

## Description

The ST0521D2 is a bi-directional TVS diode, utilizing leading monolithic silicon technology to provide fast response time and low ESD clamping voltage, making this device an ideal solution for protecting voltage sensitive high-speed data lines. The ST0521D2 has an ultra-low capacitance with a typical value at 0.26pF, and complies with the IEC 61000-4-2 (ESD) standard with  $\pm 15\text{kV}$  air and  $\pm 8\text{kV}$  contact discharge. It is assembled into an ultra-small 0.6x0.3x0.3mm lead-free DFN package. The small size, ultra-low capacitance and high ESD surge protection make ST0521D2 an ideal choice to protect cell phone, digital video interfaces and other high speed ports.

## Features

- ◆ Ultra small package: 0.6x0.3x0.3mm
- ◆ Ultra low capacitance: 0.26pF typical
- ◆ Ultra low leakage: nA level
- ◆ Low operating voltage: 5V
- ◆ Low clamping voltage
- ◆ 2-pin leadless package
- ◆ Complies with following standards:
  - IEC 61000-4-2 (ESD) immunity test  
Air discharge:  $\pm 20\text{kV}$   
Contact discharge:  $\pm 15\text{kV}$
  - IEC61000-4-4 (EFT) 40A (5/50ns)
  - IEC61000-4-5 (Lightning) 4A (8/20 $\mu\text{s}$ )
- ◆ RoHS Compliant

## Mechanical Characteristics

- ◆ Package: DFN0603-2
- ◆ Lead Finish: NiPdAu
- ◆ Case Material: “Green” Molding Compound.
- ◆ UL Flammability Classification Rating 94V-0
- ◆ Moisture Sensitivity: Level 3 per J-STD-020
- ◆ Terminal Connections: See Diagram Below
- ◆ Marking Information: See Below

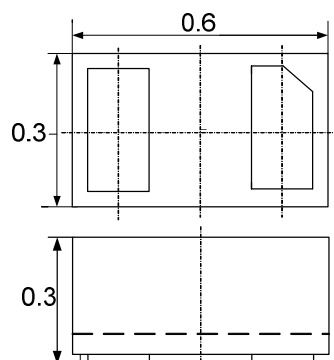
## Applications

- ◆ Cellular Handsets and Accessories
- ◆ Display Ports
- ◆ MDDI Ports
- ◆ USB Ports
- ◆ Digital Video Interface (DVI)
- ◆ PCI Express and Serial SATA Ports

## Ordering Information

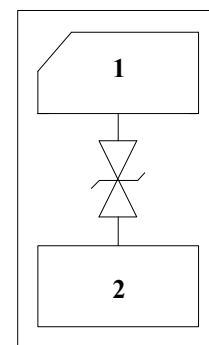
Part Number	Packaging	Reel Size
ST0521D2	10000/Tape & Reel	7 inch

## Dimensions



Maximum Dimensions (mm)

## Schematic and PIN Configuration



DFN0603-2 (Bottom View)

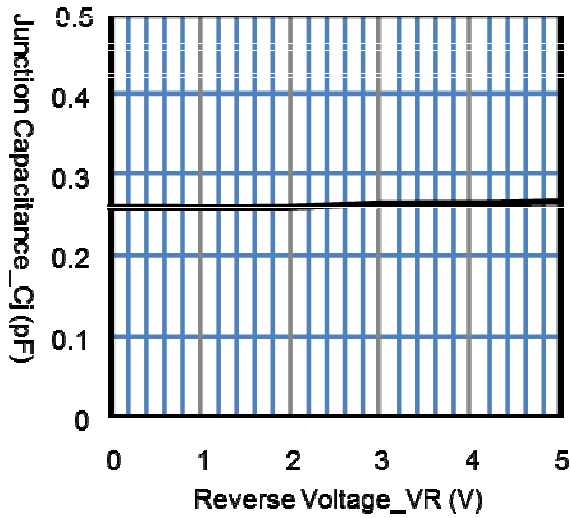
**Absolute Maximum Ratings (TA=25°C unless otherwise specified)**

Parameter	Symbol	Value	Unit
Peak Pulse Power (8/20μs)	Ppk	100	W
Peak Pulse Current (8/20μs)	I <sub>PP</sub>	4	A
ESD per IEC 61000-4-2 (Air)	V <sub>ESD</sub>	±20	kV
ESD per IEC 61000-4-2 (Contact)		±15	
Operating Temperature Range	T <sub>J</sub>	-55 to +125	°C
Storage Temperature Range	T <sub>stg</sub>	-55 to +150	°C

