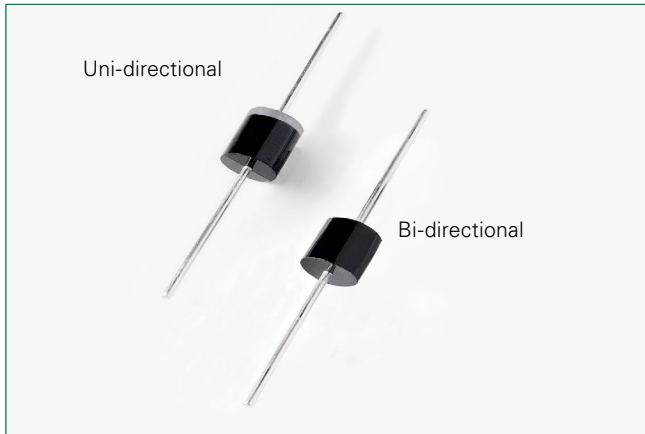


SLD Series

Axial Leaded - 2200W



Web Resources



Download ECAD models, order samples, and find technical resources at www.littelfuse.com/sld

Agency Approvals

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

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

| Parameter | Symbol | Value | Unit |
|--|-----------------------------------|---------------|------|
| Peak Pulse Power Dissipation 10ms x 150ms Test Waveform | P _{PPM} | 2200 | W |
| Peak Pulse Power Dissipation 10μs x 1000μs Test Waveform | P _{PPM} | 5000 | W |
| Steady State Power Dissipation on Infinite Heat Sink at T _L =75°C (Fig. 6) | P _D | 8.0 | W |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3) | I _{FSM} | 600 | A |
| Maximum Instantaneous Forward Voltage at 100A for Unidirectional Only | V _F | 3.5 | V |
| Operating Junction and Storage Temperature Range | T _J , T _{STG} | -55 to 175 | °C |
| Typical Thermal Resistance Junction to Lead | R _{JL} | 8.0 | °C/W |
| Typical Thermal Resistance Junction to Ambient | R _{JA} | 40 | °C/W |

Description

The AEC-Q101 qualified SLD Series is packaged in a highly reliable industry standard P600 axial leaded package and is designed to provide precision overvoltage protection for sensitive electronics.

Features & Benefits

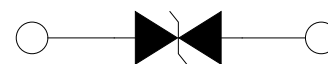
- High reliability application and automotive grade AEC-Q101 qualified with TJ 175°C
- $V_{BR} @ T_J = V_{BR} @ 25^\circ C \times (1 + \alpha T \times (T_J - 25))$ (αT : Temperature Coefficient, typical value is 0.1%)
- Glass passivated chip junction in P600 package
- Meets ISO7637 and ISO16750 load dump test; 2200W peak pulse capability at 10μs x 150ms waveform, repetition rate (duty cycles): 0.01%
- Fast response time: typically less than 1.0ps from 0 Volts to V_{BR min}
- Excellent clamping capability
- 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
- 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
- Low incremental surge resistance
- High temperature to reflow soldering guaranteed: 260°C/10sec / 0.375" (9.5mm) lead length, 5 lbs., (2.3kg) tension
- UL Recognized case material meeting flammability rating V-0.
- 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



