

SLD6S 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 1. 10ms / 150ms test waveform 2. 10 μs /1000 μs test waveform | P_{PPM} | 1800 4600 | W |
| Power dissipation on infinite heatsink at $T_A=25^\circ\text{C}$ | P_D | 6 | W |
| Maximum Instantaneous Forward Voltage at 100A for Unidirectional only | V_F | 1.8 | V |
| Peak forward surge current 8.3ms single half sine-wave | I_{FSM} | 800 | A |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 to 150 | $^\circ\text{C}$ |
| Typical Thermal Resistance Junction to case | $R_{\theta JC}$ | 1.1 | $^\circ\text{C}/\text{W}$ |
| Typical Thermal Resistance Junction to Ambient | $R_{\theta JA}$ | 12.3 | $^\circ\text{C}/\text{W}$ |



Description

The SLD6S unidirectional TVS Diode series is housed in a SMTO-263 package with lead modifications. It is designed to protect sensitive electronics against ESD, EFT, 10/1000 surge events and inductive load switching voltage transient events for severe Automotive Load Dump applications.

Features

- AEC-Q101 qualified with automotive grade (PPAP capable)
- SMTO-263 package, and foot print is compatible to industrial popular DO-218AB package
- Meet ISO7637-2 5a/5b protection, ISO16750 and JASO D-001 load dump test (refer to APP note for details)
- $V_{BR} @ T_J = V_{BR} @ 25^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$ (α : 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 $V_{BR} \text{ min}$
- Excellent clamping capability
- Low incremental surge resistance
- UL Recognized compound meeting flammability rating V-0
- Meets MSL level 1, per J-STD-020, High temperature reflow soldering guaranteed: 260 $^\circ\text{C}$ /10sec at terminals
- For surface mounted applications to optimize board space
- Low profile package
- 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

Functional Diagram



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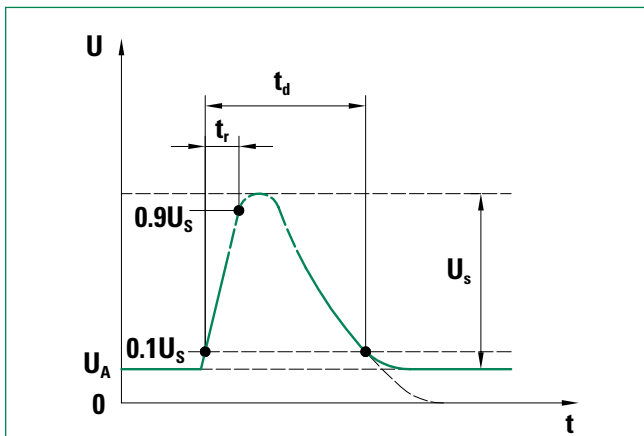
Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

| 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 (μA) | $T_J=150^\circ\text{C}$ 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 | | | | | | | |
| SLD6S14A | 15.6 | 17.2 | 5.0 | 14 | 10 | 50 | 198 | 23.2 | x |
| SLD6S15A | 16.7 | 18.5 | 5.0 | 15 | 10 | 50 | 189 | 24.4 | x |
| SLD6S16A | 17.8 | 19.7 | 5.0 | 16 | 2.0 | 50 | 177 | 26.0 | x |
| SLD6S17A | 18.9 | 20.9 | 5.0 | 17 | 2.0 | 50 | 167 | 27.6 | x |
| SLD6S18A | 20.0 | 22.1 | 5.0 | 18 | 2.0 | 50 | 158 | 29.2 | x |
| SLD6S20A | 22.2 | 24.5 | 5.0 | 20 | 2.0 | 50 | 142 | 32.4 | x |
| SLD6S22A | 24.4 | 26.9 | 5.0 | 22 | 2.0 | 50 | 130 | 35.5 | x |
| SLD6S24A | 26.7 | 29.5 | 5.0 | 24 | 2.0 | 50 | 118 | 38.9 | x |
| SLD6S26A | 28.9 | 31.9 | 5.0 | 26 | 2.0 | 50 | 109 | 42.1 | x |
| SLD6S27A | 29.9 | 33.1 | 5.0 | 27 | 2.0 | 50 | 106 | 43.6 | x |
| SLD6S28A | 31.1 | 34.4 | 5.0 | 28 | 2.0 | 50 | 101 | 45.4 | x |
| SLD6S30A | 33.3 | 36.8 | 5.0 | 30 | 2.0 | 50 | 95 | 48.4 | x |
| SLD6S33A | 36.7 | 40.6 | 5.0 | 33 | 2.0 | 50 | 86 | 53.3 | x |
| SLD6S36A | 40.0 | 44.2 | 5.0 | 36 | 2.0 | 50 | 79 | 58.1 | x |
| SLD6S40A | 44.4 | 49.1 | 5.0 | 40 | 2.0 | 50 | 71 | 64.5 | x |
| SLD6S43A | 47.8 | 52.8 | 5.0 | 43 | 2.0 | 50 | 66 | 69.4 | x |
| SLD6S48A | 53.3 | 58.9 | 5.0 | 48 | 2.0 | 50 | 59 | 77.4 | x |
| SLD6S57A | 63.8 | 69.9 | 5.0 | 57 | 2.0 | 50 | 50 | 92.7 | x |

