

PROTECTION PRODUCTS

Description

The SDxx TVS diodes are designed to replace multilayer varistors (MLVs) in portable applications such as cell phones, notebook computers, and PDA's. They offer superior electrical characteristics such as lower clamping voltage and no device degradation when compared to MLVs. The SDxx series TVS diodes are designed to protect sensitive semiconductor components from damage or upset due to electrostatic discharge (ESD) and other voltage induced transient events.

The SDxx is in a SOD-323 package and will protect one unidirectional line. They are available with working voltages of 5 volts (SD05) and 12 volts (SD12). These devices will fit on the same PCB pad area as an 0805 MLV device. They give the designer the flexibility to protect one line in applications where arrays are not practical. Additionally, it may be "sprinkled" around the board in applications where board space is at a premium.

They may be used to meet the ESD immunity requirements of IEC 61000-4-2, Level 4 ($\pm 15\text{kV}$ air, $\pm 8\text{kV}$ contact discharge).

Features

- ◆ 350 Watts peak pulse power ($t_p = 8/20\mu\text{s}$)
- ◆ Transient protection for data lines to
IEC 61000-4-2 (ESD) $\pm 25\text{kV}$ (air), $\pm 10\text{kV}$ (contact)
IEC 61000-4-4 (EFT) 40A (5/50ns)
IEC 61000-4-5 (Lightning) 24A (8/20 μs)
- ◆ Small package for use in portable electronics
- ◆ Suitable replacement for MLV's in ESD protection applications
- ◆ Protects one I/O or power line
- ◆ Low clamping voltage
- ◆ Working voltages: 5V and 12V
- ◆ Low leakage current
- ◆ Solid-state silicon-avalanche technology

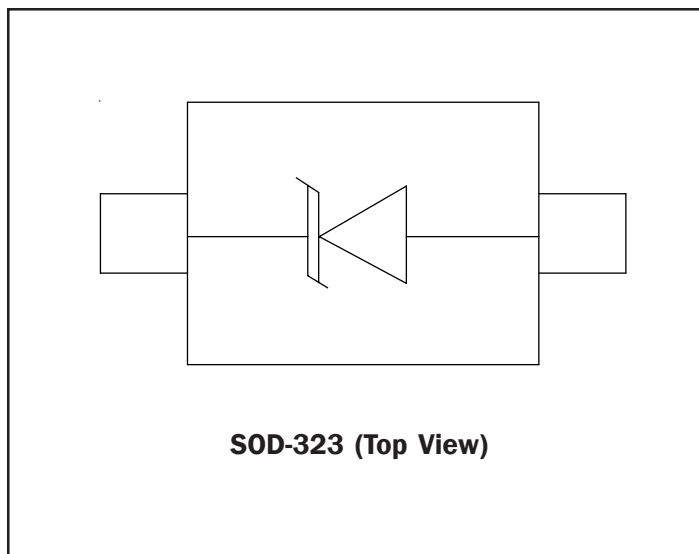
Mechanical Characteristics

- ◆ EIAJ SOD-323 package
- ◆ Molding compound flammability rating: UL 94V-0
- ◆ Marking : Marking code, cathode band
- ◆ Packaging : Tape and Reel per EIA 481

Applications

- ◆ Cell Phone Handsets and Accessories
- ◆ Microprocessor based equipment
- ◆ Personal Digital Assistants (PDA's)
- ◆ Notebooks, Desktops, and Servers
- ◆ Portable Instrumentation
- ◆ Pagers Peripherals

Schematic & PIN Configuration



PROTECTION PRODUCTS
Absolute Maximum Rating

| Rating | Symbol | Value | Units |
|--|-----------|---------------|-------|
| Peak Pulse Power ($t_p = 8/20\mu s$) | P_{pk} | 350 | Watts |
| ESD Voltage (HBM Waveform per IEC 61000-4-2) | V_{ESD} | 30 | kV |
| Lead Soldering Temperature | T_L | 260 (10 sec.) | °C |
| Operating Temperature | T_J | -55 to +125 | °C |
| Storage Temperature | T_{STG} | -55 to +150 | °C |

