

## Features

- ❑ Transient protection for high-speed data lines
  - IEC 61000-4-2 (ESD)  $\pm 25\text{kV}$  (Air)
  - $\pm 17\text{kV}$  (Contact)
  - IEC 61000-4-4 (EFT) 40A (5/50 ns)
  - Cable Discharge Event (CDE)
- ❑ Small package (2.9mm × 2.8mm × 1.4mm)
- ❑ Protects two data lines
- ❑ Low capacitance: 12 pF Typical(I/O-GND)
- ❑ 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
- ❑ ROHS compliant

## Description

TT0302MLX 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 12 pF only, TT 0302 MLX 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.

TT0302MLX uses small SOT23 package. Each TT0302MLX device can protect two high-speed data lines. The combined features of low capacitance, small size and high ESD robustness make TT0302MLX ideal for high-speed data ports and high-frequency lines.

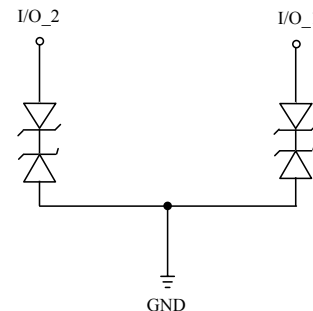
## Applications

- ❑ Serial ATA
- ❑ PCI Express
- ❑ Desktops, Servers and Notebooks
- ❑ MDDI Ports
- ❑ Display Ports
- ❑ Digital Visual Interfaces (DVI)

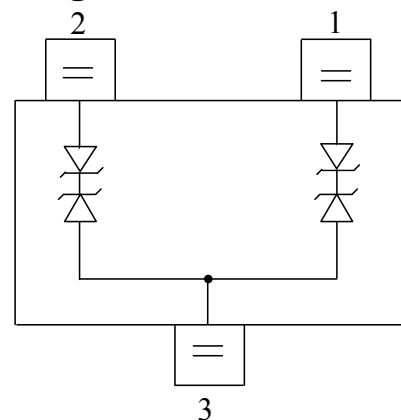
## Mechanical Characteristics

- ❑ SOT23 Package
- ❑ Flammability Rating: UL 94V-0
- ❑ Marking: Part number
- ❑ Packaging: Tape and Reel

## Circuit Diagram



## Pin Configuration



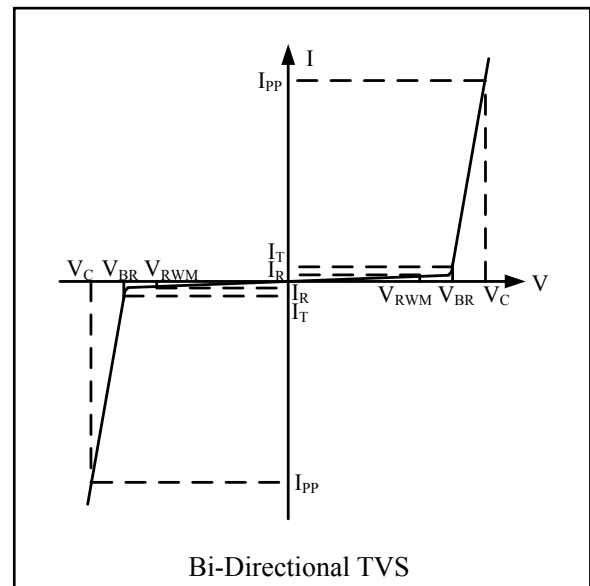
SOT23  
(Top View)

### Absolute Maximum Rating

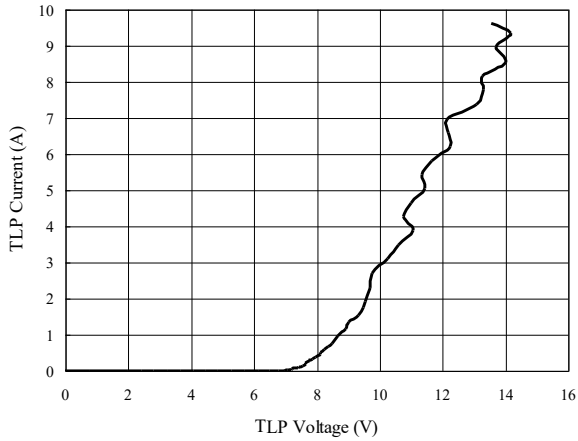
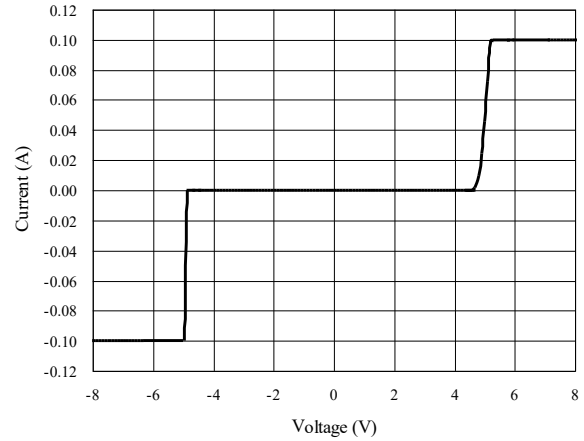
Symbol	Parameter	Value	Units
$I_{PP}$	Peak Pulse Current( $t_p=8/20\mu s$ )	5	A
$V_{ESD}$	ESD per IEC 61000-4-2(Air) ESD per IEC 61000-4-2 (Contact)	$\pm 25$ $\pm 17$	kV
$T_{OPT}$	Operating Temperature	-55/+125	°C
$T_{STG}$	Storage Temperature	-55/+150	°C

