

Features

- ❑ Transient protection for high-speed data lines
 - IEC 61000-4-2 (ESD) ±30kV (Air)
 - ±30kV (Contact)
 - IEC 61000-4-4 (EFT) 40A (5/50 ns)
 - Cable Discharge Event (CDE)
- ❑ Package optimized for high-speed lines
- ❑ Ultra-small package (0.6mm×0.3mm×0.3mm)
- ❑ Protects one data, control or power line
- ❑ Low capacitance: 12pF (Typical)
- ❑ Low leakage current: 0.1μA @ V_{RWM} (Typical)
- ❑ Low clamping voltage
- ❑ Each I/O pin can withstand over 1000 ESD strikes for ±8kV contact discharge

Description

TT0301MAX is a low-capacitance Transient Voltage Suppressor (TVS) designed to provide electrostatic discharge (ESD) protection for high-speed data interfaces. With typical capacitance of 12pF only, TT0301MAX 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, ±8 kV 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.

TT0301MAX uses ultra-small DFN0603 package. Each TT0301MAX device can protect one data line. It offers system designers flexibility to protect single data line where space is a premium concern.

Applications

- ❑ Portable Electronics
- ❑ Desktops, Servers and Notebooks
- ❑ Cellular Phones
- ❑ MP3 Ports
- ❑ Digital Camera Ports

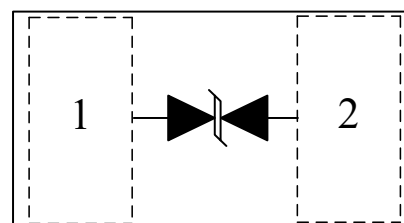
Mechanical Characteristics

- ❑ DFN0603 package
- ❑ Flammability Rating: UL 94V-0
- ❑ Marking: Part number
- ❑ Packaging: Tape and Reel

Circuit Diagram



Pin Configuration



DFN0603
(Top View)

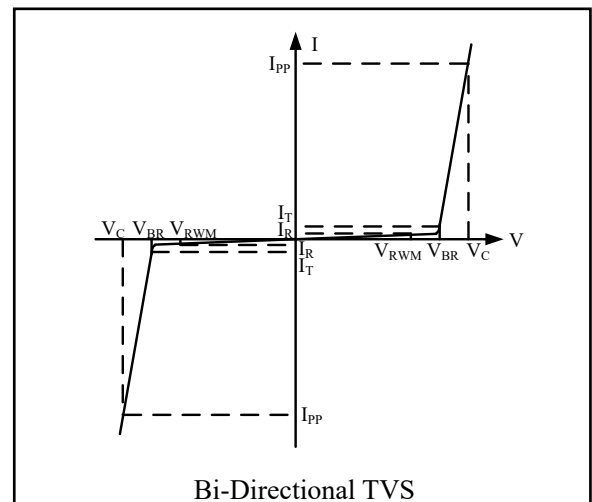


Absolute Maximum Rating

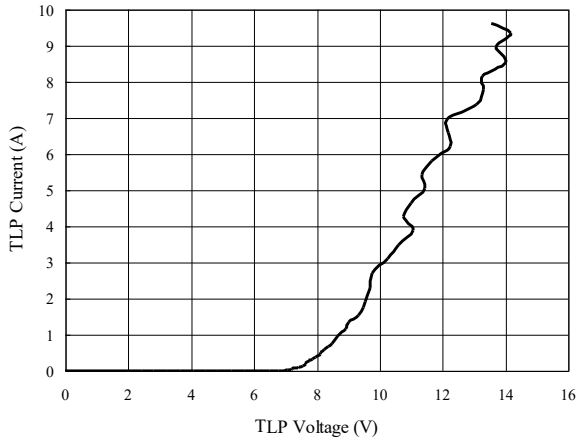
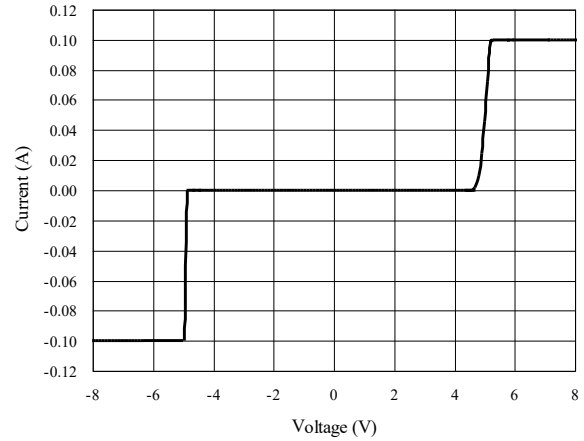
| Symbol | Parameter | Value | Units |
|-----------|---------------------------------|----------|-------------|
| V_{ESD} | ESD per IEC 61000-4-2 (Air) | ± 30 | kV |
| | ESD per IEC 61000-4-2 (Contact) | ± 30 | |
| T_{OPT} | Operating Temperature | -55/+125 | $^{\circ}C$ |
| T_{STG} | Storage Temperature | -55/+150 | $^{\circ}C$ |