Notes:

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

Load Dump Test Wave Form



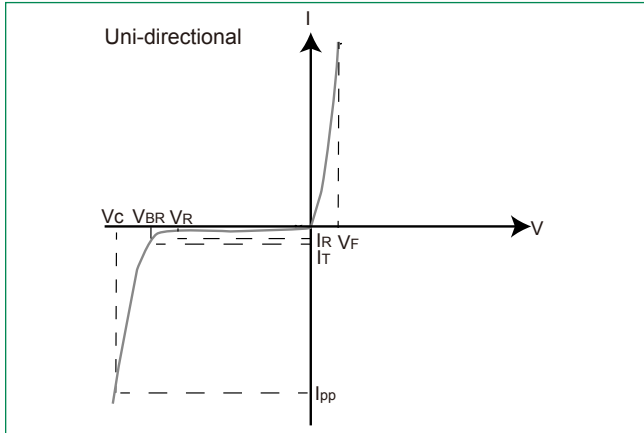
Note: LF use $t_d=400\text{ms}$ for 12V system test; $t_d=350\text{ms}$ for 24V system

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

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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 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°C unless otherwise noted)

Figure 1 - Peak Pulse Power Rating Curve

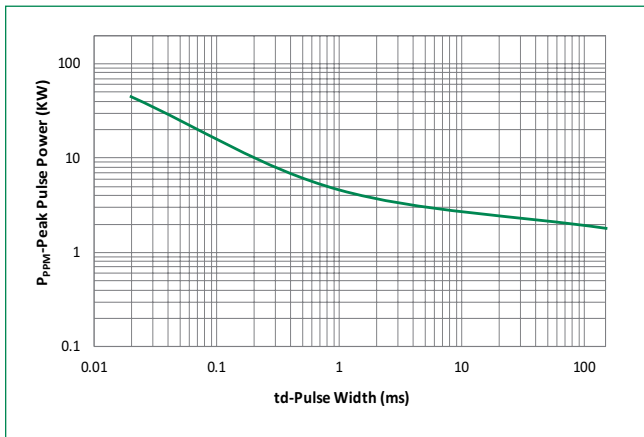


Figure 2 - Peak Pulse Power Derating Curve

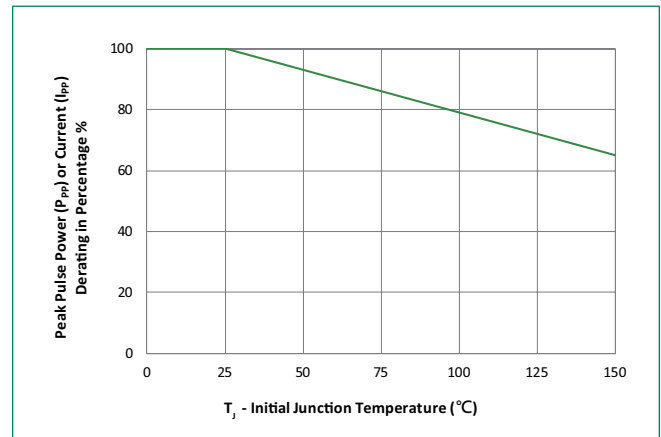


Figure 3 - Typical Transient Thermal Impedance

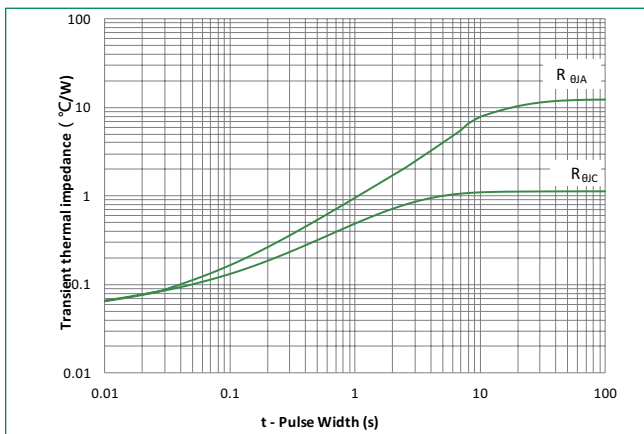
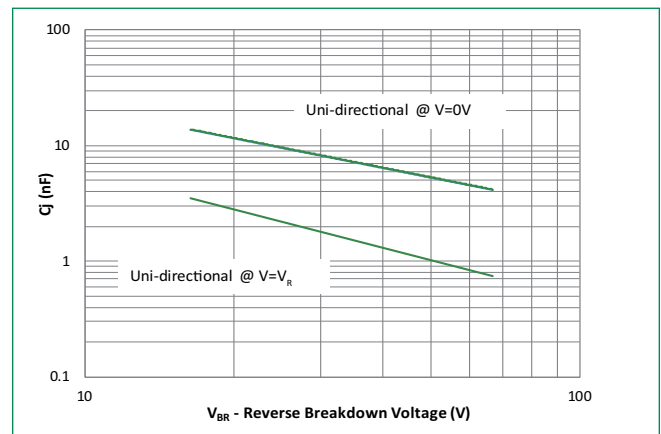


