SD05 & SD12
Single Line TVS Diode for ESD Protection in Portable Electronics

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 may be used to meet the ESD immunity requirements of IEC 61000-4-2, Level 4 (15kV air, 8kV contact discharge).

Features

- 350 Watts peak pulse power (tp = 8/20μs)
- Transient protection for data lines to
  IEC 61000-4-2 (ESD) 15kV (air), 8kV (contact)
  IEC 61000-4-4 (EFT) 40A (tp = 5/50ns)
  IEC 61000-4-5 (Lightning) 24A (tp = 8/20μs)
- 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 & 12V
- Low leakage current
- Solid-state silicon-avalanche technology

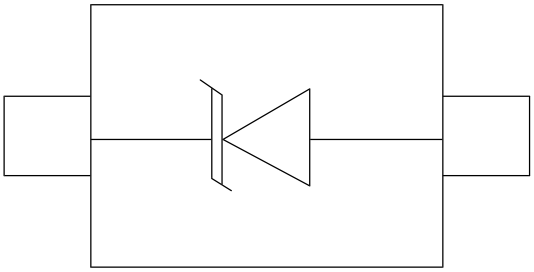
Mechanical Characteristics

- 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, & Servers
- Portable Instrumentation
- Pagers Peripherals

Schematic & PIN Configuration



SOD-323 (Top View)

Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Power (tp = 8/20μs)	P_{pk}	350	Watts
Peak Pulse Current (tp = 8/20μs)	I_{PP}	24	A
ESD Voltage (HBM Waveform per IEC 61000-4-2)	V_{PP}	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

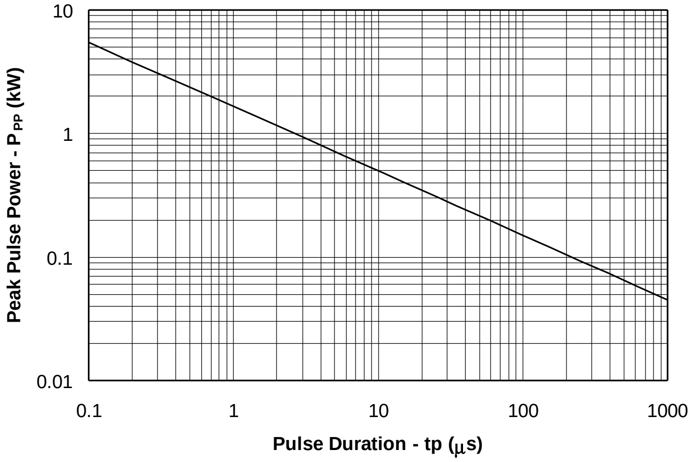
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}				5	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA	6			V
Reverse Leakage Current	I_R	V_{RWM} = 5V, T=25°C			10	μA
Clamping Voltage	V_C	I_{PP} = 5A, tp = 8/20μs			9.8	V
Clamping Voltage	V_C	I_{PP} = 24A, tp = 8/20μs			14.5	V
Junction Capacitance	C_j	V_R = 0V, f = 1MHz			350	pF

SD12

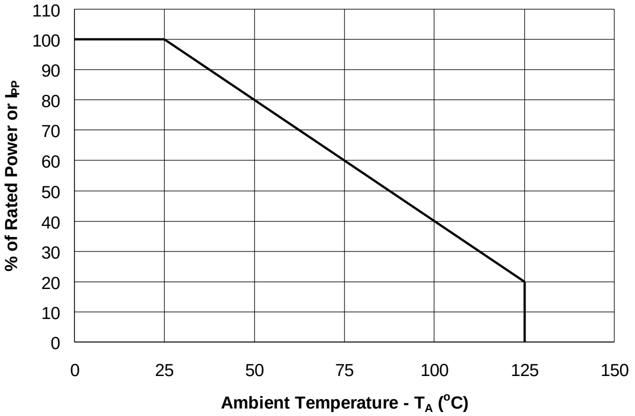
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}				12	V
Reverse Breakdown Voltage	V_{BR}	I_t = 1mA	13.3			V
Reverse Leakage Current	I_R	V_{RWM} = 12V, T=25°C			1	μA
Clamping Voltage	V_C	I_{PP} = 5A, tp = 8/20μs			19	V
Clamping Voltage	V_C	I_{PP} = 15A, tp = 8/20μs			25	V
Junction Capacitance	C_j	V_R = 0V, f = 1MHz			150	pF

