

Features

- ❑ Transient protection for high-speed data lines
 - IEC 61000-4-2 (ESD) ±30kV (Air)
 - ±30kV (Contact)
 - IEC 61000-4-4 (EFT) 80A (5/50 ns)
 - IEC 61000-4-5 (Surge) 40A (8/20µs)
- ❑ Package optimized for high-speed lines
- ❑ Provides protection for one line pair
- ❑ Low capacitance: 4.5pF (Typical)
- ❑ Low leakage current: 0.01µA @ V_{RWM} (Typical)
- ❑ Low operating and clamping voltage
- ❑ Each I/O pin can withstand over 1000 ESD strikes for ±8kV contact discharge
- ❑ ROHS compliant

Description

TS0301PEX is a low-capacitance Transient Voltage Suppressor (TVS) array designed to provide electrostatic discharge (ESD) protection for high-speed data interfaces. With typical capacitance of 4.5pF only, TS0301PEX 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, ±8kV contact discharge), IEC 61000-4-4 (electrical fast transient - EFT) (40A, 5/50 ns), IEC 61000-4-5 (Surge) (35 A, 8/20µs), very fast charged device model (CDM) ESD and cable discharge event (CDE), etc.

TS0301PEX is in a SOD323 package. Each TS0301PEX device can protect one high-speed line pair. The “flow-thru” design minimizes trace inductance and reduces voltage overshoot associated with ESD events. The combined features of low capacitance and high ESD robustness make TS0301PEX ideal for portable applications such as cellular phones and MP3 players. The low clamping voltage of the TS0301PEX guarantees a minimum stress on the protected IC.

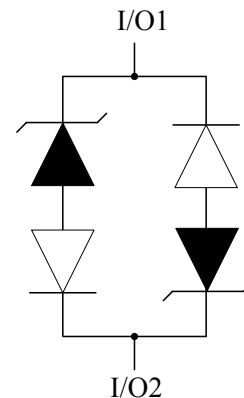
Applications

- ❑ Portable instruments
- ❑ Desktops, Servers and Notebooks
- ❑ Cellular Phones
- ❑ MP3 Players
- ❑ Keypads, Side Keys

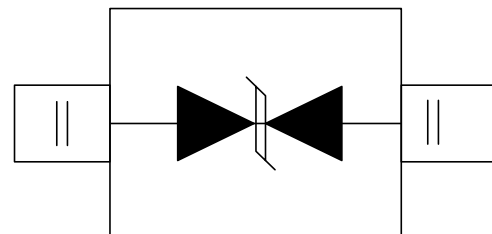
Mechanical Characteristics

- ❑ SOD323 package
- ❑ Flammability Rating: UL 94V-0
- ❑ Marking: Part number
- ❑ Packaging: Tape and Reel

Circuit Diagram



Pin Configuration



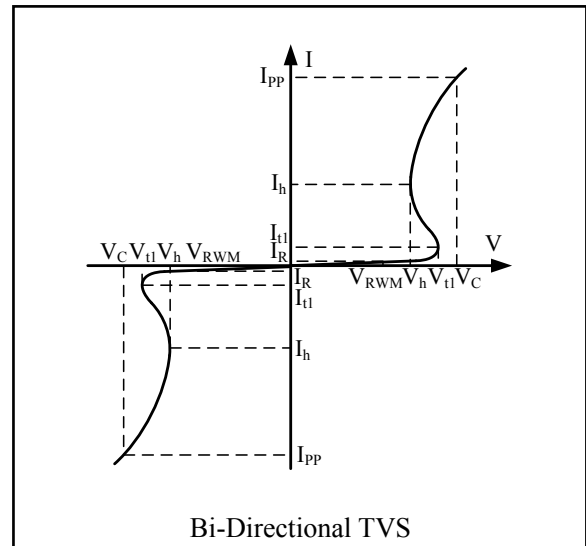
SOD-323
(Top View)