Bi-directional




Uni-directional

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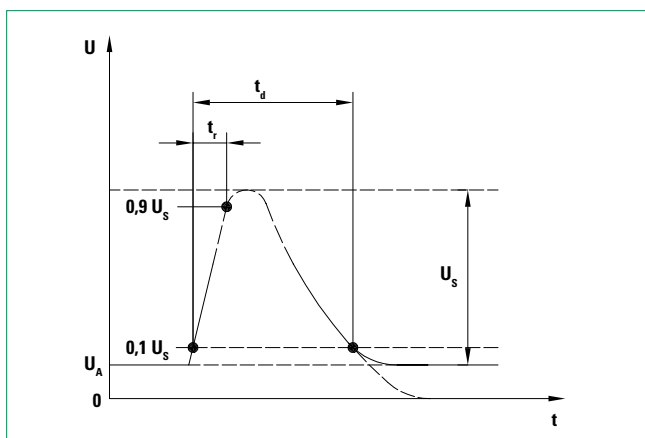
Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| Part Number (Uni) | Part Number (Bi) | Breakdown Voltage V_{BR} @ I_T (V) | | Test Current I_T (mA) | Reverse Stand off Voltage V_R (Volts) | Maximum Reverse Leakage @ V_R I_R (μA) | Maximum Peak Pulse Current I_{PP} (A) | Maximum Clamping Voltage @ I_{PP} V_C (V) | Agency Approval  |
|-------------------|------------------|--|------|-------------------------|---|---|---|---|---|
| | | MIN | MAX | | | | | | |
| SLD10U-017 | SLD10-018 | 11.8 | 13.0 | 5.0 | 10 | 10 | 300.0 | 17.0 | x |
| SLD11U-017 | SLD11-018 | 12.2 | 13.5 | 5.0 | 11 | 10 | 280.2 | 18.2 | x |
| SLD12U-017 | SLD12-018 | 13.3 | 14.7 | 5.0 | 12 | 10 | 256.3 | 19.9 | x |
| SLD13U-017 | SLD13-018 | 14.4 | 15.9 | 5.0 | 13 | 10 | 237.2 | 21.5 | x |
| SLD14U-017 | SLD14-018 | 15.6 | 17.2 | 5.0 | 14 | 10 | 219.8 | 23.2 | x |
| SLD15U-017 | SLD15-018 | 16.7 | 18.5 | 5.0 | 15 | 10 | 209.0 | 24.4 | x |
| SLD16U-017 | SLD16-018 | 18.0 | 19.3 | 5.0 | 16 | 10 | 196.2 | 26.0 | x |
| SLD17U-017 | SLD17-018 | 18.9 | 20.9 | 5.0 | 17 | 10 | 184.8 | 27.6 | x |
| SLD18U-017 | SLD18-018 | 20.0 | 22.1 | 5.0 | 18 | 10 | 174.7 | 29.2 | x |
| SLD20U-017 | SLD20-018 | 22.2 | 24.5 | 5.0 | 20 | 10 | 157.4 | 32.4 | x |
| SLD22U-017 | SLD22-018 | 24.4 | 26.9 | 5.0 | 22 | 10 | 143.7 | 35.5 | x |
| SLD24U-017 | SLD24-018 | 26.7 | 29.5 | 5.0 | 24 | 10 | 131.1 | 38.9 | x |
| SLD26U-017 | SLD26-018 | 28.9 | 31.9 | 5.0 | 26 | 10 | 121.1 | 42.1 | x |
| SLD28U-017 | SLD28-018 | 31.1 | 34.4 | 5.0 | 28 | 10 | 112.3 | 45.4 | x |
| SLD30U-017 | SLD30-018 | 33.3 | 36.8 | 5.0 | 30 | 10 | 105.4 | 48.4 | x |
| SLD33U-017 | SLD33-018 | 36.7 | 40.6 | 5.0 | 33 | 10 | 95.7 | 53.3 | x |
| SLD36U-017 | SLD36-018 | 40.0 | 44.2 | 5.0 | 36 | 10 | 87.8 | 58.1 | x |
| SLD40U-017 | SLD40-018 | 44.4 | 49.1 | 5.0 | 40 | 10 | 79.1 | 64.5 | x |
| SLD43U-017 | SLD43-018 | 49.0 | 54.2 | 5.0 | 43 | 10 | 73.5 | 69.4 | x |
| SLD45U-017 | SLD45-018 | 50.0 | 55.3 | 5.0 | 45 | 10 | 70.2 | 72.7 | x |
| SLD48U-017 | SLD48-018 | 53.3 | 58.9 | 5.0 | 48 | 10 | 65.9 | 77.4 | x |
| SLD51U-017 | SLD51-018 | 56.7 | 62.7 | 5.0 | 51 | 10 | 61.9 | 82.4 | x |
| SLD54U-017 | SLD54-018 | 60.0 | 66.3 | 5.0 | 54 | 10 | 58.6 | 87.1 | x |
| SLD58U-017 | SLD58-018 | 64.4 | 71.2 | 5.0 | 58 | 10 | 54.5 | 93.6 | x |
| SLD60U-017 | SLD60-018 | 68.4 | 75.6 | 5.0 | 60 | 10 | 52.7 | 96.8 | x |

Notes:

- VBR measured after I_T applied for 300 μs , I_T = square wave pulse or equivalent.
- Surge current waveform per 10 μs x 1000 μs exponential wave and derated per Fig. 4.
- All terms and symbols are consistent with ANSI/IEEE C62.35

