



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)
IEC 61000-4-5 (Surge) 25A (8/20 μs)
- ❑ Package optimized for high-speed lines
- ❑ Provides protection for two line pairs
- ❑ Low capacitance: 2.6pF @ 0V (Typical)
- ❑ Low leakage current: 0.1 μA @ V_{RWM} (Typical)
- ❑ Low operating and clamping voltage
- ❑ Each I/O pin can withstand over 1000 ESD strikes for $\pm 8\text{kV}$ contact discharge
- ❑ ROHS compliant

Description

TS0334PL is a low-capacitance Transient Voltage Suppressor (TVS) array designed to provide electrostatic discharge (ESD) protection for high-speed data interfaces. With typical capacitance of 2.6 pF only, TS0334PL 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), IEC 61000-4-5 (Surge) (25A, 8/20 μs), very fast charged device model (CDM) ESD and cable discharge event (CDE), etc.

TS0334PL is in a SOT23-5L package. Each TS0334PL device can protect two high-speed line pairs. The combined features of low capacitance and high ESD robustness make TS0334PL ideal for high-speed data port and high-frequency line (e.g., Gigabit Ethernet Ports) applications. The low clamping voltage of the TS0334PL guarantees a minimum stress on the protected IC.

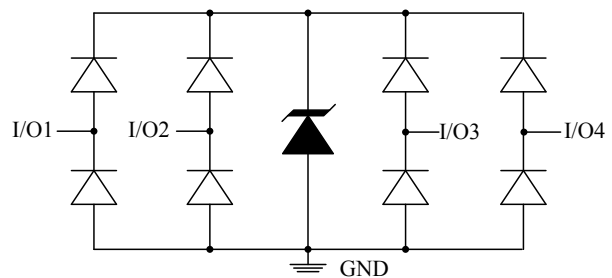
Applications

- ❑ 10/100/1000M Ethernet Ports
- ❑ WAN/LAN Equipment
- ❑ Desktops, Servers and Notebooks
- ❑ Cellular Phones
- ❑ Switching Systems
- ❑ Audio/Video Inputs

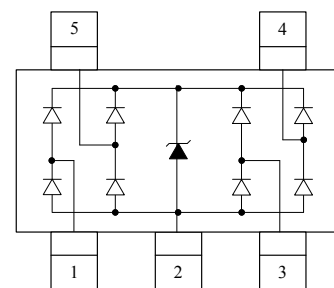
Mechanical Characteristics

- ❑ SOT23-5L package
- ❑ Flammability Rating: UL 94V-0
- ❑ Marking: Part number
- ❑ Packaging: Tape and Reel

Circuit Diagram



Pin Configuration



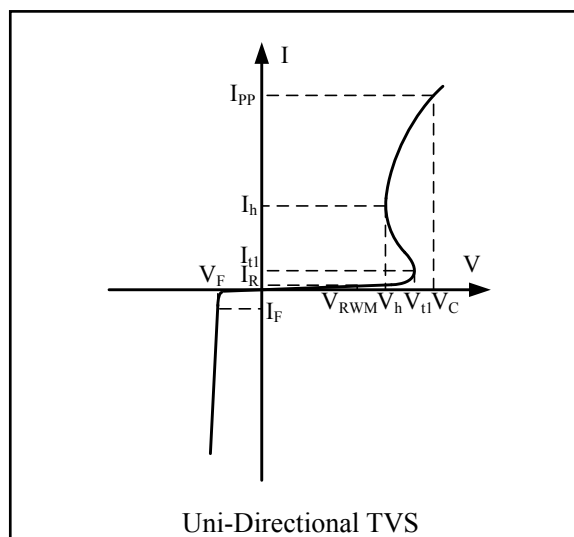
SOT23-5L
(Top View)



Absolute Maximum Rating

Symbol	Parameter	Value	Units
I_{PP}	Peak Pulse Current (8/20 μ s)	25	A
V_{ESD}	ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	± 30 ± 30	kV
T_{OPT}	Operating Temperature	-55 to +125	$^{\circ}$ C
T_{STG}	Storage Temperature	-55 to +150	$^{\circ}$ C

