

## Features

- Transient protection for high-speed data lines
 

IEC61000-4-2 (ESD)	±8kV (Air)
	±8kV (Contact)
IEC61000-4-5 (Lightning)	5.5A (8/20μs)
- Small package saves board space
- Protects one I/O line (bidirectional)
- Low capacitance: 0.45pF@0V (Typical) (I/O-I/O)
- Low leakage current: 0.01uA @  $V_{RWM}$ (Maximum)
- Low clamping voltage
- Each I/O pin can withstand over 1000 ESD strikes for ±8kV contact discharge

## Description

TT0301 SBX 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 0.45pF only, it is designed to protect parasitic -sensitive systems against over-voltage and over-current transient events.

The TT0301 SBX comes in a RoHS compliant and Halogen Free 1.0mm x 0.6mm x 0.55mm DFN1006-2L package.

## Applications

- Portable applications
- Communication systems
- Computers and peripherals
- High speed data lines:
  - USB 2.0/3.0/3.1
  - HDMI 1.4/2.0

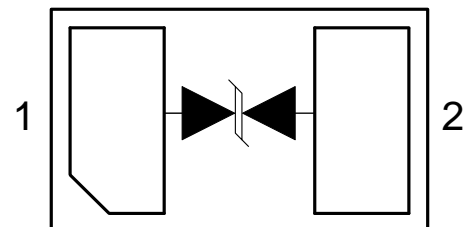
## Mechanical Characteristics

- Package: DFN1006-2L
- Marking: Part number
- Packaging: Tape and Reel
- ROHS compliant

## Circuit Diagram



## Pin Configuration

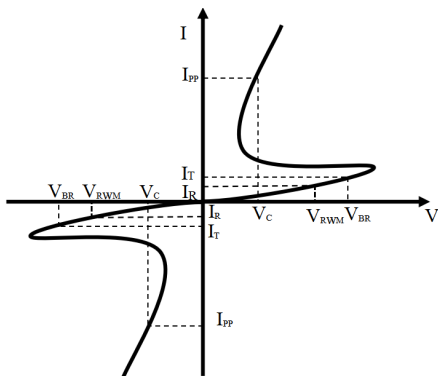


DFN1006-2L  
(Top View)

## Absolute Maximum Rating

Symbol	Parameter	Value	Units
$I_{PP}$	Peak Pulse Current (8/20 $\mu$ s)	5.5	A
$P_{PK}$	Peak Pulse Power (8/20 $\mu$ s)	33	W
$V_{ESD}$	ESD per IEC61000-4-2 (Air) ESD per IEC61000-4-2 (Contact)	$\pm 8$ $\pm 8$	kV
$T_{OPT}$	Operating Temperature	-55/+125	$^{\circ}$ C
$T_{STG}$	Storage Temperature	-55/+150	$^{\circ}$ C

