

## Features

- ❑ Transient protection for high-speed data lines
  - IEC 61000-4-2 (ESD)  $\pm 30\text{kV}$  (Air)
  - $\pm 30\text{kV}$  (Contact)
  - IEC 61000-4-4 (EFT) 40A (5/50 ns)
  - Cable Discharge Event (CDE)
- ❑ Package optimized for high-speed lines
- ❑ Ultra-small package (1.6mm × 0.8mm × 0.6mm)
- ❑ Protects one data, control or power line
- ❑ Low capacitance: 12pF (Typical)
- ❑ Low leakage current: 0.1 $\mu\text{A}$  @  $V_{\text{RWM}}$  (Typical)
- ❑ Low clamping voltage
- ❑ Each I/O pin can withstand over 1000 ESD strikes for  $\pm 8\text{kV}$  contact discharge

## Description

TT0501MD is a low-capacitance Transient Voltage Suppressor (TVS) designed to provide electrostatic discharge (ESD) protection for high-speed data interfaces. With typical capacitance of 12pF only, TT0501MD is designed to protect parasitic-sensitive systems against over-voltage and over-current transient events. It complies with IEC 61000-4-2 (ESD), Level 4 ( $\pm 15\text{kV}$  air,  $\pm 8\text{kV}$  contact discharge), IEC 61000-4-4 (electrical fast transient - EFT) (40A, 5/50 ns), very fast charged device model (CDM) ESD and cable discharge event (CDE), etc.

TT0501MD uses ultra-small SOD523 package. Each TT0501MD device can protect one data line. It offers system designers flexibility to protect single data line where space is a premium concern.

## Applications

- ❑ Portable Electronics
- ❑ Desktops, Servers and Notebooks
- ❑ Cellular Phones
- ❑ MP3 Ports
- ❑ Digital Camera Ports

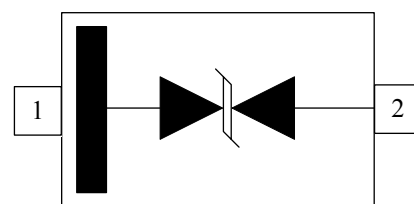
## Mechanical Characteristics

- ❑ SOD-523 package
- ❑ Flammability Rating: UL 94V-0
- ❑ Marking: Part number
- ❑ Packaging: Tape and Reel

## Circuit Diagram



## Pin Configuration



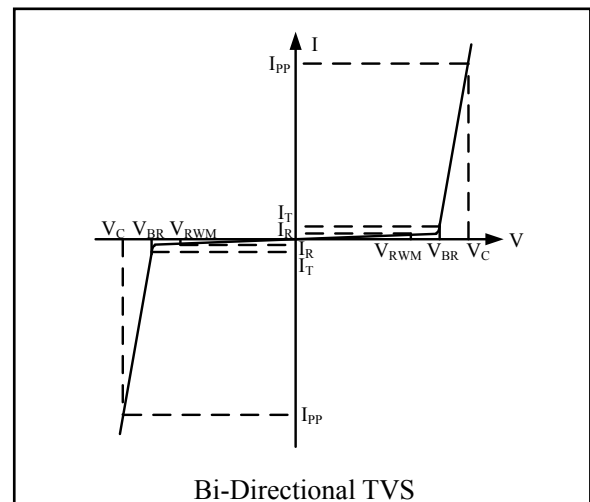
SOD-523  
(Top View)