Absolute Maximum Rating

| Symbol | Parameter | Value | Units |
|-----------|--|----------------------|--------------|
| I_{PP} | Peak Pulse Current (8/20 μ s) | 35 | A |
| P_{PK} | Peak Pulse Power (8/20 μ s) | 350 | Watts |
| V_{ESD} | ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact) | ± 30 ± 30 | kV |
| T_{OPT} | Operating Temperature | -45 to +85 | $^{\circ}$ C |
| T_{STG} | Storage Temperature | -55 to +150 | $^{\circ}$ C |

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

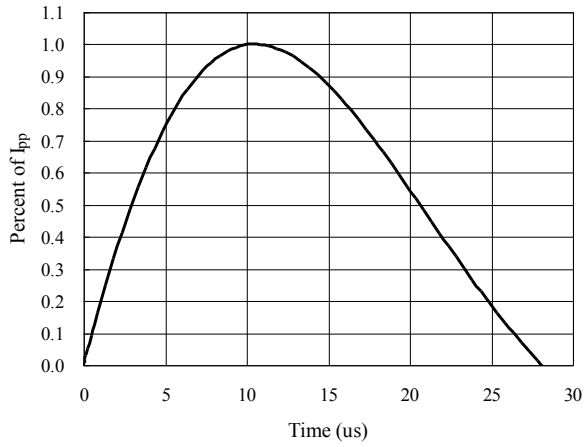
| Symbol | Parameter |
|--------------|--|
| V_{RWM} | Nominal Reverse Working Voltage |
| I_R | Reverse Leakage Current @ V_{RWM} |
| V_{t1} | Trigger Voltage |
| I_{t1} | Trigger Current @ V_{t1} |
| V_h | Holding Voltage |
| I_h | Holding Current @ V_h |
| V_C | Clamping Voltage @ I_{PP} |
| I_{PP} | Maximum Peak Pulse Current |
| C_{ESD} | Parasitic Capacitance |
| C_{Δ} | Variation in C_{ESD} with Reverse Bias |



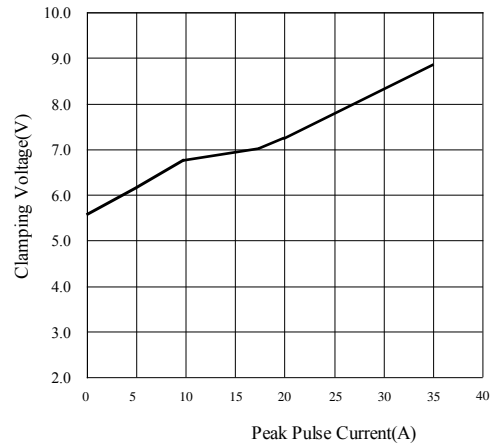
| Symbol | Test Condition | Minimum | Typical | Maximum | Units |
|-----------|-----------------------------------|---------|---------|---------|---------|
| V_{RWM} | | | | 3.3 | V |
| I_R | $V_{RWM} = 3.3V, T = 25^{\circ}C$ | | 0.01 | 0.1 | μ A |
| V_{t1} | $I_{t1} = 100nA$ | 5.0 | | 6.0 | V |
| V_h | $I_h = 10mA$ | 3.0 | | 4.0 | V |
| V_C | $I_{PP} = 1A, t_p = 8/20\mu s$ | | | 6.0 | V |
| V_C | $I_{PP} = 35A, t_p = 8/20\mu s$ | | | 10.0 | V |
| C_{ESD} | $V_R = 0V, f = 1MHz$ | | 4.5 | | pF |



