

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: 0.27pF@0V (Typical) (I/O-I/O)
- Low leakage current: 10nA @ V_{RWM} (Maximum)
- Low clamping voltage
- Each I/O pin can withstand over 1000 ESD strikes for ±8kV contact discharge

Description

TT0321SAX 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 0.27pF only, it is designed to protect parasitic-sensitive systems against over-voltage and over-current transient events.

The TT0321SAX comes in a RoHS compliant and Halogen Free 0.6mm x 0.3mm x 0.3mm DFN0603-2L package.

Applications

- Portable applications
- Communication systems
- Computers and peripherals
- High speed data lines:
 - USB 2.0/3.0/3.1(Gen 1)
 - eSATA
 - DisplayPort

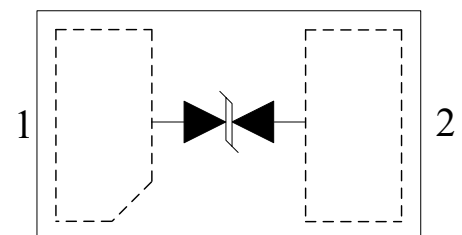
Mechanical Characteristics

- Package: DFN0603-2L
- Marking: Part number
- Packaging: Tape and Reel
- ROHS compliant

Circuit Diagram



Pin Configuration

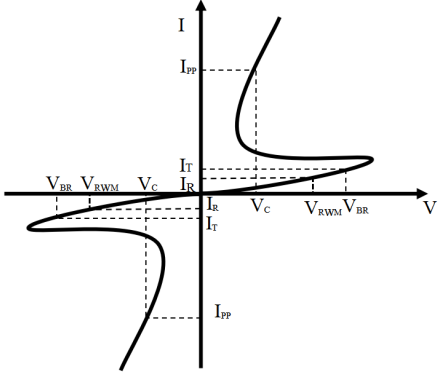


DFN0603-2L
(Top View)

Absolute Maximum Rating

Symbol	Parameter	Value	Units
I_{PP}	Peak Pulse Current (8/20 μ s)	5.5	A
P_{PK}	Peak Pulse Power (8/20 μ s)	26	W
V_{ESD}	ESD per IEC61000-4-2 (Air) ESD per IEC61000-4-2 (Contact)	± 8 ± 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	
α_{IL}	Insertion Loss	

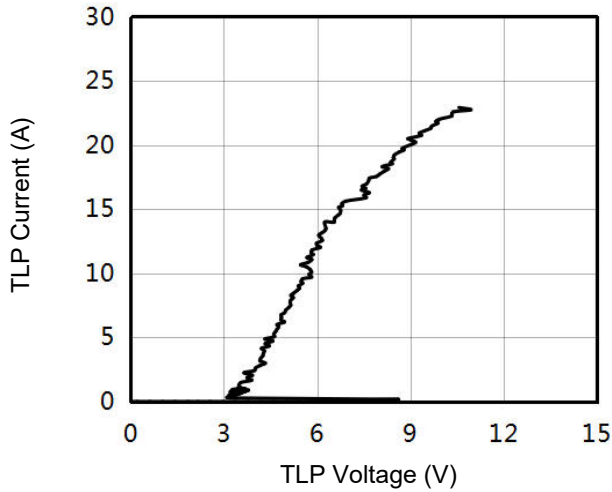
Symbol	Test Condition	Minimum	Typical	Maximum	Units
V_{RWM}				3.3	V
I_R	$V_{RWM} = 3.3V, T = 25^{\circ}C$		1	10	nA
V_{BR}	$I_T = 1mA$	6.0	8.2		V
V_C	$I_{PP} = 5.5A, t_p = 8/20\mu s$		5.2		V
V_C	$I_{PP} = 8.0A, t_p = 100ns^{(1)}$		5.3		V
	$I_{PP} = 16.0A, t_p = 100ns^{(1)}$		7.5		V
R_{dyn}	$I_{PP} = 12.0A, t_p = 100ns^{(1)}$		0.27		Ω