## Absolute Maximum Rating

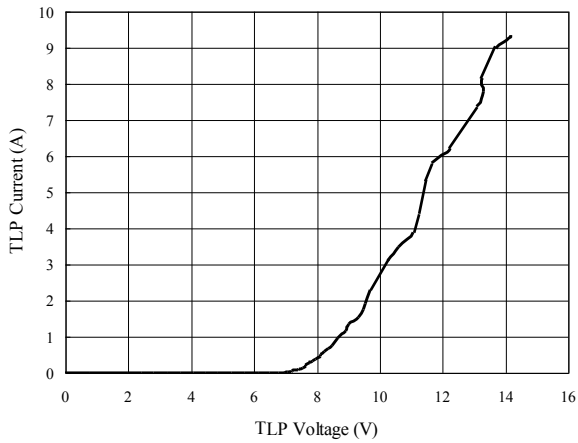
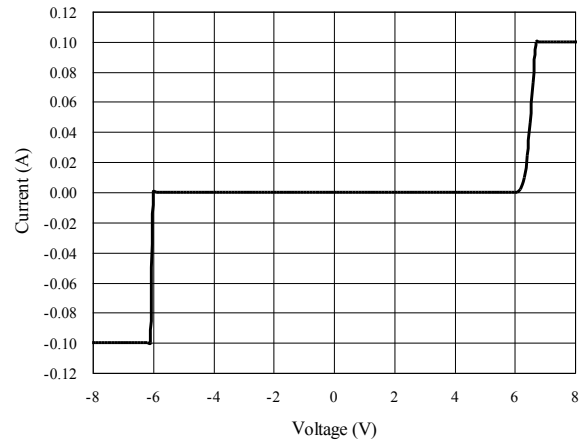
Symbol	Parameter	Value	Units
$I_{PP}$	Peak Pulse Current( $t_p=8/20\mu s$ )	5	A
$V_{ESD}$	ESD per IEC 61000-4-2(Air) ESD per IEC 61000-4-2 (Contact)	$\pm 30$ $\pm 30$	kV
$T_{OPT}$	Operating Temperature	-55/+125	$^{\circ}C$
$T_{STG}$	Storage Temperature	-55/+150	$^{\circ}C$

## Electrical Characteristics (T = 25 $^{\circ}C$ )

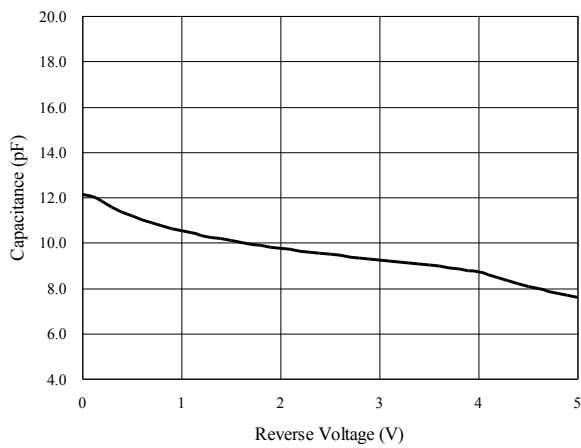
Symbol	Parameter
$V_{RWM}$	Nominal Reverse Working Voltage
$I_R$	Reverse Leakage Current @ $V_{RWM}$
$V_{BR}$	Reverse Breakdown Voltage @ $I_T$
$I_T$	Test Current for Reverse Breakdown
$V_C$	Clamping Voltage @ $I_{PP}$
$I_{PP}$	Maximum Peak Pulse Current
$C_{ESD}$	Parasitic Capacitance
$V_R$	Reverse Voltage
f	Small Signal Frequency