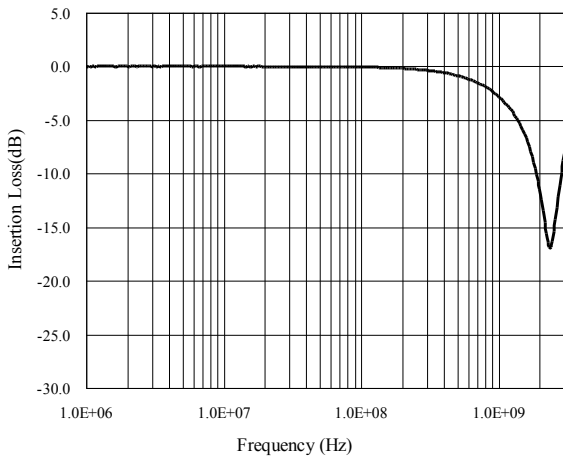
8/20µs Pulse Waveform



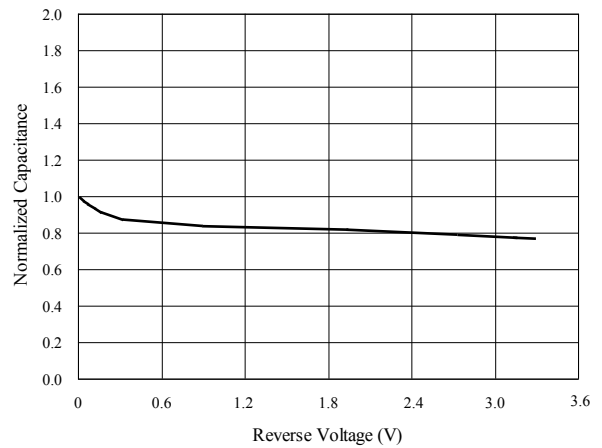
Clamping Voltage V_C vs. Current I_{PP}



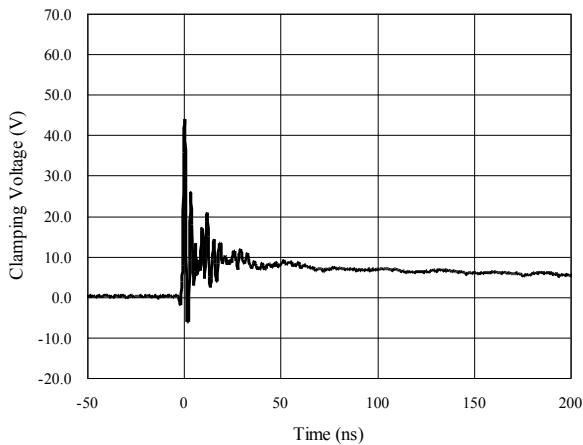
Insertion Loss S21



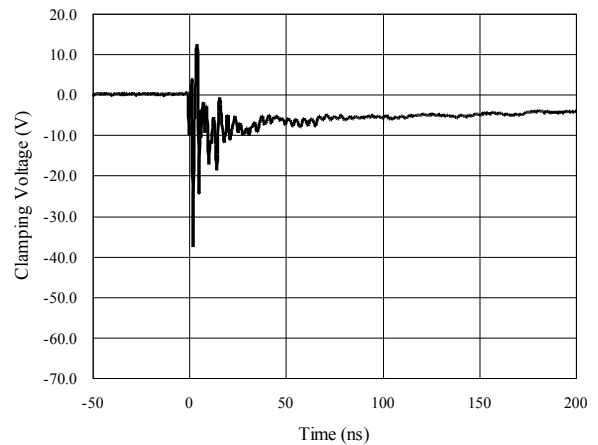
Normalized Capacitance vs. Voltage



ESD Clamping of I/O to GND (+8kV Contact per IEC 61000-4-2)