Symbol	Parameter
V_{RWM}	Nominal Reverse Working Voltage
I_R	Reverse Leakage Current @ V_{RWM}
V_{tl}	Trigger Voltage
I_{tl}	Trigger Current @ V_{tl}
V_h	Holding Voltage
I_h	Holding Current @ V_h
V_C	Clamping Voltage @ I_{PP}
I_{PP}	Maximum Peak Pulse Current
V_F	Forward Voltage @ I_F
C_{ESD}	Parasitic Capacitance



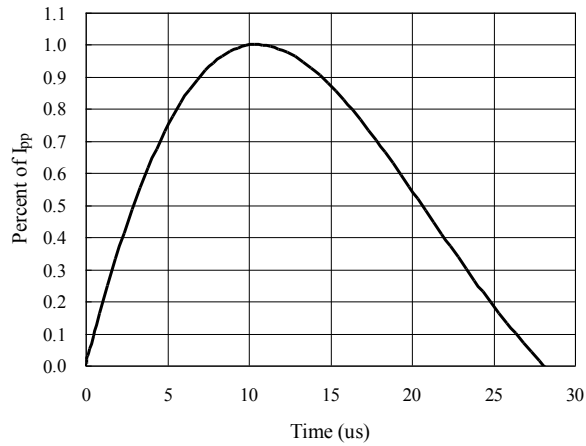


Electrical Characteristics (T = 25°C)

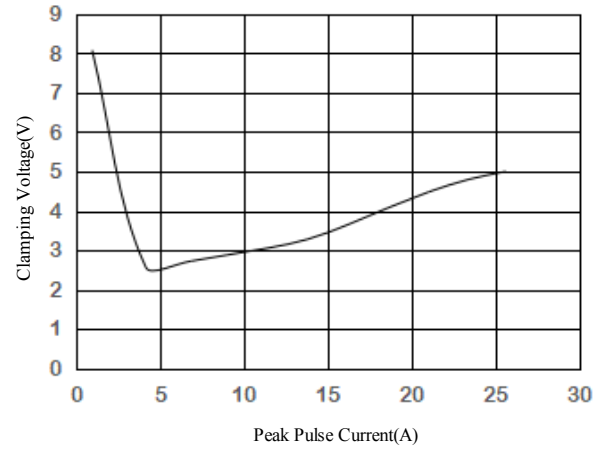
	Parameter	Test Condition	Min	Typ	Max	Units
V_{RWM}				3.3		V
I_R	Reverse Leakage Current	$V_{RWM} = 3.3V$, $T = 25^\circ C$			0.1	μA
V_F	Diode Forward Voltage	$I_F = 15mA$	0.50	0.70	1.0	V
V_{t1}	Reverse Breakdown Voltage	$I_{t1} = 1\mu A$	4.0		9.0	V
V_h	Holding Reverse Voltage	$I_h = 40mA$	2.0	4.5		V
V_C	Clamping Voltage $t_p = 8/20\mu s$	$I_{PP} = 5A$ $I_{PP} = -5A$			3.5 -2.7	V
	Clamping Voltage $t_p = 8/20\mu s$	$I_{PP} = 10A$ $I_{PP} = -10A$			4.3 -3.5	V
	Clamping Voltage $t_p = 8/20\mu s$	$I_{PP} = 25A$ $I_{PP} = -25A$			7.0 -6.0	V
	Channel Clamp Voltage Positive Transients Negative Transient	$I_{PP} = 5A$, $t_p = 0.2/100ns(TLP)$ any I/O pin to Ground			2.6 -2.7	V
	Channel Clamp Voltage Positive Transients Negative Transient	$I_{PP} = 10A$, $t_p = 0.2/100ns(TLP)$ any I/O pin to Ground			3.0 -3.3	V
	Channel Clamp Voltage Positive Transients Negative Transient	$I_{PP} = 16A$, $t_p = 0.2/100ns(TLP)$ any I/O pin to Ground			4.0 -4.4	V
	Channel Clamp Voltage Positive Transients Negative Transient	$I_{PP} = 30A$, $t_p = 0.2/100ns(TLP)$ any I/O pin to Ground			5.0 -8.0	V
R_{DYN}	Dynamic Resistance	Dynamic Resistance Between I/O Pins and Ground		0.2		Ohms
C_{ESD}	Junction Capacitance	Between I/O Pins and Ground $V_R = 0V$, $f = 1MHz$		2.6	3.0	pF
C_{ESD}	Junction Capacitance	Between I/O Pins $V_R = 0V$, $f = 1MHz$		1.2	1.5	pF



