

Features

- ❑ Transient protection for high-speed data lines
 - IEC 61000-4-2 (ESD) ±25kV (Air)
 - ±17kV (Contact)
 - IEC 61000-4-4 (EFT) 40A (5/50 ns)
 - Cable Discharge Event (CDE)
- ❑ Package optimized for high-speed lines
- ❑ Ultra-small package (2.0mm×1.0mm×0.55mm)
- ❑ Protects four data lines
- ❑ Low capacitance: 0.2 pF Typical (I/O-I/O)
- ❑ Low leakage current: 0.1µA @ V_{RWM} (Typical)
- ❑ Low clamping voltage
- ❑ Each I/O pin can withstand over 1000 ESD strikes for ±8kV contact discharge

Description

TT0564SNX 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 0.2 pF only, TT0564SNX 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.

TT0564SNX uses ultra-small DFN2010-5L package. Each TT0564SNX device can protect four high-speed data lines. The combined features of ultra-low capacitance, ultra-small size and high ESD robustness make TT0564SNX ideal for high-speed data ports and high-frequency lines (e.g., HDMI & DVI) applications. The low clamping voltage of the TT 0564 SNX guarantees a minimum stress on the protected IC.

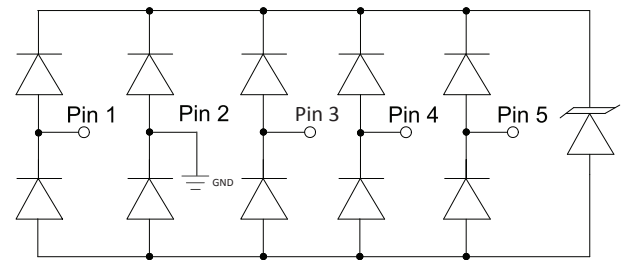
Applications

- ❑ Serial ATA
- ❑ PCI Express
- ❑ Desktops, Servers and Notebooks
- ❑ MDDI Ports
- ❑ USB 2.0/3.0/3.1 Power and Data Line Protection
- ❑ Display Ports
- ❑ High Definition Multi-Media Interface (HDMI 1.4/2.0)
- ❑ Digital Visual Interfaces (DVI)

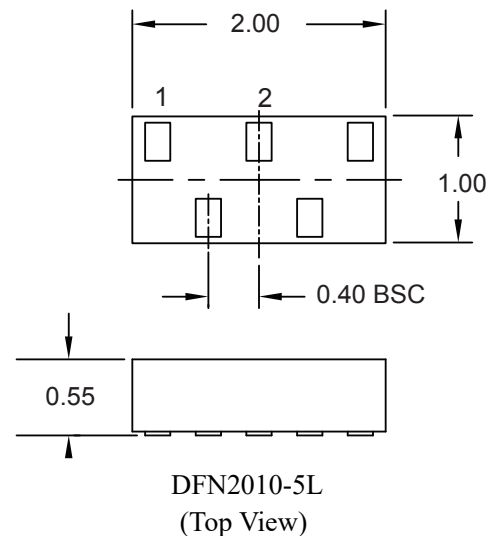
Mechanical Characteristics

- ❑ DFN2010-5L package
- ❑ Flammability Rating: UL 94V-0
- ❑ Marking: Part number
- ❑ Packaging: Tape and Reel

Circuit Diagram



Pin Configuration

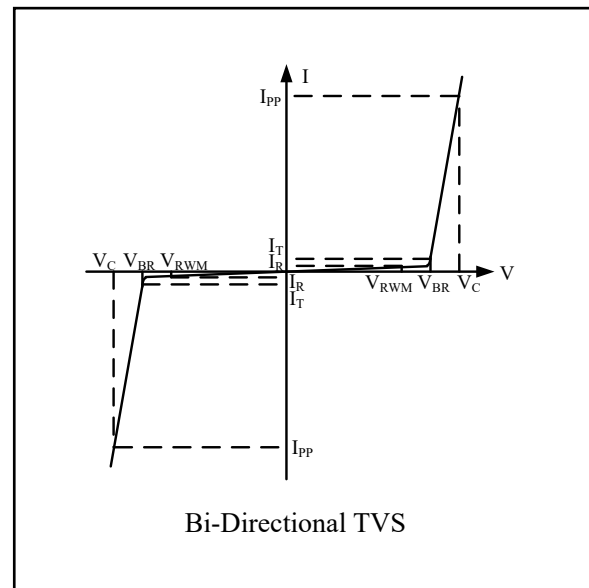


Absolute Maximum Rating

Symbol	Parameter	Value	Units
V_{ESD}	ESD per IEC 61000-4-2 (Air)	±25	kV
	ESD per IEC 61000-4-2 (Contact)	±17	
T_{OPT}	Operating Temperature	-55/+125	°C
T_{STG}	Storage Temperature	-55/+150	°C