Electrical Characteristics

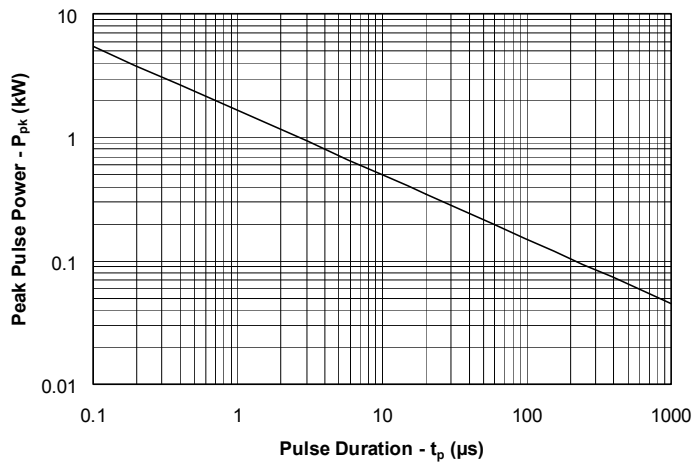
| SD05 | | | | | | |
|---------------------------|-----------|---------------------------------|---------|---------|---------|---------|
| Parameter | Symbol | Conditions | Minimum | Typical | Maximum | Units |
| Reverse Stand-Off Voltage | V_{RWM} | | | | 5 | V |
| Reverse Breakdown Voltage | V_{BR} | $I_t = 1mA$ | 6 | | | V |
| Reverse Leakage Current | I_R | $V_{RWM} = 5V, T=25^\circ C$ | | | 10 | μA |
| Clamping Voltage | V_C | $I_{PP} = 5A, t_p = 8/20\mu s$ | | | 9.8 | V |
| Clamping Voltage | V_C | $I_{PP} = 24A, t_p = 8/20\mu s$ | | | 14.5 | V |
| Peak Pulse Current | I_{PP} | $t_p = 8/20\mu s$ | | | 24 | A |
| Junction Capacitance | C_J | $V_R = 0V, f = 1MHz$ | | | 350 | pF |

| SD12 | | | | | | |
|---------------------------|-----------|---------------------------------|---------|---------|---------|---------|
| Parameter | Symbol | Conditions | Minimum | Typical | Maximum | Units |
| Reverse Stand-Off Voltage | V_{RWM} | | | | 12 | V |
| Reverse Breakdown Voltage | V_{BR} | $I_t = 1mA$ | 13.3 | | | V |
| Reverse Leakage Current | I_R | $V_{RWM} = 12V, T=25^\circ C$ | | | 1 | μA |
| Clamping Voltage | V_C | $I_{PP} = 5A, t_p = 8/20\mu s$ | | | 19 | V |
| Clamping Voltage | V_C | $I_{PP} = 15A, t_p = 8/20\mu s$ | | | 25 | V |
| Peak Pulse Current | I_{PP} | $t_p = 8/20\mu s$ | | | 15 | A |
| Junction Capacitance | C_J | $V_R = 0V, f = 1MHz$ | | | 150 | pF |

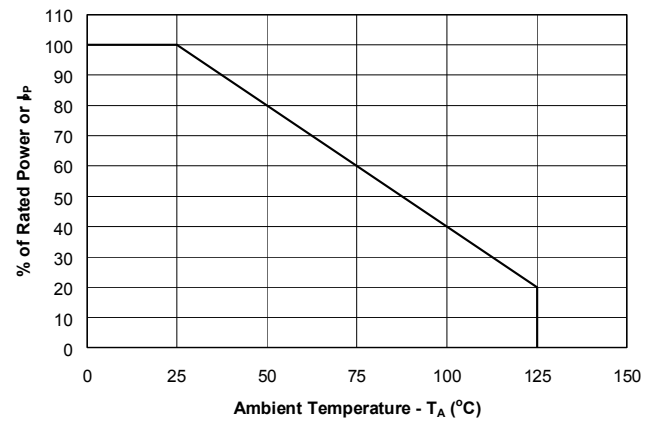
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Typical Characteristics

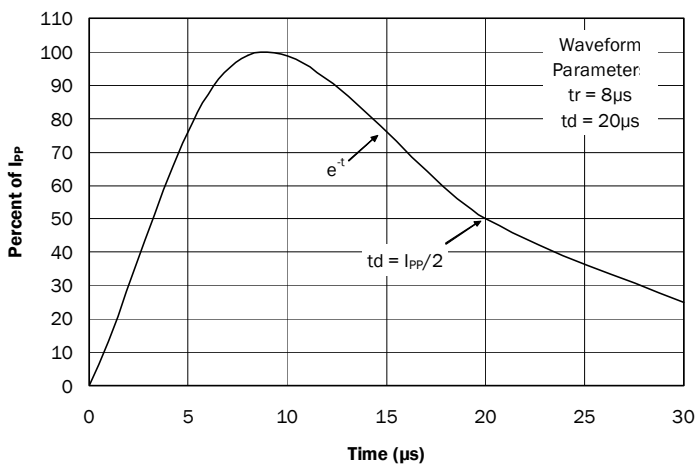
Non-Repetitive Peak Pulse Power vs. Pulse Time