Typical Characteristics

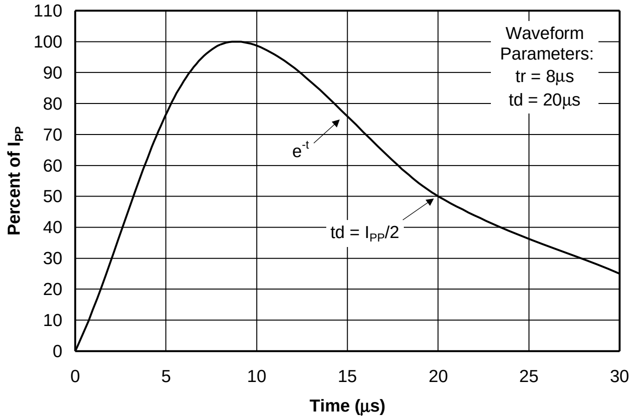
Non-Repetitive Peak Pulse Power vs. Pulse Time



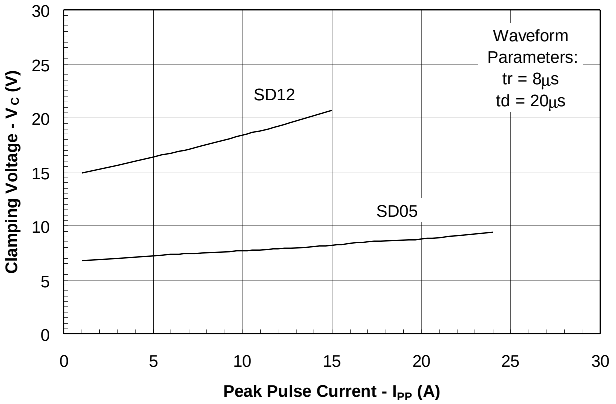
Power Derating Curve



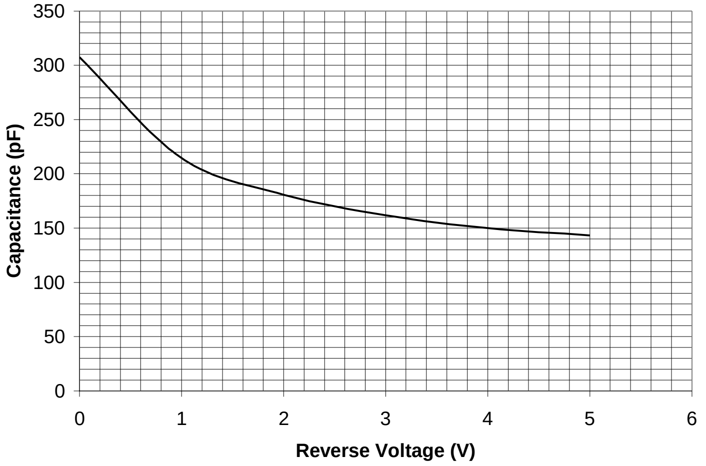
Pulse Waveform



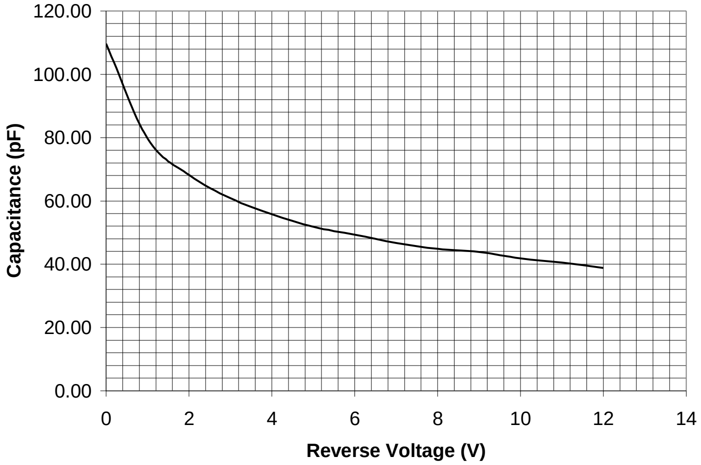
Clamping Voltage vs. Peak Pulse Current



SD05 Capacitance vs. Reverse Voltage



SD12 Capacitance vs. Reverse Voltage



Applications Information

Device Connection Options

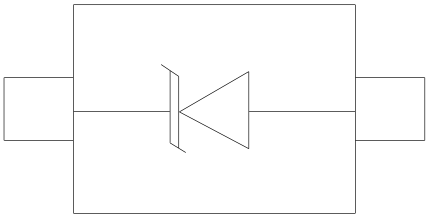
The SDxx TVS diodes are designed to protect one data, I/O, or power supply line. The device is designed to replace multi-layer varistors (MLVs) in portable applications. It is easily implemented on existing 0805 MLV pads and is only slightly larger than 0603 MLV pads. The device is unidirectional and 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.