Load Dump Test Wave Form



Note

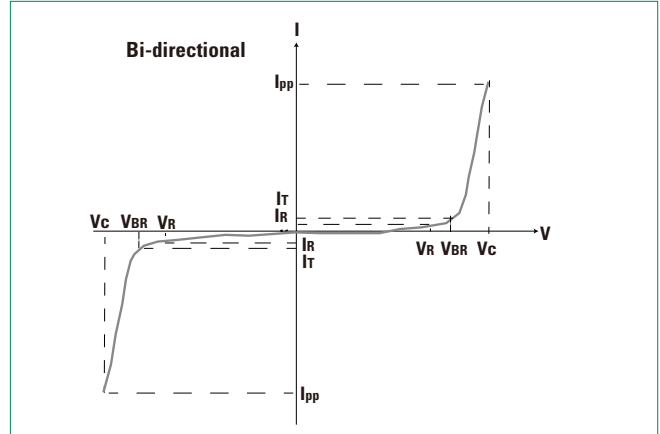
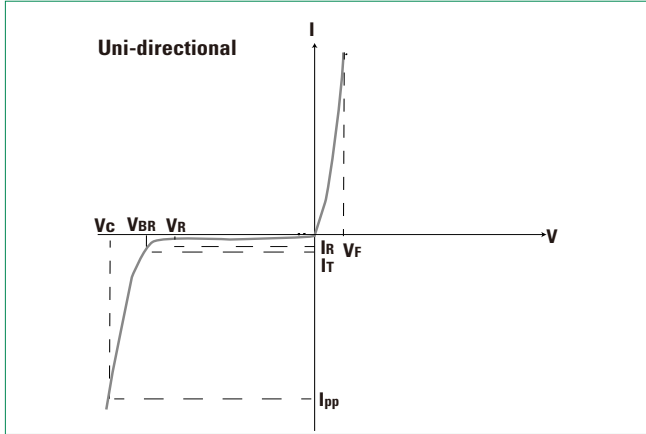
LF use $t_d=400\text{ms}$ for 12V system test; $t_d=350\text{ms}$ for 24V system

| 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 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 (TA=25°C unless otherwise noted)

