

Features

- Transient protection for high-speed data lines

IEC61000-4-2 (ESD)	±10kV (Air)
	±10kV (Contact)
IEC61000-4-5 (Lightning)	3.0A (8/20µs)
- Small package saves board space
- Protects one I/O line (bidirectional)
- Low capacitance: 0.15pF@0V (Typical) (I/O-I/O)
- Low leakage current: 0.1µA @ V_{RWM} (Maximum)
- Low clamping voltage
- Each I/O pin can withstand over 1000 ESD strikes for ±10kV contact discharge

Description

TT0421SAX 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 0.15pF only, it is designed to protect parasitic-sensitive systems against over-voltage and over-current transient events.

The TT0421SAX 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
 - HDMI 1.4/2.0

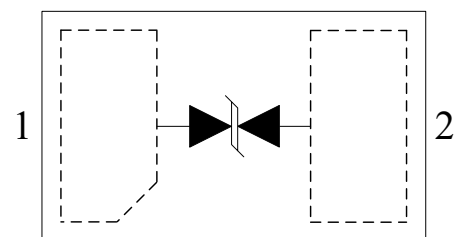
Mechanical Characteristics

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

Circuit Diagram



Pin Configuration

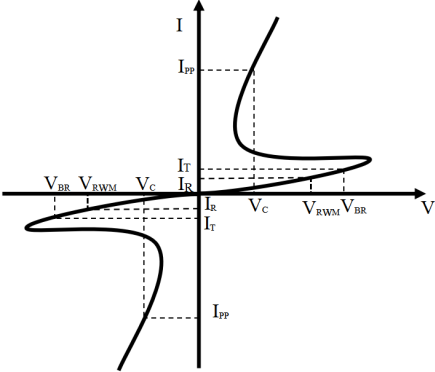


DFN0603-2L
(Top View)

Absolute Maximum Rating

Symbol	Parameter	Value	Units
I_{PP}	Peak Pulse Current (8/20 μ s)	3	A
V_{ESD}	ESD per IEC61000-4-2 (Air) ESD per IEC61000-4-2 (Contact)	± 10 ± 10	kV
T_{OPT}	Operating Temperature	-55/+125	°C
T_{STG}	Storage Temperature	-55/+150	°C

Electrical Characteristics (T = 25°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	

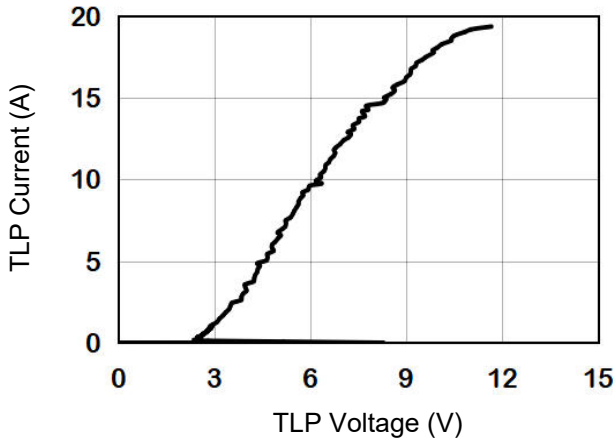
Symbol	Test Condition	Minimum	Typical	Maximum	Units
V_{RWM}			3.3	4.5	V
I_R	$V_{RWM} = 4.5V, T = 25^\circ C$			100	nA
V_{BR}	$I_T = 100\mu A$	5.0		9.0	V
V_C	$I_{PP} = 3A, t_p = 8/20\mu s$		4.5		V
V_C	$I_{PP} = 8.0A, t_p = 100ns^{(1)}$		5.2		V
	$I_{PP} = 16.0A, t_p = 100ns^{(1)}$		8.3		V
R_{dyn}	$I_{PP} = 12.0A, t_p = 100ns^{(1)}$		0.39		Ω

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

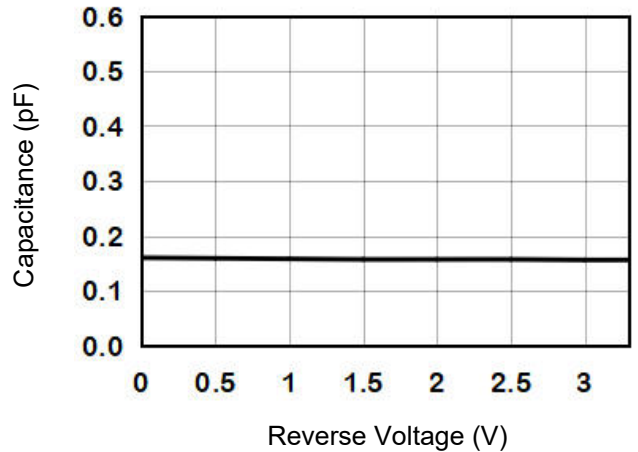
Symbol	Test Condition	Minimum	Typical	Maximum	Units
C_{ESD}	$V_R = 0V, f = 1MHz$		0.15		pF
	$V_R = 1V, f = 1GHz$		0.12		pF
Q_{IL}	$f = 5GHz$		-0.04		dB
	$f = 10GHz$		-0.63		dB