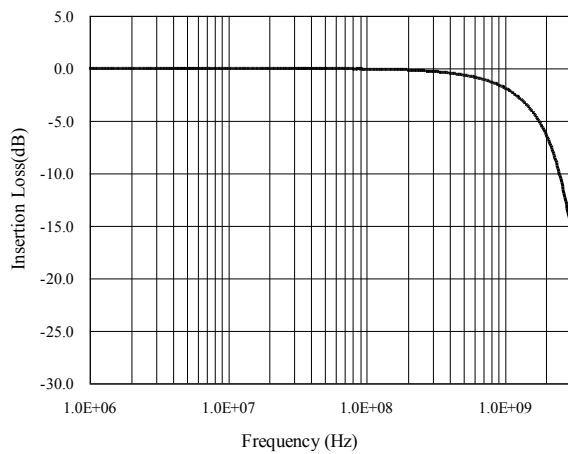
8/20 μ s Pulse Waveform



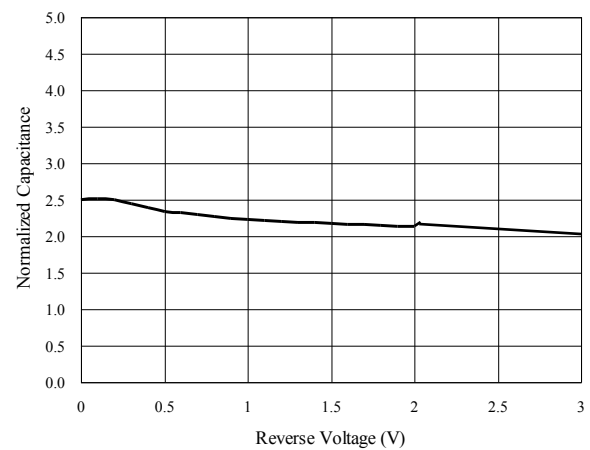
Clamping Voltage V_C vs. Current I_{PP}



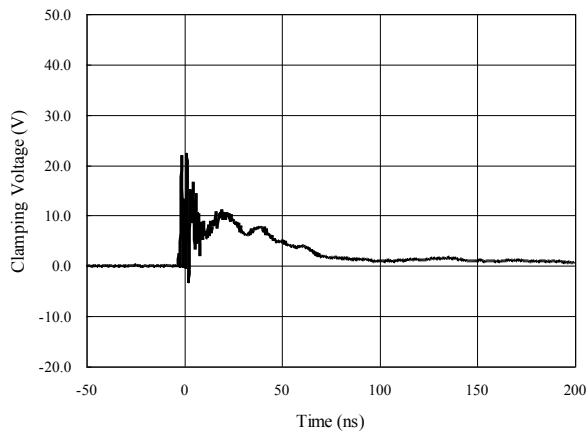
Insertion Loss S21



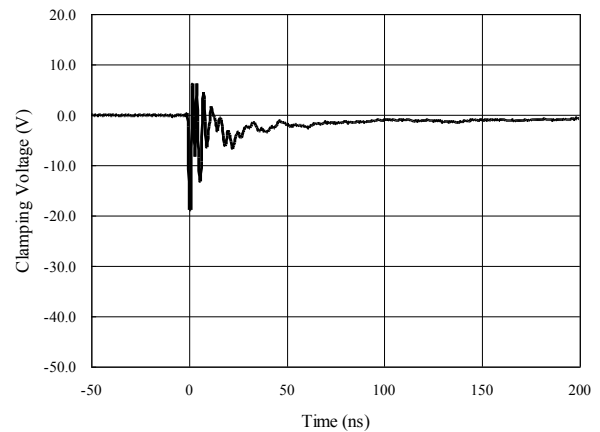
Normalized Capacitance vs. Voltage



