

## Features

- ❑ Transient protection for high-speed data lines
  - IEC 61000-4-2 (ESD)  $\pm 25\text{kV}$  (Air)
  - $\pm 20\text{kV}$  (Contact)
  - IEC 61000-4-4 (EFT) 40A (5/50 ns)
  - Cable Discharge Event (CDE)
- ❑ Package optimized for high-speed lines
- ❑ Protects one data, control or power line
- ❑ Low capacitance: 0.5pF (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

TT0511TE is an ultra low-capacitance Transient Voltage Suppressor (TVS) designed to provide electrostatic discharge (ESD) protection for high-speed data interfaces. With typical capacitance of 0.5pF only, TT0511TEX is designed to protect parasitic-sensitive systems against over-voltage and over-current transient events. It complies with IEC 61000-4-2 (ESD) ( $\pm 10\text{kV}$  air,  $\pm 10\text{kV}$  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.

TT0511TEX uses ultra-small SOD-323 package. Each TT0511TEX device can protect one high-speed data line. It offers system designers flexibility to protect single data line where space is a premium concern. The combined features of low capacitance, ultra-small size and high ESD robustness make TT0511TEX ideal for high-speed data port and high-frequency line (e.g., HDMI & antenna line) applications, such as cellular phones and HD visual devices.

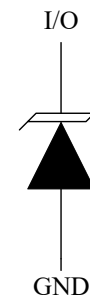
## Applications

- ❑ Serial ATA
- ❑ PCI Express
- ❑ Desktops, Servers and Notebooks
- ❑ Cellular Phones
- ❑ MDDI Ports
- ❑ USB2.0/3.0 Power and Data Line Protection
- ❑ Display Ports
- ❑ High Definition Multi-Media Interface (HDMI)
- ❑ Digital Visual Interfaces (DVI)

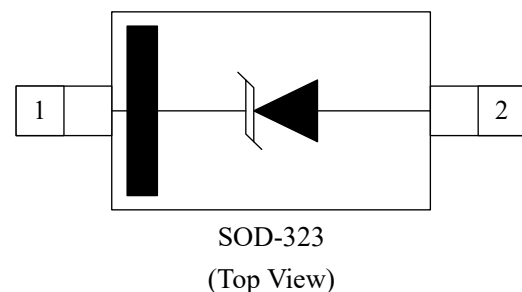
## Mechanical Characteristics

- ❑ SOD-323 package
- ❑ Flammability Rating: UL 94V-0
- ❑ Marking: Part number
- ❑ Packaging: Tape and Reel

## Circuit Diagram



## Pin Configuration

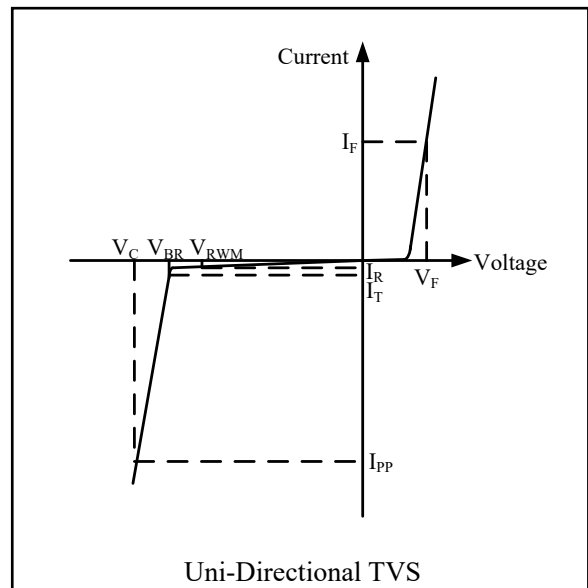


## Absolute Maximum Rating

Symbol	Parameter	Value	Units
$V_{ESD}$	ESD per IEC 61000-4-2 (Air)	±25	kV
	ESD per IEC 61000-4-2 (Contact)	±20	
$T_{OPT}$	Operating Temperature	-55/+125	°C
$T_{STG}$	Storage Temperature	-55/+150	°C