Electrical Characteristics (T = 25°C)

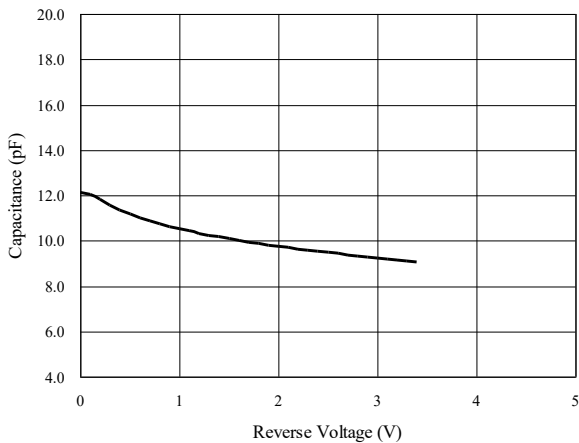
| Symbol | Parameter |
|-----------|-------------------------------------|
| V_{RWM} | Nominal Reverse Working Voltage |
| I_R | Reverse Leakage Current @ V_{RWM} |
| V_{BR} | Reverse Breakdown Voltage @ I_T |
| I_T | Test Current for Reverse Breakdown |
| V_C | Clamping Voltage @ I_{PP} |
| I_{PP} | Maximum Peak Pulse Current |
| C_{ESD} | Parasitic Capacitance |
| V_R | Reverse Voltage |
| f | Small Signal Frequency |



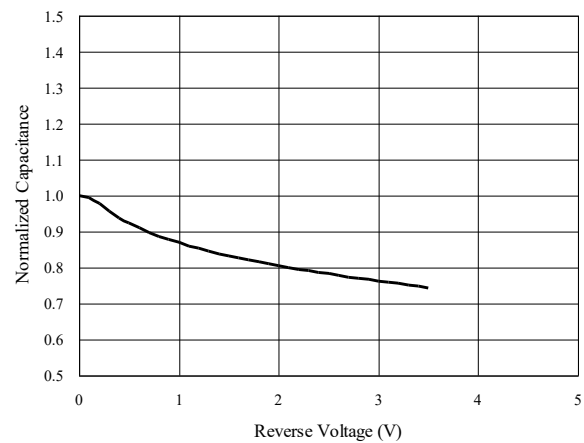
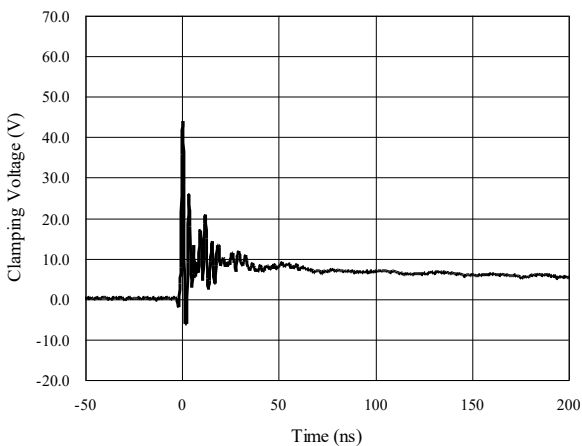
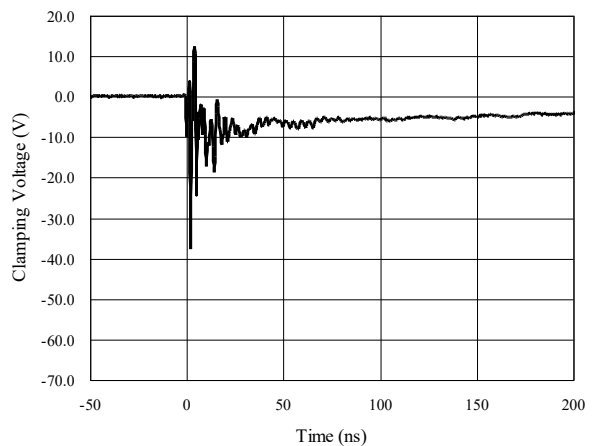
| Symbol | Test Condition | Minimum | Typical | Maximum | Units |
|-----------|--|---------|---------|---------|---------|
| V_{RWM} | | | | 3.3 | V |
| I_R | $V_{RWM} = 3.3V, T = 25^{\circ}C$ Between I/O_1 and I/O_2 | | 0.1 | 1.0 | μA |
| V_{BR} | $I_T = 1mA$ Between I/O_1 and I/O_2 | 3.8 | | 6.0 | V |
| V_C | $I_{PP} = 1A, t_p = 8/20\mu s$ Between I/O_1 and I/O_2 | | | 8 | V |
| V_C | $I_{PP} = 4A, t_p = 8/20\mu s$ Between I/O_1 and I/O_2 | | | 10 | V |
| C_{ESD} | $V_R = 0V, f = 1MHz$ Between I/O_1 and I/O_2 | | 12 | 15 | pF |

