

## Features

- ❑ Transient protection for high-speed data lines
  - IEC 61000-4-2 (ESD) ±30kV (Air)
  - ±30kV (Contact)
  - IEC 61000-4-4 (EFT) 40A (5/50 ns)
  - IEC 61000-4-5 (Surge) 15A (8/20µs)
- ❑ Package optimized for high-speed lines
- ❑ Provides protection for two line pairs
- ❑ Low capacitance: 0.7pF @ 2.5V (Typical)
- ❑ Low leakage current: 0.01µA @ V<sub>RWM</sub> (Typical)
- ❑ Low operating and clamping voltage
- ❑ Each I/O pin can withstand over 1000 ESD strikes for ±8kV contact discharge
- ❑ ROHS compliant

## Description

TS2522PNX 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 0.7pF only, TS2522PNX 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 (±15kV air, ±8kV contact discharge), IEC 61000-4-4 (electrical fast transient - EFT) (40A, 5/50 ns), IEC 61000-4-5 (Surge) (15A, 8/20µs), very fast charged device model (CDM) ESD and cable discharge event (CDE), etc.

TS2522PNX is in a DFN-8L package. Each TS2522PNX device can protect two high-speed line pairs. The “flow-thru” design minimizes trace inductance and reduces voltage overshoot associated with ESD events. The combined features of low capacitance and high ESD robustness make TS2522PNX ideal for high-speed data port and high-frequency line (e.g., Gigabit Ethernet Ports) applications. The low clamping voltage of the TS2522PNX guarantees a minimum stress on the protected IC.

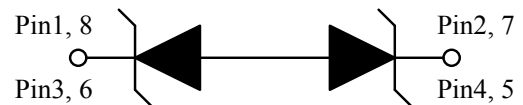
## Applications

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

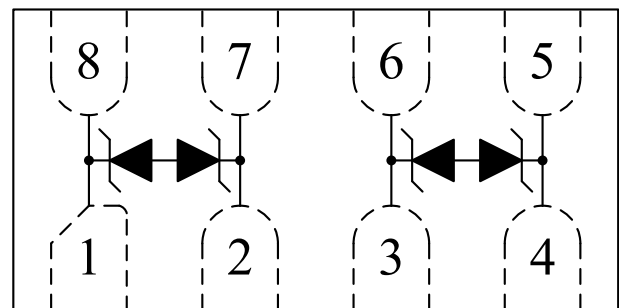
## Mechanical Characteristics

- ❑ DFN-8L package
- ❑ Flammability Rating: UL 94V-0
- ❑ Marking: Part number
- ❑ Packaging: Tape and Reel

## Circuit Diagram



## Pin Configuration



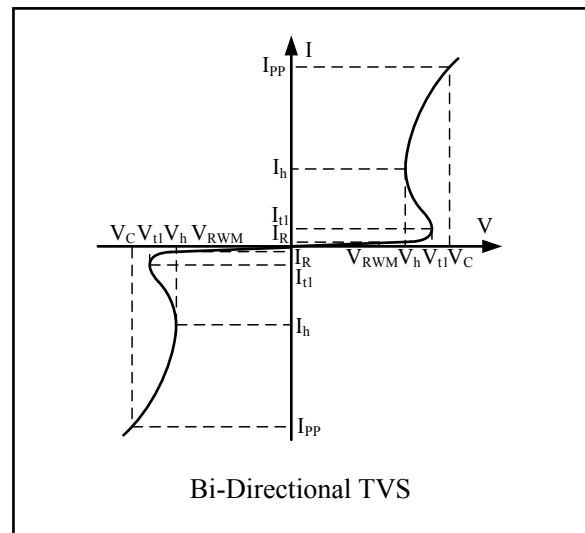
DFN-8L  
(Top View)

## Absolute Maximum Rating

Symbol	Parameter	Value	Units
$I_{PP}$	Peak Pulse Current (8/20 $\mu$ s)	15	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	-45 to +85	$^{\circ}$ C
$T_{STG}$	Storage Temperature	-55 to +150	$^{\circ}$ C