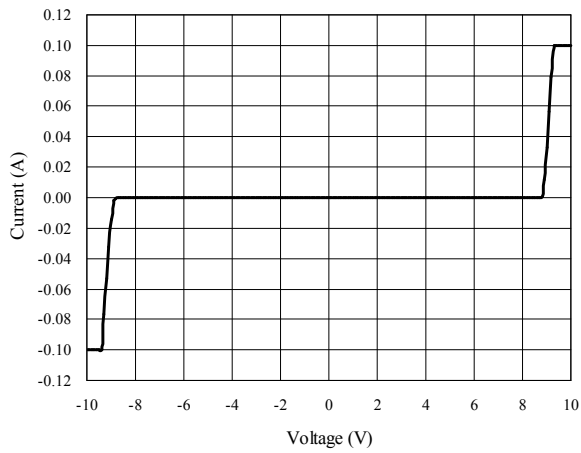
Electrical Characteristics (T = 25°C)

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

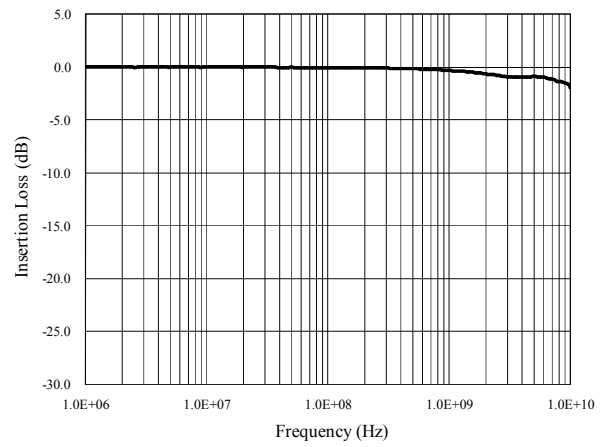


Symbol	Test Condition	Minimum	Typical	Maximum	Units
V_{RWM}				5.0	V
I_R	$V_{RWM} = 5V, T = 25^\circ C$ Between I/O and GND		0.1	1.0	μA
V_{BR}	$I_T = 1mA$ Between I/O and GND	7.0	9.0	11.0	V
V_C	$I_{PP} = 1A, t_p = 8/20\mu s$ Between I/O and GND			12	V
C_{ESD}	$V_R = 0V, f = 1MHz$ Between I/O and GND		0.2	0.3	pF
C_{ESD}	$V_R = 0V, f = 1MHz$ Between I/O and I/O		0.2	0.3	pF

Voltage Sweeping of I/O to GND

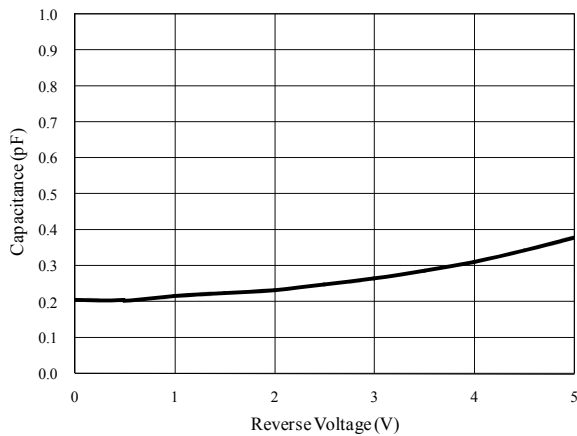


Insertion Loss S21 of I/O to GND

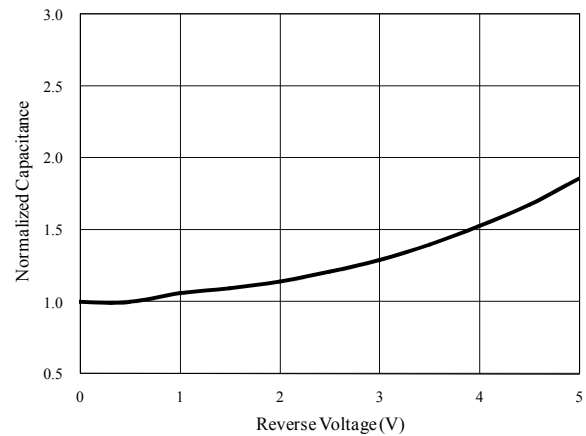


Capacitance vs. Voltage of I/O to GND (f = 1MHz)