### Electrical Characteristics (T = 25°C)

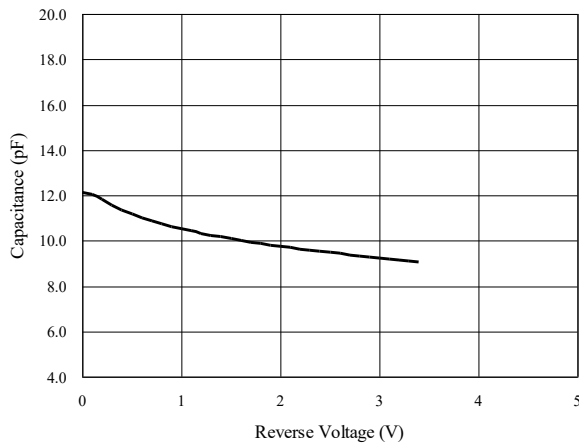
Symbol	Parameter
$V_{RWM}$	Nominal Reverse Working Voltage
$I_R$	Reverse Leakage Current @ $V_{RWM}$
$V_{BR}$	Reverse Breakdown Voltage @ $I_T$
$I_T$	Test Current for Reverse Breakdown
$V_C$	Clamping Voltage @ $I_{PP}$
$I_{PP}$	Maximum Peak Pulse Current
$C_{ESD}$	Parasitic Capacitance
$V_R$	Reverse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



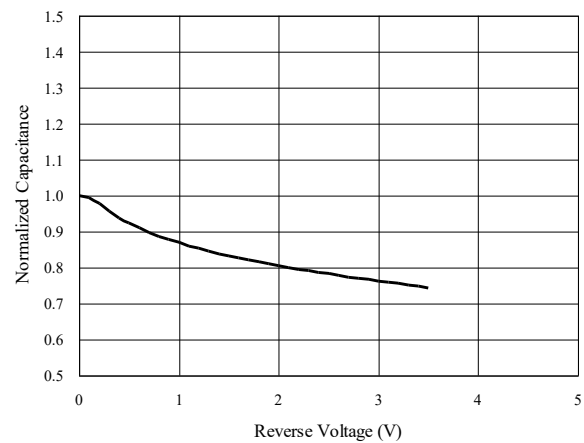
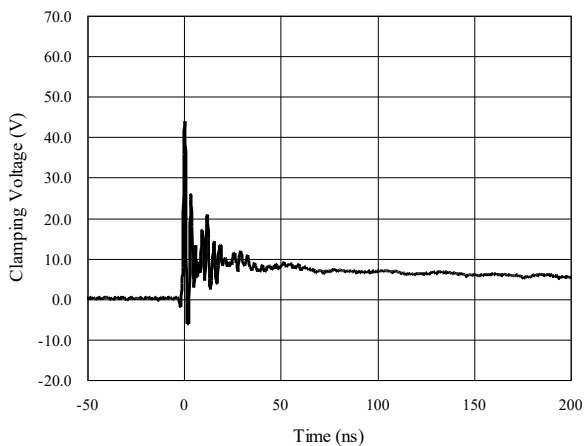
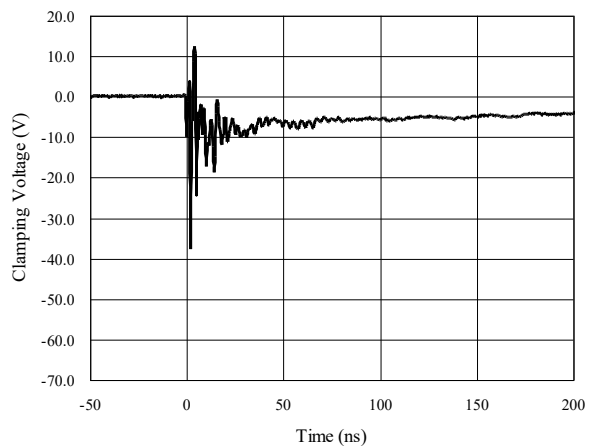
Symbol	Test Condition	Minimum	Typical	Maximum	Units
$V_{RWM}$				3.3	V
$I_R$	$V_{RWM}= 3.3V, T = 25^\circ C$ Between I/O and GND		0.1	1.0	$\mu A$
$V_{BR}$	$I_T = 1mA$ Between I/O and GND	3.8		6.0	V
$V_C$	$I_{PP} = 1A, t_p = 8/20\mu s$ Between I/O and GND			5	V
$V_C$	$I_{PP} = 5A, t_p = 8/20\mu s$ Between I/O and GND			7	V
$C_{ESD}$	$V_R = 0V, f = 1MHz$ Between I/O and GND		12	15	pF