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

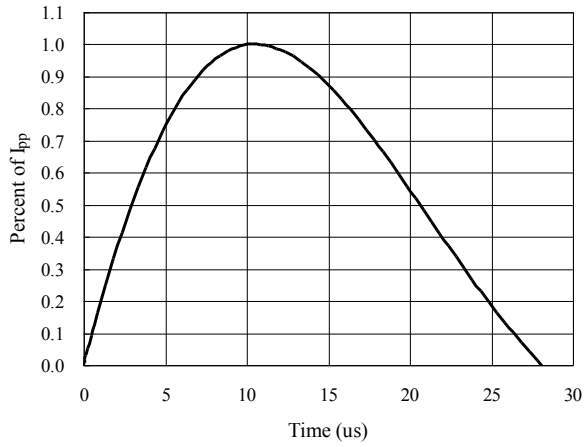
Symbol	Parameter
$V_{RWM}$	Nominal Reverse Working Voltage
$I_R$	Reverse Leakage Current @ $V_{RWM}$
$V_{t1}$	Trigger Voltage
$I_{t1}$	Trigger Current @ $V_{t1}$
$V_h$	Holding Voltage
$I_h$	Holding Current @ $V_h$
$V_C$	Clamping Voltage @ $I_{PP}$
$I_{PP}$	Maximum Peak Pulse Current
$C_{ESD}$	Parasitic Capacitance
$C_{\Delta}$	Variation in $C_{ESD}$ with Reverse Bias



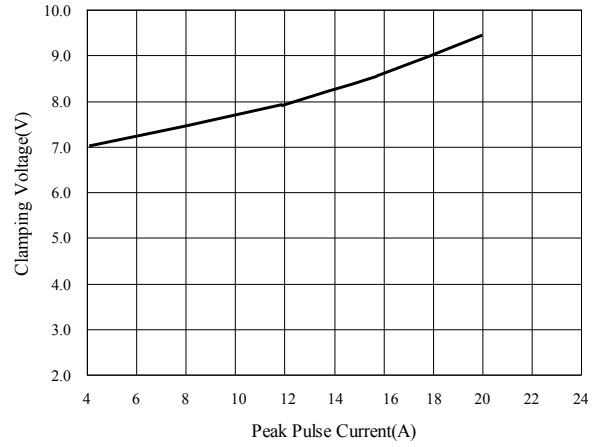
Symbol	Test Condition	Minimum	Typical	Maximum	Units
$V_{RWM}$				2.5	V
$I_R$	$V_{RWM} = 2.5V, T = 25^{\circ}C$		0.01	0.05	$\mu$ A
$V_{t1}$	$I_{t1} = 1\mu A$	6.0		8.0	V
$V_h$	$I_h = 1mA$	2.5		4.5	V
$V_C$	$I_{PP} = 2A, t_p = 8/20\mu s$ (Each Line)			4.5	V
$V_C$	$I_{PP} = 15A, t_p = 8/20\mu s$ (Each Line)		5.0	8.0	V
$C_{ESD}$	$V_R = 2.5V, f = 1MHz$ (Each Line)		0.7		pF
$C_{\Delta}$	Pin1, 8 to 2, 7 & Pin3, 6 to Pin4, 5 $V_R = 0V \sim 2.5V, f = 1MHz$		0.5		pF