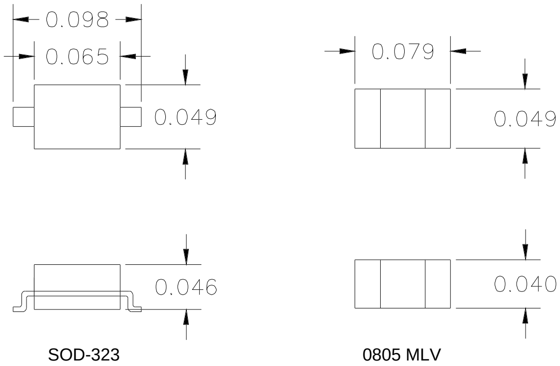
Good circuit board layout is critical for the suppression of fast rise-time transients such as ESD. The following guidelines are recommended (Refer to application note SI99-01 for more detailed information):

- 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 & 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 & Pin Configuration

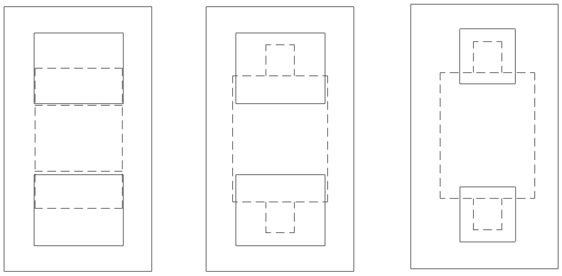


Size Comparison to 0805 MLV



Note: Nominal dimensions in inches

Component Placement Comparison

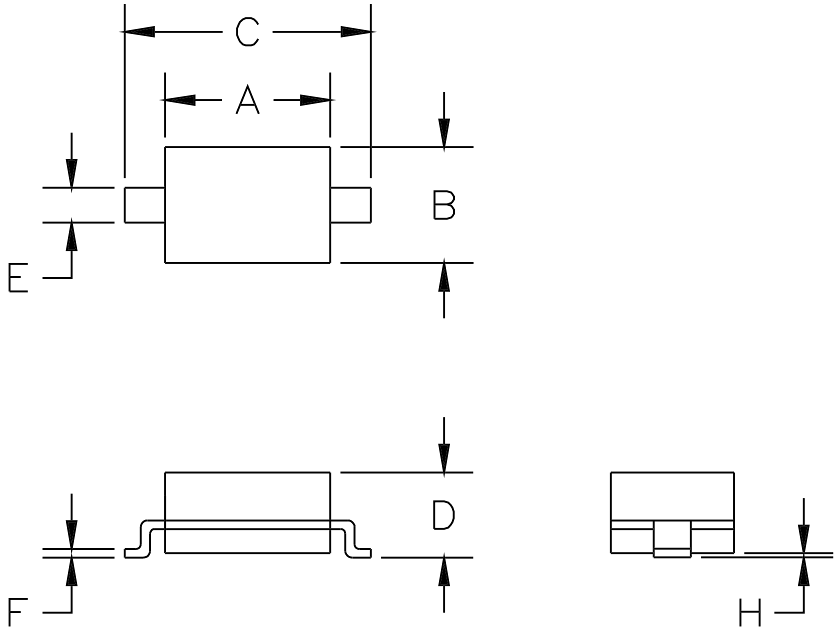


0805 MLV on 0805 Solder Pad

SOD-323 on 0805 MLV Pad

SOD-323 on Recommended (SOD-323) Solder Pad

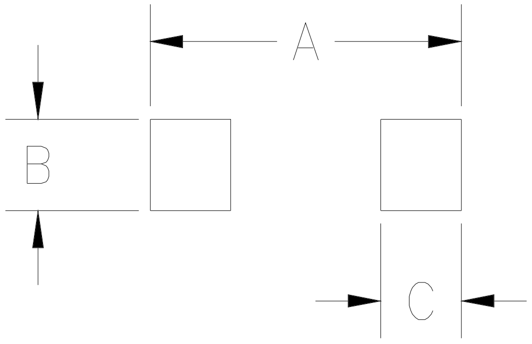
Outline Drawing



DIMENSIONS					
DIMᴺ	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					
DIMᴺ	INCHES		MM 1		NOTE
	MIN	MAX	MIN	MAX	
A	–	.120	–	3.05	–
B	–	.031	–	0.8	–
C	–	.031	–	0.8	–

1 CONTROLLING DIMENSION: MILLIMETERS

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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