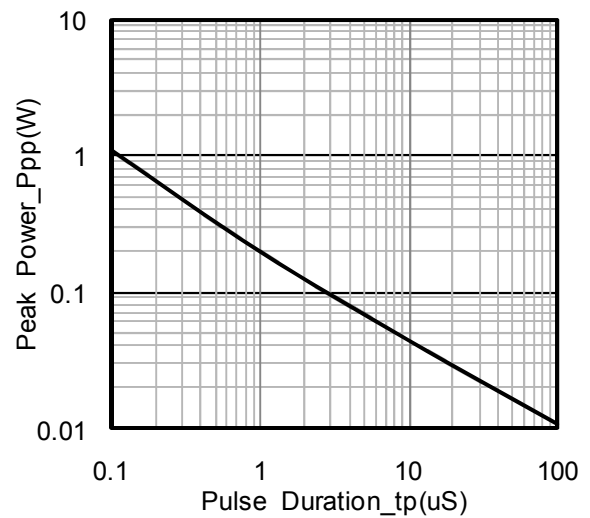
**Electrical Characteristics (TA=25°C unless otherwise specified)**

Parameter	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Working Voltage	V <sub>RWM</sub>			5	V	
Breakdown Voltage	V <sub>BR</sub>	5.4		9	V	I <sub>T</sub> = 1mA
Reverse Leakage Current	I <sub>R</sub>			0.5	μA	V <sub>RWM</sub> = 5V
Clamping Voltage	V <sub>C</sub>			12	V	I <sub>PP</sub> = 1A (8 x 20μs pulse)
Clamping Voltage	V <sub>C</sub>			25	V	I <sub>PP</sub> = 4A (8 x 20μs pulse)
Junction Capacitance	C <sub>J</sub>		0.26	0.35	pF	V <sub>R</sub> = 0V, f = 1MHz

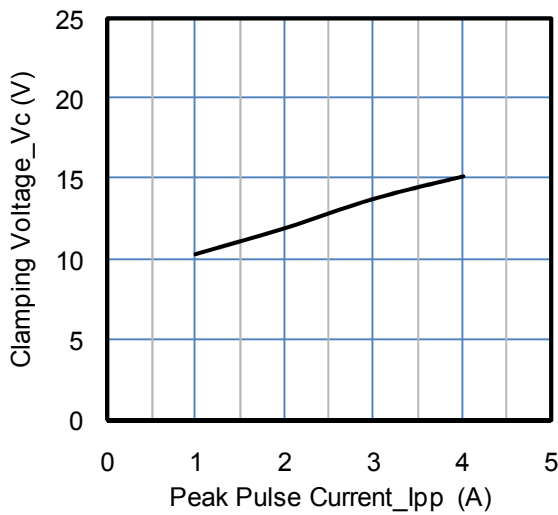
# Typical Performance Characteristics (TA=25°C unless otherwise specified)



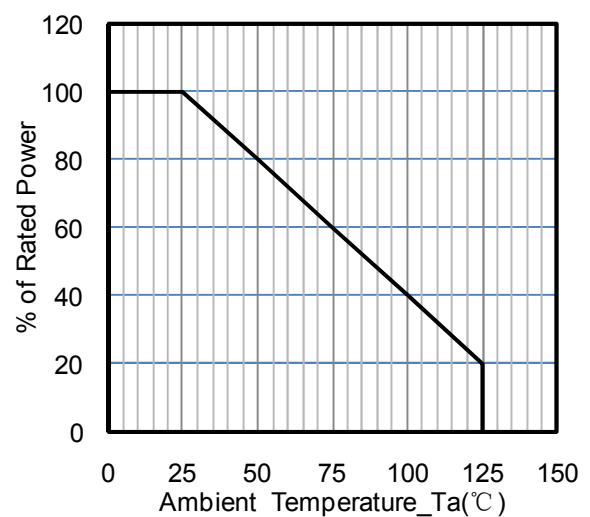
Junction Capacitance vs. Reverse Voltage