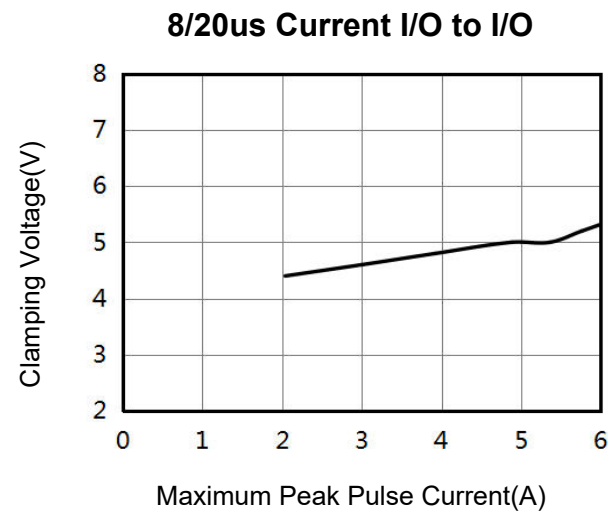
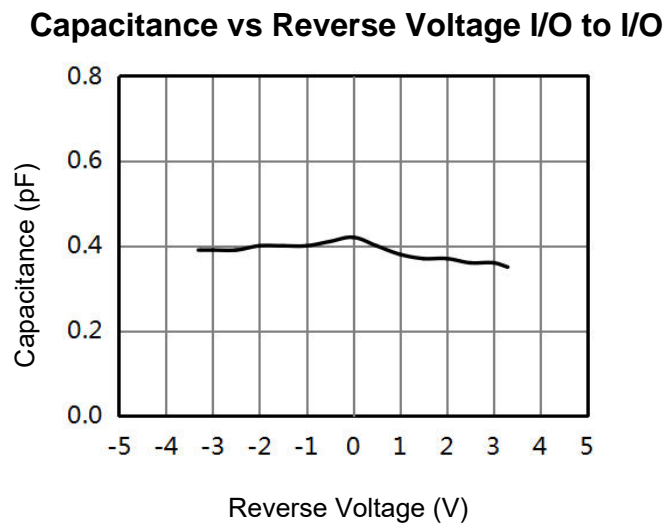
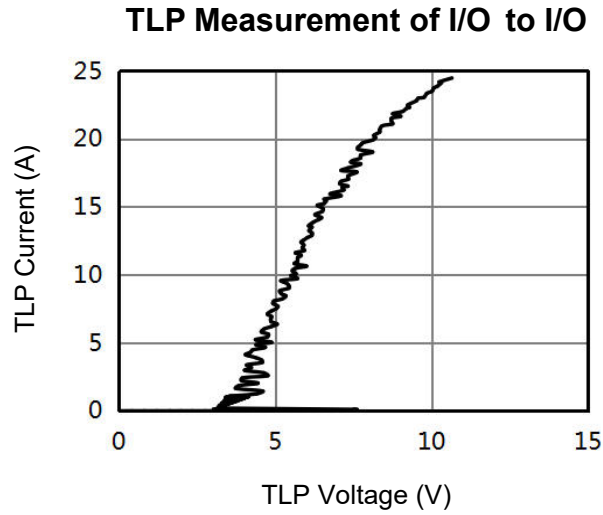
## Electrical Characteristics (T = 25 $^{\circ}$ C)

Symbol	Parameter	Diagram
$V_{RWM}$	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	
$R_{dyn}$	Dynamic Resistance	

