



### Features

- ❑ Transient protection for high-speed data lines
  - IEC 61000-4-2 (ESD) ±27kV (Air)
  - ±20kV (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: 0.40 pF Typical (I/O-GND)
- ❑ 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

TT0534SP 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 0.40pF only, TT0534SP 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.

TT0534SP uses ultra-small DFN-10L package. Each TT0534SP device can protect four high-speed data lines. The combined features of ultra-low capacitance, ultra-small size and high ESD robustness make TT0534SP ideal for high-speed data ports and high-frequency lines (e.g., HDMI & DVI) applications. The low clamping voltage of the TT0534SP guarantees a minimum stress on the protected IC.

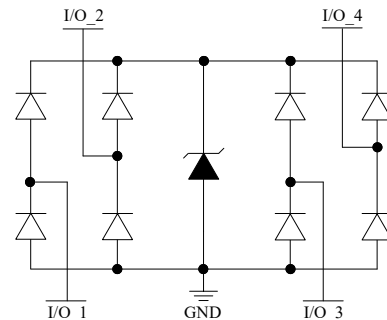
### Applications

- ❑ 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)

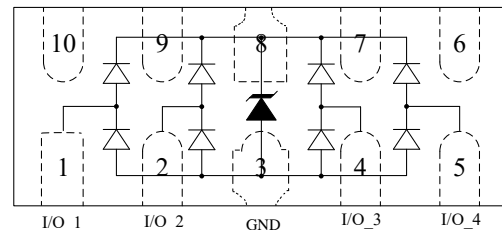
### Mechanical Characteristics

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

### Circuit Diagram



### Pin Configuration



DFN-10L  
(Top View)

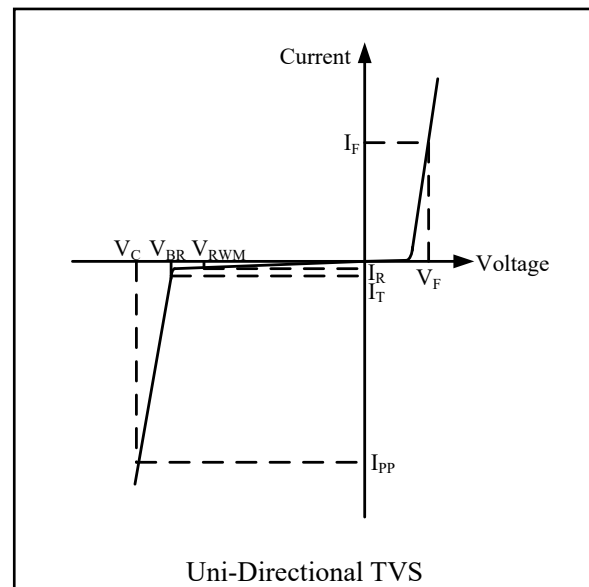


### Absolute Maximum Rating

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)	$\pm 27$ $\pm 20$	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 @ $I_F$



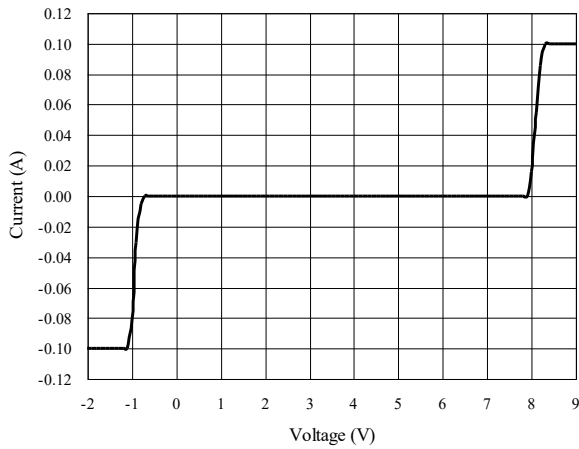
Symbol	Test Condition	Minimum	Typical	Maximum	Units
$V_{RWM}$				5.0	V
$I_R$	$V_{RWM} = 5V, T = 25^{\circ}C$ Between I/O and GND		0.1	1.0	$\mu A$
$V_{BR}$	$I_T = 1mA$ Between I/O and GND	6.0	8.0	10.0	V
$V_C$	$I_{PP} = 1A, t_p = 8/20\mu s$ Between I/O and GND			12	V
$V_C$	$I_{PP} = 8.0A, t_p = 100ns^{(1)}$		14.0		V
	$I_{PP} = 16.0A, t_p = 100ns^{(1)}$		20.0		V
$R_{dyn}$	IEC61000-4-2 0-6KV, T=25 $^{\circ}C$ Contact, I/O to GND		0.9		$\Omega$
$C_{ESD}$	$V_R = 0V, f = 1MHz$ Between I/O and GND		0.4	0.5	pF
$C_{ESD}$	$V_R = 0V, f = 1MHz$ Between I/O and I/O		0.2	0.25	pF