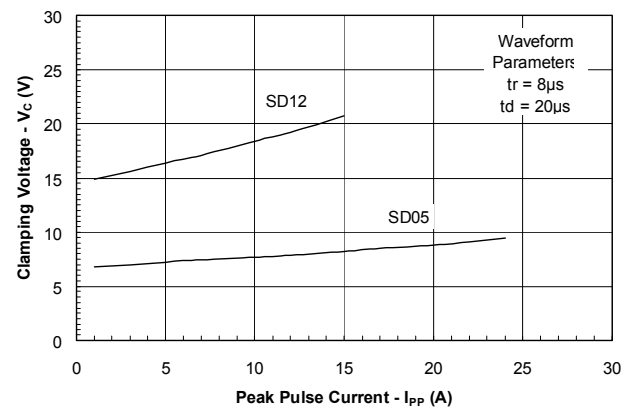
Power Derating Curve



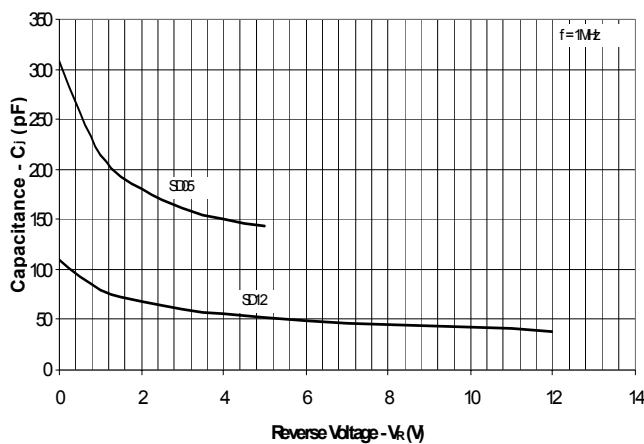
Pulse Waveform



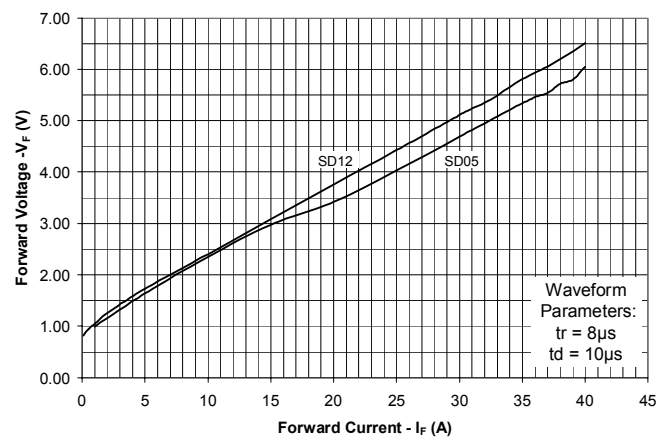
Clamping Voltage vs. Peak Pulse Current



Capacitance vs. Reverse Voltage



Forward Voltage vs. Forward Current



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Applications Information

Device Connection Options

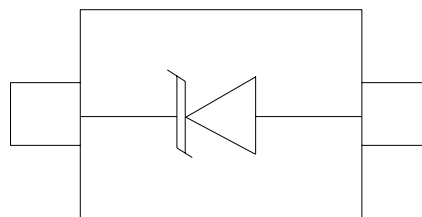
The SDxx TVS diodes are designed to protect one data, I/O, or power supply line. The device is designed to replace multi-layer varistors (MLVs) in portable applications. It is easily implemented on existing 0805 MLV pads and is only slightly larger than 0603 MLV pads. The device is unidirectional and may be used on lines where the signal polarity is above ground. The cathode band should be placed towards the line that is to be protected.

Circuit Board Layout Recommendations for Suppression of ESD.

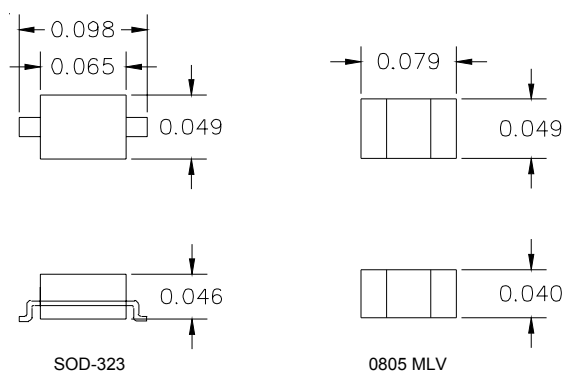
Good circuit board layout is critical for the suppression of fast rise-time transients such as ESD. The following guidelines are recommended (Refer to application note SI99-01 for more detailed information):

- Place the TVS near the input terminals or connectors to restrict transient coupling.
- Minimize the path length between the TVS and the protected line.
- The ESD transient return path to ground should be kept as short as possible.
- Place a TVS and decoupling capacitor between power and ground of components that may be vulnerable to electrostatic discharges to the ground plane.
- Minimize all conductive loops including power and ground loops.
- Use multilayer boards when possible.
- Minimize interconnecting line lengths
- Never run critical signals near board edges.
- Fill unused portions of the PCB with ground plane.