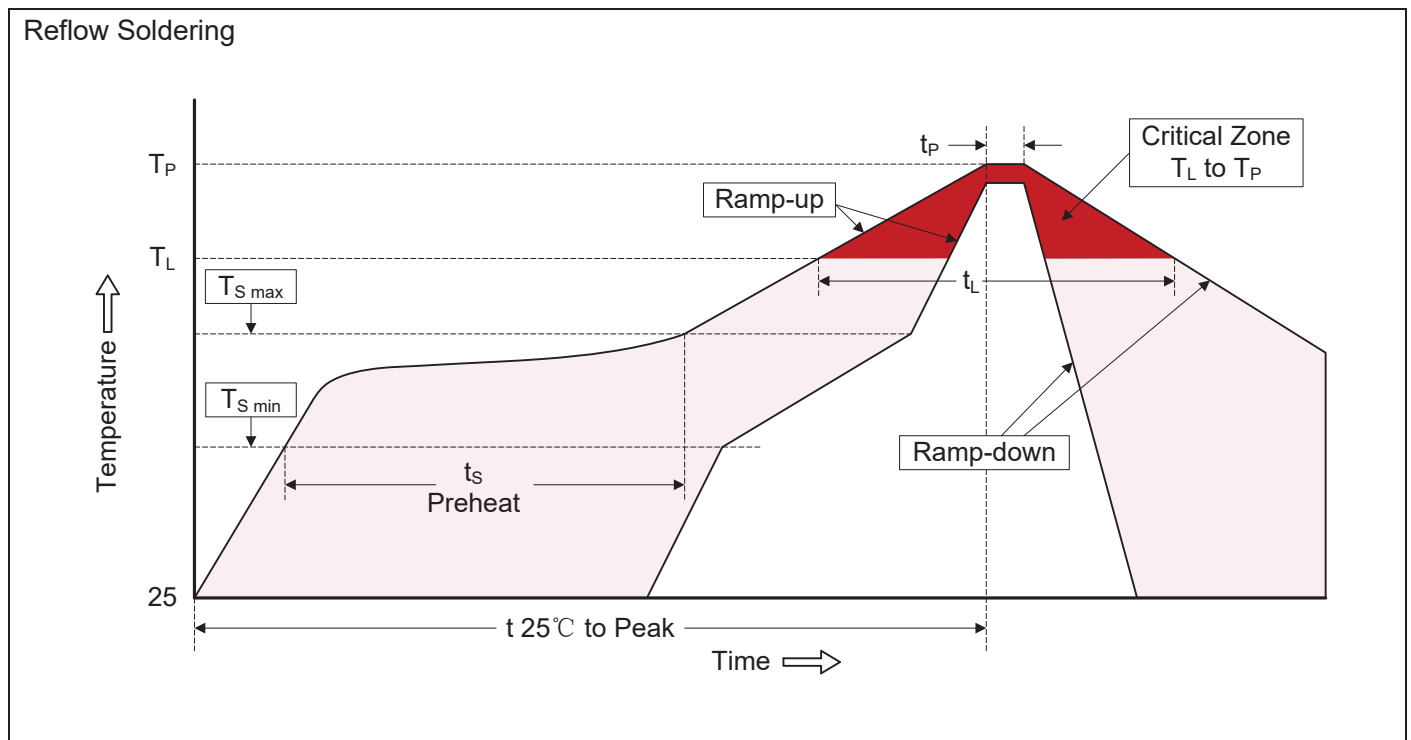
Symbol	Test Condition	Minimum	Typical	Maximum	Units
$V_{RWM}$				3.3	V
$I_R$	$V_{RWM} = 3.3V, T = 25^{\circ}C$		1	10	nA
$V_{BR}$	$I_T = 1mA$	5.5	7.0		V
$V_C$	$I_{PP} = 5.5A, t_p = 8/20\mu s$		6.0	8.0	V
$V_C$	$I_{PP} = 8.0A, t_p = 100ns^{(1)}$		6.0		V
	$I_{PP} = 16.0A, t_p = 100ns^{(1)}$		8.0		V
$R_{dyn}$	$I_{PP} = 12.0A, t_p = 100ns^{(1)}$		0.28		$\Omega$
$C_{ESD}$	$V_R = 0V, f = 1MHz$		0.45		pF

