                                                                                       | 180                                           | 38.9                                          | x                                                                                                   |
| SLD263-26A        | 263-26A | 28.9                                   | 31.9 | 5                       | 26                                  | 2                                                       | 50                                                                                       | 142.5                                         | 42.1                                          | -                                                                                                   |
| SLD263-27A        | 263-27A | 29.9                                   | 33.1 | 5                       | 27                                  | 2                                                       | 50                                                                                       | 137.6                                         | 43.6                                          | -                                                                                                   |
| SLD263-28A        | 263-28A | 31.1                                   | 34.4 | 5                       | 28                                  | 2                                                       | 50                                                                                       | 132.2                                         | 45.4                                          | -                                                                                                   |
| SLD263-30A        | 263-30A | 33.3                                   | 36.8 | 5                       | 30                                  | 2                                                       | 50                                                                                       | 124.0                                         | 48.4                                          | -                                                                                                   |
| SLD263-33A        | 263-33A | 36.7                                   | 40.6 | 5                       | 33                                  | 2                                                       | 50                                                                                       | 112.6                                         | 53.3                                          | -                                                                                                   |
| SLD263-36A        | 263-36A | 40.0                                   | 44.2 | 5                       | 36                                  | 2                                                       | 50                                                                                       | 103.3                                         | 58.1                                          | -                                                                                                   |
| SLD263-40A        | 263-40A | 44.4                                   | 49.1 | 5                       | 40                                  | 2                                                       | 50                                                                                       | 93.0                                          | 64.5                                          | -                                                                                                   |

#### Notes:

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

### Load Dump Test Wave Form



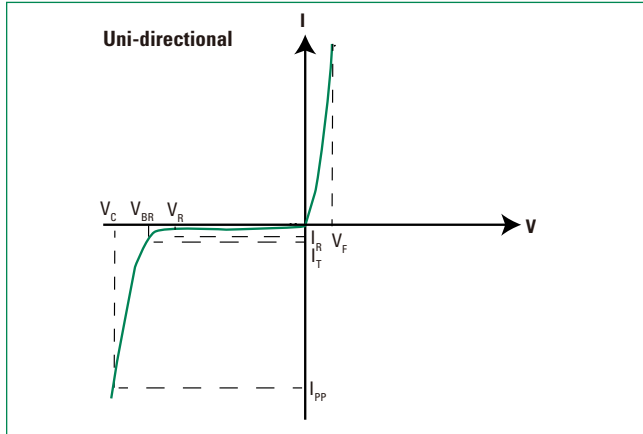
**Note:** LF use  $t_d = 400\text{ ms}$  for 12 V system test;  $t_d = 350\text{ ms}$  for 24 V system

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

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### 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**