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

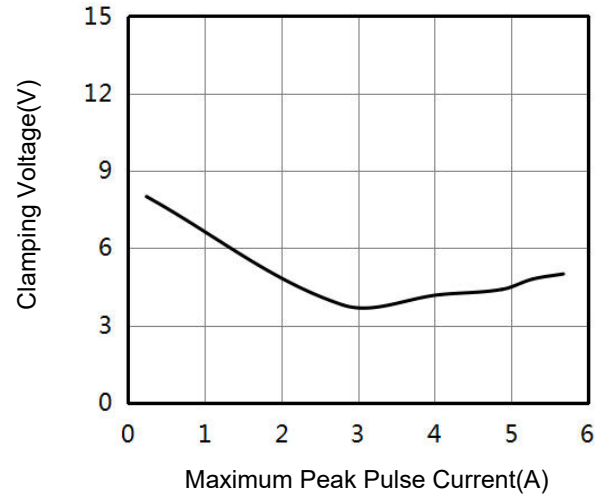
Symbol	Test Condition	Minimum	Typical	Maximum	Units
C_{ESD}	$V_R = 0V, f = 1MHz$		0.27		pF
	$V_R = 0V, f = 5GHz$		0.20		pF
α_{IL}	$f = 5GHz$		-0.15		dB
	$f = 10GHz$		-1.1		dB

Typical Performance Characteristics

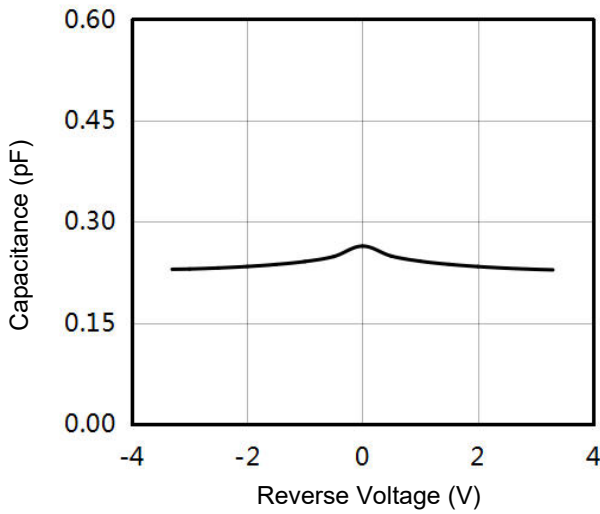
TLP Measurement of I/O to I/O



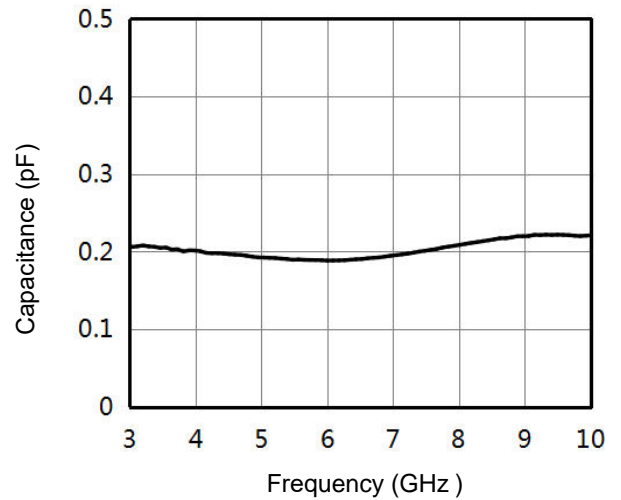
8/20us Current of I/O to I/O



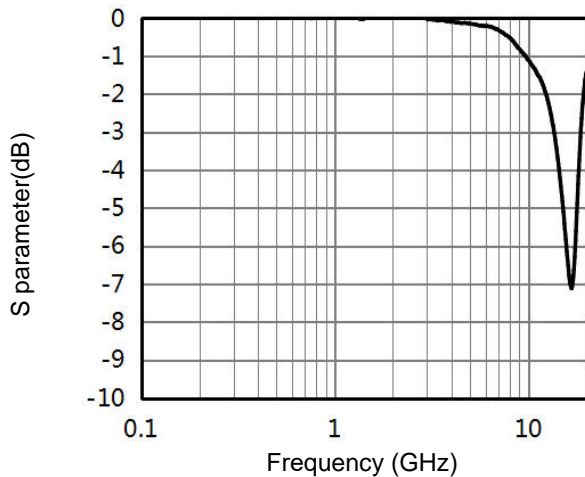
Capacitance vs Reverse Voltage of I/O to I/O



