

Features

- ❑ Transient protection for high-speed data lines
 - IEC 61000-4-2 (ESD) $\pm 25\text{kV}$ (Air)
 - $\pm 25\text{kV}$ (Contact)
 - IEC 61000-4-4 (EFT) 40A (5/50 ns)
 - Cable Discharge Event (CDE)
- ❑ Package optimized for high-speed lines
- ❑ Ultra-small package (1.0mm×0.6mm×0.55mm)
- ❑ Protects one data, control or power line
- ❑ Low capacitance: 1.5pF (Typical)
- ❑ Low leakage current: $0.1\mu\text{A}$ @ V_{RWM} (Typical)
- ❑ Low clamping voltage
- ❑ Each I/O pin can withstand over 1000 ESD strikes for $\pm 8\text{kV}$ contact discharge

Description

TT0511VBX 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 1.5 pF only, TT0511VBX is designed to protect parasitic-sensitive systems against over-voltage and over-current transient events. It complies with IEC 61000-4-2 (ESD ($\pm 10\text{kV}$ air, $\pm 10\text{kV}$ 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.

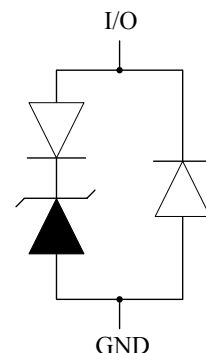
Applications

- ❑ Serial ATA
- ❑ PCI Express
- ❑ Desktops, Servers and Notebooks
- ❑ Cellular Phones
- ❑ MDDI Ports
- ❑ USB2.0/3.0 Power and Data Line Protection
- ❑ Display Ports
- ❑ High Definition Multi-Media Interface (HDMI)
- ❑ Digital Visual Interfaces (DVI)

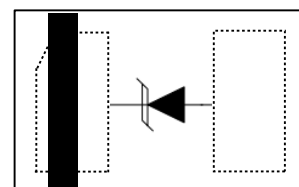
Mechanical Characteristics

- ❑ uDFN-2L package
- ❑ Flammability Rating: UL 94V-0
- ❑ Marking: Part number
- ❑ Packaging: Tape and Reel

Circuit Diagram



Pin Configuration



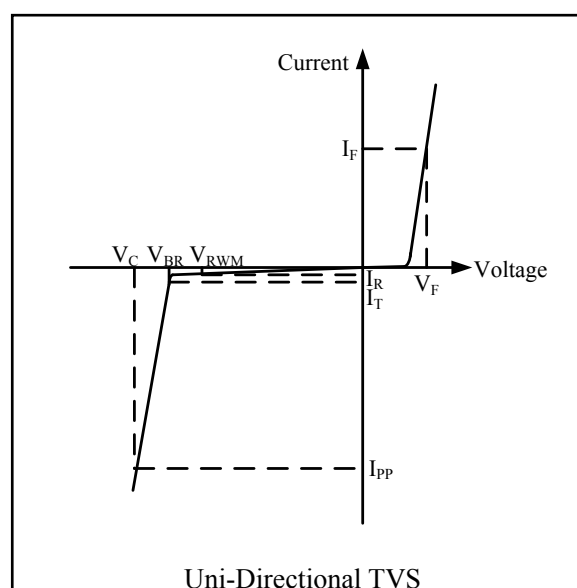
uDFN-2L
(Top View)