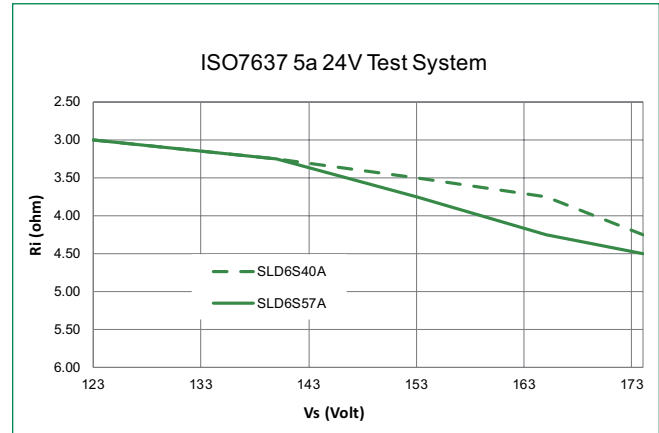
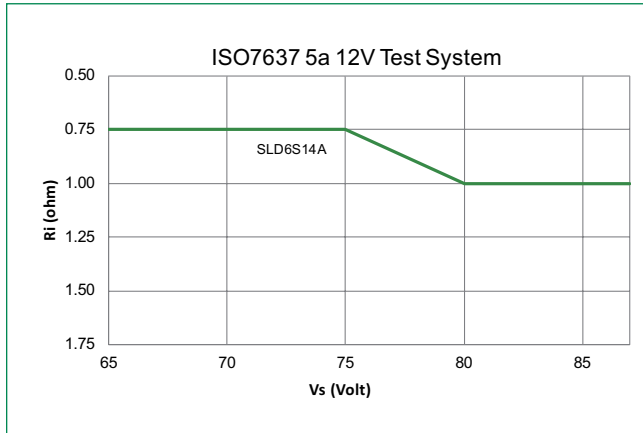
Figure 4 - Typical Junction Capacitance



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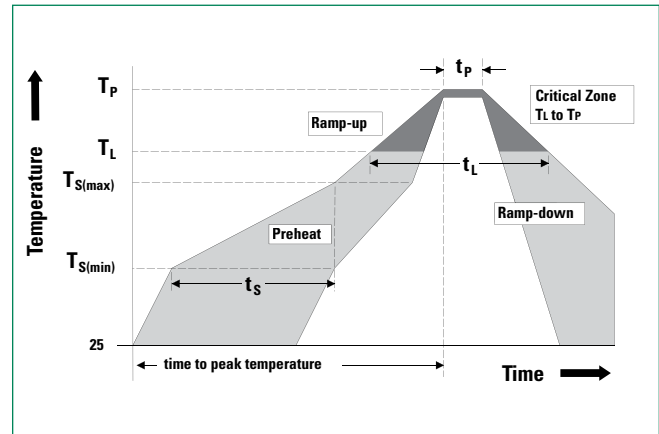
Figure 5 - Typical SOA Chart



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

Soldering Parameters

| | | |
|--|------------------------------------|-------------------------|
| 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 – 120 secs |
| 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_L) | 60 – 150 seconds |
| Peak Temperature (T_p) | | 260 ^{+0/-5} °C |
| Time within 5°C of actual peak Temperature (t_p) | | 30 seconds max |
| Ramp-down Rate | | 6°C/second max |
| Time 25°C to peak Temperature (T_p) | | 8 minutes max. |
| Do not exceed | | 260°C |



