## DESCRIPTION

ESD0504TL is an ultra-low capacitance Transient Voltage Suppressor (TVS) designed to protection for high-speed data interfaces. With typical capacitance of 0.20pF (I/O to I/O) only, ESD0504TL 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), IEC61000-4-4 (electrical fast transient-EFT) (40A, 5/50ns), very fast charged device model (CDM) ESD and cable discharge event (CDE), etc.

ESD0504TL uses small SC-74 package. Each ESD0504TL device can protect four high-speed data lines one $V_{CC}$ line. The combined features of ultra-low capacitance, small size and high ESD robustness make ESD0504TL ideal for high-speed data ports and high-frequency lines (e.g., HDMI & DVI) applications. The low clamping voltage of the ESD0504TL guarantees a minimum stress on the protected IC.

The ESD0504TL is available in SC-74 Package.

## ORDERING INFORMATION

| Package Type | Part Number |
|---|---|
| SC-74 | ESD0504TL |
| Note | SPQ: 3,000pcs/Reel |
| AiT provides all RoHS Compliant Products | |

## FEATURES

- Transient protection for high-speed data lines
  IEC 61000−4−2(ESD) ±25kV (Air)
  ±17kV (Contact)
  IEC 61000-4-4(EFT) 40A (5/50ns)
  Cable Discharge Event (CDE)
- Package optimized for high-speed lines
- Small package (2.9mm*2.8mm*1.1mm)
- Protects four data lines and one $V_{CC}$ line
- Low capacitance: 0.20pF (I/O to I/O)
- Low leakage current
- Low clamping voltage
- Each I/O pin can withstand over 1000 ESD strikes for ±8kV contact discharge
- Available in SC-74 Package

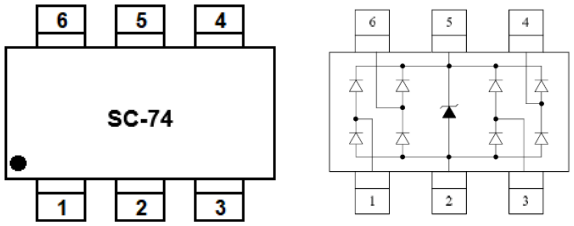
## APPLICATIONS

- Serial ATA
- MDDI Ports
- USB 2.0/3.0 Power and Data Line Protection
- Display Ports
- High Definition Multi-Media Interface (HDMI)
- Digital Visual Interface (DVI)

## MECHANICAL DATA

SC-74 package
Flammability Rating: UL 94V-0
Terminal: Matte tin plated.
Packaging; Tape and Reel
High temperature soldering guaranteed: 260ºC/10s
Reel size: 7inch

## PIN DESCRIPTION



## ABSOLUTE MAXIMUM RATINGS

| | | |
|---|---|---|
| $P_{PP}$, Peak Pulse Power (8/20μs) | | 60W |
| $V_{ESD}$, ESD per IEC 61000-4-2 | Air | ±25kV |
| | Contact | ±20kV |
| $T_{OPT}$, Operating Temperature | | -55ºC ~125ºC |
| $T_{STG}$, Storage Temperature | | -55ºC ~150ºC |

Stresses above may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## ELECTRICAL CHARACTERISTICS

Tamb = 25°C

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Reverse Working Voltage | $V_{RWM}$ | Any I/O pin to GND | - | - | 5.0 | V |
| Reverse Breakdown Voltage | $V_{BR}$ | $I_T$ = 1mA<br>Any I/O pin to GND | 6.0 | - | 9.0 | V |
| Reverse Leakage Current | $I_R$ | $V_{RWM}$ = 5V<br>Any I/O pin to GND | - | - | 1.0 | μA |
| Clamping Voltage | $V_C$ | $I_{PP}$ = 1A, $t_p$ = 8/20μs<br>Any I/O pin to GND | - | - | 10 | V |
| | | $I_{PP}$ = 4A, $t_p$ = 8/20μs<br>Any I/O pin to GND | - | - | 15 | |
| | | $I_{PP}$ = 8A, $t_p$ = 8/20μs<br>$V_{CC}$ I/O pin to GND | - | - | 15 | |
| Parasitic Capacitance | $C_{ESD}$ | $V_R$ = 0V, f = 1MHz<br>Between I/O and I/O | - | 0.20 | 0.30 | pF |
| | | $V_R$ = 0V, f = 1MHz<br>Between I/O and GND | - | 0.45 | 0.50 | |
| | | $V_R$ = 0V, f = 1MHz<br>Between $V_{CC}$ and GND | - | 0.80 | - | |