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

## Typical Performance Characteristics



## Recommended Soldering Conditions

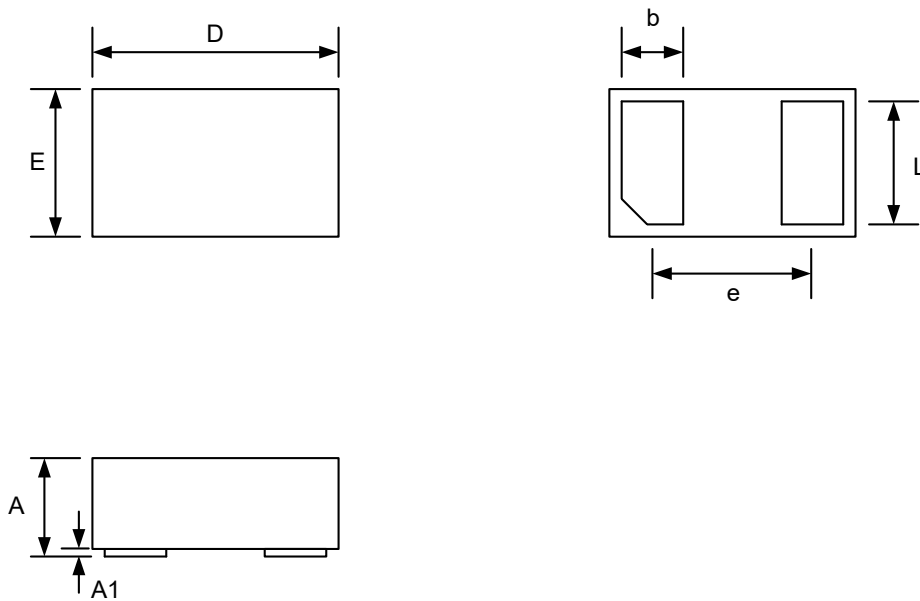


Recommended Conditions

Profile Feature	Pb-Free Assembly
Average ramp-up rate ( $T_L$ to $T_P$ )	3°C/second max.
Preheat -Temperature Min ( $T_{S\ min}$ ) -Temperature Max ( $T_{S\ max}$ ) -Time (min to max) ( $t_s$ )	150°C 200°C 60-180 seconds
$T_{S\ max}$ to $T_L$ -Ramp-up Rate	3°C/second max.
Time maintained above: -Temperature ( $T_L$ ) -Time ( $t_L$ )	217°C 60-150 seconds
Peak Temperature ( $T_P$ )	260°C
Time within 5°C of actual Peak Temperature ( $t_P$ )	20-40 seconds
Ramp-down Rate	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.

## Package Outline

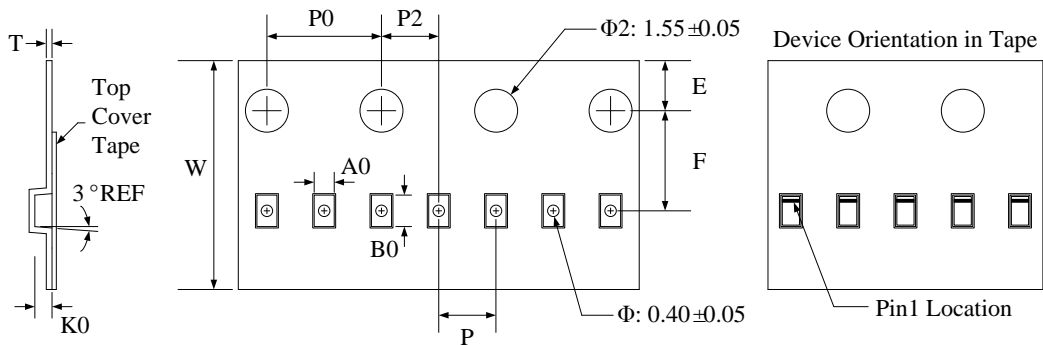
- DFN1006-2L package
- 2 leads, very small package
- MSL-1



Package Dimensions (Controlling dimensions are in millimeters)

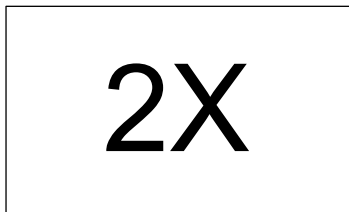
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Minimum	Maximum	Minimum	Maximum
A	0.450	0.550	0.017	0.022
A1	0.000	0.050	0.000	0.002
D	0.950	1.050	0.037	0.041
E	0.550	0.650	0.022	0.026
b	0.200	0.300	0.008	0.012
e	0.650 BSC		0.026 BSC	
L	0.450	0.550	0.018	0.022

## 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

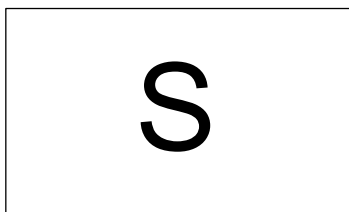
## Marking Codes



**Note:**

- (1) "2" is part number.
- (2) "X" is the internal code.

**OR**



**Note:**

- (1) "S" is part number.

## Ordering Information

Part Number	Working Voltage	Quantity Per Reel	Reel Size
TT0301SBX	3.3V	10,000	7 Inch

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