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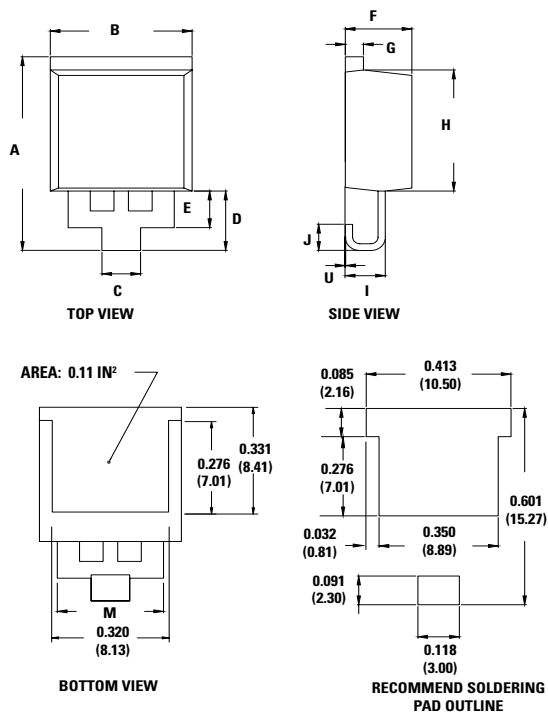
Physical Specifications

| | |
|------------------------|--|
| Terminal Finish | 100% Matte Tin-plated |
| Body Material | UL Recognized compound meeting flammability classification 94V-0 |
| Lead Material | Copper Alloy |

Environmental Specifications

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

Dimensions

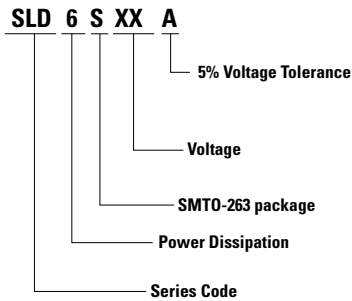


| Dimensions | Inches | | Millimeters | |
|------------|--------|-------|-------------|-------|
| | Min | Max | Min | Max |
| A | 0.568 | 0.600 | 14.44 | 15.24 |
| B | 0.380 | 0.420 | 9.65 | 10.67 |
| C | 0.098 | 0.114 | 2.50 | 2.90 |
| D | 0.169 | 0.189 | 4.30 | 4.80 |
| E | 0.102 | 0.118 | 2.60 | 3.00 |
| 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 |

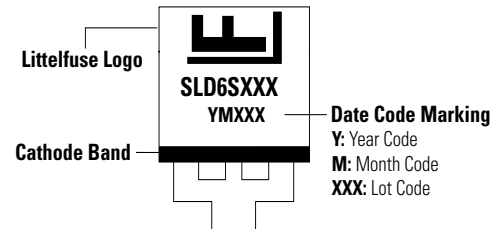
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Part Numbering System



Part Marking System

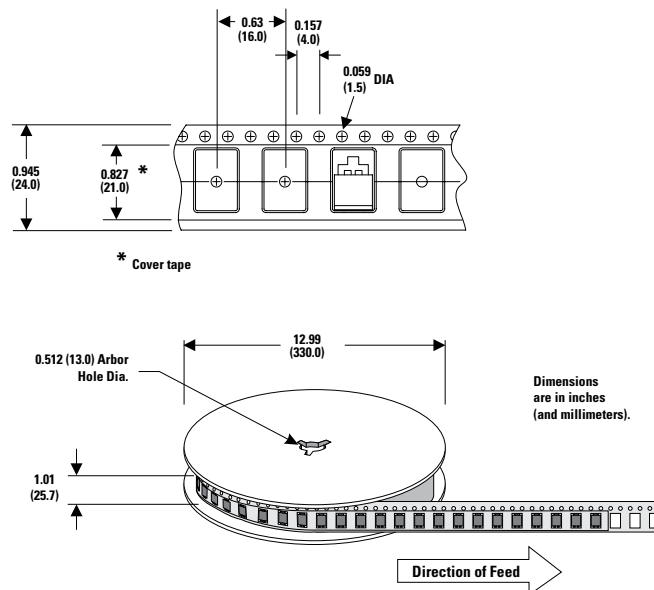


Packaging

| Part Number | Component Package | Quantity | Packaging Option |
|-------------|-------------------|----------|------------------|
| SLD6SxxA | SMT0-263 | 500 | Embossed Carrier |

SMT0-263 Embossed Carrier Reel Pack (RP) Specifications

Meets all EIA-481-2 Standards



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