

## 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) 50A (8/20µs)
- ❑ Package optimized for high-speed lines
- ❑ Provides protection for two line pairs
- ❑ Low capacitance: 1.5pF @ 3.0V (Typical)
- ❑ Low leakage current: 0.1µA @ V<sub>RWM</sub> (Typical)
- ❑ Low operating and clamping voltage
- ❑ Each I/O pin can withstand over 1000 ESD strikes for ±8kV contact discharge

## Description

TS2814VUX is an ultra low-capacitance Transient Voltage Suppressor (TVS) array designed to provide electrostatic discharge (ESD) protection for high-speed data interfaces. With typical capacitance of 1.5pF only, TS2814VUX 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) (50A, 8/20µs), very fast charged device model (CDM) ESD and cable discharge event (CDE), etc.

TS2814VUX is in an SOP-8 package. Each TS2814VUX 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 TS2814 VUX ideal for high-speed data port and high-frequency line (e.g., Gigabit Ethernet Ports) applications. The low clamping voltage of the TS2814 VUX guarantees a minimum stress on the protected IC.

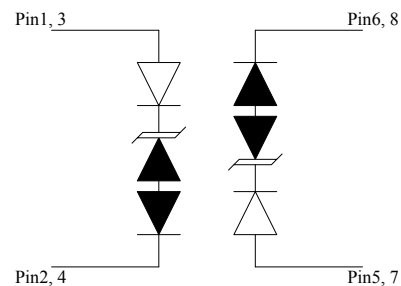
## Applications

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

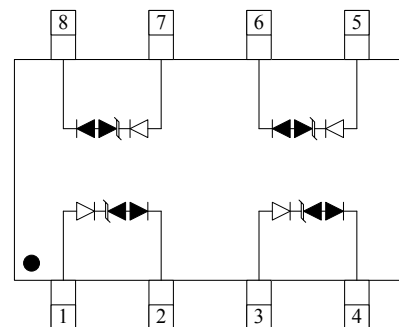
## Mechanical Characteristics

- ❑ SOP-8 package
- ❑ Flammability Rating: UL 94V-0
- ❑ Marking: Part number, logo, date
- ❑ Packaging: Tape and Reel

## Circuit Diagram



## Pin Configuration



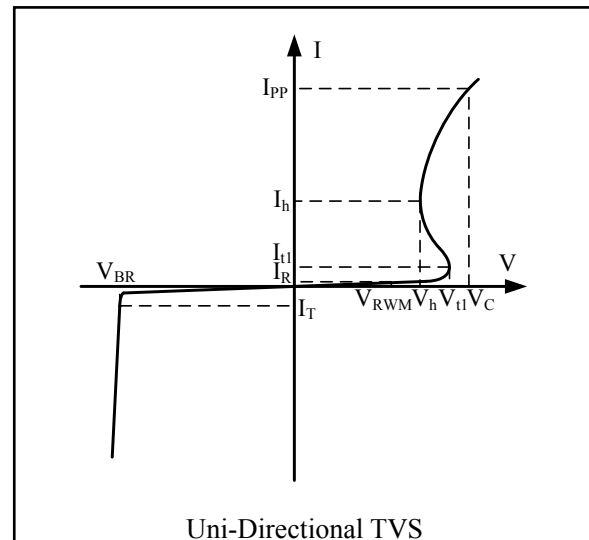
SOP-8  
(Top View)

## Absolute Maximum Rating

Symbol	Parameter	Value	Units
$I_{PP}$	Peak Pulse Current (8/20 $\mu$ s)	50	A
$P_{PK}$	Peak Pulse Power (8/20 $\mu$ s)	800	Watts
$V_{ESD}$	ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	$\pm 30$ $\pm 30$	kV
$T_{OPT}$	Operating Temperature	-55 to +125	$^{\circ}$ C
$T_{STG}$	Storage Temperature	-55 to +150	$^{\circ}$ C
$T_{LST}$	Lead Soldering Temperature	260 (10 seconds)	$^{\circ}$ C