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

Figure 1 - Peak Pulse Power Rating Curve

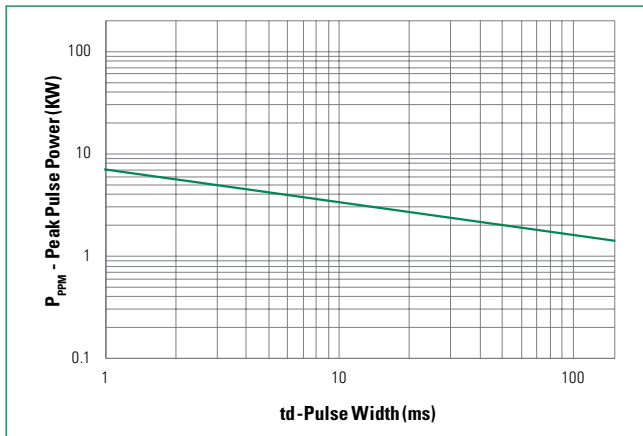


Figure 2 - Peak Pulse Power Derating Curve

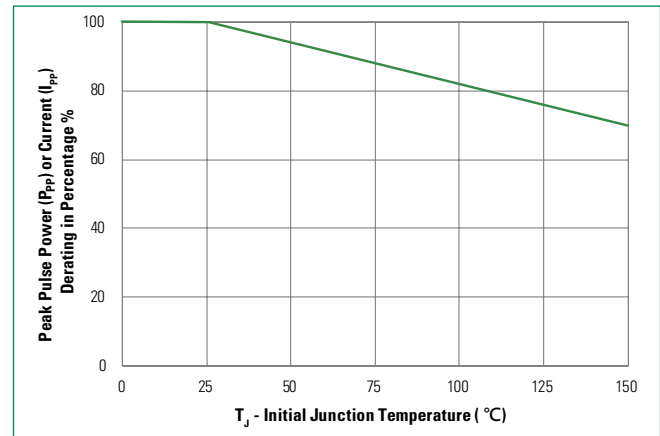


Figure 3 - Typical Transient Thermal Impedance

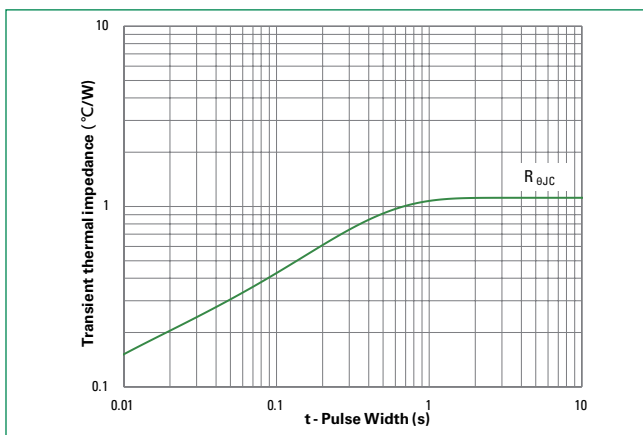
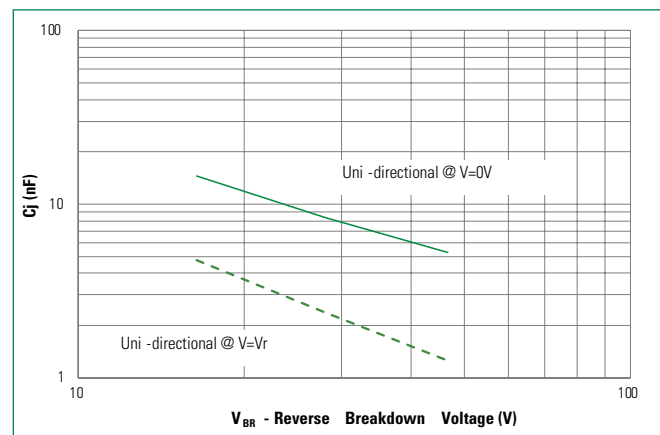


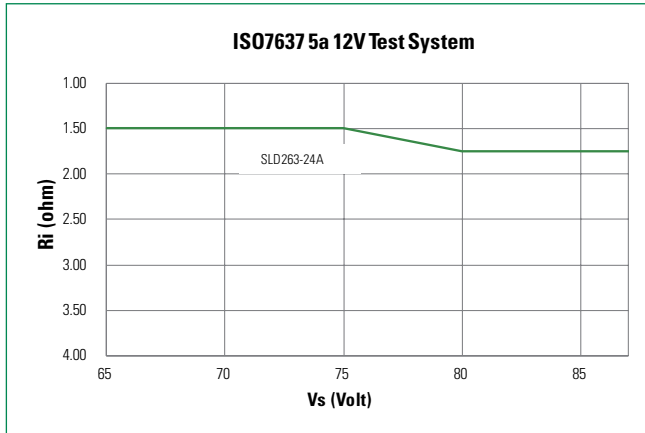
Figure 4 - Typical Junction Capacitance



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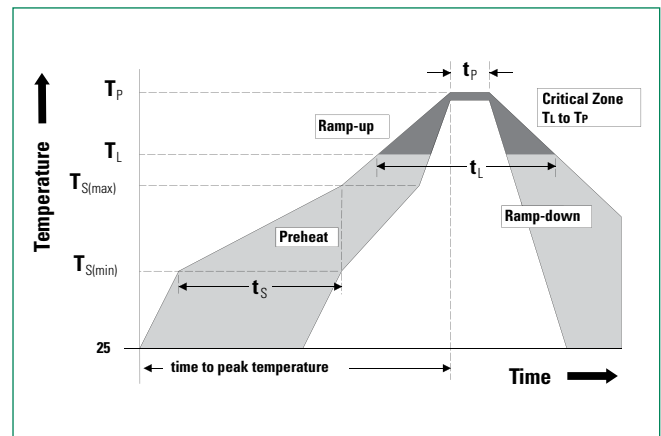
**Figure 5 - Typical SOA Chart**



**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>                                                |                                    | Lead-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> |                                    | 3 °C/second max         |
| <b><math>T_{s(max)}</math> to <math>T_L</math> - Ramp-up Rate</b>      |                                    | 3 °C/second max         |
| <b>Reflow</b>                                                          | - Temperature ( $T_L$ ) (Liquidus) | 217 °C                  |
|                                                                        | - Time (min to max) ( $t_L$ )      | 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 max          |
| <b>Ramp-down Rate</b>                                                  |                                    | 6 °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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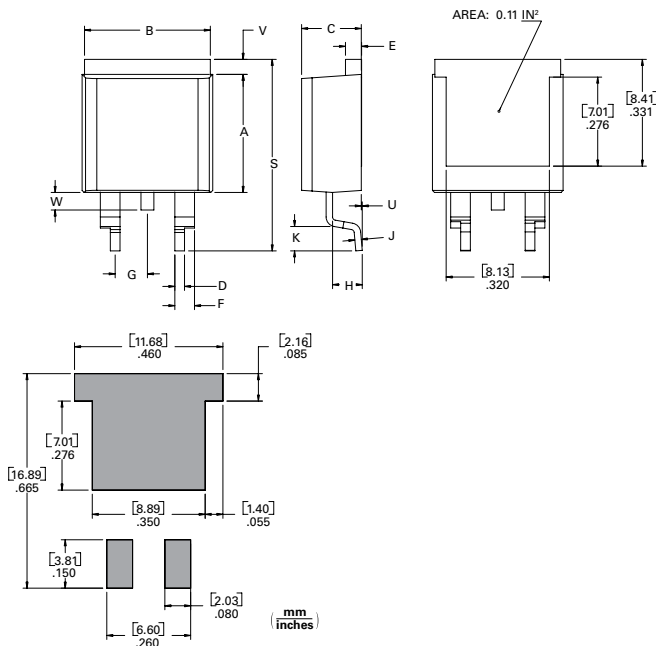
### Physical Specifications

