



Features

- ❑ Transient protection for high-speed data lines
 - IEC 61000-4-2 (ESD) $\pm 15\text{kV}$ (Air)
 $\pm 8\text{kV}$ (Contact)
 - IEC 61000-4-4 (EFT) 40A (5/50 ns)
Cable Discharge Event (CDE)
- ❑ Package optimized for high-speed lines
- ❑ Ultra-small package (2.5mm×1.0mm×0.55mm)
- ❑ Protects four data lines
- ❑ Low capacitance: 0.50 pF Typical (I/O-GND)
- ❑ Low leakage current: 0.1 μA @ V_{RWM} (Typical)
- ❑ Low clamping voltage
- ❑ Each I/O pin can withstand over 1000 ESD strikes for $\pm 8\text{kV}$ contact discharge
- ❑ ROHS compliant

Description

TT0514SP 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 0.50pF only, TT0514SP 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 ($\pm 15\text{kV}$ air, $\pm 8\text{kV}$ 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.

TT0514SP uses ultra-small DFN-10L package. Each TT0514SP device can protect four high-speed data lines. The combined features of ultra-low capacitance, ultra-small size and high ESD robustness make TT0514SP ideal for high-speed data ports and high-frequency lines (e.g., HDMI & DVI) applications. The low clamping voltage of the TT0514SP guarantees a minimum stress on the protected IC.

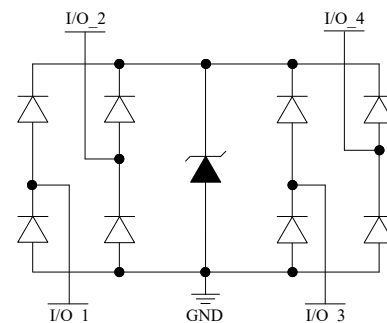
Applications

- ❑ Serial ATA
- ❑ PCI Express
- ❑ Desktops, Servers and Notebooks
- ❑ MDDI Ports
- ❑ USB2.0/3.0 Power and Data Line Protection
- ❑ Display Ports
- ❑ High Definition Multi-Media Interface (HDMI 1.4 /2.0)
- ❑ Digital Visual Interfaces (DVI)

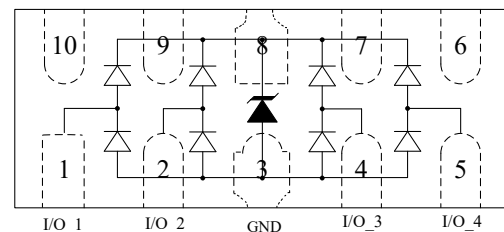
Mechanical Characteristics

- ❑ DFN-10L package
- ❑ Flammability Rating: UL 94V-0
- ❑ Marking: Part number
- ❑ Packaging: Tape and Reel

Circuit Diagram



Pin Configuration



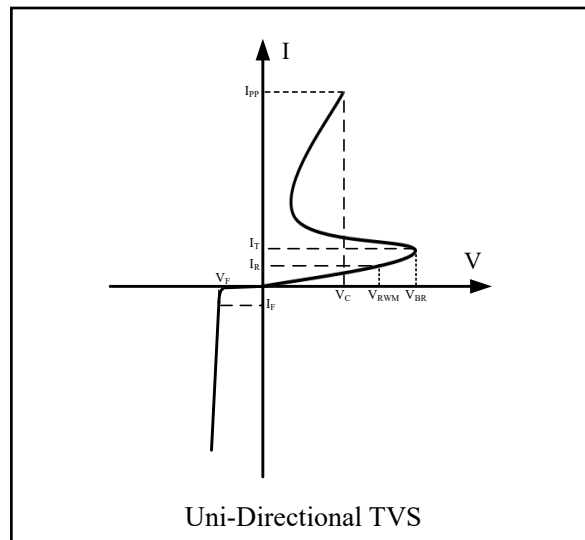
DFN-10L
(Top View)

**Absolute Maximum Rating**

Symbol	Parameter	Value	Units
I_{PP}	Peak Pulse Current($t_p=8/20\mu s$)(I/O pins)	5	A
V_{ESD}	ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	± 15 ± 8	kV
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