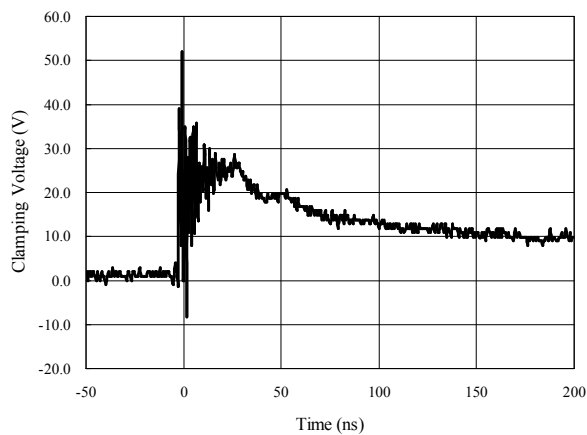
Capacitance vs. Reverse Voltage



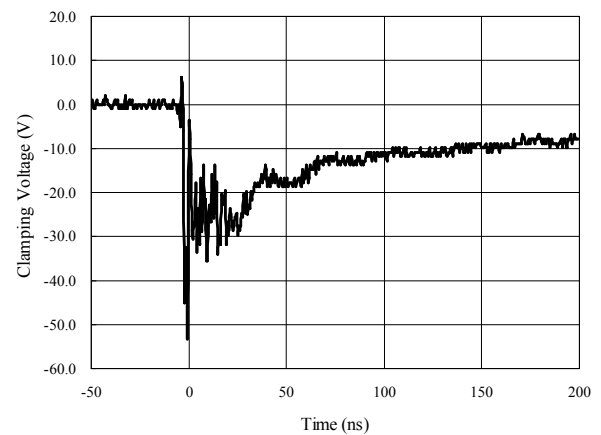
Normalized Capacitance vs. Reverse Voltage



**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)**



Application Information

Pin Connection in PCB

TT0564SNX provides ESD protection for four data lines simultaneously. The pin connection is shown in the figure below.

Four parallel data lines, from inner IC to I/O port connector, could connect to TT0564SNX four I/O pins directly. Pin 3 of TT0564SNX is the GND pin, which should connect to the GND of PCB. The wire should be as short as possible in order to minimize the parasitic inductance.

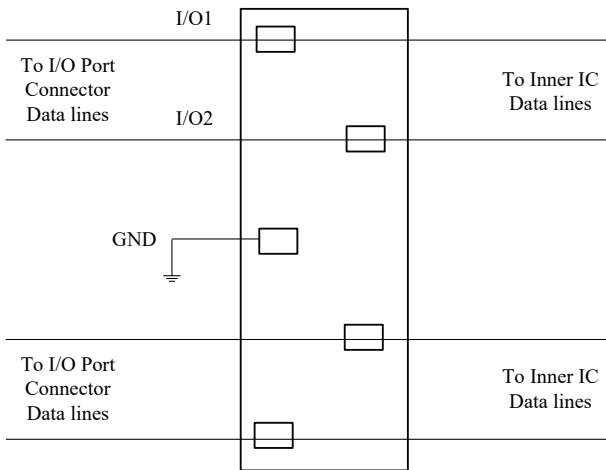


Figure 1 TT0564SNX in connection in PCB

PCB Layout Guidelines

For optimum ESD protection and the whole circuit performance, the following PCB layout guidelines are recommended:

- ❑ TT0564SNX GND pin to the PCB GND rail path should be as short as possible. It could reduce the ESD transient return path to GND.
- ❑ The vias connecting TT0564SNX GND pins to the PCB GND should be wide.
- ❑ Place TT0564SNX as close to the connector port as possible. It could reduce the parasitic inductance and restrict ESD coupling into adjacent traces.
- ❑ Avoid running critical signals near board edges.