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

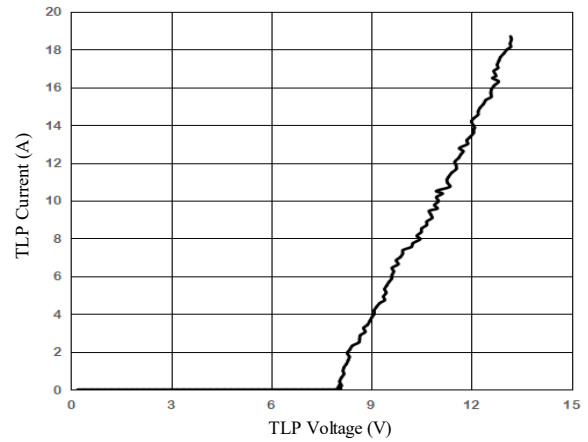
service@jy-electronics.com.cn



### Voltage Sweeping of I/O to GND

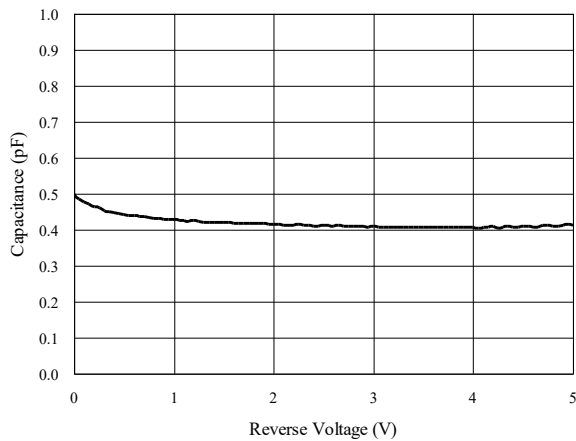


### TLP Measurement of I/O to GND

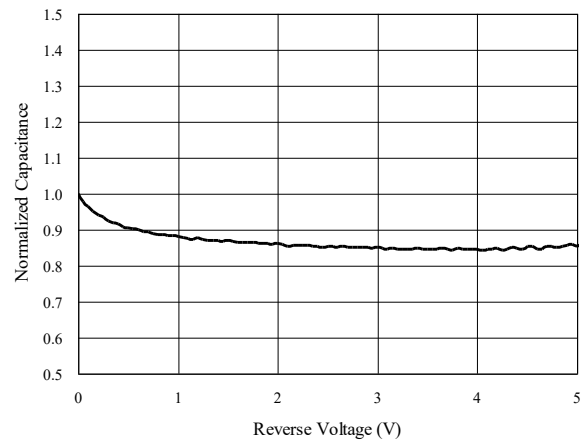


### Capacitance vs. Voltage of I/O to GND (f = 1MHz)

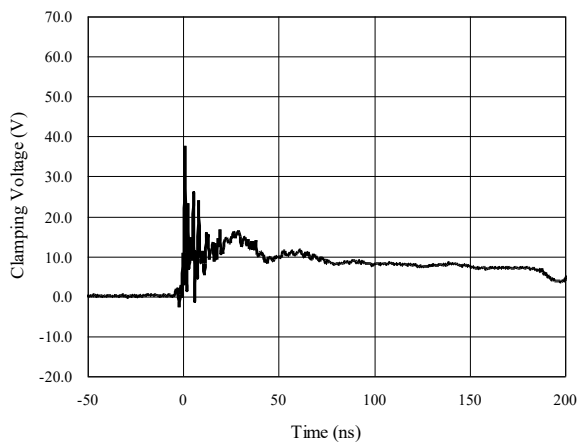
Capacitance vs. Reverse Voltage



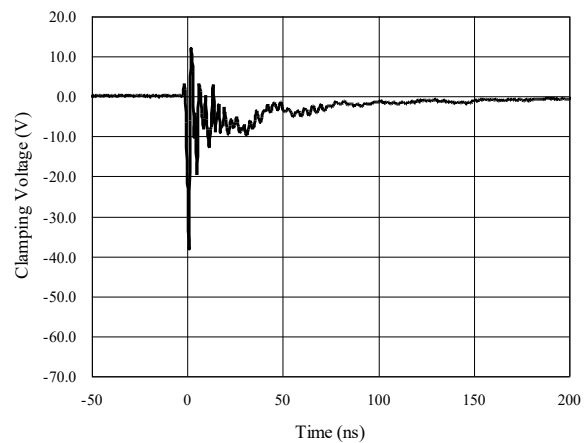
Normalized Capacitance vs. Reverse Voltage