Figure 1 - TVS Transients Clamping Waveform

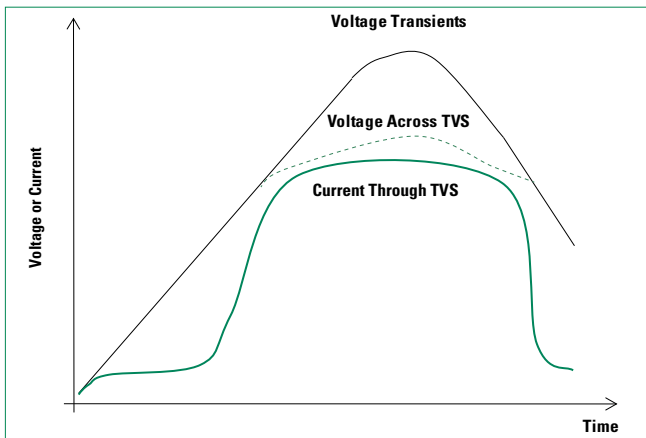


Figure 2 - Peak Pulse Power Rating Curve

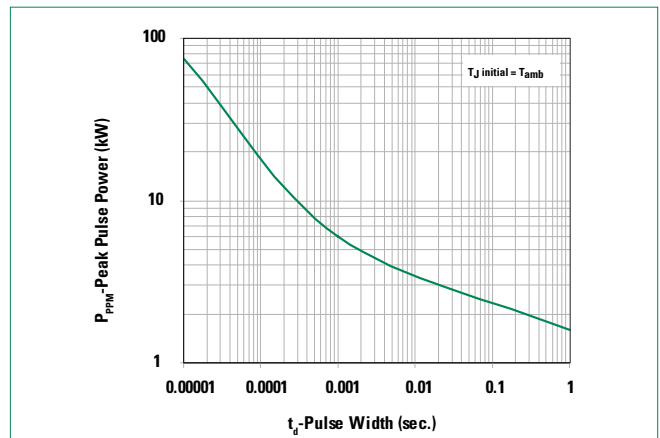


Figure 3 - Peak Pulse Power Derating Curve

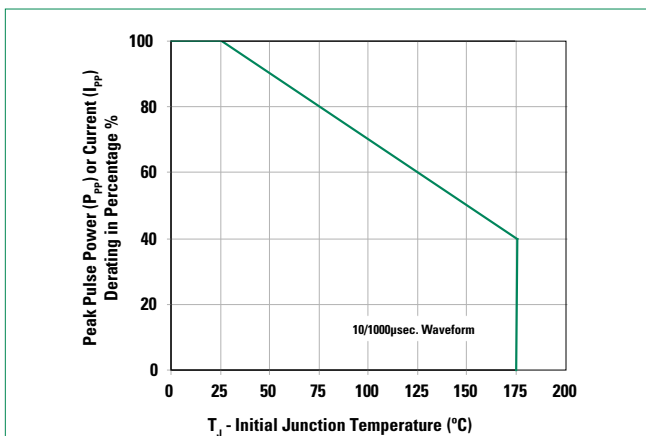
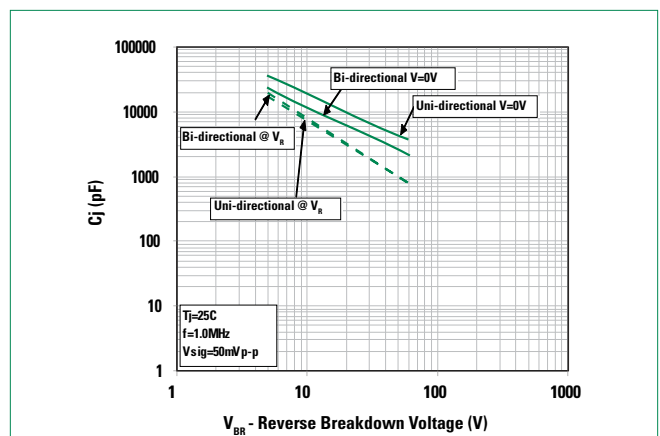


Figure 4 - Typical Junction Capacitance



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Figure 5 - Maximum Non-Repetitive Peak Forward Surge Current

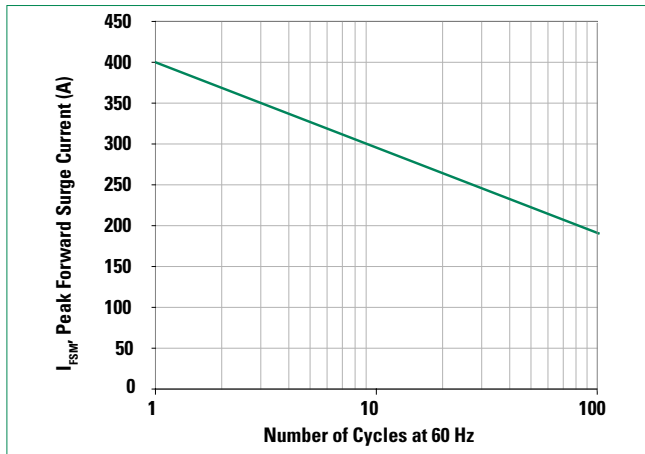
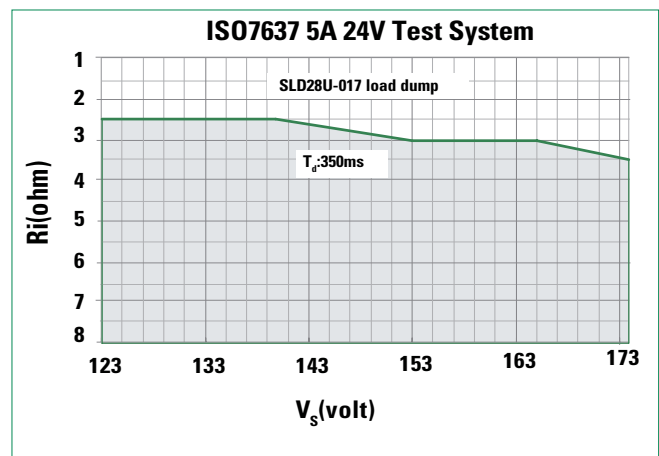
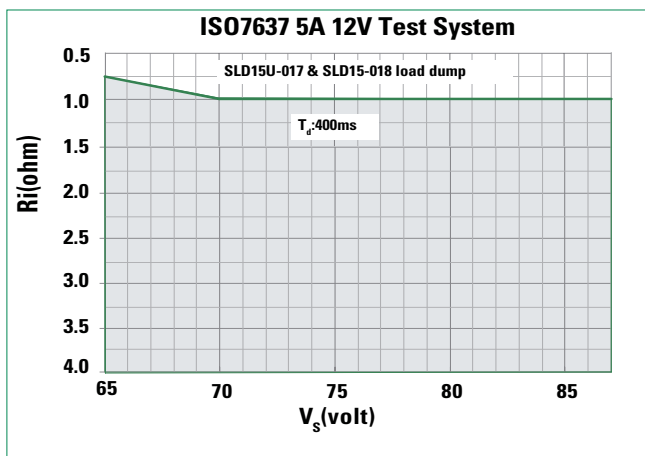