Application Information

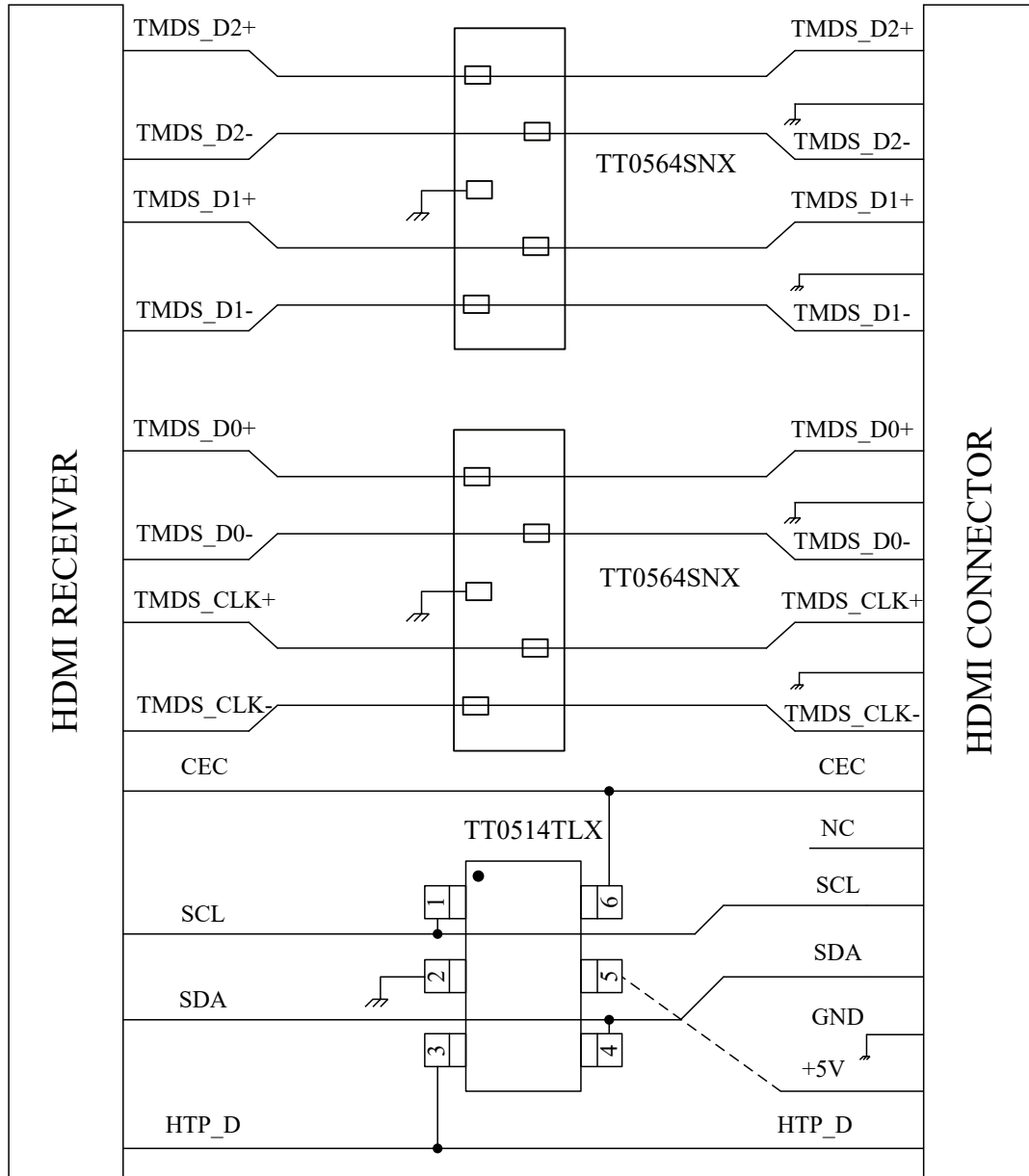
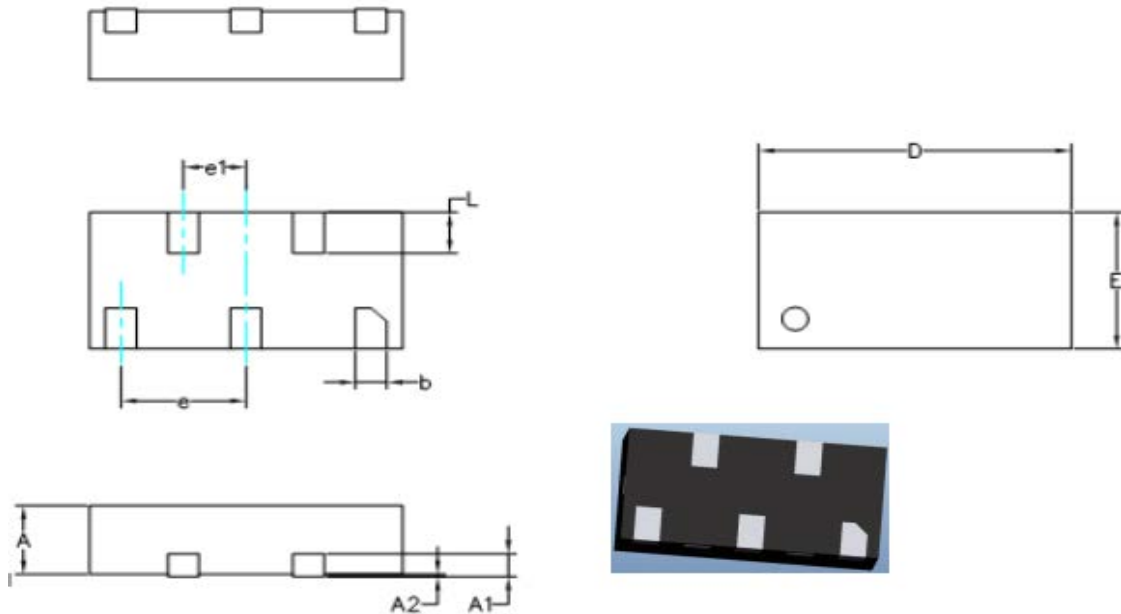