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

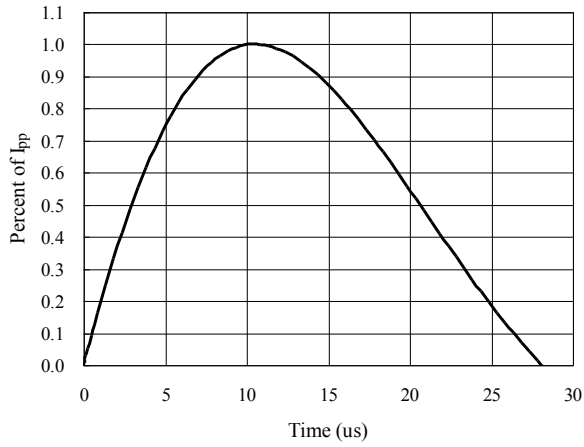
Symbol	Parameter
$V_{RWM}$	Nominal Reverse Working Voltage
$I_R$	Reverse Leakage Current @ $V_{RWM}$
$V_{tl}$	Trigger Voltage
$I_{tl}$	Trigger Current @ $V_{tl}$
$V_h$	Holding Voltage
$I_h$	Holding Current @ $V_h$
$V_C$	Clamping Voltage @ $I_{PP}$
$I_{PP}$	Maximum Peak Pulse Current
$V_{BR}$	Breakdown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



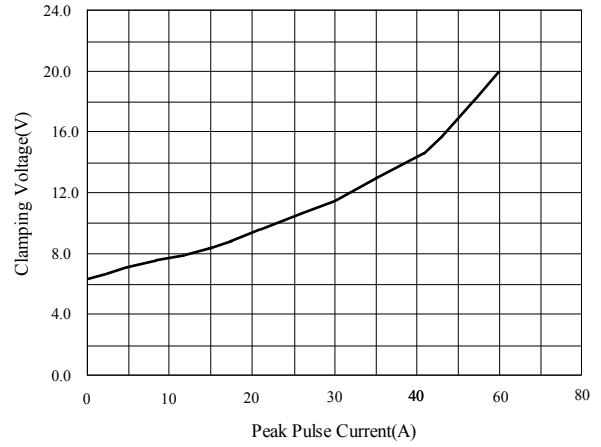
Symbol	Test Condition	Minimum	Typical	Maximum	Units
$V_{RWM}$				2.8	V
$I_R$	$V_{RWM} = 2.8V, T = 25^{\circ}C$		0.1	1.0	$\mu$ A
$V_C$	$I_{PP} = 2A, t_p = 8/20\mu s$ (Each Line)			5.0	V
$V_C$	$I_{PP} = 10A, t_p = 8/20\mu s$ (Each Line)			8.0	V
$V_C$	$I_{PP} = 24A, t_p = 8/20\mu s$ (Each Line)			14.0	V
$C_{ESD}$	$V_R = 3.0V, f = 1MHz$ (Each Line)		1.5	2.5	pF