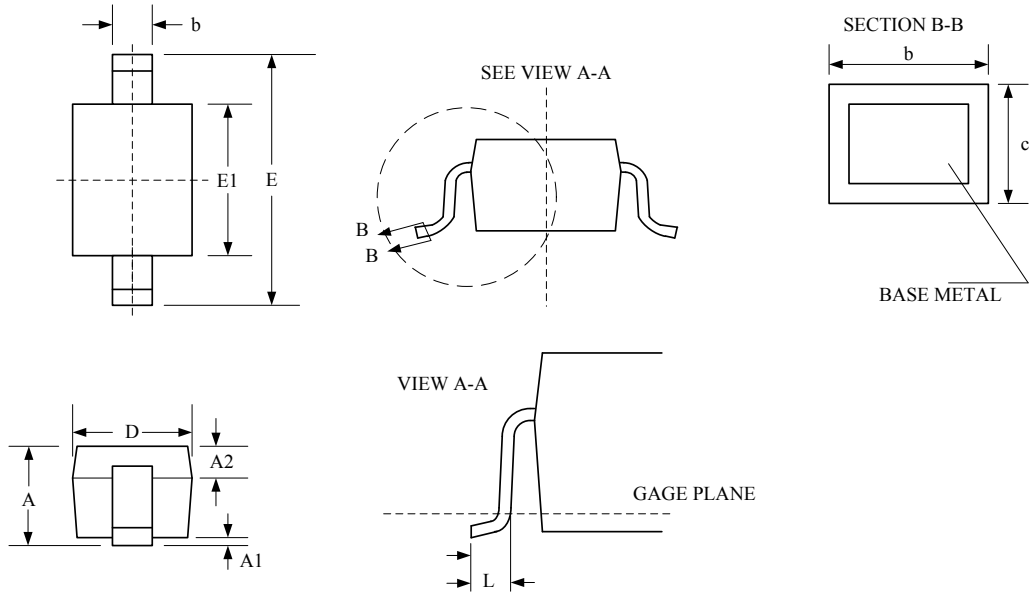
ESD Clamping of I/O to GND (-8kV Contact per IEC 61000-4-2)





Package Outline

- ☐ SOD-323 Package
- ☐ MSL-3

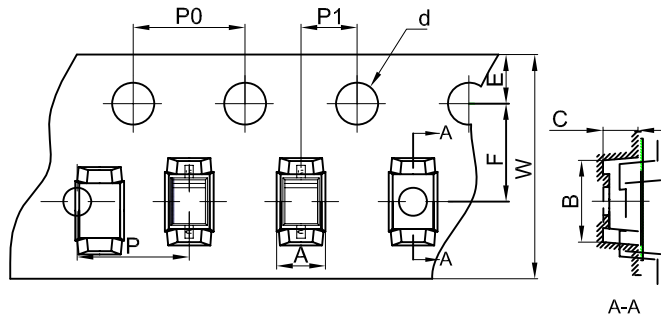


Package Dimensions (Controlling dimensions are in millimeters)

| Symbol | Dimensions (mm) | | | Dimensions (Inches) | | |
|--------|-----------------|---------|---------|---------------------|---------|---------|
| | Minimum | Typical | Maximum | Minimum | Typical | Maximum |
| A | 0.910 | — | 1.170 | 0.036 | — | 0.046 |
| A1 | 0.000 | — | 0.100 | 0.000 | — | 0.004 |
| A2 | 0.300 | — | 0.400 | 0.012 | — | 0.016 |
| b | 0.330 | — | 0.430 | 0.013 | — | 0.017 |
| c | 0.130 | — | 0.200 | 0.005 | — | 0.008 |
| D | 1.180 | 1.280 | 1.370 | 0.044 | 0.050 | 0.054 |
| E | 2.460 | 2.590 | 2.720 | 0.097 | 0.102 | 0.107 |
| E1 | 1.500 | 1.640 | 1.780 | 0.060 | 0.065 | 0.070 |
| L | 0.250 | 0.350 | 0.450 | 0.010 | 0.014 | 0.018 |