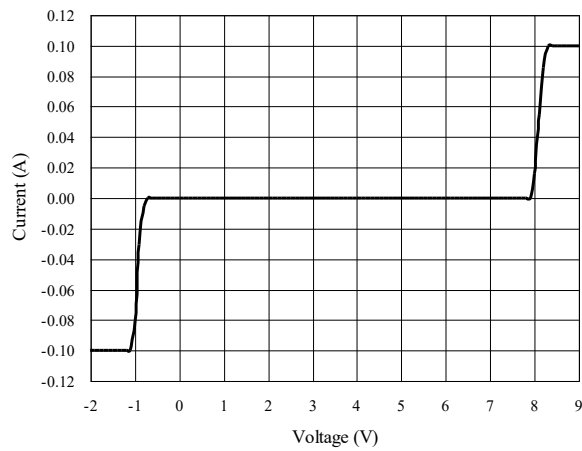
Symbol	Test Condition	Minimum	Typical	Maximum	Units
V_{RWM}				5.0	V
I_R	$V_{RWM} = 5V$, T = 25°C Between I/O and GND		0.1	1.0	μA
V_{BR}	$I_T = 1mA$ Between I/O and GND	6.0		10.0	V
V_C	$I_{PP} = 5A$, $t_p = 8/20\mu s$ Between I/O and GND			6	V
V_C	$I_{PP} = 8.0A$, $t_p = 100ns^{(1)}$		4.0		V
	$I_{PP} = 16.0A$, $t_p = 100ns^{(1)}$		7.0		V
C_{ESD}	$V_R = 0V$, f = 1MHz Between I/O and GND		0.5		pF
C_{ESD}	$V_R = 0V$, f = 1MHz Between I/O and I/O		0.3		pF

Notes: (1) Measurements performed using a 100ns Transmission Line Pulse (TLP) system.

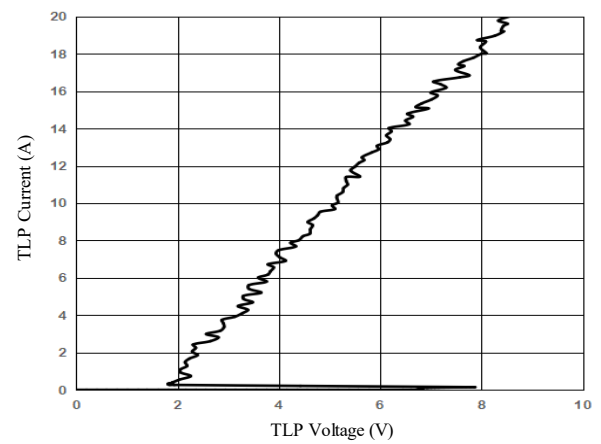
service@jy-electronics.com.cn



Voltage Sweeping of I/O to GND

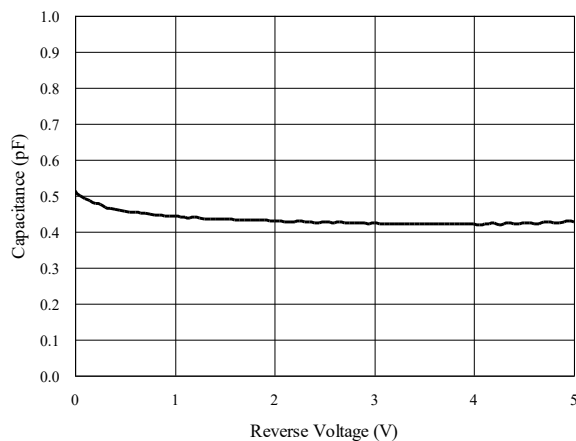


TLP Measurement of I/O to GND

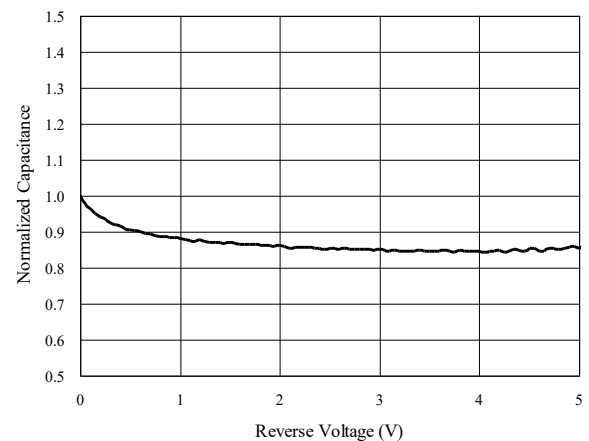


Capacitance vs. Voltage of I/O to GND (f = 1MHz)