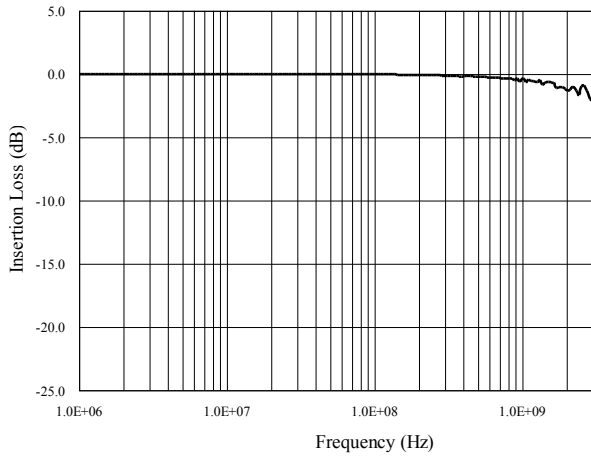
### 8/20 $\mu$ s Pulse Waveform



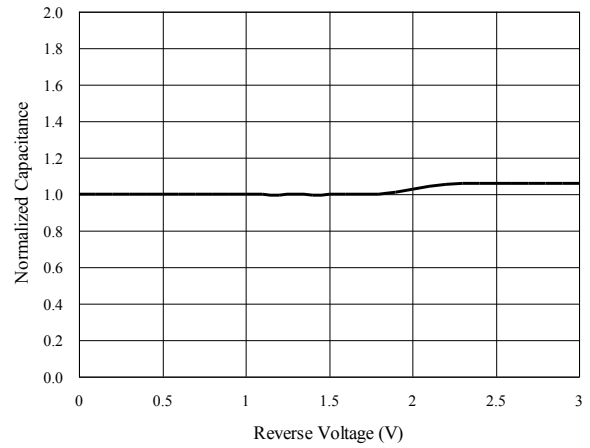
### Clamping Voltage $V_C$ vs. Current $I_{PP}$



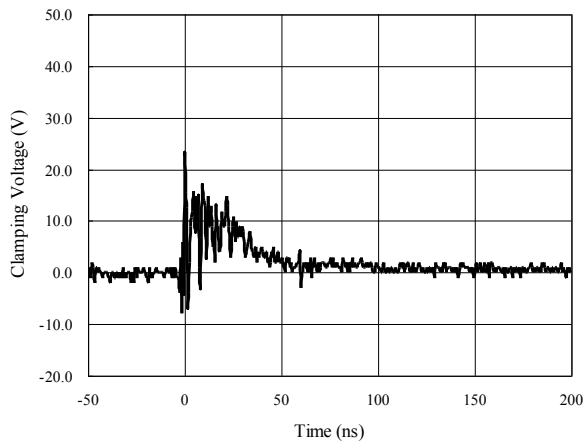
### Insertion Loss S21



### Normalized Capacitance vs. Voltage



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



## 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 TS2814VUX was designed to protect the sensitive equipment from damage which may be induced by such transient events. This product can be configured in different connections to meet the requirement of common-mode and differential-mode as follows:

### Four Lines Protection

The TS2814VUX can provide protection for four high speed data lines as depicted in figure 1:

- Pin 1 is connected to Line 1
- Pin 3 is connected to Line 2
- Pin 5 is connected to Line 3
- Pin 7 is connected to Line 4
- Pin 2, 4, 6 and 8 are connected to ground

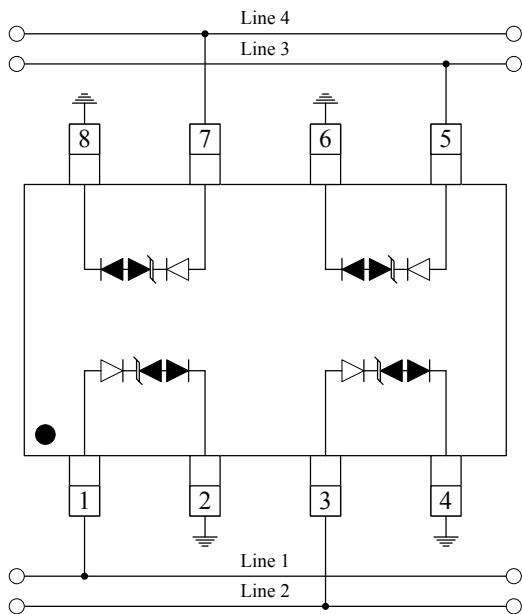


Figure 1 Four lines protection configuration

### Two Lines Bidirectional Protection

The TS2814VU can provide bidirectional protection for two high speed data lines as depicted in figure 2:

- Pin 1 & 4 is connected to Line 1
- Pin 5 & 8 is connected to Line 2
- Pin 2, 3, 6 and 7 are connected to ground

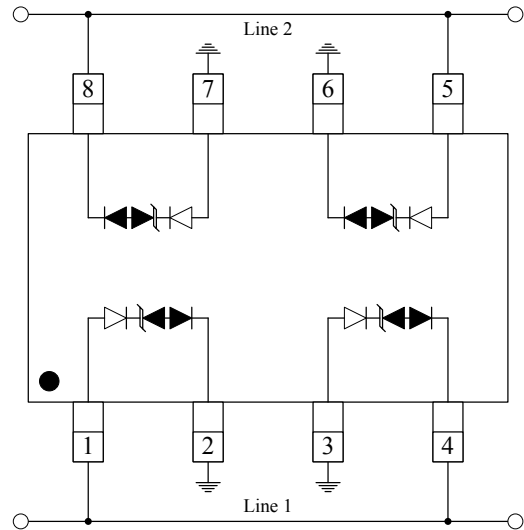


Figure 2 Two lines bidirectional protection

### Two Line Pairs Differential Protection

The TS2814VUX can provide differential protection for two high speed data line pairs as depicted in figure 3:

- Pin 1, 2, 7 and 8 are connected to Line Pair 1
- Pin 3, 4, 5 and 6 are connected to Line Pair 2

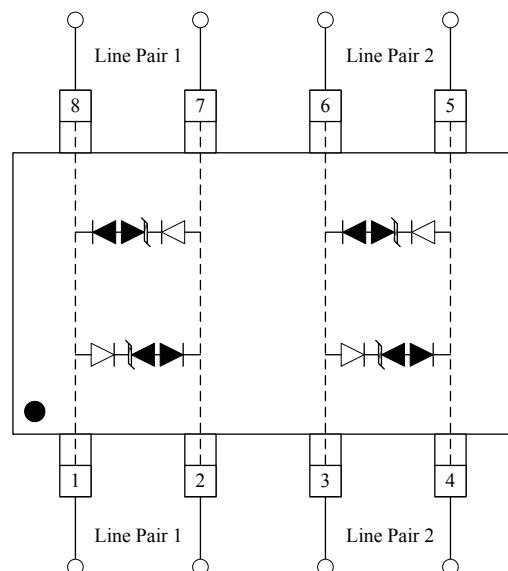
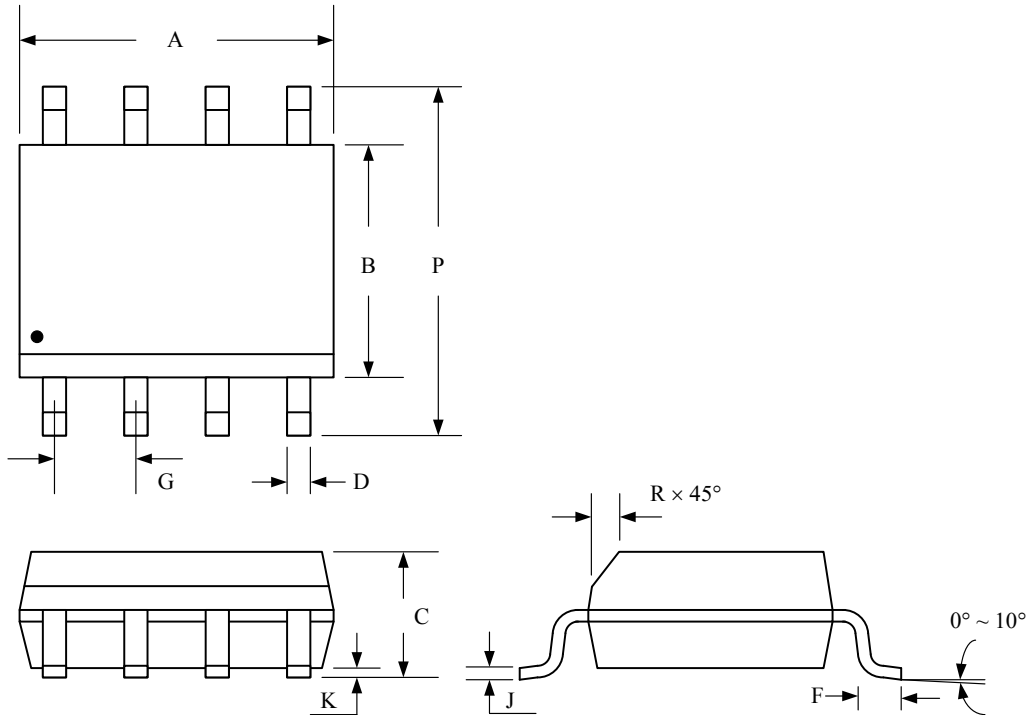