TLP Measurement of I/O_1 to I/O_2

Voltage Sweeping of I/O_1 to I/O_2

Capacitance vs. Voltage of I/O_1 to I/O_2 (f = 1MHz)

Capacitance vs. Reverse Voltage

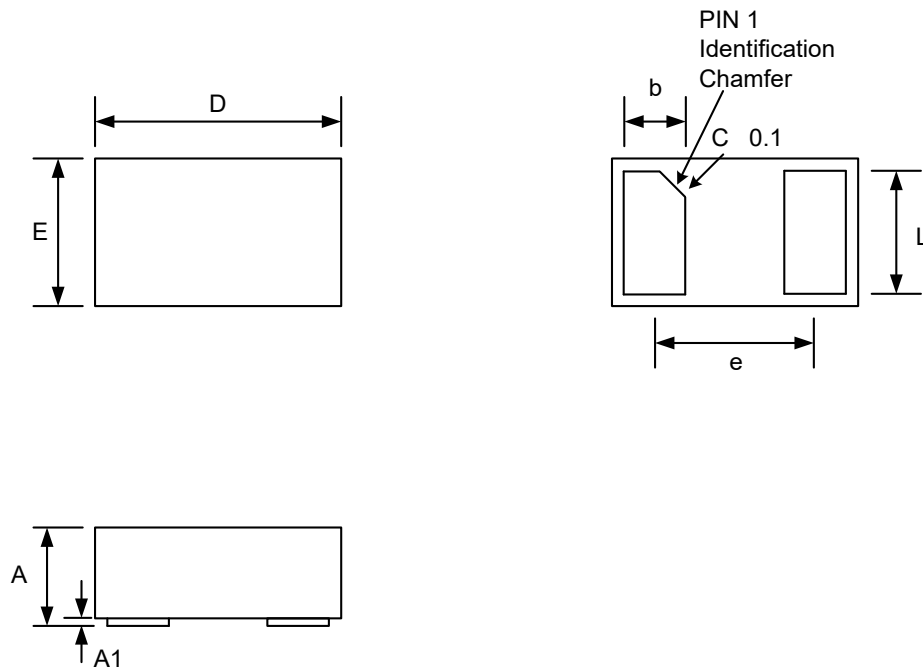


Normalized Capacitance vs. Reverse Voltage


**ESD Clamping of I/O_1 to I/O_2
(+8kV Contact per IEC 61000-4-2)**

**ESD Clamping of I/O_1 to I/O_2
(-8kV Contact per IEC 61000-4-2)**


Package Outline

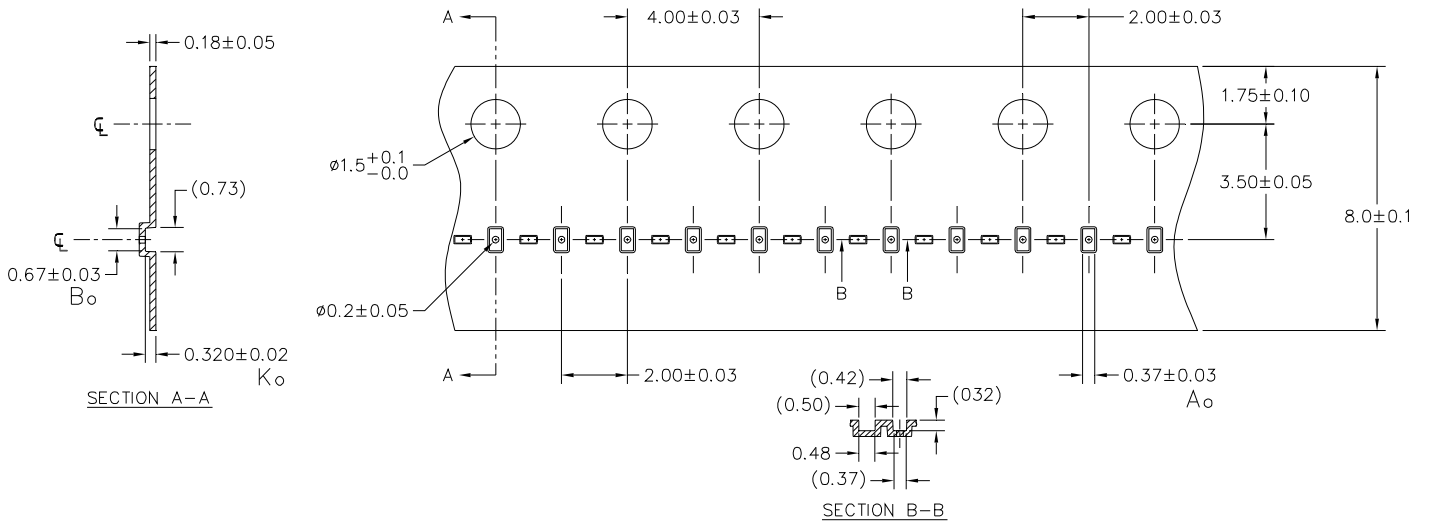
- DFN0603-2L package
- 2 leads, very small package
- MSL-1



Package Dimensions (Controlling dimensions are in millimeters)

| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|---------|----------------------|---------|
| | Minimum | Maximum | Minimum | Maximum |