Figure 6 - SOA Chart



Soldering Parameters

Flow/Wave Soldering (Solder Dipping)

| | |
|--------------------|------------|
| Peak Temperature : | 265°C |
| Dipping Time : | 10 seconds |
| Soldering : | 1 time |

Physical Specifications

| | |
|----------|--|
| Weight | 0.07oz., 2.1g |
| Case | P600 molded plastic body over passivated junction. |
| Polarity | Color band denotes cathode for unidirectional components |
| Terminal | Matte Tin axial leads, solderable per JESD22-B102. |

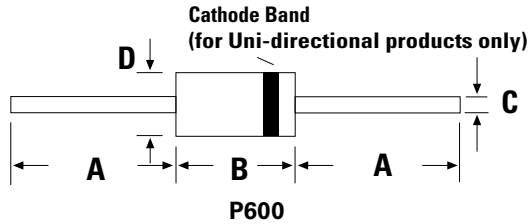
Environmental Specifications

| | |
|---------------------|-------------|
| High Temp. Storage | JESD22-A103 |
| HTRB | JESD22-A108 |
| Temperature Cycling | JESD22-A104 |
| H3TRB | JESD22-A101 |
| RSH | JESD22-B106 |

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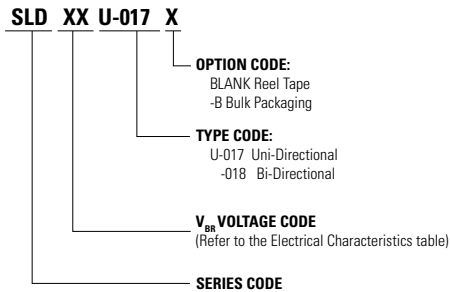
Axial Leaded - 2200W

Dimensions

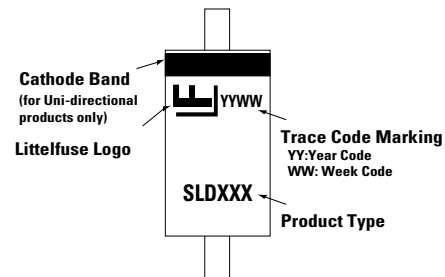


| Dimensions | Inches | | Millimeters | |
|------------|--------|-------|-------------|------|
| | Min | Max | Min | Max |
| A | 1.000 | - | 25.40 | - |
| B | 0.340 | 0.360 | 8.60 | 9.10 |
| C | 0.048 | 0.054 | 1.22 | 1.36 |
| D | 0.340 | 0.360 | 8.60 | 9.10 |

Part Numbering System



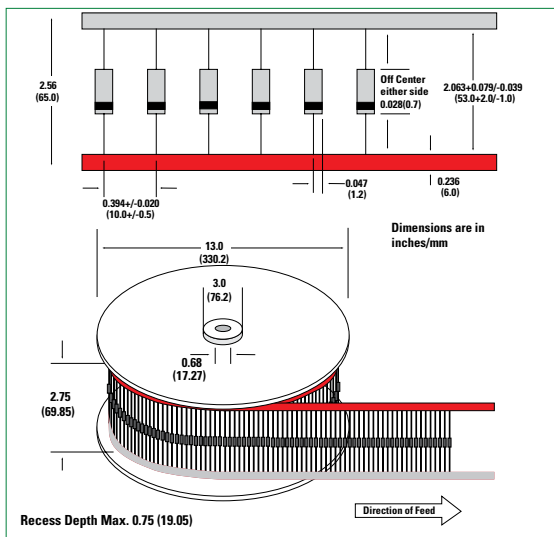
Part Marking System



Packing Options

| Part Number | Component Package | Quantity | Packaging Option | Packaging Specification |
|-------------|-------------------|----------|------------------|-------------------------|
| SLDxxXXX | P600 | 800 | Tape & Reel | EIA STD RS-296 |
| SLDxxXX-B | P600 | 100 | BOX | Littelfuse Spec. |

Tape and Reel Specification



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