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



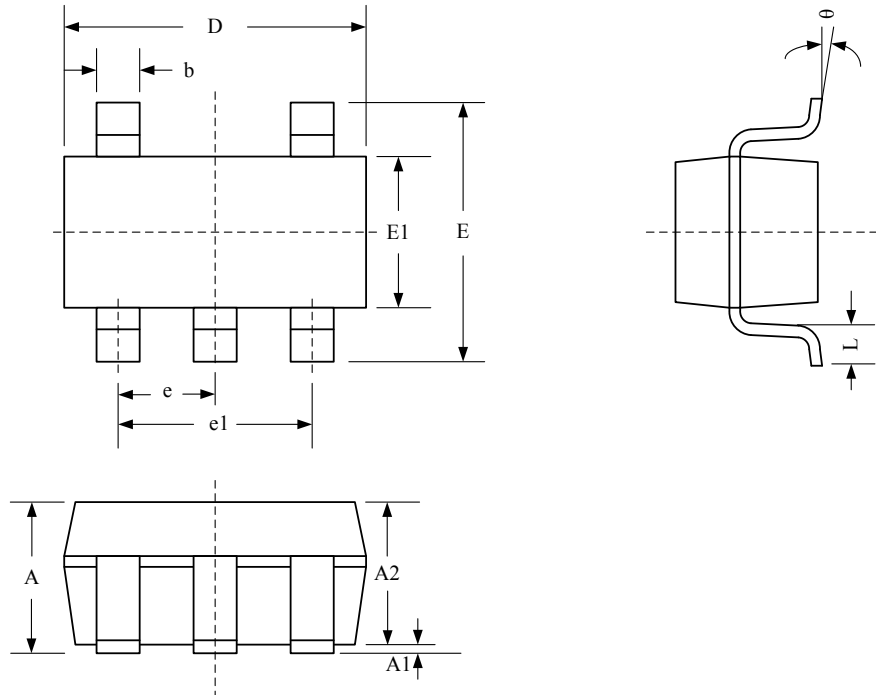
ESD Clamping of I/O to GND (-8kV Contact per IEC 61000-4-2)





Package Outline

- SOT23-5L package
- MSL-3 Level

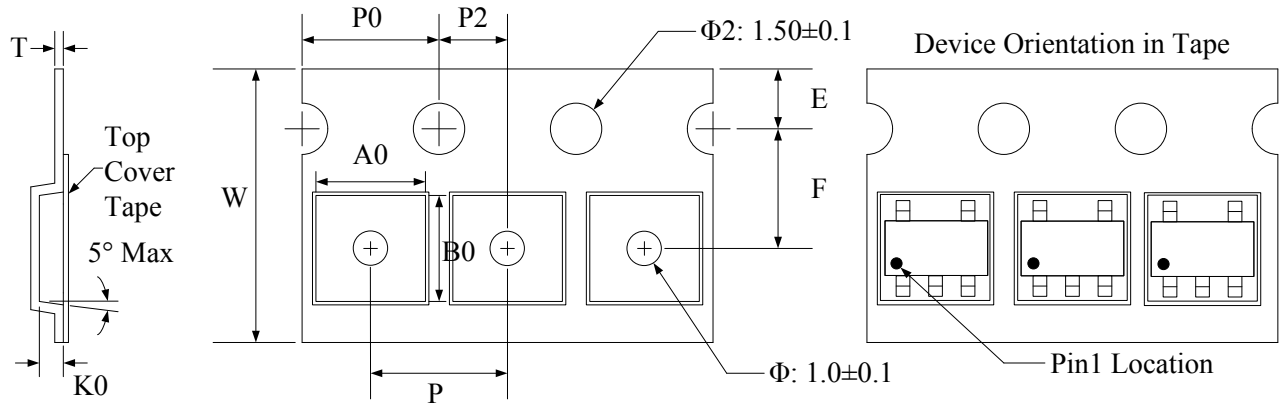


Package Dimensions (Controlling dimensions are in millimeters)