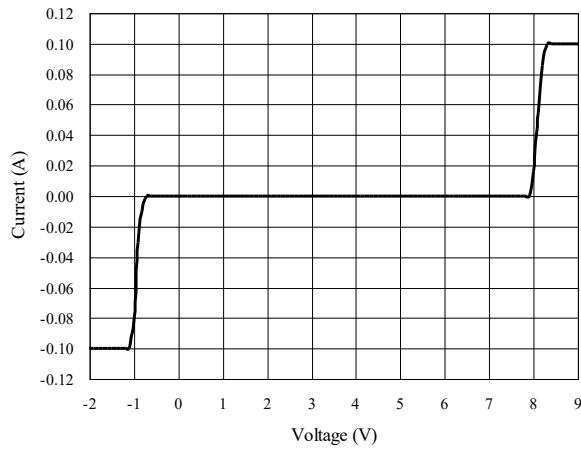
## Electrical Characteristics (T = 25°C)

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
$I_F$	Forward Current
$V_F$	Forward Voltage @ $I_F$

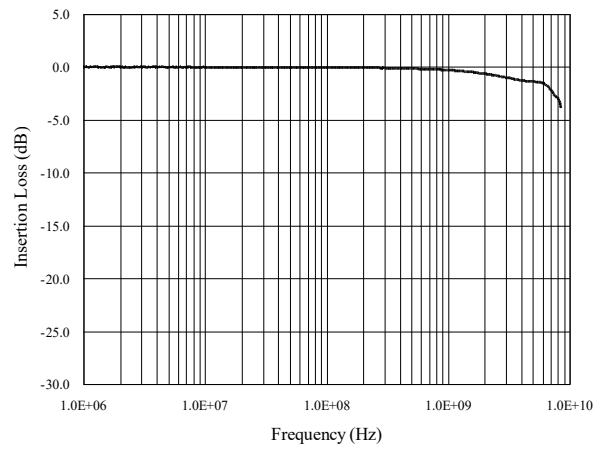


Symbol	Test Condition	Minimum	Typical	Maximum	Units
$V_{RWM}$				5.0	V
$I_R$	$V_{RWM} = 5V, T = 25^\circ C$ Between I/O and GND		0.1	1.0	μA
$V_{BR}$	$I_T = 1mA$ Between I/O and GND	6.0	8.0	9.0	V
$V_C$	$I_{PP} = 1A, t_p = 8/20\mu s$ Between I/O and GND			10	V
$C_{ESD}$	$V_R = 0V, f = 1MHz$ Between I/O and GND		0.5	0.8	pF