| A | 0.270 | 0.330 | 0.011 | 0.013 |
| A1 | 0.000 | 0.050 | 0.000 | 0.002 |
| D | 0.600 | 0.640 | 0.023 | 0.025 |
| E | 0.300 | 0.340 | 0.011 | 0.013 |
| b | 0.115 | 0.175 | 0.005 | 0.007 |
| e | 0.400 BSC | | 0.016 BSC | |
| L | 0.215 | 0.275 | 0.008 | 0.011 |

Carries Tape Specification

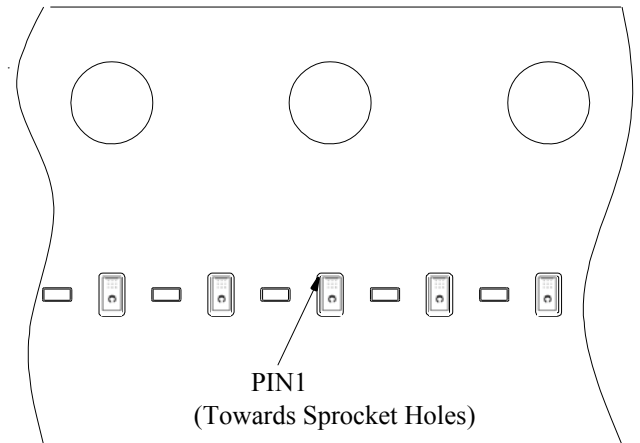


NOTE: ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.

Device Orientation in Tape

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

Note: All dimensions in mm unless otherwise specified



Marking Codes



Note:

(1) "3A" is part number, fixed

Ordering Information

| Part Number | Qty per Reel | Reel Size |
|-------------|--------------|-----------|
| TT0301MAX | 10,000 | 7 inch |