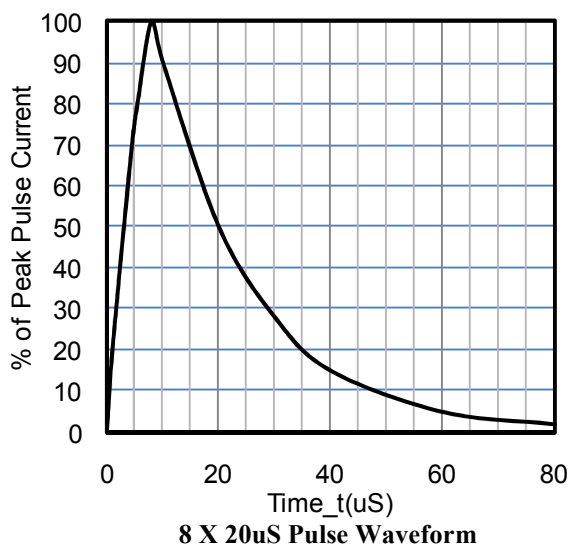
Peak Pulse Power vs. Pulse Time



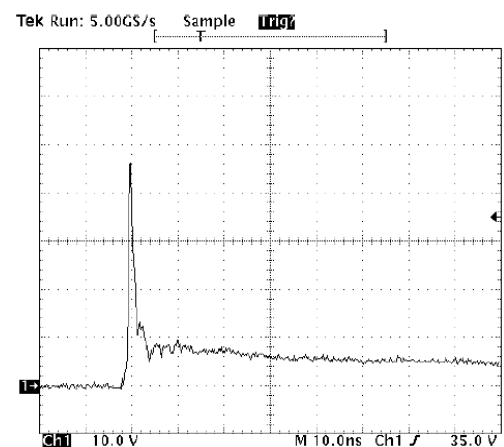
Clamping Voltage vs. Peak Pulse Current



Power Derating Curve



8 X 20uS Pulse Waveform



ESD Clamping Voltage

8 kV Contact per IEC61000-4-2

## Applications Information

### Device Connection Options

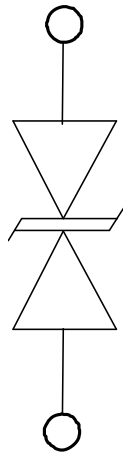
These low capacitance TVS diodes are designed to provide common mode protection for one high-speed line or differential protection for one line pair. The device is bidirectional and may be used on lines where the signal polarity is positive and negative.

### Circuit Board Layout Recommendations for Suppression of ESD

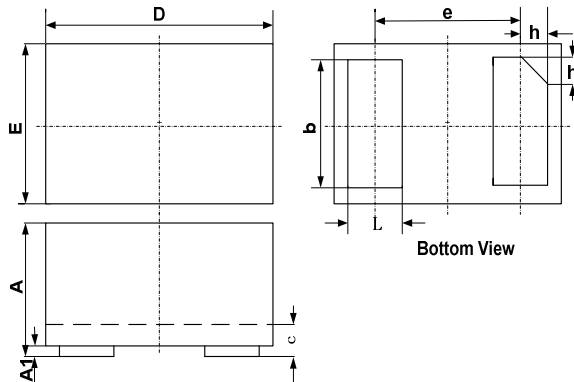
Good circuit board layout is critical for the suppression of ESD induced transients. The following guidelines are recommended:

- ◆ Place the TVS near the input terminals or connectors to restrict transient coupling.
- ◆ Minimize the path length between the TVS and the protected line.
- ◆ Minimize all conductive loops including power and ground loops.
- ◆ The ESD transient return path to ground should be kept as short as possible.
- ◆ Never run critical signals near board edges.
- ◆ Use ground planes whenever possible.

### Equivalent Circuit Diagram

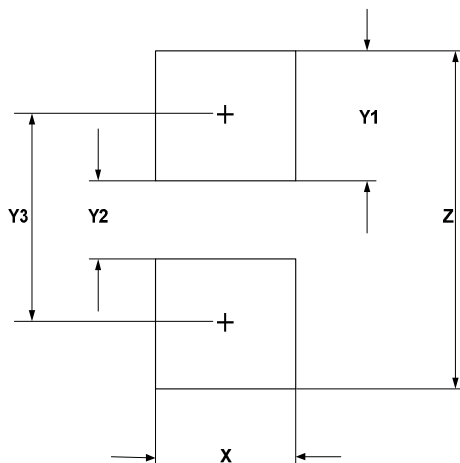


## DFN0603-2 Package Outline Drawing



SYM	DIMENSIONS		
	MILLIMETERS		
	MIN	NOM	MAX
A	0.230		0.330
A1	0.000	0.020	0.050
b	0.215	0.245	0.275
c	0.120	0.150	0.180
D	0.550	0.600	0.650
e	0.355 BSC		
E	0.250	0.300	0.350
L	0.160	0.190	0.220
h	0.079 BSC		

## Suggested Land Pattern



SYM	DIMENSIONS	
	MILLIMETERS	INCHES
X	0.30	0.012
Y1	0.25	0.010
Y2	0.15	0.006
Y3	0.40	0.016
Z	0.65	0.026

## Contact Information

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