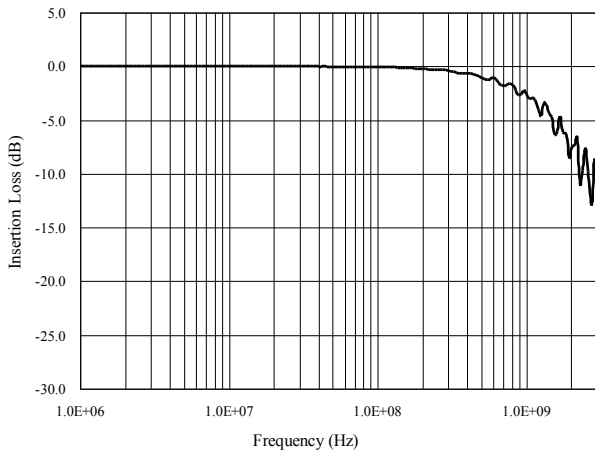
#### 8/20 $\mu$ s Pulse Waveform



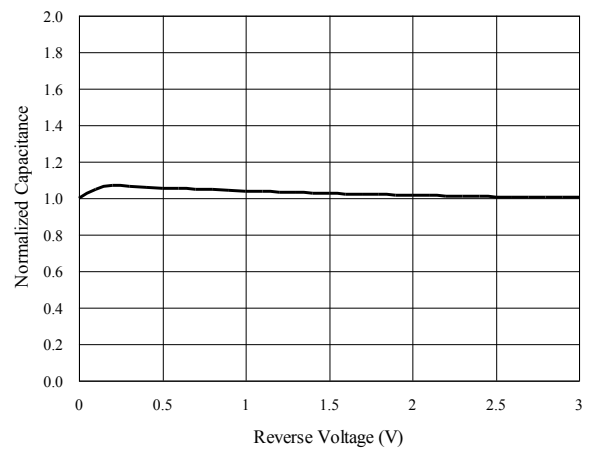
#### Clamping Voltage $V_C$ vs. Current $I_{PP}$



