

## Features

- ❑ Transient protection for high-speed data lines
  - IEC 61000-4-2 (ESD) ±27kV (Air)
  - ±17kV (Contact)
  - IEC 61000-4-4 (EFT) 40A (5/50 ns)
  - Cable Discharge Event (CDE)
- ❑ Small package (1.6mm × 1.2mm × 0.55mm)
- ❑ Protects four data lines
- ❑ Low capacitance: 0.3pF Typical (I/O-I/O)
- ❑ Low leakage current: 0.1µA @ V<sub>RWM</sub> (Typical)
- ❑ Low clamping voltage
- ❑ Each I/O pin can withstand over 1000 ESD strikes for ±8kV contact discharge
- ❑ ROHS compliant

## Description

TT0514TGX 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 0.3pF only, TT0514TGX 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), very fast charged device model (CDM) ESD and cable discharge event (CDE), etc.

TT0514TGX uses small SOT-553 package. Each TT0514TGX device can protect four high-speed data lines. The combined features of low capacitance, small size and high ESD robustness make TT0514TGX ideal for high-speed data ports and high-frequency lines (e.g., HDMI & DVI) applications. The low clamping voltage of the TT0514TGX guarantees a minimum stress on the protected IC.

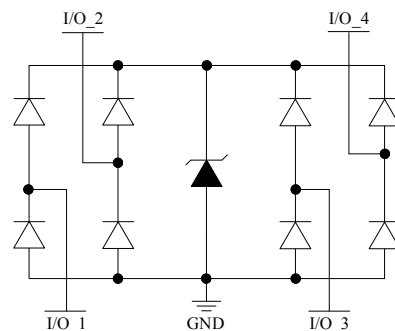
## Applications

- ❑ Serial ATA
- ❑ PCI Express
- ❑ Desktops, Servers and Notebooks
- ❑ MDDI Ports
- ❑ USB 2.0/3.0 Power and Data Line Protection
- ❑ Display Ports
- ❑ High Definition Multi-Media Interface (HDMI)
- ❑ Digital Visual Interfaces (DVI)

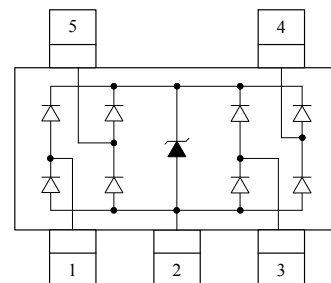
## Mechanical Characteristics

- ❑ SOT-553 package
- ❑ Flammability Rating: UL 94V-0
- ❑ Marking: Part number
- ❑ Packaging: Tape and Reel

## Circuit Diagram



## Pin Configuration



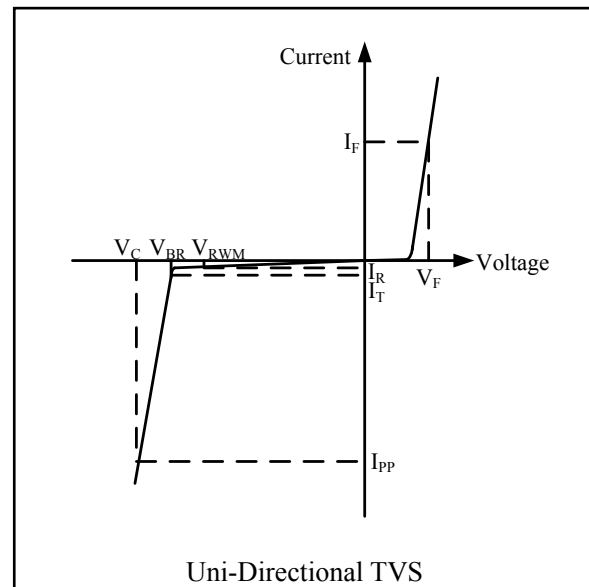
SOT-553  
(Top View)

### Absolute Maximum Rating

Symbol	Parameter	Value	Units
$I_{PP}$	Peak Pulse Current (8/20 $\mu$ s)	4	A
$P_{PK}$	Peak Pulse Power (8/20 $\mu$ s)	40	Watts
$V_{ESD}$	ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	$\pm 27$ $\pm 17$	kV
$T_{OPT}$	Operating Temperature	-55 to +125	$^{\circ}$ C
$T_{STG}$	Storage Temperature	-55 to +150	$^{\circ}$ C

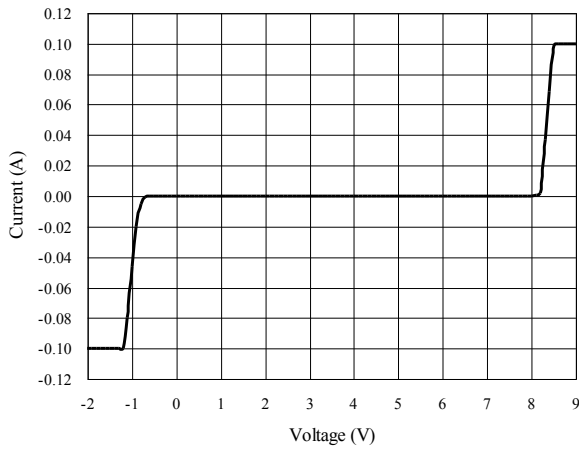
### Electrical Characteristics (T = 25 $^{\circ}$ C)