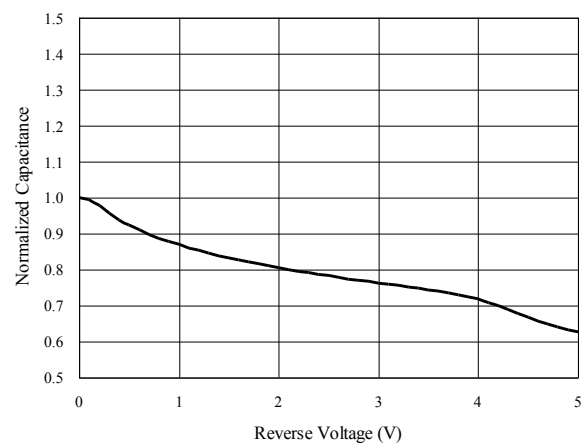
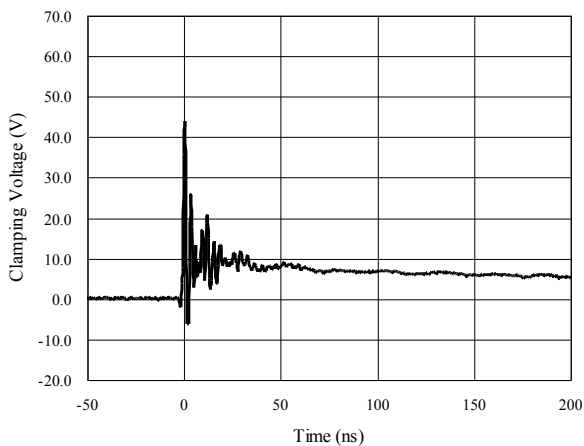
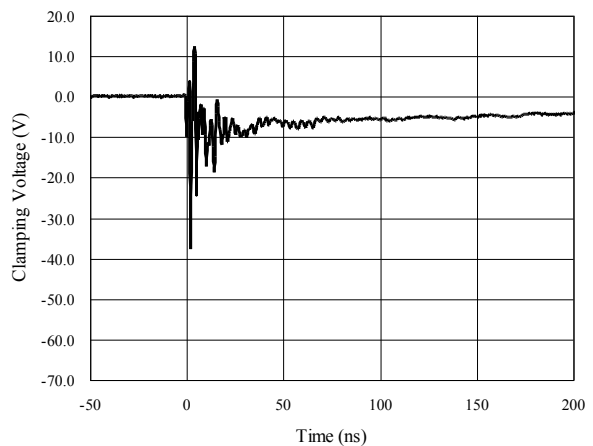
Symbol	Test Condition	Minimum	Typical	Maximum	Units
$V_{RWM}$				5.0	V
$I_R$	$V_{RWM} = 5V, T = 25^{\circ}C$ Between I/O_1 and I/O_2		0.1	1.0	$\mu A$
$V_{BR}$	$I_T = 1mA$ Between I/O_1 and I/O_2	5.5	6.0	8.0	V
$V_C$	$I_{PP} = 1A, t_p = 8/20\mu s$ Between I/O_1 and I/O_2			10	V
$V_C$	$I_{PP} = 5A, t_p = 8/20\mu s$ Between I/O_1 and I/O_2			15	V
$C_{ESD}$	$V_R = 0V, f = 1MHz$ Between I/O_1 and I/O_2	10	12	15	pF