Absolute Maximum Rating

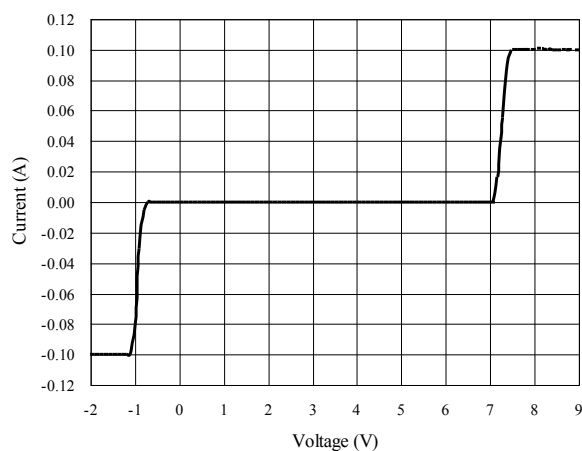
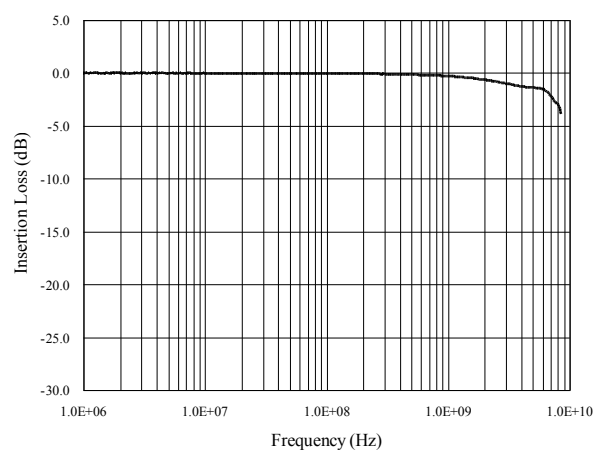
Symbol	Parameter	Value	Units
P_{pk}	Peak Pulse Power($t_p=8/20\mu s$)	80	W
I_{pp}	Peak Pulse Current($t_p=8/20\mu s$)	8	A
V_{ESD}	ESD per IEC 61000-4-2(Air) ESD per IEC 61000-4-2 (Contact)	± 25 ± 25	kV
T_{OPT}	Operating Temperature	$-55/+125$	$^{\circ}C$
T_{STG}	Storage Temperature	$-55/+150$	$^{\circ}C$

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

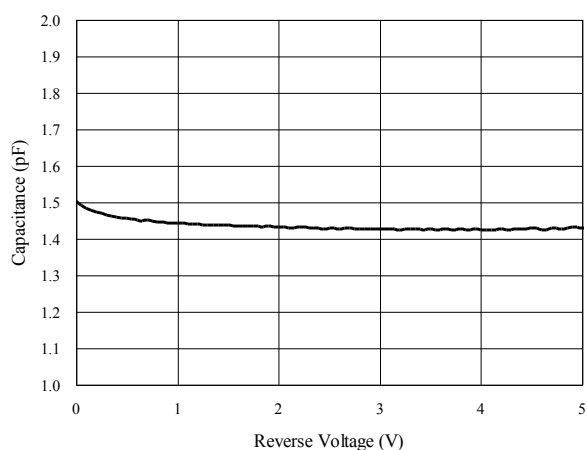
Symbol	Parameter
V_{RWM}	Nominal Reverse Working Voltage
I_R	Reverse Leakage Current @ V_{RWM}
V_{BR}	Reverse Breakdown Voltage @ I_T
I_T	Test Current for Reverse Breakdown
V_C	Clamping Voltage @ I_{pp}
I_{pp}	Maximum Peak Pulse Current
C_{ESD}	Parasitic Capacitance
V_R	Reverse Voltage
f	Small Signal Frequency
I_F	Forward Current
V_F	Forward Voltage @ I_F