Symbol	Parameter
$V_{RWM}$	Nominal Reverse Working Voltage
$I_R$	Reverse Leakage Current @ $V_{RWM}$
$V_{BR}$	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 @ $I_F$

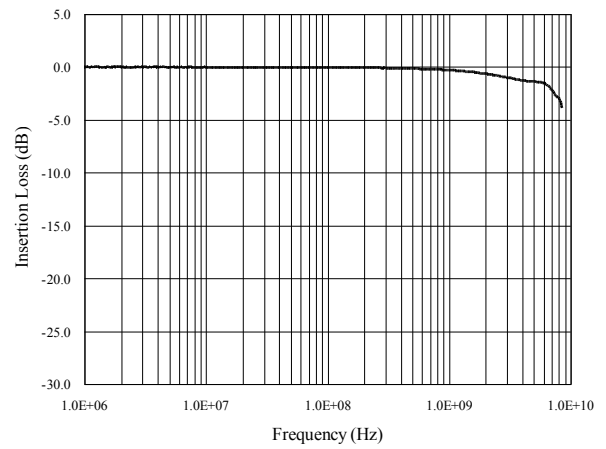


Symbol	Test Condition	Minimum	Typical	Maximum	Units
$V_{RWM}$				5.0	V
$I_R$	$V_{RWM} = 5V, T = 25^{\circ}C$ Between I/O and GND		0.1	1.0	$\mu$ A
$V_{BR}$	$I_T = 1mA$ Between I/O and GND	6.0	8.0	10.0	V
$V_C$	$I_{PP} = 1A, t_p = 8/20\mu s$ Between I/O and GND			11	V
$V_C$	$I_{PP} = 4A, t_p = 8/20\mu s$ Between I/O and GND			12	V
$C_{ESD}$	$V_R = 0V, f = 1MHz$ Between I/O and GND		0.6	0.8	pF
$C_{ESD}$	$V_R = 0V, f = 1MHz$ Between I/O and I/O		0.3	0.4	pF