Device Schematic and Pin Configuration

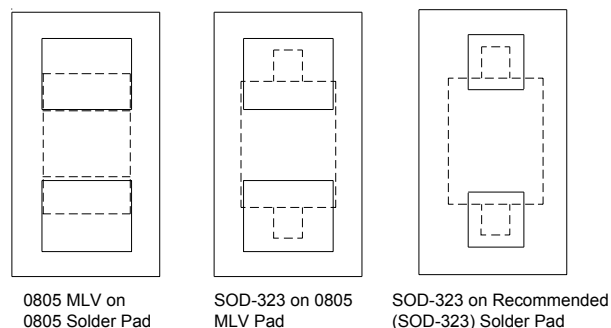


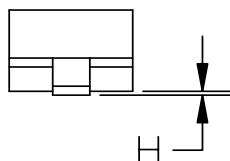
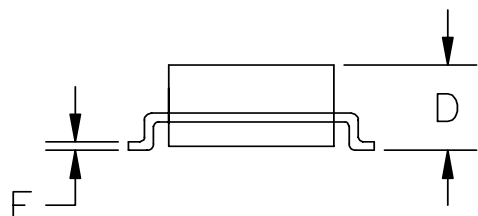
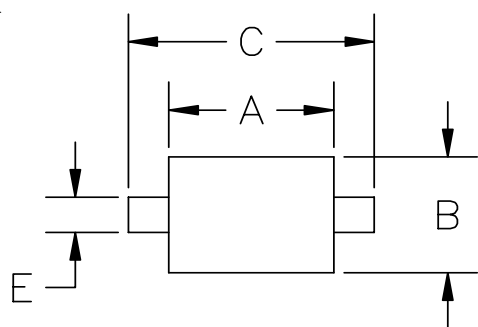
Size Comparison to 0805 MLV



Note: Nominal dimensions in inches

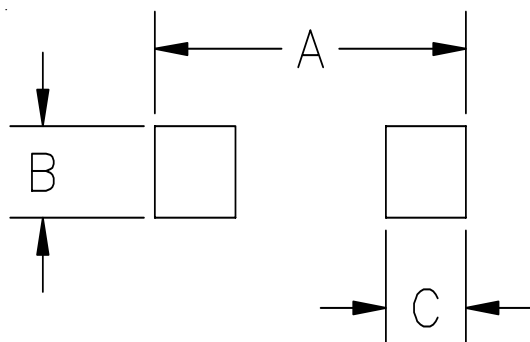
Component Placement Comparison



PROTECTION PRODUCTS
Outline Drawing


| DIMENSIONS | | | | | |
|------------------|--------|------|--------|-----|------|
| DIM ^N | INCHES | | MM [1] | | NOTE |
| | MIN | MAX | MIN | MAX | |
| A | .060 | .071 | 1.5 | 1.8 | — |
| B | .045 | .054 | 1.2 | 1.4 | — |
| C | .090 | .107 | 2.3 | 2.7 | — |
| D | — | .043 | — | 1.1 | — |
| E | .012 | .016 | 0.3 | 0.4 | — |
| F | .004 | .010 | .10 | .25 | — |
| H | — | .004 | — | .10 | — |

¹ CONTROLLING DIMENSION: MILLIMETERS

Land Pattern


| DIMENSIONS | | | | | |
|------------------|--------|------|-----------------|------|------|
| DIM ^N | INCHES | | MM ¹ | | NOTE |
| | MIN | MAX | MIN | MAX | |
| A | — | .120 | — | 3.05 | — |
| B | — | .031 | — | 0.8 | — |
| C | — | .031 | — | 0.8 | — |

¹ CONTROLLING DIMENSION: MILLIMETERS

PROTECTION PRODUCTS**Marking Codes**

| Part Number | Marking Code |
|--------------------|---------------------|
| SD05 | 5U |
| SD12 | 6U |

Ordering Information

| Part Number | Working Voltage | Qty per Reel | Reel Size |
|--------------------|------------------------|---------------------|------------------|
| SD05.TC | 5V | 3,000 | 7" |
| SD05.TG | 5V | 10,000 | 13" |
| SD12.TC | 12V | 3,000 | 7" |
| SD12.TG | 12V | 10,000 | 13" |

Contact Information

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