

## Ultra Low Capacitance TVS/ESD Protection Diode

### DESCRIPTION

ESD0502TL 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 0.2pF (I/O to I/O) only, ESD0502TL 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 ( $\pm 15\text{kV}$  air,  $\pm 8\text{kV}$  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.

ESD0502TL uses small SOT-23 package. Each ESD0502TL device can protect two high-speed data lines. The combined features of low capacitance, small size and high ESD robustness make ESD0502TL ideal for high-speed data port and high-frequency line applications. The low clamping voltage of the ESD0502TL guarantees a minimum stress on the protected IC.

### FEATURES

- ✧ Transient protection for high-speed data lines  
IEC 61000-4-2 (ESD)  $\pm 15\text{kV}$  (Air)  
 $\pm 8\text{kV}$  (Contact)
- IEC 61000-4-4 (EFT) 40A (5/50 ns)  
Cable Discharge Event (CDE)
- ✧ Small package (2.9mm $\times$ 2.4mm $\times$ 1.0mm)
- ✧ Protects two data lines
- ✧ Low capacitance: 0.2pF Typical (I/O-I/O)
- ✧ Low leakage current
- ✧ Low clamping voltage

### MACHANICAL DATA

- ✧ SOT-23 package
- ✧ Flammability Rating: UL 94V-0
- ✧ Packaging: Tape and Reel
- ✧ High temperature soldering guaranteed: 260/10s
- ✧ Reel size: 7 inch

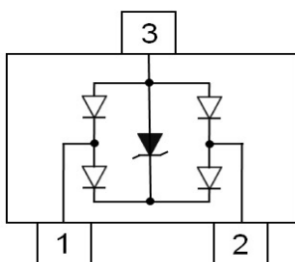
### ORDERING INFORMATION

- ✧ Device: ESD0502TL
- ✧ Package: SOT-23
- ✧ Marking: 52L
- ✧ Material: Halogen free
- ✧ Packing: Tape & Reel
- ✧ Quantity per reel: 3,000pcs

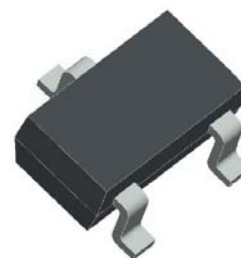
### APPLICATIONS

- ✧ Serial ATA
- ✧ Desktops, Servers and Notebooks
- ✧ PCI Express
- ✧ MDDI Ports
- ✧ USB Data Line Protection
- ✧ Display Ports
- ✧ Digital Visual Interfaces (DVI)

### PIN CONFIGURATION



### PACKAGE OUTLINE



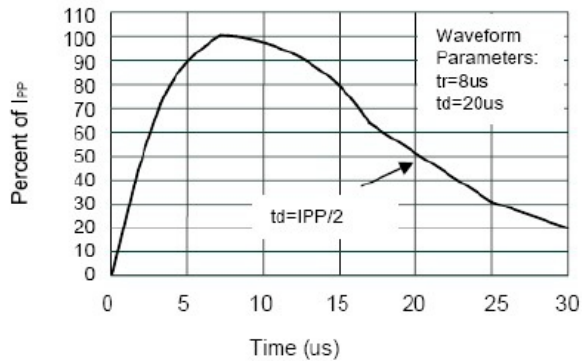
## ABSOLUTE MAXIMUM RATING

| Symbol    | Parameter  | Value      | Units |
|-----------|--|------------|-------|
| $P_{PP}$  | Peak Pulse Power (8/20μs)                                      | 60         | W     |
| $V_{ESD}$ | ESD per IEC 61000-4-2 (Air)<br>ESD per IEC 61000-4-2 (Contact) | ±20<br>±20 | kV    |
| $T_{OPT}$ | Operating Temperature  | -55/+125   | °C    |
| $T_{STG}$ | Storage Temperature  | -55/+150   | °C    |