Figure 3 Two line pairs differential protection

## Package Outline

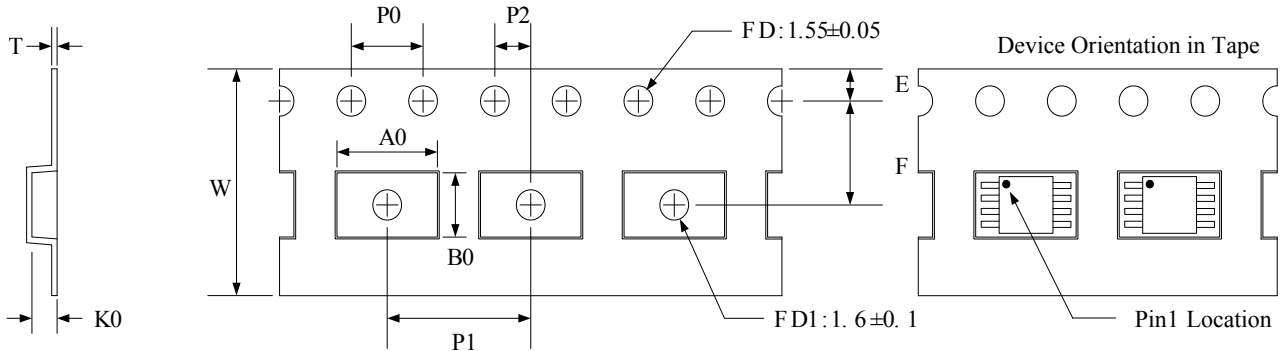
- SOP-8 package



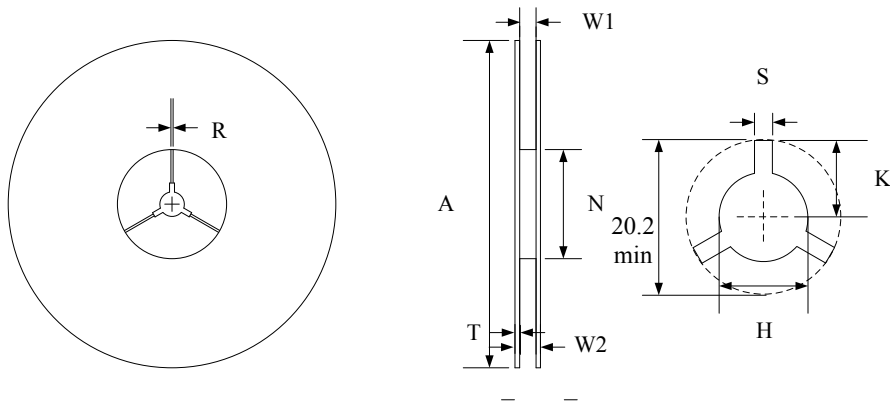
Package Dimensions (Controlling dimensions are in millimeters)

Symbol	Dimensions (mm)		Dimensions (Inches)	
	Minimum	Maximum	Minimum	Maximum
A	4.800	5.000	0.189	0.196
B	3.800	4.000	0.150	0.157
C	1.350	1.750	0.054	0.068
D	0.350	0.490	0.014	0.019
F	0.400	1.250	0.016	0.049
G	1.27 BSC		0.05 BSC	
J	0.180	0.250	0.007	0.009
K	0.100	0.250	0.004	0.008
P	5.800	6.200	0.229	0.244
R	0.250	0.500	0.010	0.019

### Tape and Reel Specification

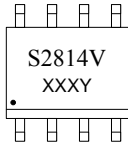


Symbol	W	A0	B0	K0	E	F	P1	P0	P2	T
Dimensions (mm)	12.00±0.3	6.40±0.1	5.2±0.1	2.10±0.1	1.75±0.1	5.50±0.1	8.00±0.1	4.0±0.1	2.0±0.1	0.3±0.05



Symbol	Reel Size	A	N	W2	W1	H	T	S	K	R
Dimensions (mm)	Φ330	330.0±2.0	100.0±2.0	18.4 max	12.4+2.0 -0.0	13.0+0.5 -0.2	2.0±0.2	1.5 min	10.1 min	2.5 min

### Marking Codes



**Note:**

- (1) “S2814V ” 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
TS2814VUX	2.8V	3,000	13 Inch

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