**Voltage Sweeping of I/O to GND**

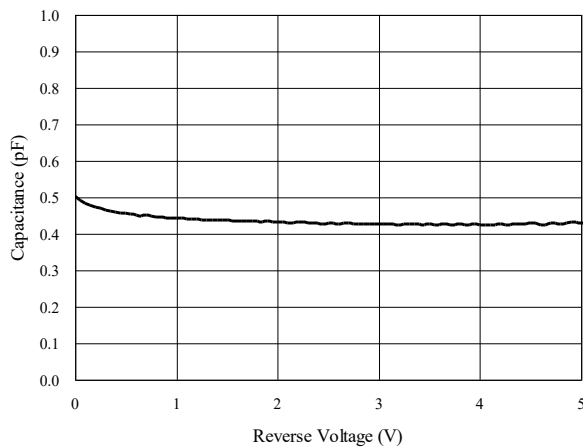


**Insertion Loss S21 of I/O to GND**

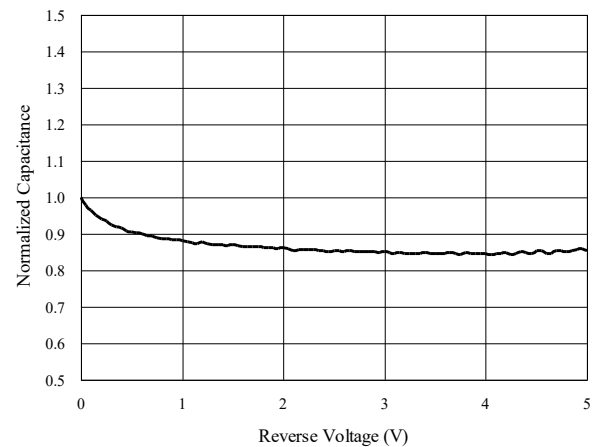


**Capacitance vs. Voltage of I/O to GND (f = 1MHz)**

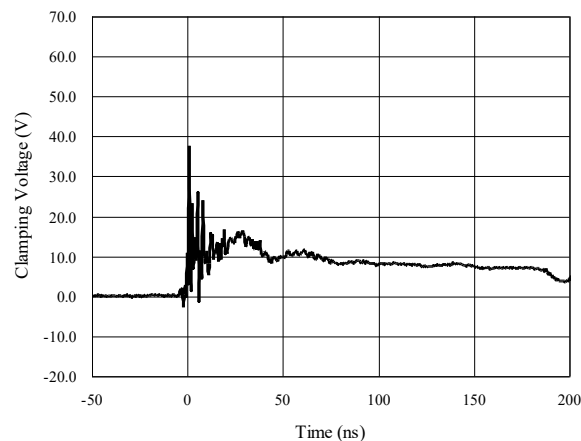
Capacitance vs. Reverse Voltage



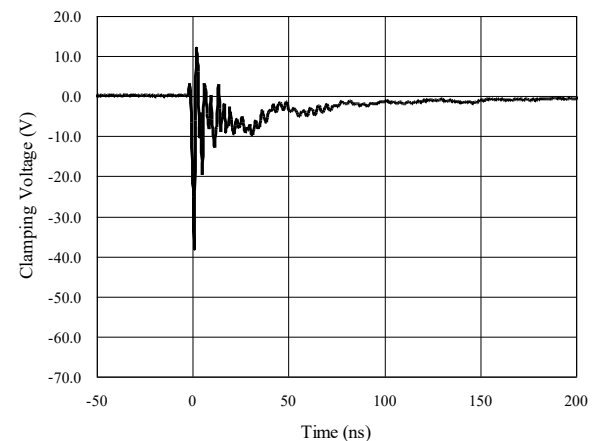
Normalized Capacitance vs. Reverse Voltage