Typical Performance Characteristics

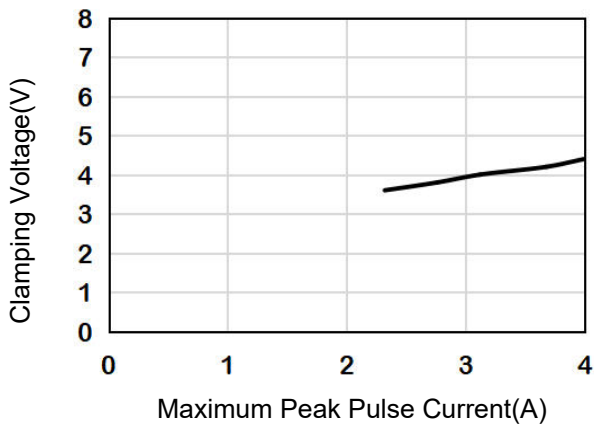
TLP Measurement of I/O to I/O



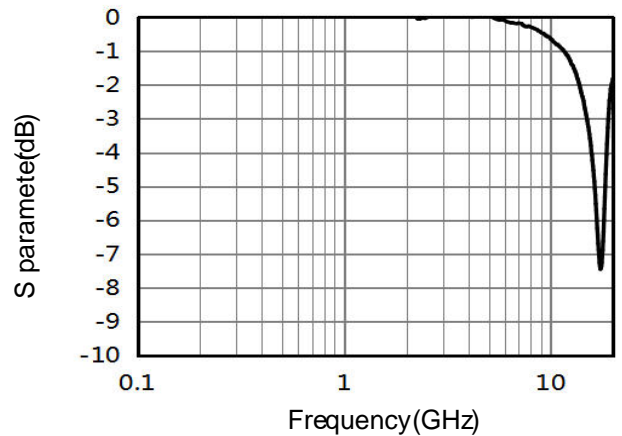
Capacitance vs Reverse Voltage IO to IO



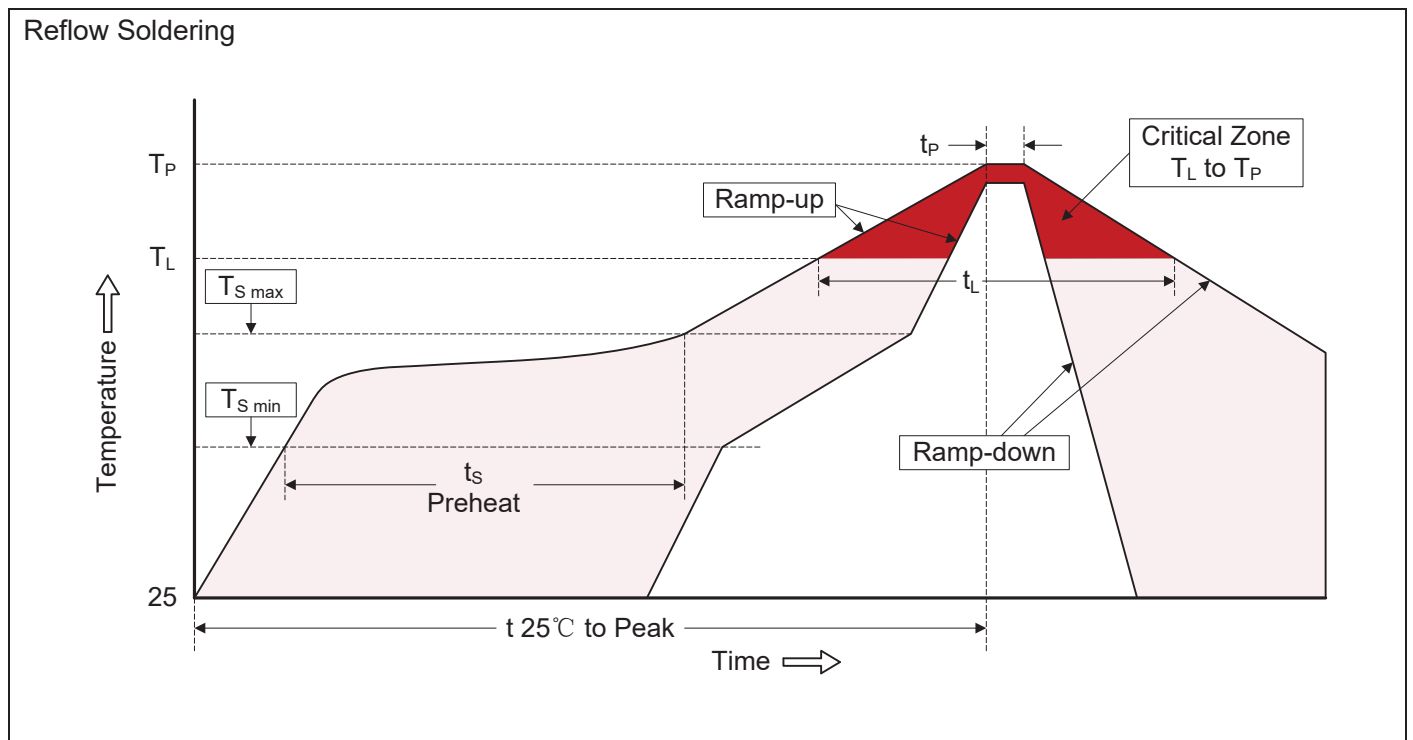
8/20us Current IO to IO



Insertion loss



Recommended Soldering Conditions

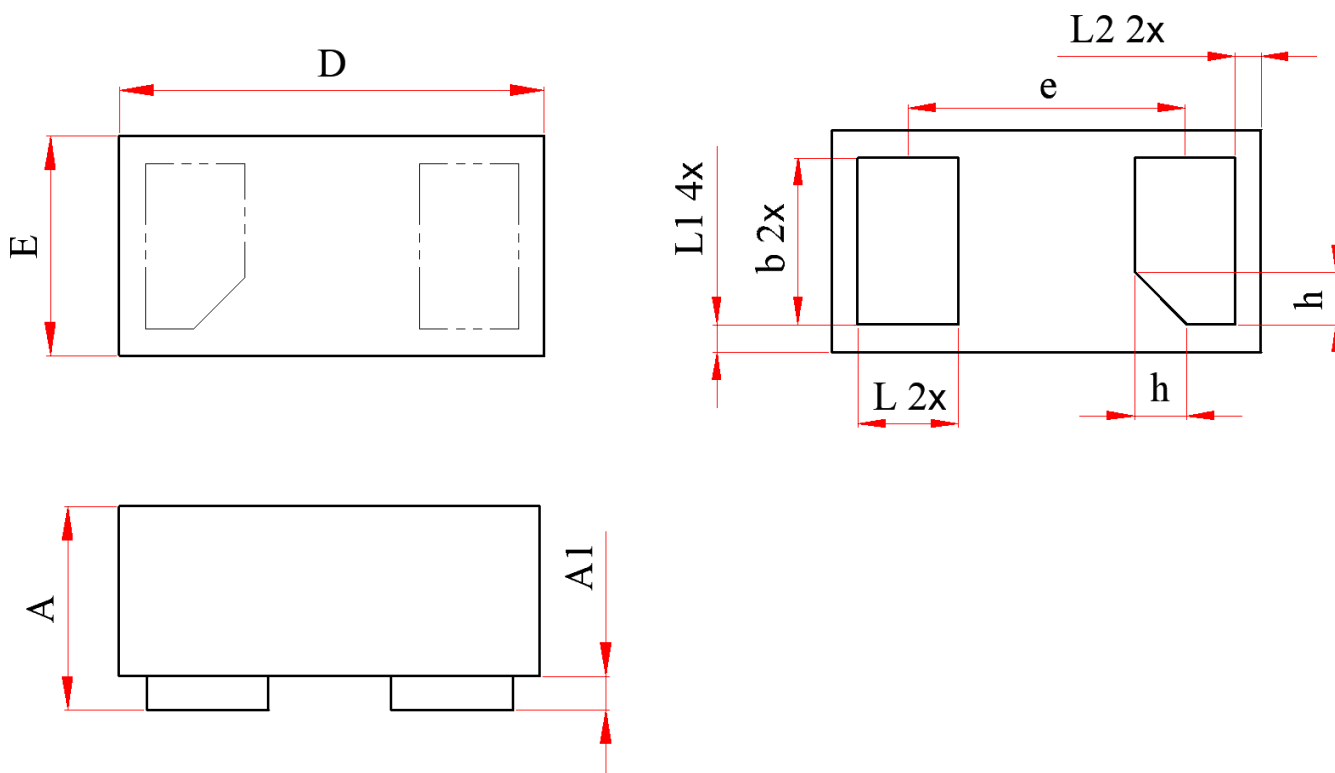


Recommended Conditions

Profile Feature	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	3°C/second max.
Preheat	
-Temperature Min ($T_{S\ min}$)	150°C
-Temperature Max ($T_{S\ max}$)	200°C
-Time (min to max) (t_s)	60-180 seconds
$T_{S\ max}$ to T_L	
-Ramp-up Rate	3°C/second max.
Time maintained above:	
-Temperature (T_L)	217°C
-Time (t_L)	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.