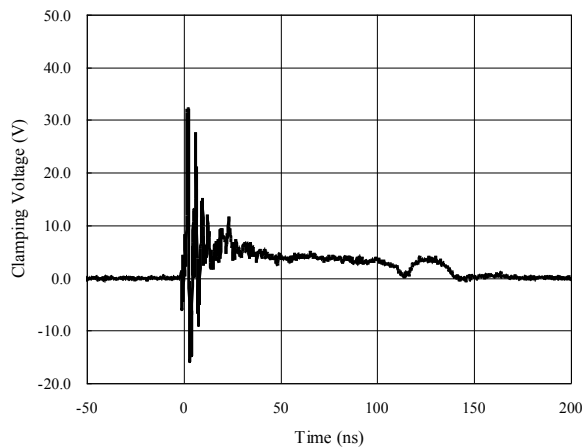
#### Insertion Loss S21



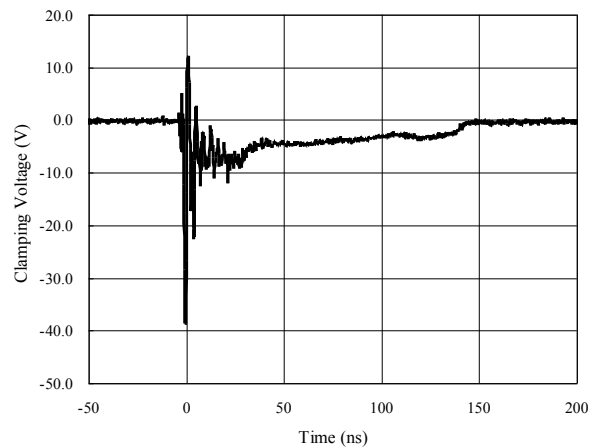
#### Normalized Capacitance vs. Voltage



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

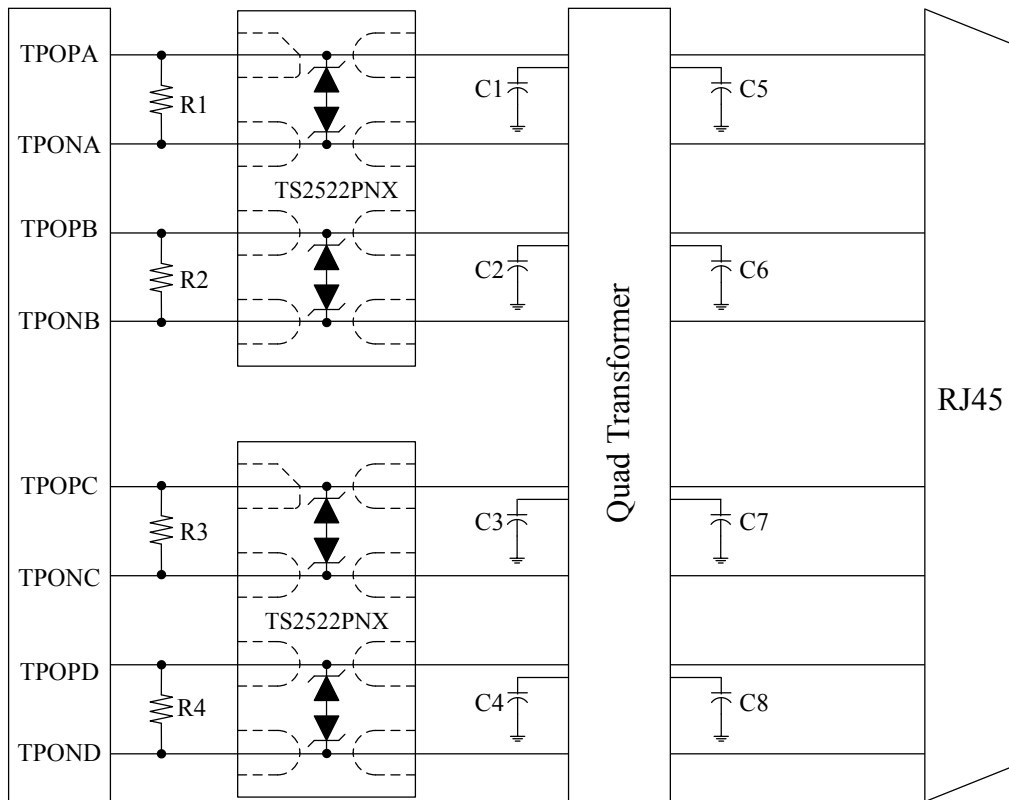


#### ESD Clamping of I/O to GND (-8kV Contact per IEC 61000-4-2)



## Application Information

Electronic equipment is susceptible to damage caused by a variety of sources, including Electrostatic Discharge (ESD), Electrical Fast Transients (EFT) and Lightning strikes. The TS2522PNX was designed to protect the sensitive equipment from damage which may be induced by such transient events. This product can be configured in a connection to meet the requirement of differential line pairs as follows:

