



**THE DATASHEET OF  
SLD13U-017-B**



**SLD Series**



**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<br>10ms x 150ms Test Waveform                               | P <sub>PPM</sub>                  | 2200       | W    |
| Peak Pulse Power Dissipation<br>10µs x 1000µs Test Waveform                              | P <sub>PPM</sub>                  | 5000       | W    |
| Steady State Power Dissipation on<br>Infinite Heat Sink at T <sub>A</sub> =75°C (Fig. 6) | P <sub>D</sub>                    | 8.0        | W    |
| Peak Forward Surge Current, 8.3ms<br>Single Half Sine Wave (Note 3)                      | I <sub>FSM</sub>                  | 600        | A    |
| Maximum Instantaneous Forward Voltage at<br>100A for Unidirectional Only                 | V <sub>F</sub>                    | 3.5        | V    |
| Operating Junction and Storage<br>Temperature Range                                      | T <sub>J</sub> , T <sub>STG</sub> | -55 to 175 | °C   |
| Typical Thermal Resistance Junction to<br>Lead   | R <sub>θJL</sub>                  | 8.0        | °C/W |
| Typical Thermal Resistance Junction to<br>Ambient  | R <sub>θJA</sub>                  | 40         | °C/W |

**Functional Diagram**



**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**

- High reliability application and automotive grade AEC-Q101 qualified with T<sub>J</sub> 175°C
- V<sub>BR</sub> @ T<sub>J</sub> = V<sub>BR</sub> @ 25°C x (1 + α T x (T<sub>J</sub> - 25)) (α T: 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<sub>BR</sub> 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

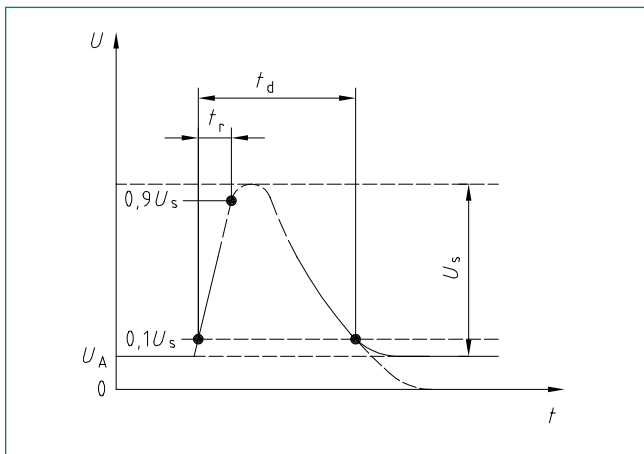
### Electrical Characteristics ( $T_A=25^\circ\text{C}$ unless otherwise noted)

| 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 @ $V_R$ $I_R$ ( $\mu\text{A}$ ) | 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:**

- $V_{BR}$  measured after  $I_T$  applied for 300 $\mu\text{s}$ ,  $I_T$ = square wave pulse or equivalent.
- Surge current waveform per 10 $\mu\text{s}$  x 1000 $\mu\text{s}$  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 $\Omega$ to 4 $\Omega$ | 1 $\Omega$ to 8 $\Omega$ |
| $t_d$     | 40 ms to 400 ms            | 100 ms to 350 ms         |
| $t_r$     | $(10^0_{-5})\text{ms}$     |                          |

**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 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 - TVS Transients Clamping Waveform**



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



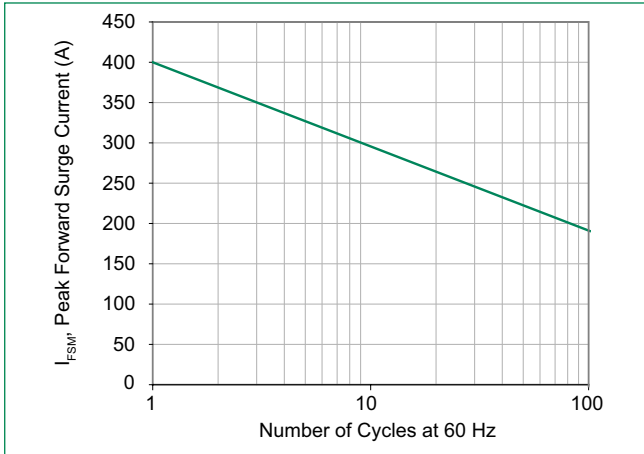
**Figure 3 - Peak Pulse Power Derating Curve**



