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) 11A (8/20μs)
- Package optimized for high-speed lines
- Provides protection for one line pair
- Low capacitance: 2.0pF @ 0V (Typical)
- Low leakage current: 0.01uA @ V_{RWM} (Typical)
- Low operating and clamping voltage
- Each I/O pin can withstand over 1000 ESD strikes for ±8kV contact discharge
- ROHS compliant

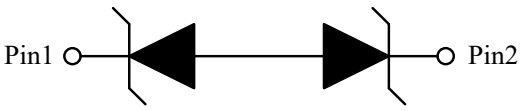
Applications

- Portable instruments
- Desktops, Servers and Notebooks
- Cellular Phones
- MP3 Players
- Keypads, Side Keys

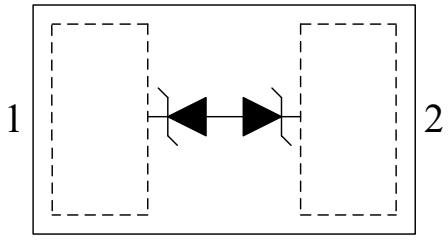
Mechanical Characteristics

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

Circuit Diagram



Pin Configuration



uDFN-2L
(Top View)

Description

TS0501VB 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 2.0pF only, TS0501VB 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) (11 A, 8/20μs), very fast charged device model (CDM) ESD and cable discharge event (CDE), etc.

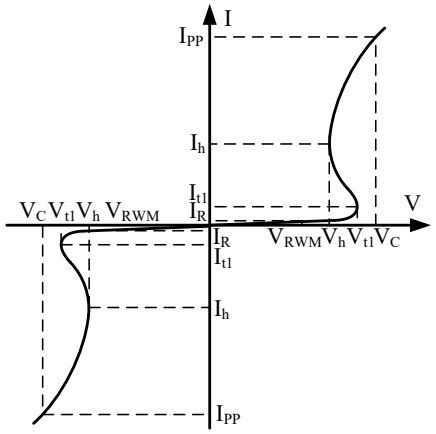
TS0501VB is in a uDFN-2L package. Each TS0501VB device can protect one high-speed line pair. The "flow-thru" design minimizes trace inductance and reduces voltage overshoot associated with ESD events. The combined features of low capacitance and high ESD robustness make TS0501VB ideal for portable applications such as cellular phones and MP3 players. The low clamping voltage of the TS0501VB guarantees a minimum stress on the protected IC.

Absolute Maximum Rating

Symbol	Parameter	Value	Units
I_{PP}	Peak Pulse Current (8/20μs)	11	A
P_{PK}	Peak Pulse Power (8/20μs)	100	Watts
V_{ESD}	ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	±30 ±30	kV
T_{OPT}	Operating Temperature	-45 to +85	°C
T_{STG}	Storage Temperature	-55 to +150	°C

Electrical Characteristics (T = 25°C)

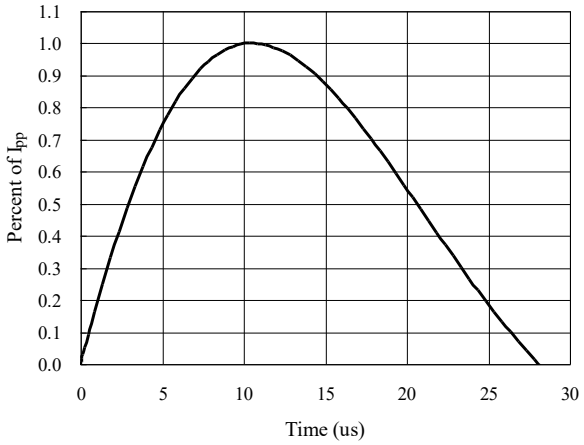
Symbol	Parameter
V_{RWM}	Nominal Reverse Working Voltage
I_R	Reverse Leakage Current @ V_{RWM}
V_{t1}	Trigger Voltage
I_{t1}	Trigger Current @ V_{t1}
V_h	Holding Voltage
I_h	Holding Current @ V_h
V_C	Clamping Voltage @ I_{PP}
I_{PP}	Maximum Peak Pulse Current
C_{ESD}	Parasitic Capacitance
C_Δ	Variation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



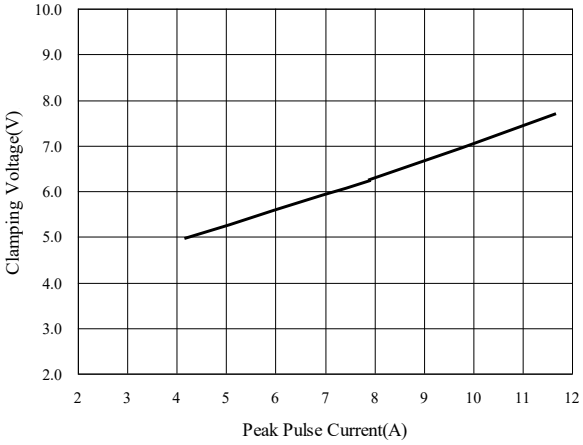
Bi-Directional TVS

Symbol	Test Condition	Minimum	Typical	Maximum	Units
V_{RWM}				5.0	V
I_R	V_{RWM} = 5V, T = 25°C			0.1	μA
V_{t1}	I_{t1} = 100nA	6.0		7.5	V
V_h	I_h = 10mA	3.5		4.5	V
V_C	I_{PP} = 2A, t_p = 8/20μs			7.0	V
V_C	I_{PP} = 11A, t_p = 8/20μs			10.0	V
C_{ESD}	V_R = 0V, f = 1MHz		2.0		pF