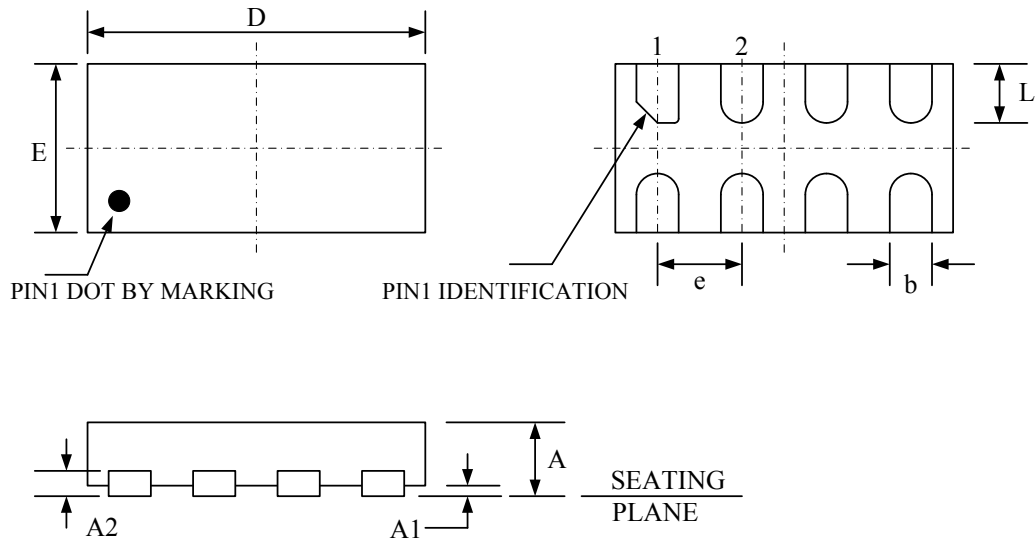


Schematic Diagram for Gigabit Ethernet ESD/Surge Protection



### Package Outline

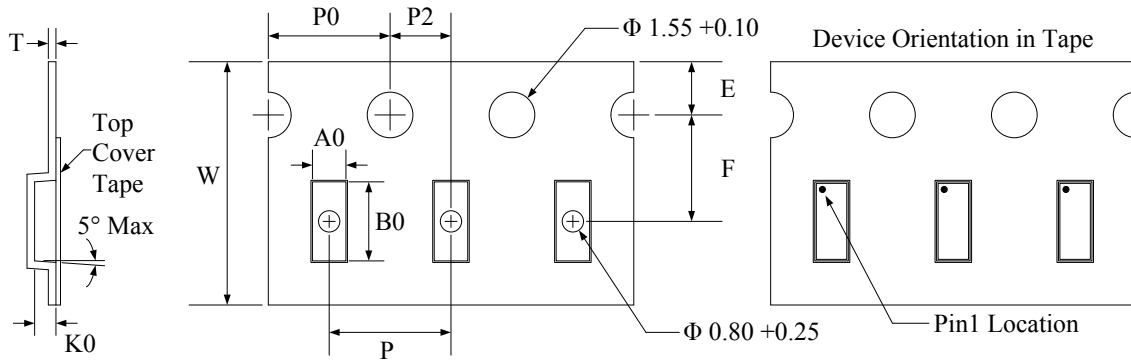
- ❑ DFN-8L Package
- ❑ Flow-Through
- ❑ MSL 1 & Thermally-Enhanced



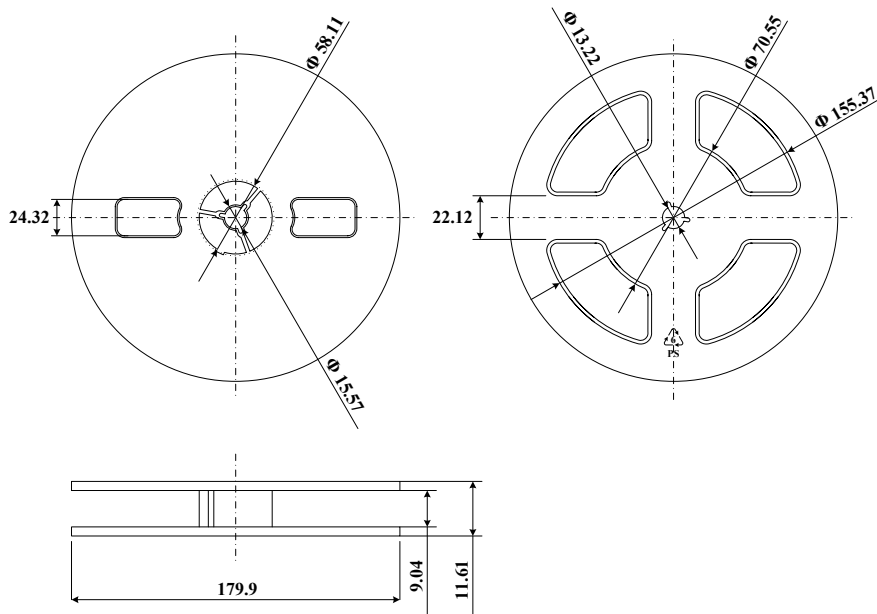
Package Dimensions (Controlling dimensions are in millimeters)

Symbol	Dimensions (mm)			Dimensions (Inches)		
	Minimum	Typical	Maximum	Minimum	Typical	Maximum
A	0.370	0.400	0.430	0.015	0.016	0.017
A1	0.000	0.020	0.050	0.000	0.001	0.002
A2	0.130			0.005		
b	0.200	0.250	0.300	0.008	0.010	0.012
D	1.900	2.000	2.100	0.075	0.079	0.083
E	0.900	1.000	1.100	0.035	0.039	0.043
e	0.500 BSC			0.020 BSC		
L	0.300	0.350	0.400	0.012	0.014	0.016
R	0.050	0.100	0.150	0.002	0.004	0.006

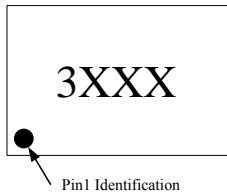
### Tape and Reel Specification



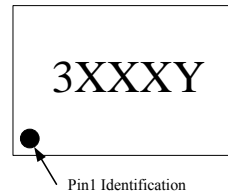
Symbol	W	A0	B0	K0	E	F	P	P0	P2	T
Dimensions (mm)	8.00+0.3 -0.1	1.15±0.05	2.15±0.05	0.48±0.05	1.75±0.1	3.5±0.10	4.0±0.1	4.0±0.1	2.0±0.05	0.2±0.03



## Marking Codes



**Or**



**Note:**

- (1) “3” is the part number, fixed.
- (2) “XXX” is internal code.

**Note:**

- (1) “3” is the 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
TS2522PNX	2.5V	3,000	7 Inch

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