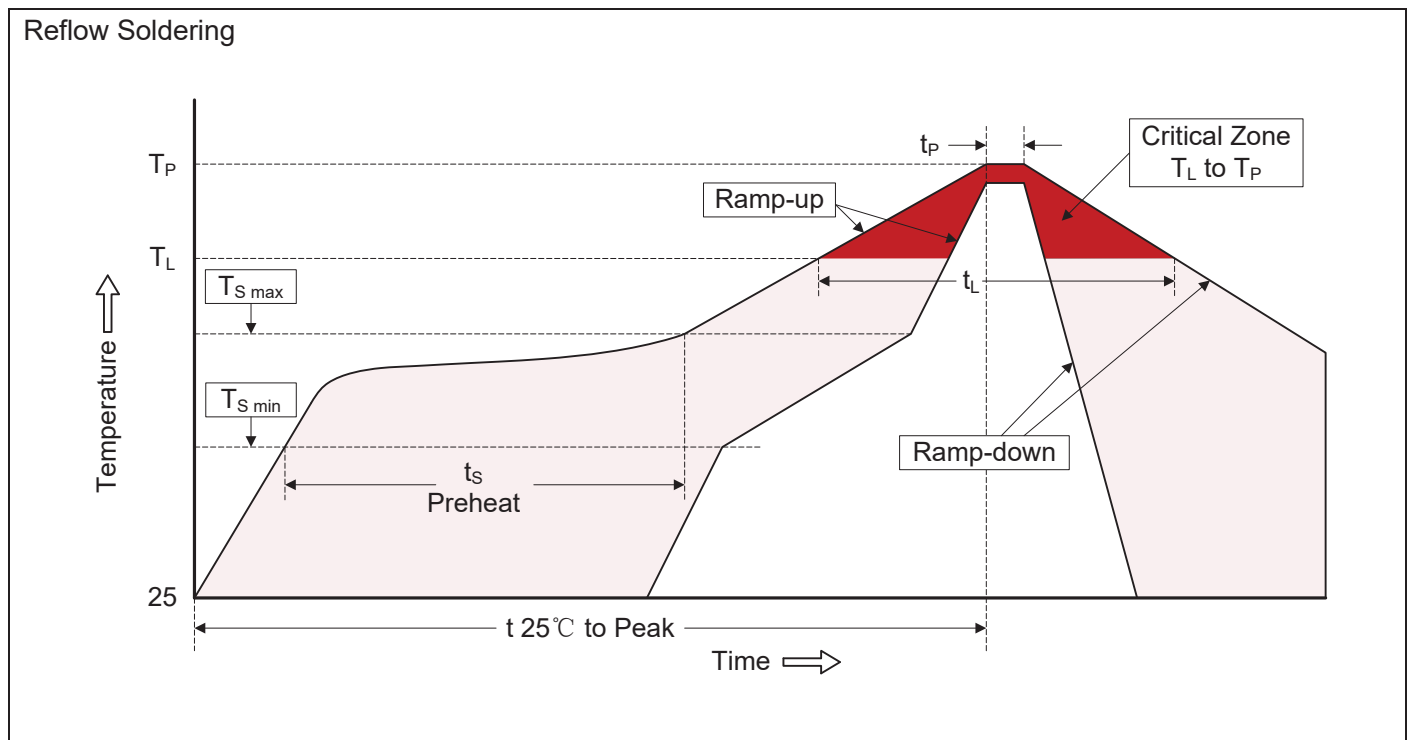
Capacitance vs Frequency of I/O to I/O



Insertion loss



Recommended Soldering Conditions

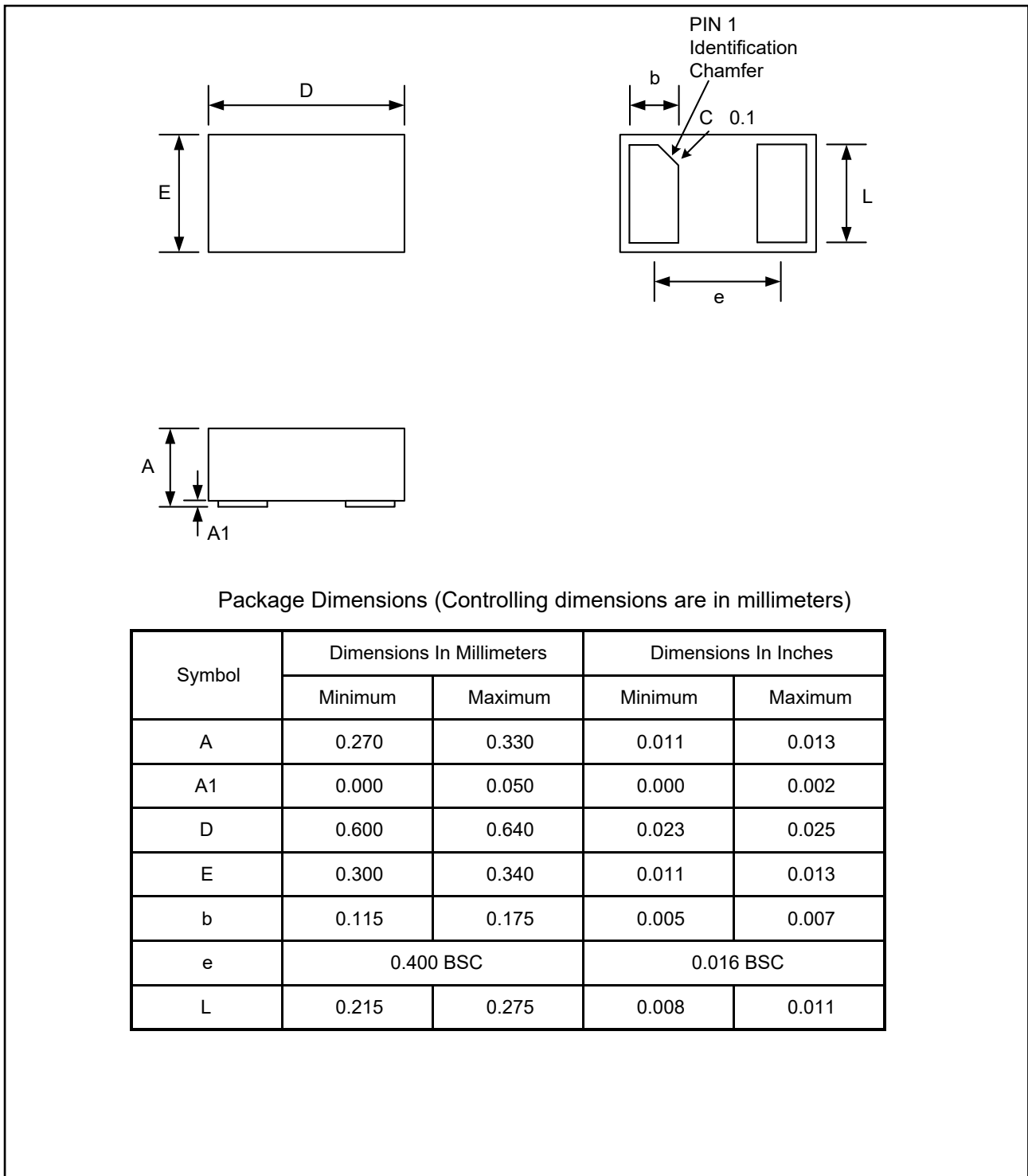


Recommended Conditions

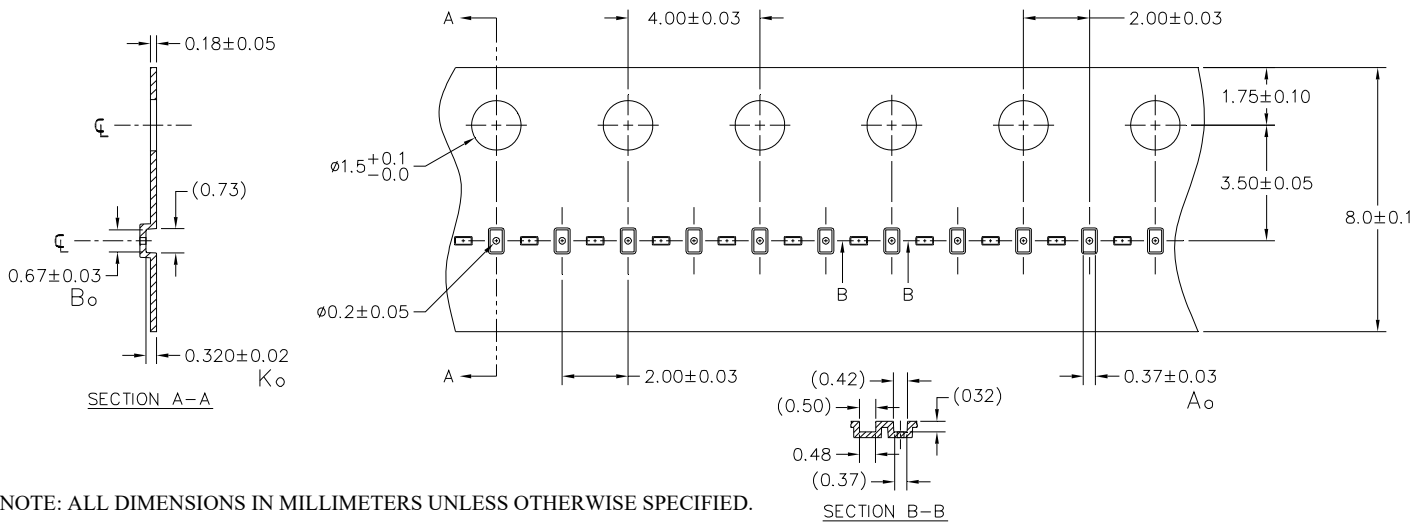
Profile Feature	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	3°C/second max.
Preheat -Temperature Min ($T_{S\ min}$) -Temperature Max ($T_{S\ max}$) -Time (min to max) (t_s)	150°C 200°C 60-180 seconds
$T_{S\ max}$ to T_L -Ramp-up Rate	3°C/second max.
Time maintained above: -Temperature (T_L) -Time (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

- ❑ DFN0603-2L package
- ❑ 2 leads, very small package
- ❑ MSL-1



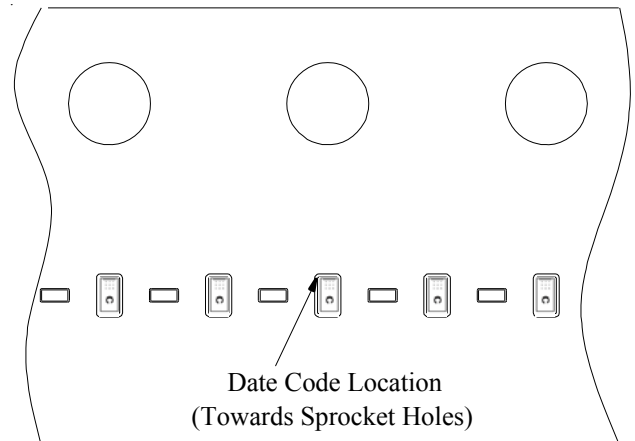
Carries Tape Specification



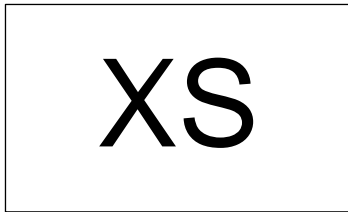
Device Orientation in Tape

A0	B0	K0
0.37 +/-0.03	0.67 +/-0.03	0.32 +/-0.02 mm

Note: All dimensions in mm unless otherwise specified



Marking Codes



OR



Note:

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

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Ordering Information

Part Number	Working Voltage	Quantity Per Reel	Reel Size
TT0321SAX	3.3V	10,000	7Inch