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



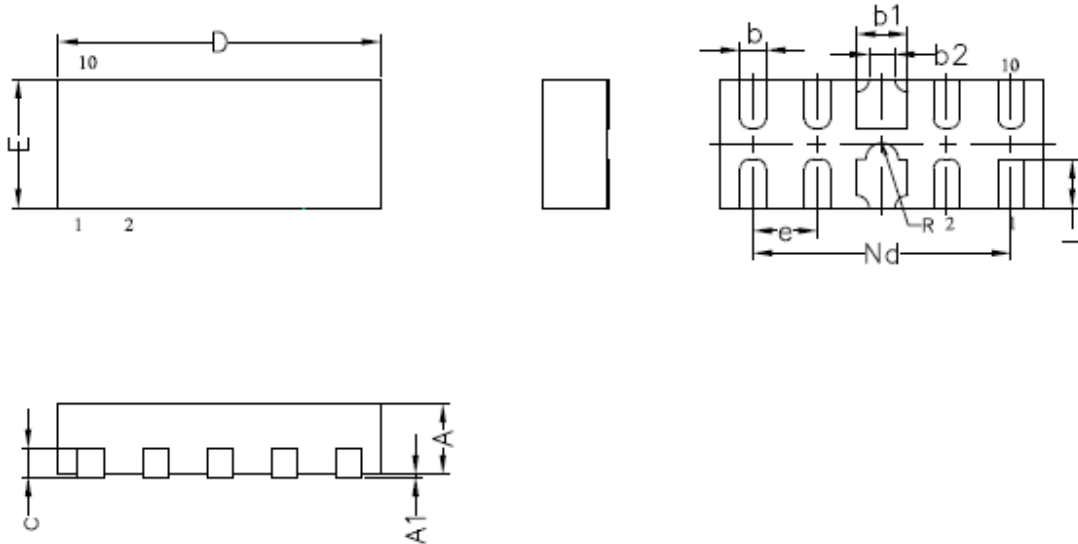
### ESD Clamping of I/O to GND (-8kV Contact per IEC 61000-4-2)