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



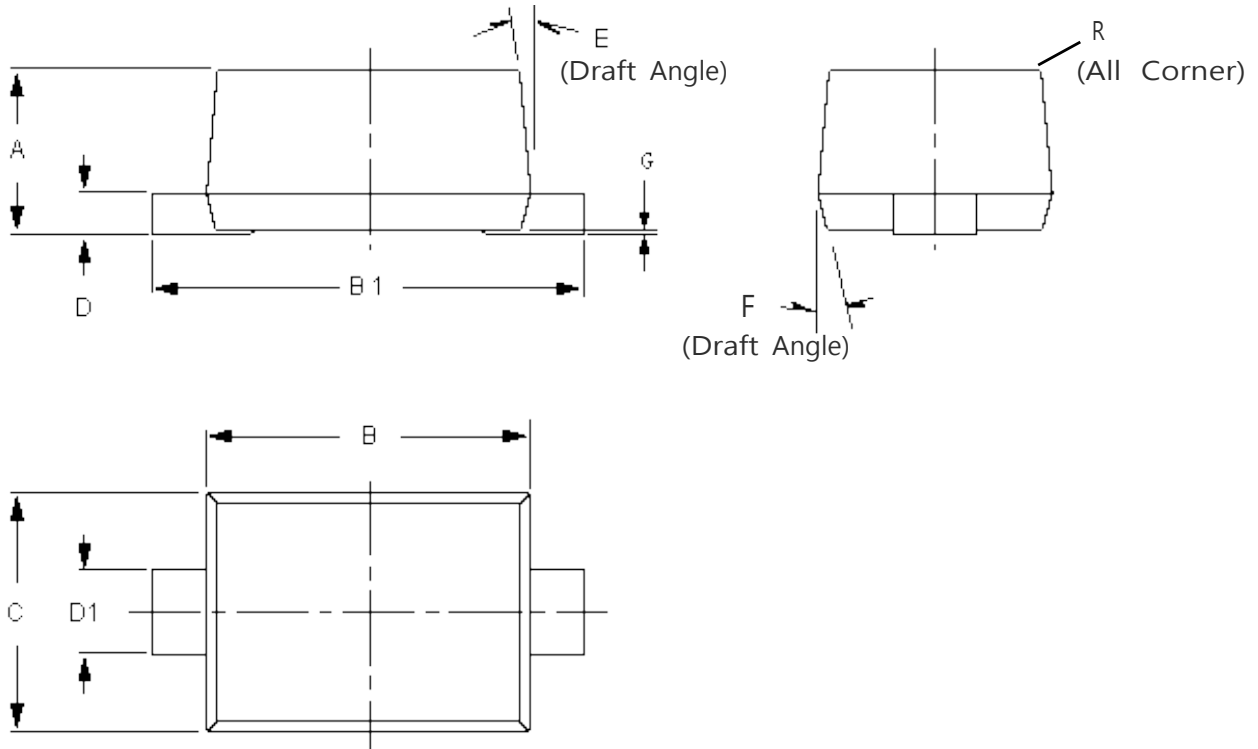
**ESD Clamping of I/O to GND (-8kV Contact per IEC 61000-4-2)**





## Package Outline Dimensions

□ SOD323 package

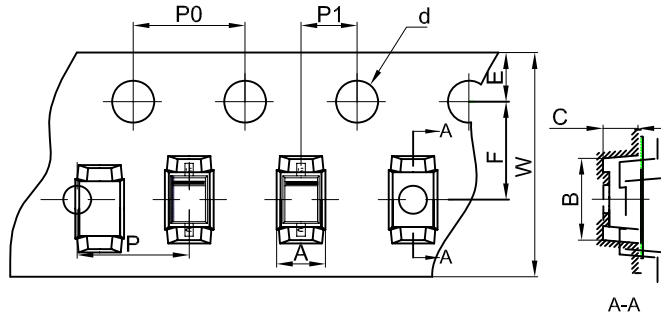


Symbol	Dim in mm		
	Min	Nom	Max
A	0.700	0.800	0.900
B	1.650	1.700	1.750
B1	2.550	2.600	2.750
C	1.250	1.300	1.350
D	0.090	0.100	0.110
D1	0.280	0.300	0.320
E	7°	8°	9°
F	9°	10°	11°
G	0.000	-	0.020
R	0.020	-	0.050