Capacitance vs. Reverse Voltage



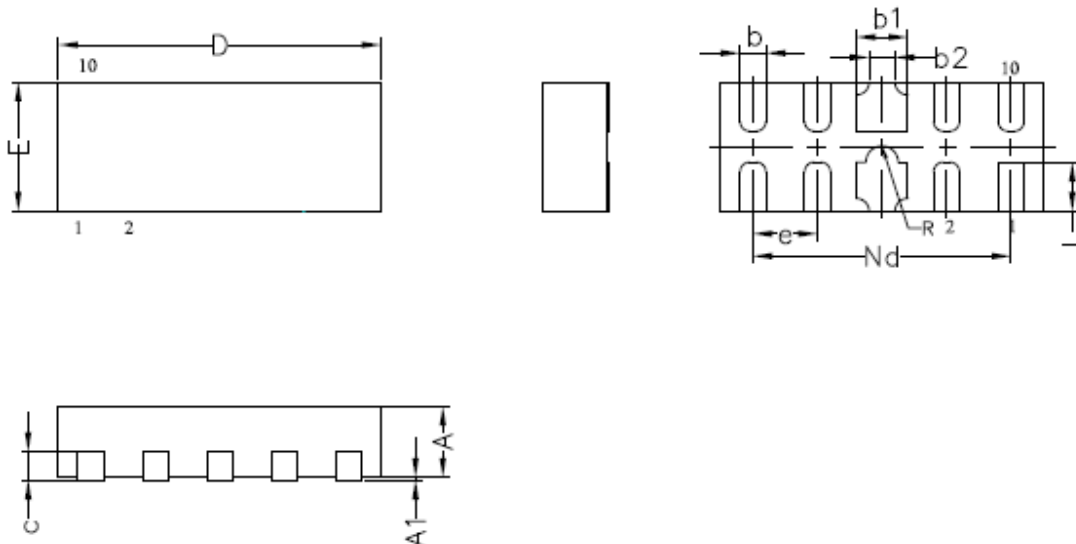
Normalized Capacitance vs. Reverse Voltage