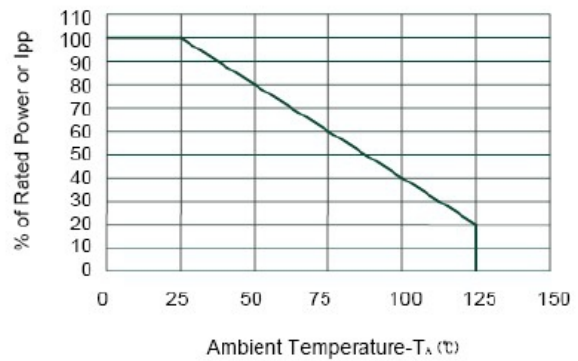
## ELECTRICAL CHARACTERISTICS (Tamb=25°C)

| Symbol    | Parameter                 | Test Condition  | Min | Typ | Max | Units |
|-----------|---------------------------|---|-----|-----|-----|-------|
| $V_{RWM}$ | Reverse Working Voltage   | I/O to GND  |     |     | 5.0 | V     |
| $V_{BR}$  | Reverse Breakdown Voltage | $I_T = 1mA$<br>Between I/O and GND                    | 6.0 |     |     | V     |
| $I_R$     | Reverse Leakage Current   | $V_{RWM} = 5V$<br>Between I/O and GND                 |     |     | 100 | nA    |
| $V_C$     | Clamping Voltage          | $I_{PP} = 1A, t_p = 8/20\mu s$<br>Between I/O and GND |     |     | 10  | V     |
|           |                           | $I_{PP} = 4A, t_p = 8/20\mu s$<br>Between I/O and GND |     |     | 15  | V     |
| $V_F$     | Forward Voltage           | $I_T = 10mA$<br>Between I/O and GND                   |     |     | 1.2 | V     |
| $C_T$     | Total Capacitance         | $V_R = 0V, f = 1MHz$<br>Between I/O and GND           |     | 0.4 |     | pF    |
|           |                           | $V_R = 0V, f = 1MHz$<br>Between I/O and I/O           |     | 0.2 |     | pF    |

### ELECTRICAL CHARACTERISTICS CURVE

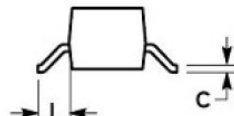
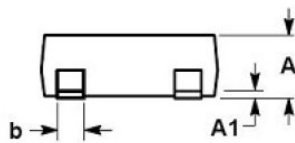
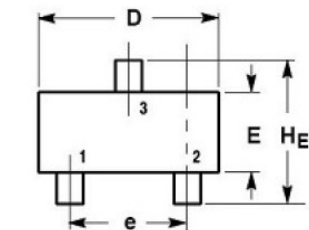


Pulse Waveform



Power Derating Curve

### SOT-23 PACKAGE OUTLINE DIMENSIONS



| DIM | MILLIMETERS |      |      | INCHES |       |       |
|-----|-------------|------|------|--------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN    | NOM   | MAX   |
| A   | 0.89        | 1.00 | 1.11 | 0.035  | 0.040 | 0.044 |
| A1  | 0.01        | 0.06 | 0.10 | 0.001  | 0.002 | 0.004 |
| b   | 0.37        | 0.44 | 0.50 | 0.015  | 0.018 | 0.020 |
| c   | 0.09        | 0.13 | 0.18 | 0.003  | 0.005 | 0.007 |
| D   | 2.80        | 2.90 | 3.04 | 0.110  | 0.114 | 0.120 |
| E   | 1.20        | 1.30 | 1.40 | 0.047  | 0.051 | 0.055 |
| e   | 1.78        | 1.90 | 2.04 | 0.070  | 0.075 | 0.081 |
| L   | 0.35        | 0.54 | 0.69 | 0.014  | 0.021 | 0.029 |
| HE  | 2.10        | 2.40 | 2.64 | 0.083  | 0.094 | 0.104 |