**TLP Measurement of I/O\_1 to I/O\_2**

**Voltage Sweeping of I/O\_1 to I/O\_2**

**Capacitance vs. Voltage of I/O\_1 to I/O\_2 (f = 1MHz)**

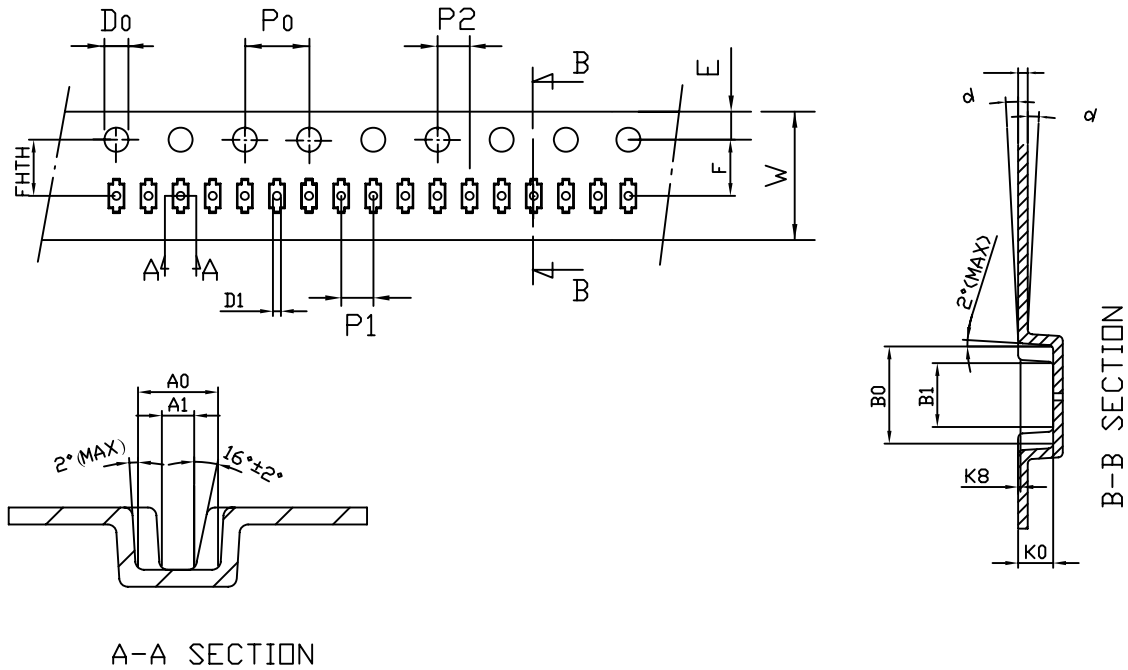
Capacitance vs. Reverse Voltage



Normalized Capacitance vs. Reverse Voltage


**ESD Clamping of I/O\_1 to I/O\_2  
(+8kV Contact per IEC 61000-4-2)**

**ESD Clamping of I/O\_1 to I/O\_2  
(-8kV Contact per IEC 61000-4-2)**


### Tape and Reel Specification

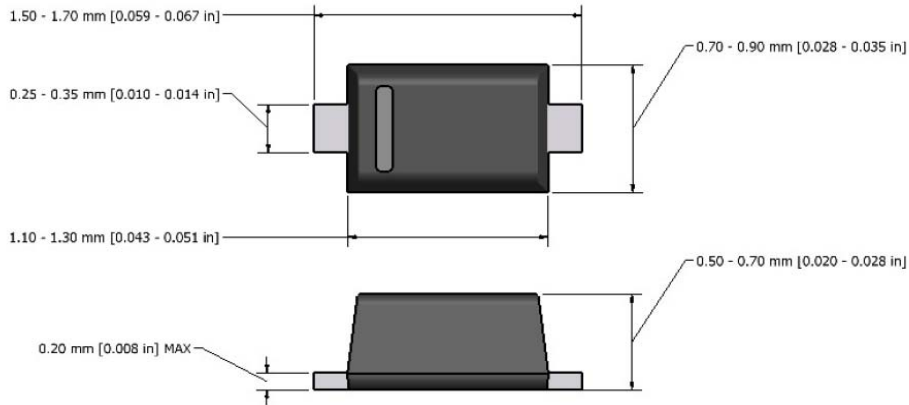


unit:mm

symbol	A0	B0	K0	P0	P1	P2	A1	T
Spec	$0.90 \pm 0.05$	$1.95 \pm 0.05$	$0.73 \pm 0.05$	$4.0 \pm 0.10$	$2.0 \pm 0.05$	$2.0 \pm 0.05$	$0.39 \pm 0.05$	$0.20 \pm 0.02$
symbol	E	F	D0	D1	B2	W	10P0	K8
Spec	$1.75 \pm 0.10$	$3.50 \pm 0.05$	$1.50^{+0.10}_{-0}$	$0.50 \pm 0.05$	$1.40 \pm 0.05$	$8.0^{+0.3}_{-0.1}$	$40.0 \pm 0.10$	0.15MAX
symbol	FHTH							
Spec	$3.50 \pm 0.05$							

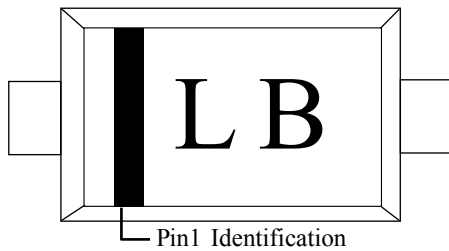
## Package Outline

- ❑ SOD-523 package
- ❑ 2 leads, very small package



**Note:** Dimensions are exclusive of Burrs, Mold Flash & Tie Bar extrusions.

## Marking Codes



Note:

- (1) "LB" is part number, fixed

## Ordering Information

Part Number	Working Voltage	Quantity Per Reel	Reel Size
TT0501MD	5V	3,000	7 Inch