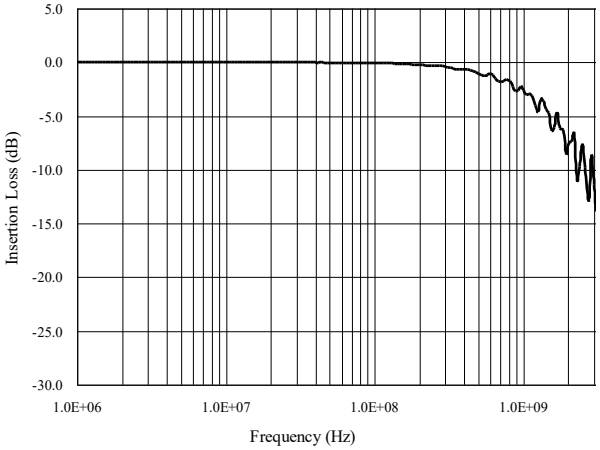
8/20μs Pulse Waveform



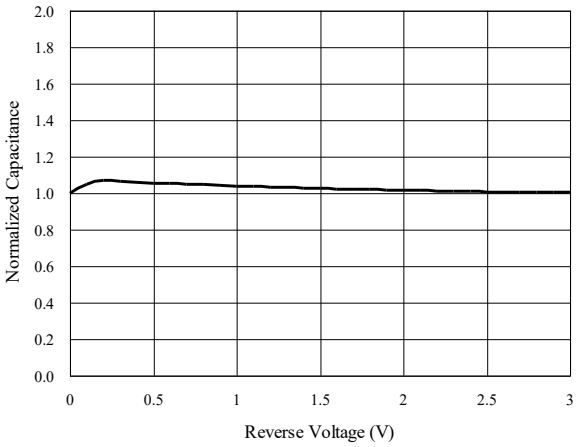
Clamping Voltage V_C vs. Current I_{PP}



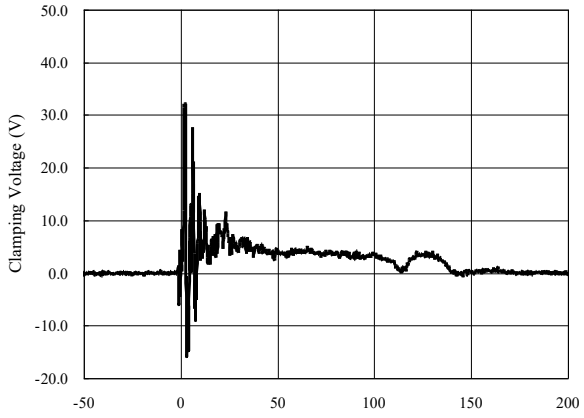
Insertion Loss S21



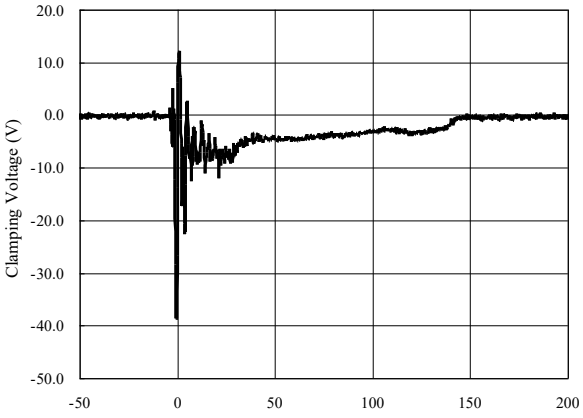
Normalized Capacitance vs. Voltage



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

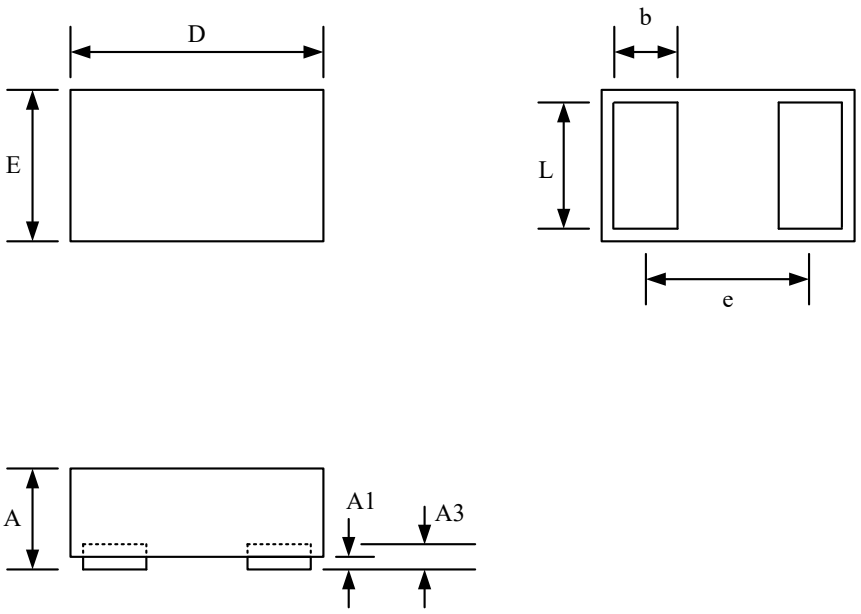


ESD Clamping of I/O to GND (-8kV Contact per IEC 61000-4-2)



Package Outline

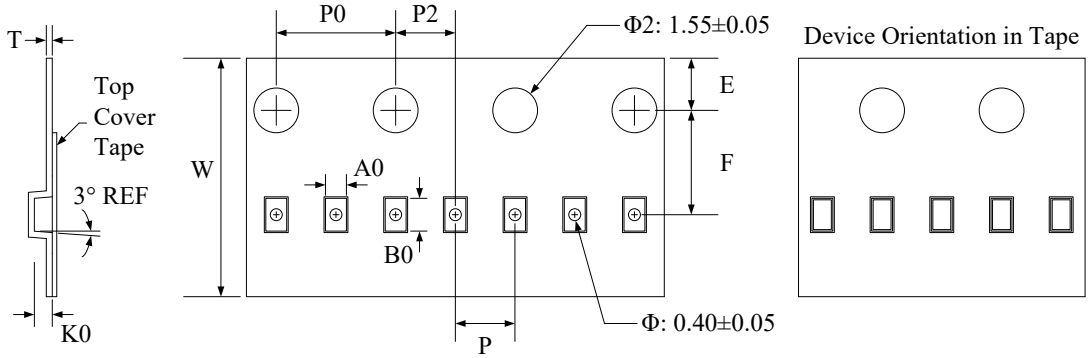
- uDFN-2L package
- 2 leads, very small package
- MSL-1



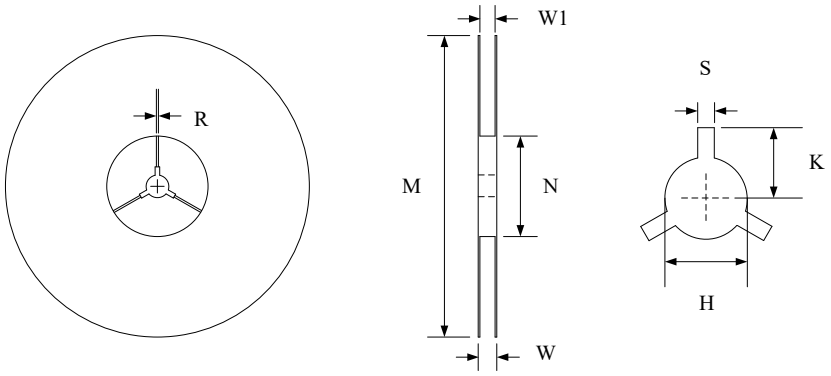
Package Dimensions (Controlling dimensions are in millimeters)

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

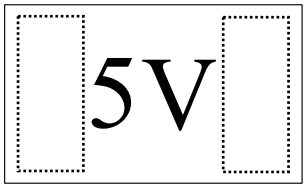


Symbol	W	A0	B0	K0	E	F	P	P0	P2	T
Dimensions (mm)	8.00±0.1	0.7±0.05	1.15±0.05	0.55±0.05	1.75±0.1	3.5±0.05	2.0±0.1	4.0±0.1	2.0±0.05	0.2±0.05

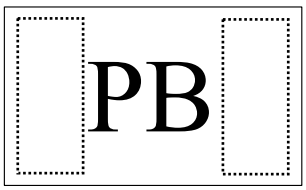


Symbol	Reel Size	M	N	W	W1	H	S	K	R
Dimensions (mm)	Φ178	178.0±1.0	60.0±1.0	11.5±0.5	9.0±0.5	13.0±0.5	2.0±0.1	11.0±0.2	1.0±0.05

Marking Codes



Note:
(1) "5V" is part number, fixed
(2) no cathode line and date c



Note:
(1) "PB" is part number, fixed
(2) no cathode line and date c

Ordering Information

Part Number	Working Voltage	Quantity Per Reel	Reel Size
TS0501VB	5V	10,000	7 Inch