Package Outline

- DFN-10L package
- Thermally-Enhanced
- MSL-1 Level

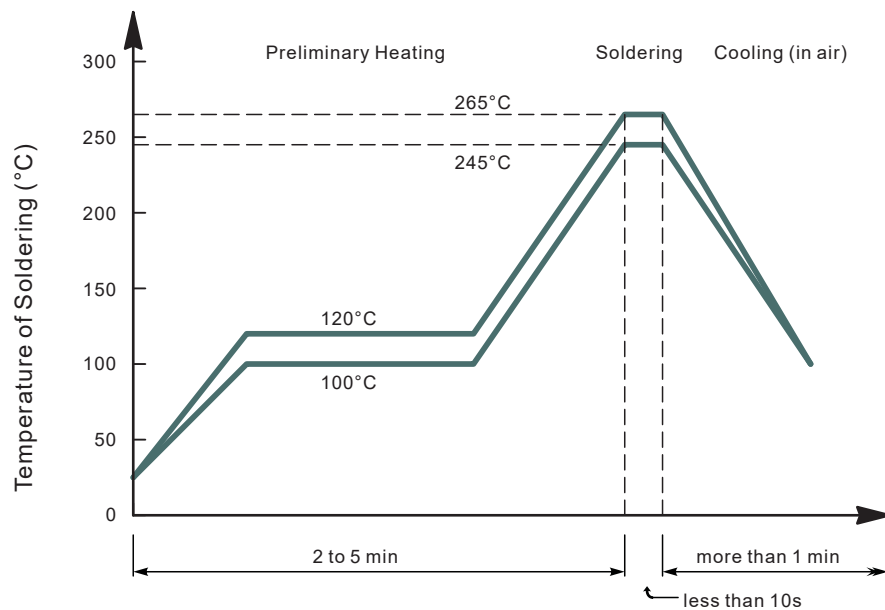


Unit: mm

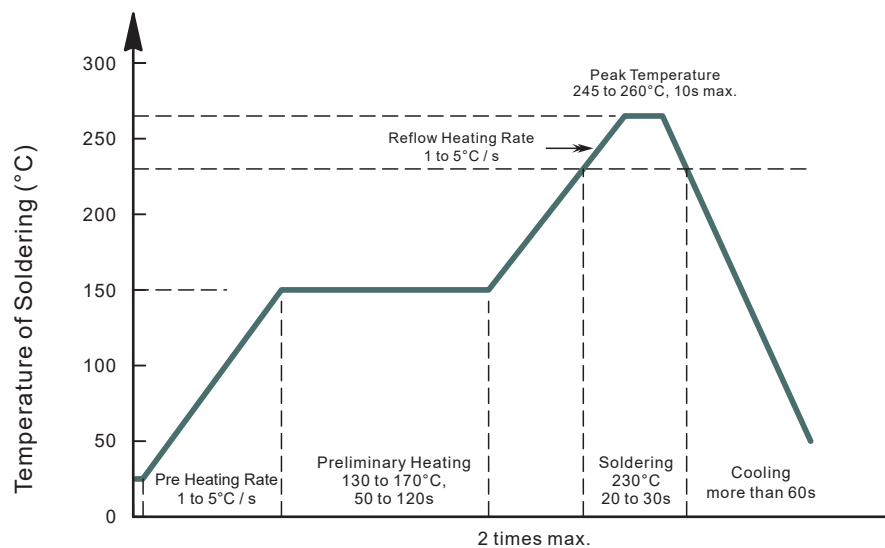
Package Dimensions			
Symbols	Min	Nom	Max
D	2.45	2.50	2.55
E	0.95	1.00	1.05
b1	0.35	0.40	0.45
b2	0.20REF		
b	0.15	0.20	0.25
L	0.33	0.38	0.43
Nd	2.00BSC		
e	0.50BSC		
R	0.10	0.125	0.15
A	0.50	0.55	0.60
c	0.203REF		
A1	0.00	0.02	0.05



• Recommended condition of flow soldering

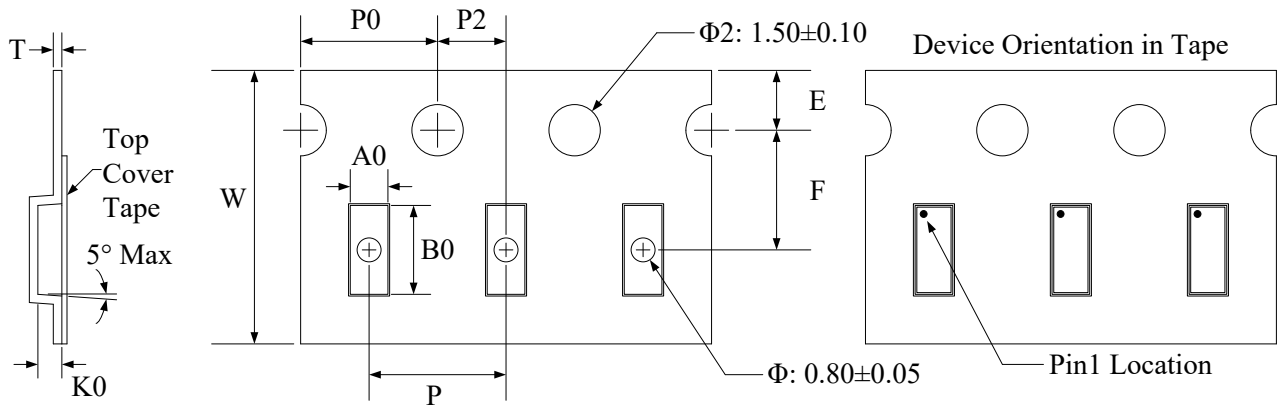


• Recommended condition of reflow soldering



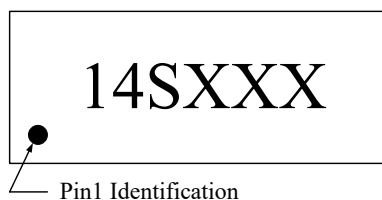


Tape and Reel Specification

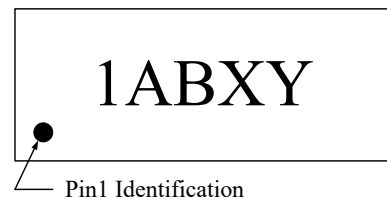


Symbol	W	A0	B0	K0	E	F	P	P0	P2	T
Dimensions (mm)	8.00+0.3 -0.1	1.23±0.05	2.7±0.05	0.7±0.05	1.75±0.1	3.5±0.05	4.0±0.1	4.0±0.1	2.0±0.05	0.25±0.02

Marking Codes



Or



Note:

- (1) "14S" is part number , fixed.
- (2) "XXX" is the identification number

Note:

- (1) "1" is part number ,fixed.
- (2) "AB" is the wafer's Lot No. "XY" is internal code

Ordering Information

Part Number	Working Voltage	Quantity Per Reel	Reel Size
TT0514SP	5V	3,000	7 Inch