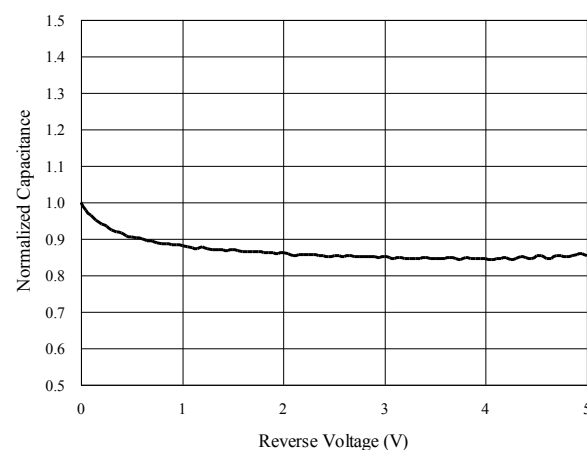
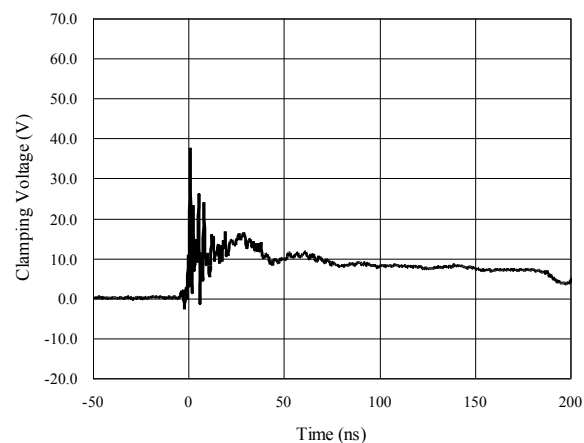
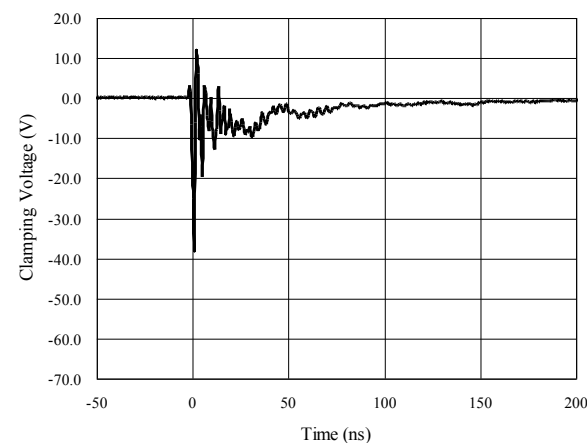
Symbol	Test Condition	Minimum	Typical	Maximum	Units
V_{RWM}				5.0	V
I_R	$V_{RWM}=5.0V$, T = 25 $^{\circ}C$ Between I/O and GND		0.1	1.0	μA
V_{BR}	$I_T = 1mA$ Between I/O and GND	6.0		10	V
V_C	$I_{pp} = 8A$, $t_p = 8/20\mu s$ Between I/O and GND		10		V
C_{ESD}	$V_R = 0V$, f = 1MHz Between I/O and GND		1.5	2.0	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