|                        |                                                                     |
|------------------------|---------------------------------------------------------------------|
| <b>Terminal Finish</b> | 100 % matte tin-plated                                              |
| <b>Body Material</b>   | UL recognized compound meeting flammability classification UL94 V-0 |
| <b>Lead Material</b>   | Copper alloy                                                        |

### Environmental Specifications

|                                 |                          |
|---------------------------------|--------------------------|
| <b>High Temperature 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              |

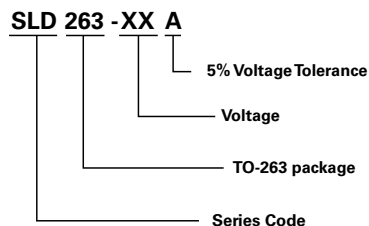
### Dimensions



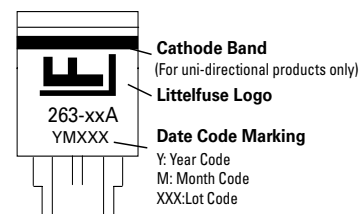
Recommend Soldering Pad Outline

| Dimensions | Inches |       | Millimeters |       |
|------------|--------|-------|-------------|-------|
|            | Min    | Max   | Min         | Max   |
| A          | 0.36   | 0.37  | 9.14        | 9.4   |
| B          | 0.38   | 0.42  | 9.65        | 10.67 |
| C          | 0.178  | 0.188 | 4.52        | 4.78  |
| D          | 0.025  | 0.035 | 0.64        | 0.89  |
| E          | 0.045  | 0.06  | 1.14        | 1.52  |
| F          | 0.06   | 0.075 | 1.52        | 1.91  |
| G          | 0.095  | 0.105 | 2.41        | 2.67  |
| H          | 0.092  | 0.102 | 2.34        | 2.59  |
| J          | 0.018  | 0.024 | 0.46        | 0.61  |
| K          | 0.09   | 0.11  | 2.29        | 2.79  |
| S          | 0.59   | 0.625 | 14.99       | 15.88 |
| V          | 0.035  | 0.045 | 0.89        | 1.14  |
| U          | 0.002  | 0.01  | 0.05        | 0.25  |
| W          | 0.04   | 0.07  | 1.016       | 1.78  |

### Part Numbering System



### Part Marking System



# SLD263 Uni-directional Series

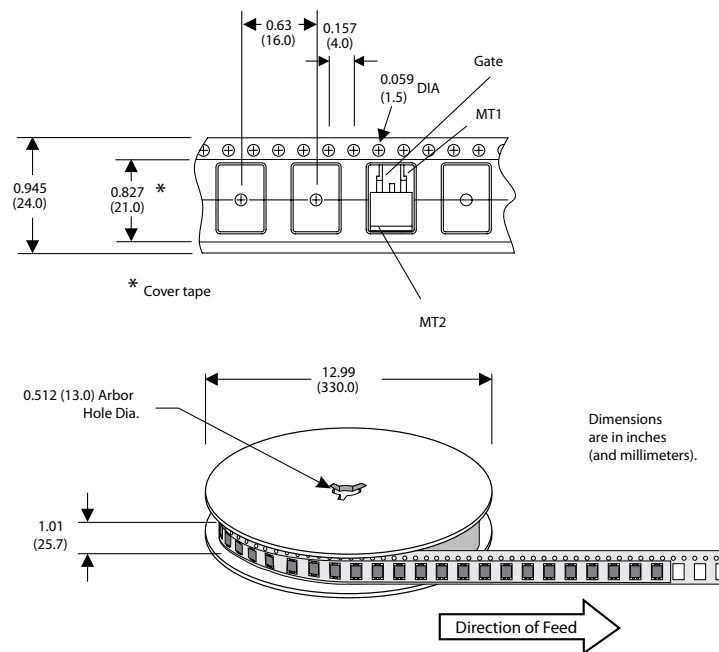
## Surface Mount - 7000 W - TO-263

### Packaging

| Part Number | Component Package | Quantity | Packaging Option |
|-------------|-------------------|----------|------------------|
| SLD263-xxA  | TO-263            | 500      | Embossed Carrier |

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

Meets all EIA-481-2 Standards



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