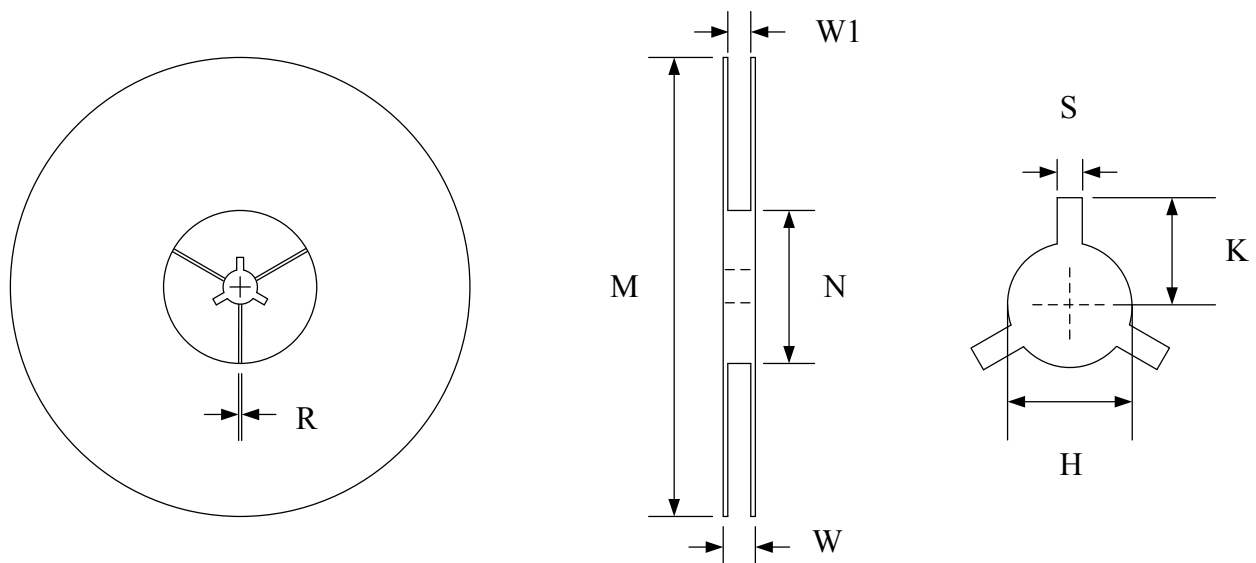
Symbol	Dimensions (mm)			Dimensions (Inches)		
	Minimum	Typical	Maximum	Minimum	Typical	Maximum
A	—	—	1.450	—	—	0.057
A1	0.000	—	0.150	0.000	—	0.006
A2	—	—	1.300	—	—	0.012
b	0.300	—	0.500	0.012	—	0.020
D	2.90 BSC			0.114 BSC		
e	0.95 BSC			0.037 BSC		
e1	1.90 BSC			0.075 BSC		
E	2.80 BSC			0.110 BSC		
E1	1.60 BSC			0.063 BSC		
L	0.300	0.450	0.600	0.012	0.018	0.024
θ	0°	4°	8°	0°	4°	8°



Tape and Reel Specification (SOT23-5L)



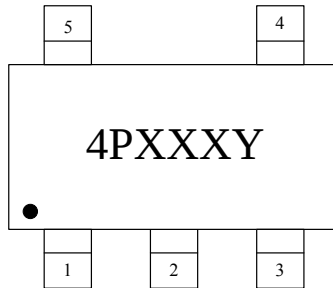
Symbol	W	A0	B0	K0	E	F	P	P0	P2	T
Dimensions (mm)	8.00+0.3 -0.1	3.23±0.05	3.17±0.05	1.37±0.05	1.75±0.1	3.5±0.05	4.0±0.1	4.0±0.1	2.0±0.05	0.25±0.02



Symbol	Reel Size	M	N	W	W1	H	S	K	R
Dimensions (mm)	Φ178	178.0±1.0	60.0±1.0	11.5±0.5	9.0±0.5	13.0±0.5	2.0±0.1	11.0±0.2	1.0±0.05



Marking Codes



Note:

- (1) “4P” is part number, fixed.
- (2) “XXX” is the last 3 characters of the wafer's Lot No.,
“Y” is the internal code.

Ordering Information

Part Number	Working Voltage	Quantity Per Reel	Reel Size
TS0334PL	3.3V	3,000	7 Inch