**TLP Measurement of I/O to GND**

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

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

Capacitance vs. Reverse Voltage

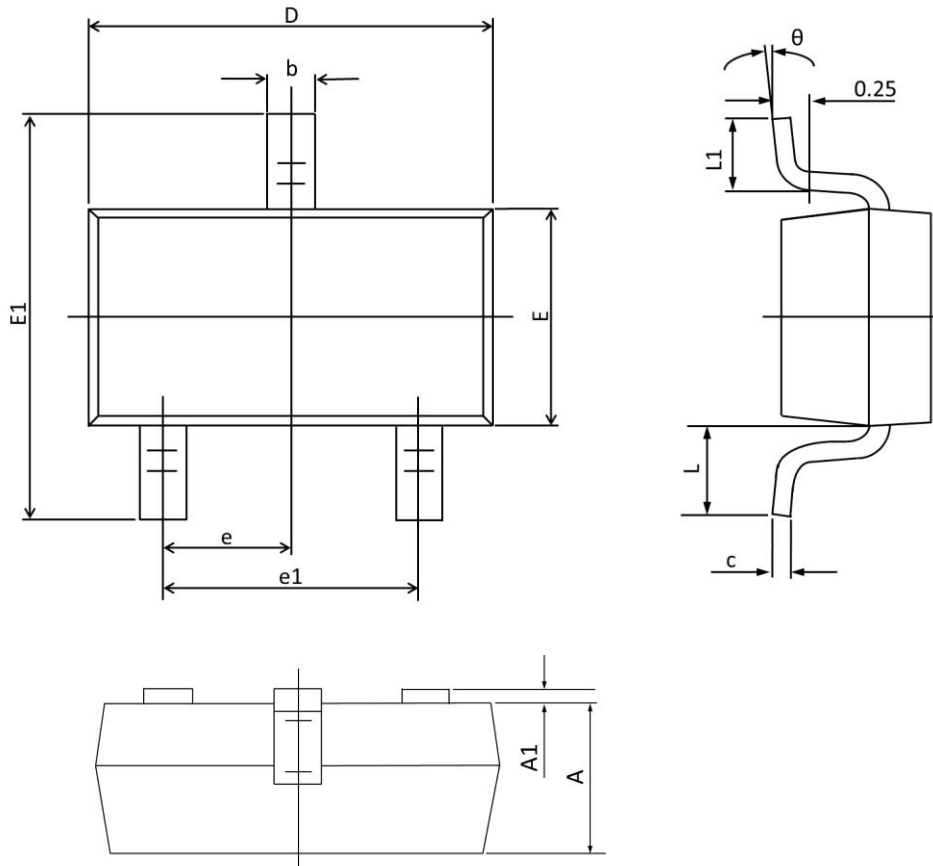


Normalized Capacitance vs. Reverse Voltage

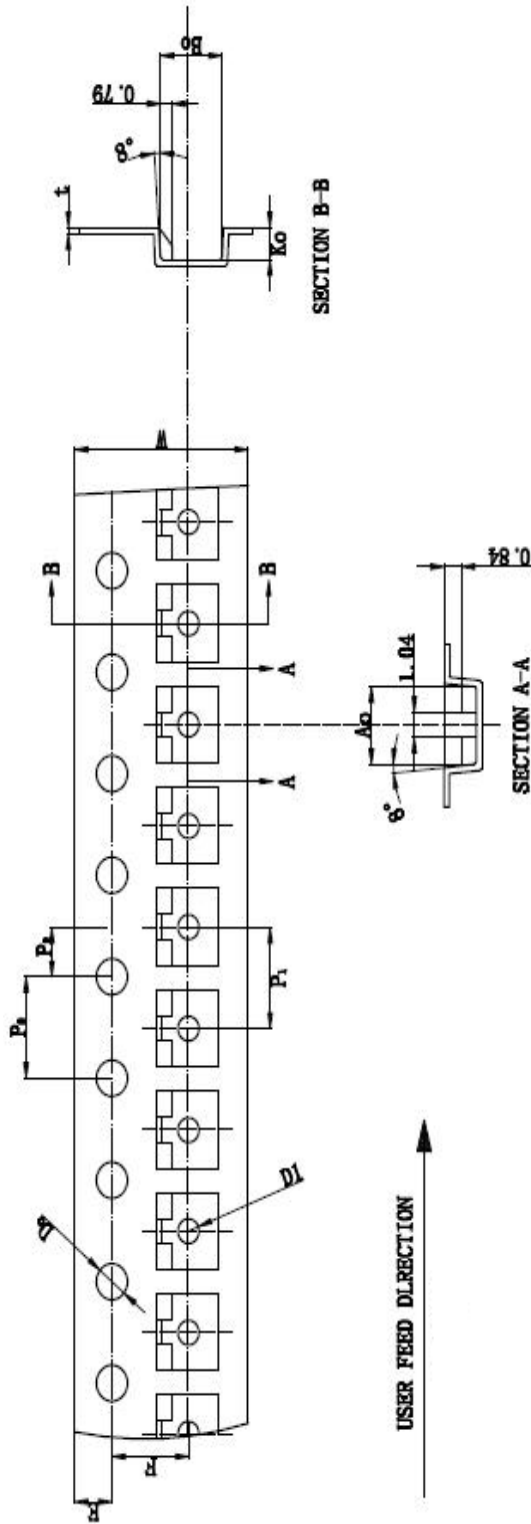

**ESD Clamping of I/O to GND (+8kV Contact per IEC 61000-4-2)**

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


## Package Outline Demensions

- SOT23 package
- MSL 3

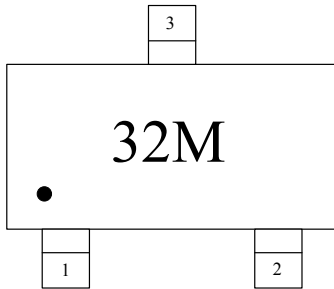


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.000	0.035	0.039
A1	0.000	0.100	0.000	0.004
b	0.300	0.500	0.012	0.020
c	0.090	0.110	0.003	0.004
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	1°	7°	1°	7°

**Tape and Reel Specification**


W	P	E	F	D	D1	P0	P010	P2	A0	B0	K0	T
8.00	4.00	1.75	3.50	1.50	1.00	4.00	40.00	2.00	3.15	2.77	1.22	0.20
+0.3/-0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.2	±0.05	±0.1	±0.1	±0.1	±0.02

### Marking Codes



**Note:**

(1) "32M" is part number, fixed.

### Ordering Information

Part Number	Working Voltage	Quantity Per Reel	Reel Size