### Package Outline

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

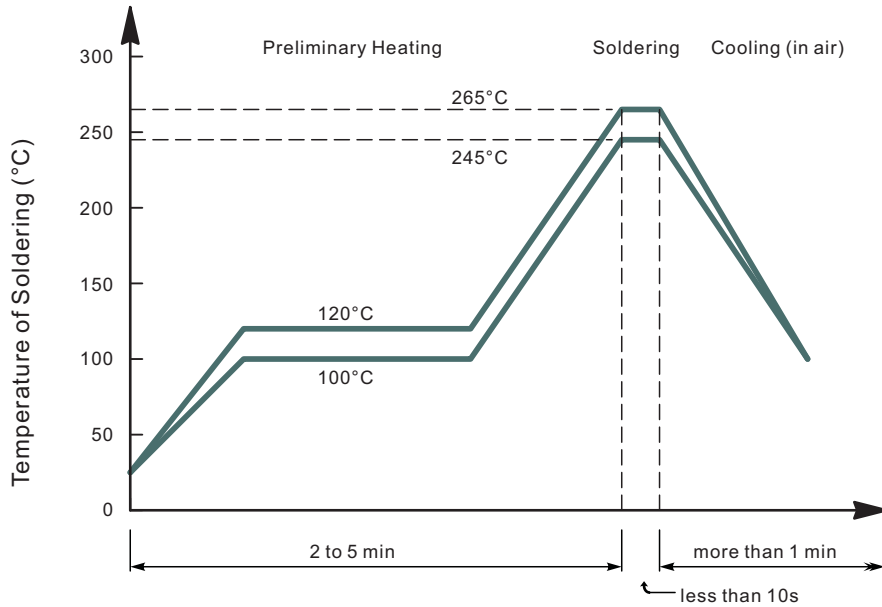


Unit: mm

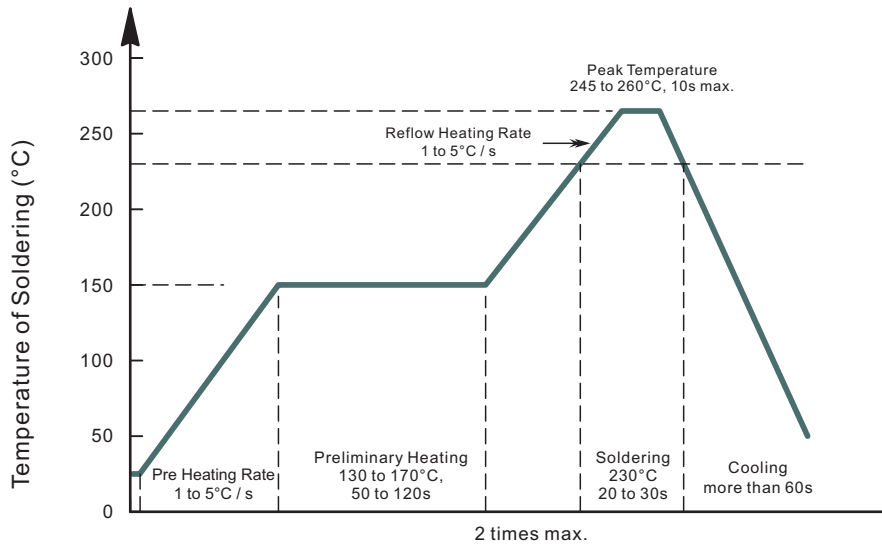
Package Dimensions			
Symbols	Min	Nom	Max
D	2.45	2.50	2.55
E	0.95	1.00	1.05
b1	0.35	0.40	0.45
b2	0.20REF		
b	0.15	0.20	0.25
L	0.33	0.38	0.43
Nd	2.00BSC		
e	0.50BSC		
R	0.10	0.125	0.15
A	0.50	0.55	0.60
c	0.203REF		
A1	0.00	0.02	0.05



### • Recommended condition of flow soldering

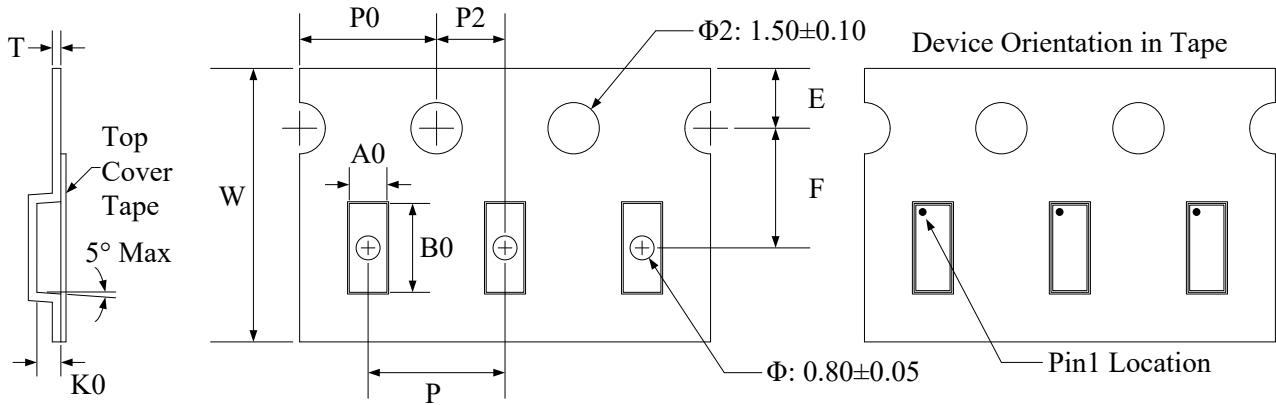


### • Recommended condition of reflow soldering



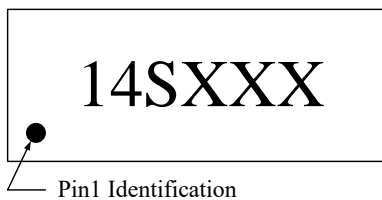


### Tape and Reel Specification

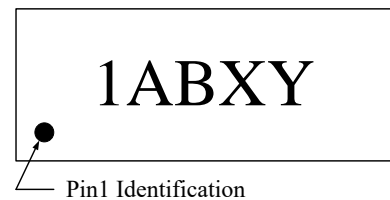


Symbol	W	A0	B0	K0	E	F	P	P0	P2	T
Dimensions (mm)	8.00+0.3 -0.1	1.23±0.05	2.7±0.05	0.7±0.05	1.75±0.1	3.5±0.05	4.0±0.1	4.0±0.1	2.0±0.05	0.25±0.02

### 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
TT0534SP	5V	3,000	7 Inch