Figure 2 Layout Top View for HDMI Interface with TT0564SNX & TT0514TLX

Package Outline

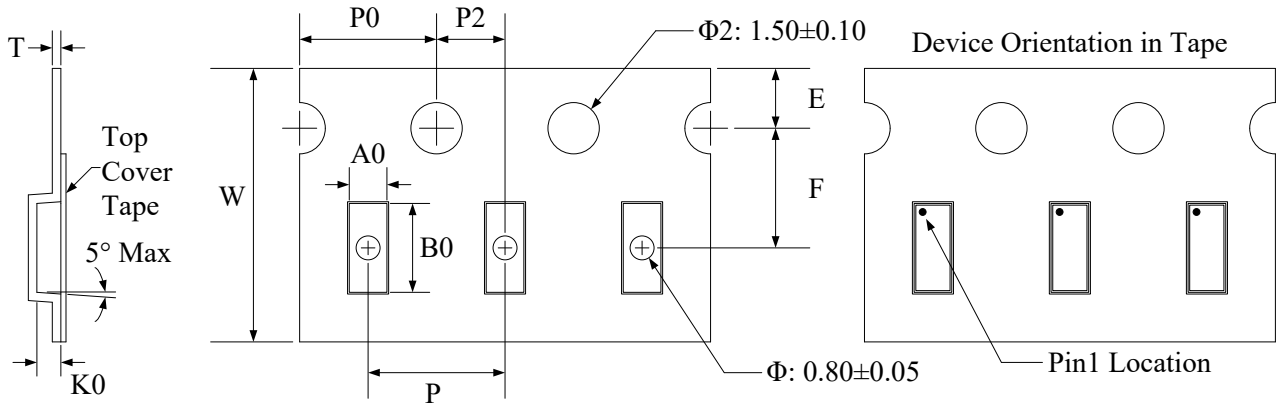
- DFN2010-5L package
- Thermally-Enhanced
- MSL-1 Level



ALL DIMENSIONS IN MM

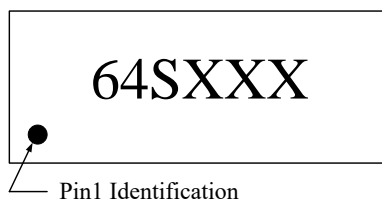
	MIN	NOM	MAX
D	1.95	2.00	2.05
E	0.95	1.00	1.05
b	0.15	0.20	0.25
L	0.25	0.30	0.35
e	0.80BSC		
e1	0.40BSC		
A	0.45	0.5	0.55
A1			
A2	0.00	-	0.05

Tape and Reel Specification

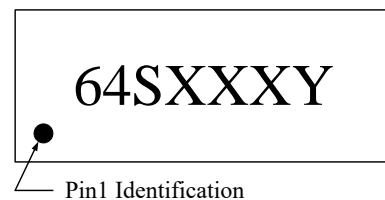


Symbol	W	A0	B0	K0	E	F	P	P0	P2	T
Dimensions (mm)	8.00+0.3 -0.1	1.23±0.05	2.7±0.05	0.7±0.05	1.75±0.1	3.5±0.05	4.0±0.1	4.0±0.1	2.0±0.05	0.25±0.02

Marking Codes



Or



Note:

(1) "64S" is part number, while "XXX" is internal code.

Note:

(1) "64S" is part number.

(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
TT0564SNX	5V	3,000	7 Inch