TT0302MLX	3.3V	3,000	7 Inch

## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [ESD Suppressors / TVS Diodes](#) category:*

*Click to view products by [Shenzhen JingYang](#) manufacturer:*

Other Similar products are found below :

[60KS200C](#) [D18V0L1B2LP-7B](#) [D5V0F4U5P5-7](#) [NTE4902](#) [P4KE27CA](#) [P6KE11CA](#) [P6KE8.2A](#) [SA60CA](#) [SA64CA](#) [SMBJ12CATR](#)  
[SMBJ33CATR](#) [SMBJ6.5A](#) [SMBJ8.0A](#) [ESD101-B1-02ELS](#) [E6327](#) [ESD112-B1-02EL](#) [E6327](#) [ESD7451N2T5G](#) [19180-510](#) [CPDT-5V0USP-](#)  
[HF](#) [3.0SMCJ33CA-F](#) [3.0SMCJ36A-F](#) [HSPC16701B02TP](#) [JANTX1N6126A](#) [D3V3Q1B2DLP3-7](#) [D55V0M1B2WS-7](#) [SCM1293A-04SO](#)  
[ESD200-B1-CSP0201](#) [E6327](#) [SM12-7](#) [CEN955](#) [W/DATA](#) [VESD12A1A-HD1-GS08](#) [CPDQC5V0-HF](#) [D1213A-01LP4-7B](#) [ESD101-B1-02EL](#)  
[E6327](#) [AOZ8808DI-03](#) [5KP15A](#) [5KP48A](#) [5KP90A](#) [ESD3V3D7-TP](#) [15KPA36A-LF](#) [P4KE56CA](#) [P4KE68A](#) [P4KE91CATR](#) [P6KE120A](#)  
[P6KE13CA](#) [P6KE43CA](#) [P6KE6.8CA](#) [P6KE8.2](#) [P6SMBJ20CA](#) [JANTX1N6072A](#) [SR2835ESKG](#) [SA90CA](#)