Mold Surface roughness: < 4um

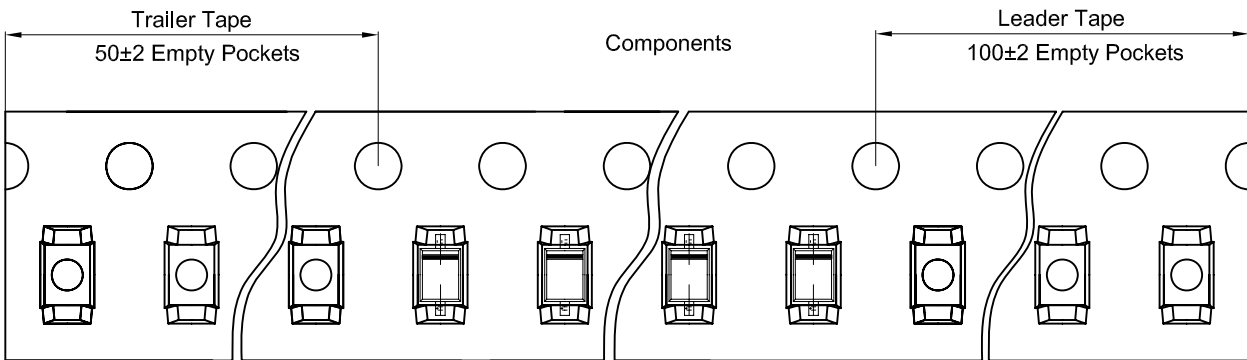


**Tape and Reel Specification**

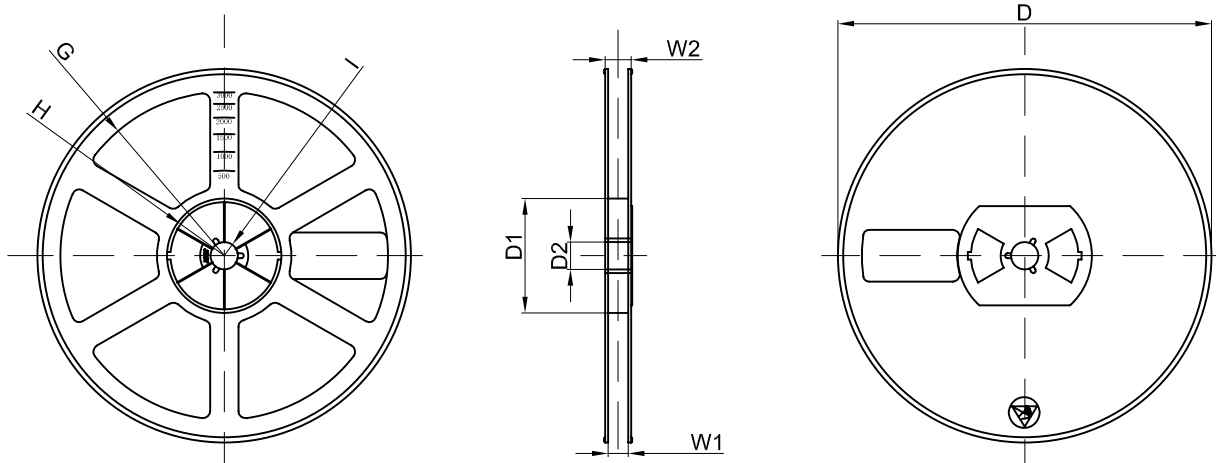


Dimensions are in millimeter										
Pkg type	A	B	C	d	E	F	P0	P	P1	W
SOD-323	1.46	2.90	1.25	Ø1.50	1.75	3.50	4.00	4.00	2.00	8.00
(Tolerance)	+/-0.05	+/-0.05	+/-0.05	+/-0.1	+/-0.1	+/-0.1	+/-0.1	+/-0.1	+/-0.1	+0.3/-0.1

**SOD-323 Tape Leader and Trailer**



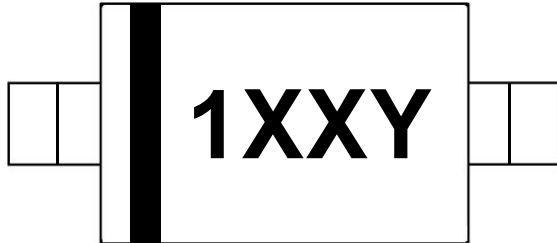
**SOD-323 Reel**



Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
7" Dia	Ø178.00	54.40	13.00	R78.00	R25.60	R6.50	9.50	12.30
Tolerance	+/-2	+/-1	+/-1	+/-1	+/-1	+/-1	+/-1	+/-1

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
3000 pcs	7 inch	45,000 pcs	203×203×195	180,000 pcs	438×438×220	

## Marking Codes



**Note:**

- (1) "1" is part number, fixed
- (2) "XXY" is internal code.