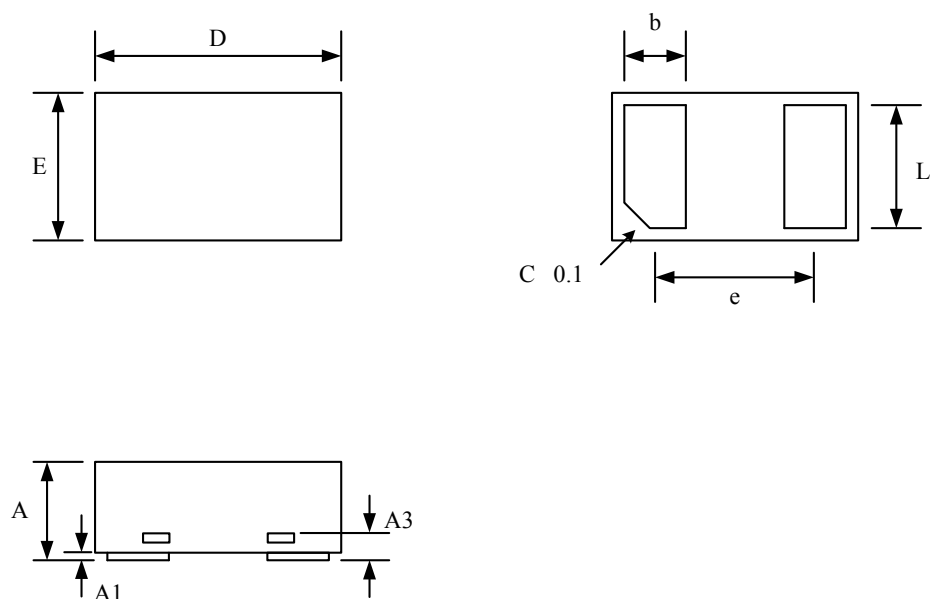


Normalized Capacitance vs. Reverse Voltage


**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

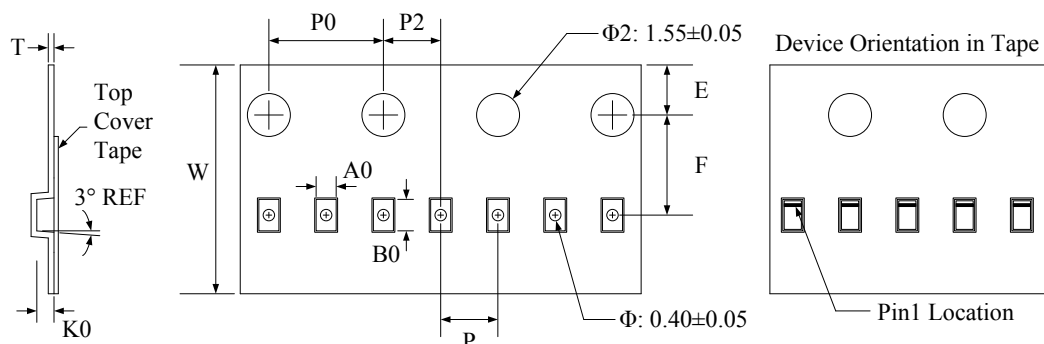
- ❑ uDFN-2L package
- ❑ 2 leads, very small package
- ❑ MSL-1



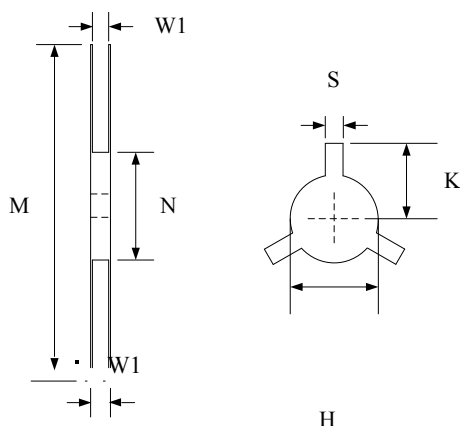
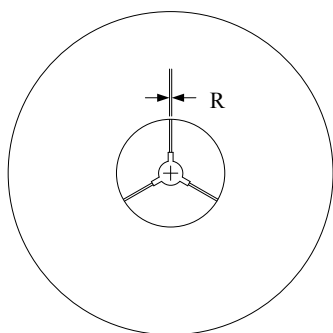
Package Dimensions (Controlling dimensions are in millimeters)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Minimum	Maximum	Minimum	Maximum
A	0.400	0.550	0.016	0.022
A1	0.000	0.050	0.000	0.002
A3	0.125 REF		0.005 REF	
D	0.950	1.050	0.037	0.041
E	0.550	0.650	0.022	0.026
b	0.200	0.300	0.008	0.012
e	0.650 BSC		0.026 BSC	
L	0.450	0.550	0.018	0.022

Tape and Reel Specification

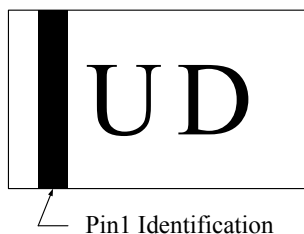


Symbol	W	A0	B0	K0	E	F	P	P0	P2	T
Dimensions (mm)	8.00±0.1	0.7±0.05	1.15±0.05	0.55±0.05	1.75±0.1	3.5±0.05	2.0±0.1	4.0±0.1	2.0±0.05	0.2±0.05



Symbol	Reel Size	M	N	W	W	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



Ordering Information

Part Number	Working Voltage	Quantity Per Reel	Reel Size
TT0511VBX	5.0V	10,000	7 Inch