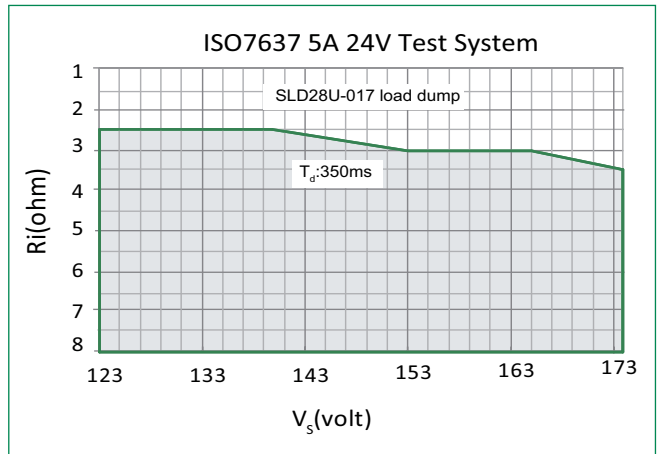
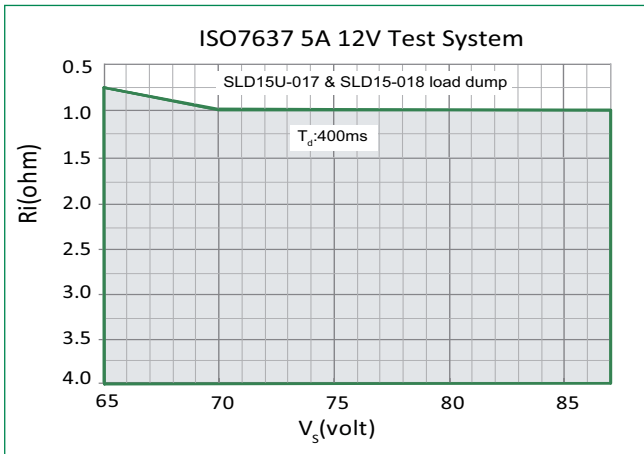
**Figure 4 - Typical Junction Capacitance**



**Figure 5 - Maximum Non-Repetitive Peak Forward Surge Current**



**Figure 6 - SOA Chart**



**Soldering Parameters**

**Flow/Wave Soldering (Solder Dipping)**

|                           |            |
|---------------------------|------------|
| <b>Peak Temperature :</b> | 265°C      |
| <b>Dipping Time :</b>     | 10 seconds |
| <b>Soldering :</b>        | 1 time     |

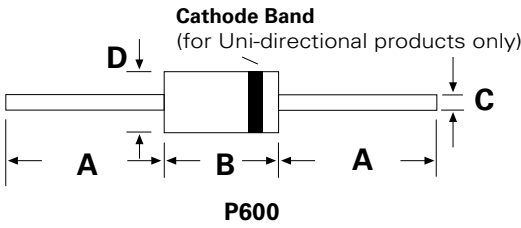
**Physical Specifications**

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

**Environmental Specifications**

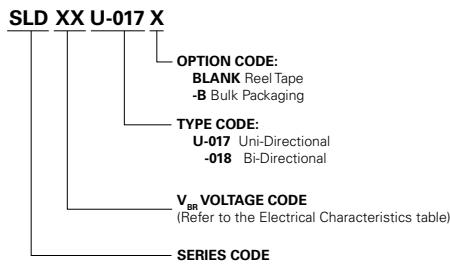
|                            |             |
|----------------------------|-------------|
| <b>High Temp. Storage</b>  | JESD22-A103 |
| <b>HTRB</b>                | JESD22-A108 |
| <b>Temperature Cycling</b> | JESD22-A104 |
| <b>H3TRB</b>               | JESD22-A101 |
| <b>RSH</b>                 |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

**Dimensions**



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



## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

 [View SLD13U-017-B on WIN SOURCE](#)

 [Littelfuse Inc. Information](#)

## Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management