### Voltage Sweeping of I/O to GND

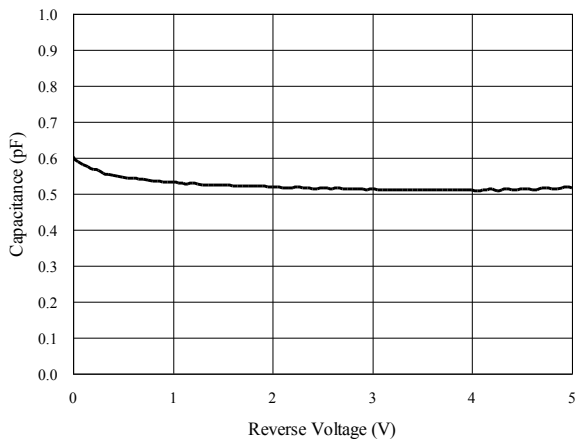


### Insertion Loss S21 of I/O to GND

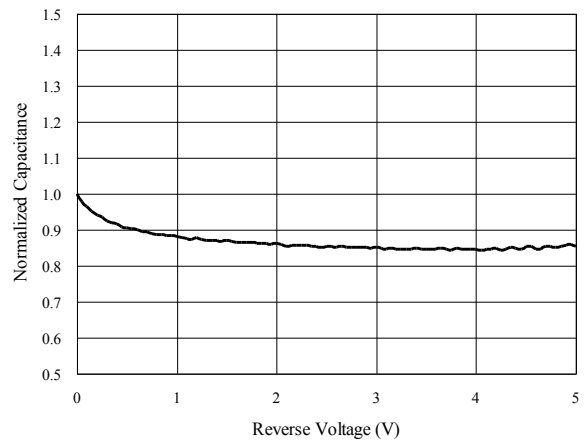


### Capacitance vs. Voltage of I/O to GND (f = 1MHz)

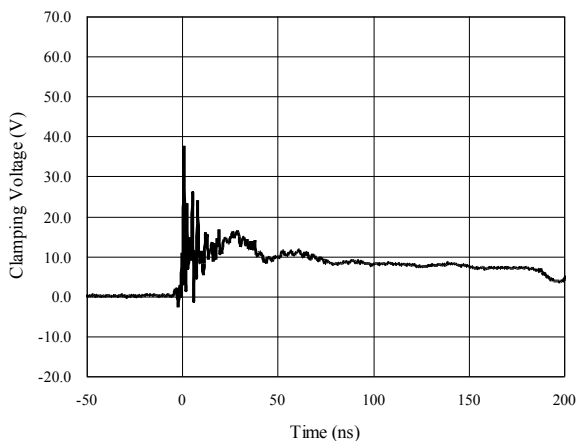
Capacitance vs. Reverse Voltage



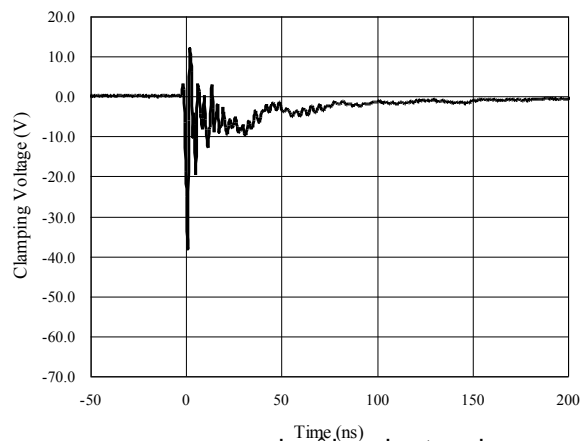
Normalized Capacitance vs. Reverse Voltage



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

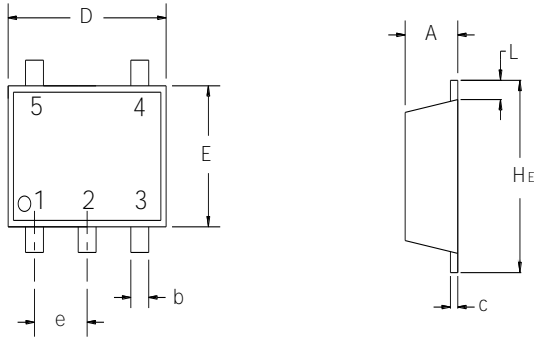


### ESD Clamping of I/O to GND (-8kV Contact per IEC 61000-4-2)



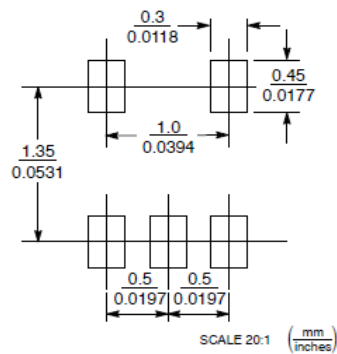
## Package Outline

□ SOT-553 package

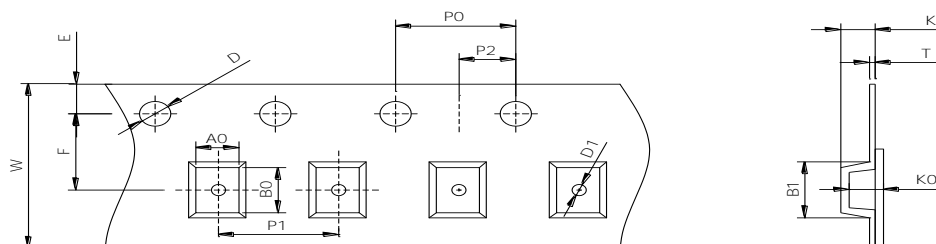


Dim	Millimeters		Inches	
	MIN	MAX	MIN	MAX
<b>A</b>	0.525	0.60	0.021	0.024
<b>b</b>	0.17	0.27	0.007	0.011
<b>c</b>	0.09	0.16	0.004	0.006
<b>D</b>	1.50	1.70	0.059	0.067
<b>E</b>	1.10	1.30	0.043	0.051
<b>e</b>	0.50BSC		0.020BSC	
<b>L</b>	0.10	0.30	0.004	0.012
<b>HE</b>	1.50	1.70	0.059	0.067

## Recommended Pad outline

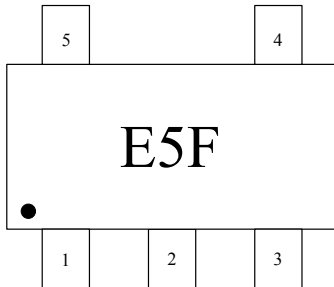


## SOT553 Reel Dim



Package	Chip Size	Pocket Size B0×A0×K0(mm)	Tape Width	Reel Diameter	Quantity Per Reel	P0	P1
SOT553	1.70×1.70×0.60	1.80×1.80×0.70	8mm	178mm(7")	3000	4mm	4mm
D0	D1	E	F	K	T	W	
1.5mm	0.2mm	1.75mm	3.5mm	0.65mm	0.2mm	8mm	

### Marking Codes



**Note:**

(1) “E5F” is part number, fixed.

### Ordering Information

Part Number	Working Voltage	Quantity Per Reel	Reel Size
TT0514TGX	5V	3,000	7 Inch