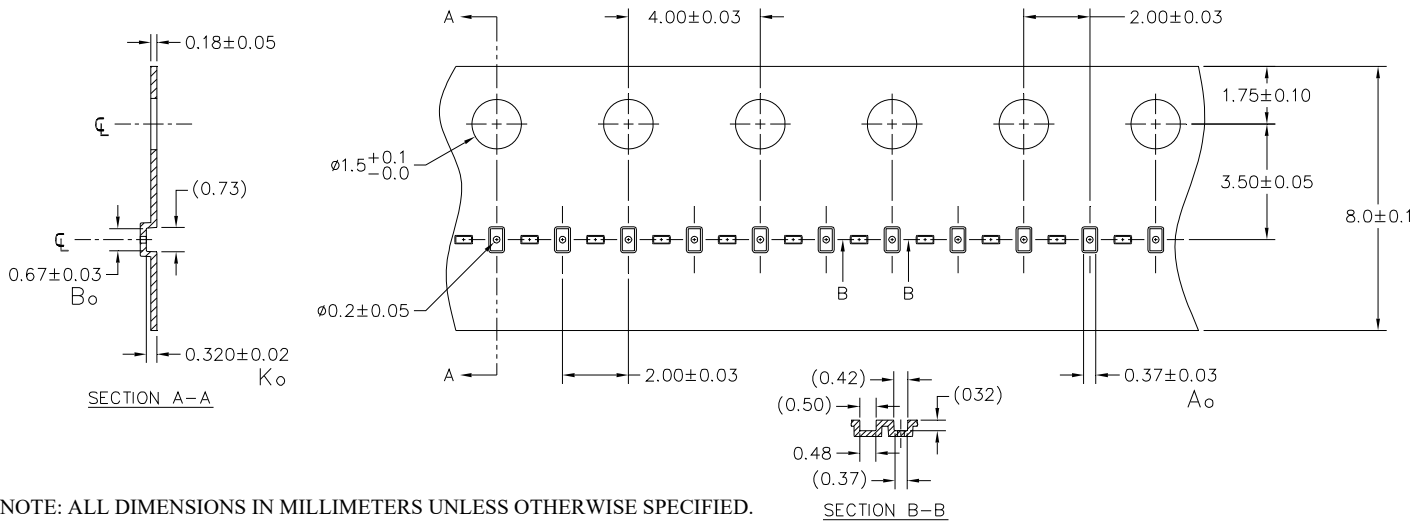
Package Outline

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



Symbol	Dimension In Millimeters			Dimension In Inches		
	Normal	Min	Max	Normal	Min	Max
A	--	0.270	0.330	--	0.011	0.013
A1	--	--	0.050	--	--	0.002
D	0.620	0.600	0.640	0.024	0.023	0.025
E	0.320	0.300	0.340	0.012	0.011	0.013
b	0.245	0.215	0.275	0.010	0.008	0.011
L	0.145	0.115	0.175	0.006	0.005	0.007
L1	0.038 REF			0.001 REF		
L2	0.038 REF			0.001 REF		
h	0.075 REF			0.003 REF		
e	0.400 BSC			0.016 BSC		

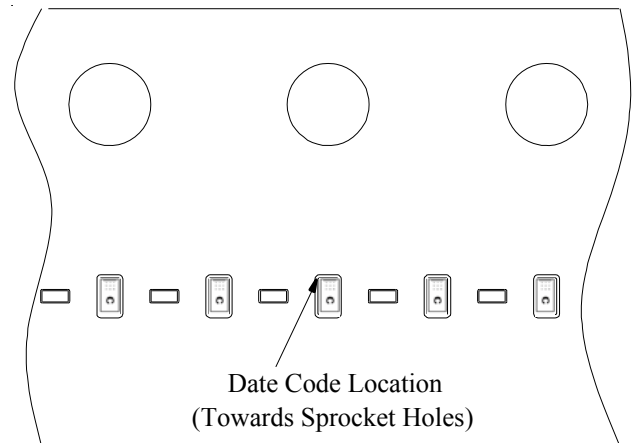
Carries Tape Specification



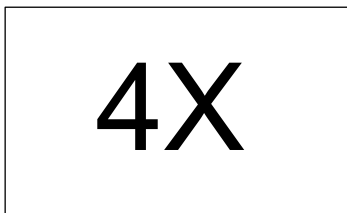
Device Orientation in Tape

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



Ordering Information

Part Number	Working Voltage	Quantity Per Reel	Reel Size
TT0421SAX	4.5V	10,000	7 Inch

Note:

- (1) "4" and "A" is part number.
- (2) "X" is the internal code.