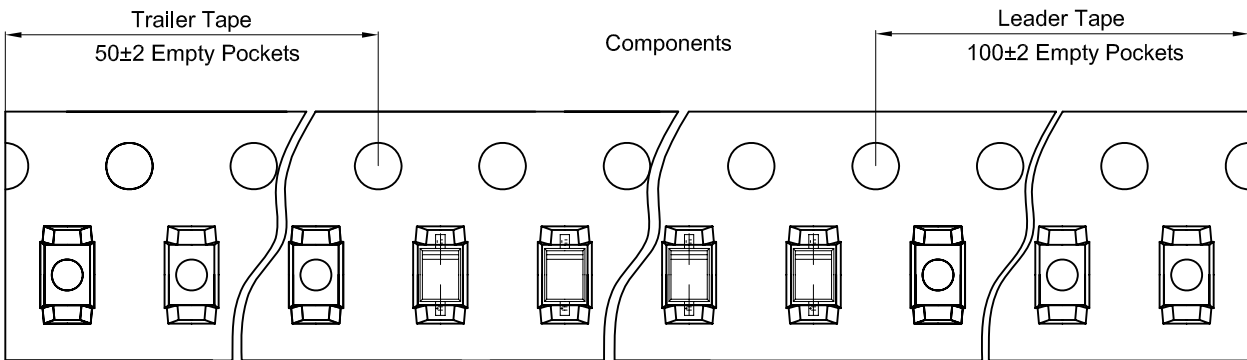


Tape and Reel Specification

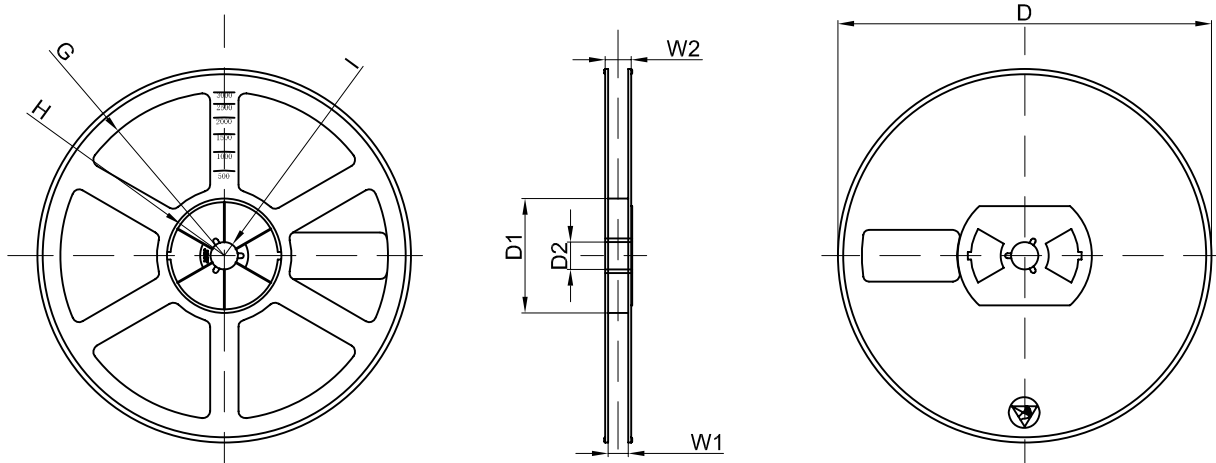


| Dimensions are in millimeter | | | | | | | | | | |
|------------------------------|---------|---------|---------|--------|--------|--------|--------|--------|--------|-----------|
| Pkg type | A | B | C | d | E | F | P0 | P | P1 | W |
| SOD-323 | 1.46 | 2.90 | 1.25 | Ø1.50 | 1.75 | 3.50 | 4.00 | 4.00 | 2.00 | 8.00 |
| (Tolerance) | +/-0.05 | +/-0.05 | +/-0.05 | +/-0.1 | +/-0.1 | +/-0.1 | +/-0.1 | +/-0.1 | +/-0.1 | +0.3/-0.1 |

SOD-323 Tape Leader and Trailer



SOD-323 Reel



| Dimensions are in millimeter | | | | | | | | |
|------------------------------|---------|-------|-------|--------|--------|-------|------|-------|
| Reel Option | D | D1 | D2 | G | H | I | W1 | W2 |
| 7" Dia | Ø178.00 | 54.40 | 13.00 | R78.00 | R25.60 | R6.50 | 9.50 | 12.30 |
| Tolerance | +/-2 | +/-1 | +/-1 | +/-1 | +/-1 | +/-1 | +/-1 | +/-1 |

| REEL | Reel Size | Box | Box Size(mm) | Carton | Carton Size e(mm) | G.W.(kg) |
|----------|-----------|------------|--------------|-------------|-------------------|----------|
| 3000 pcs | 7 inch | 45,000 pcs | 203×203×195 | 180,000 pcs | 438×438×220 | |

Marking Codes**Note:**

(1) "30PE" is part number, fixed

Ordering Information

| Part Number | Working Voltage | Quantity Per Reel | Reel Size |
|-------------|-----------------|-------------------|-----------|
| TS0301PEX | 3.3V | 3,000 | 7 Inch |