NOTE: I/O Pins are pin 1,3,4,6 Pin 5 is $V_{CC}$. Pin 2 is GND

## TYPICAL CHARACTERISTICS

Figure1. Insertion Loss S21 of I/O to GND

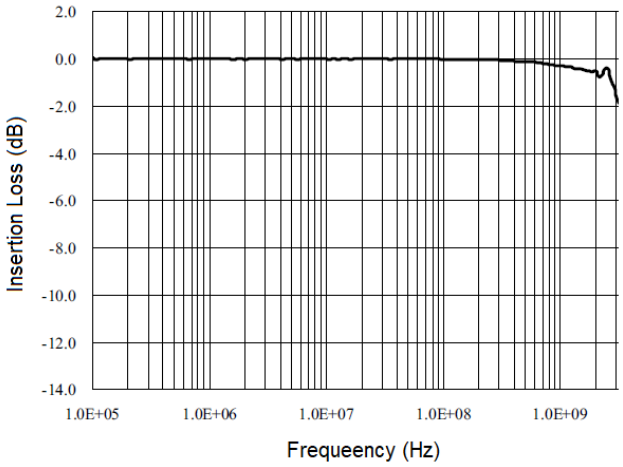



Figure 2. Normalized Capacitance vs. Reverse Voltage

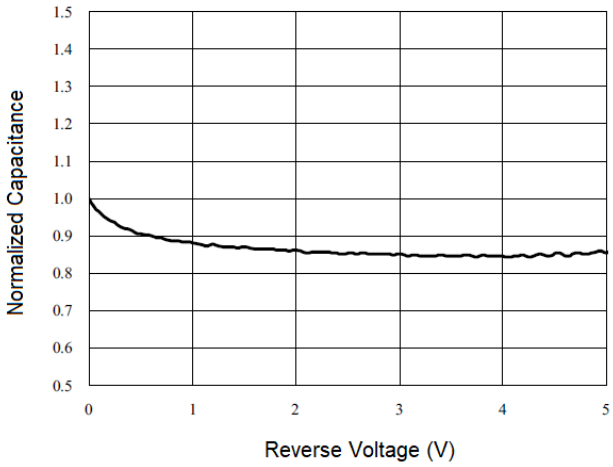



Figure 3. ESD Clamping (+8kV Contact per IEC 61000-4-2)

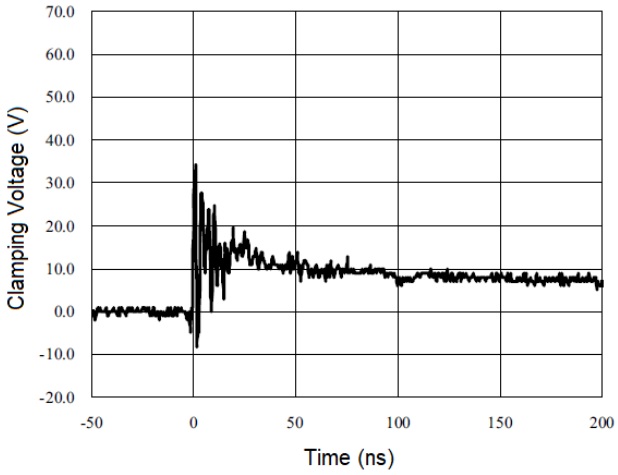
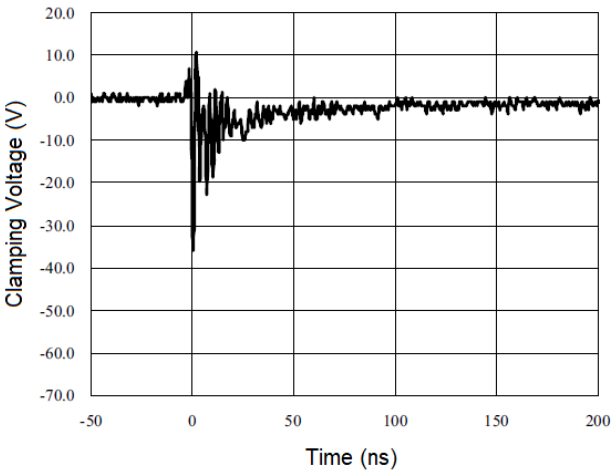
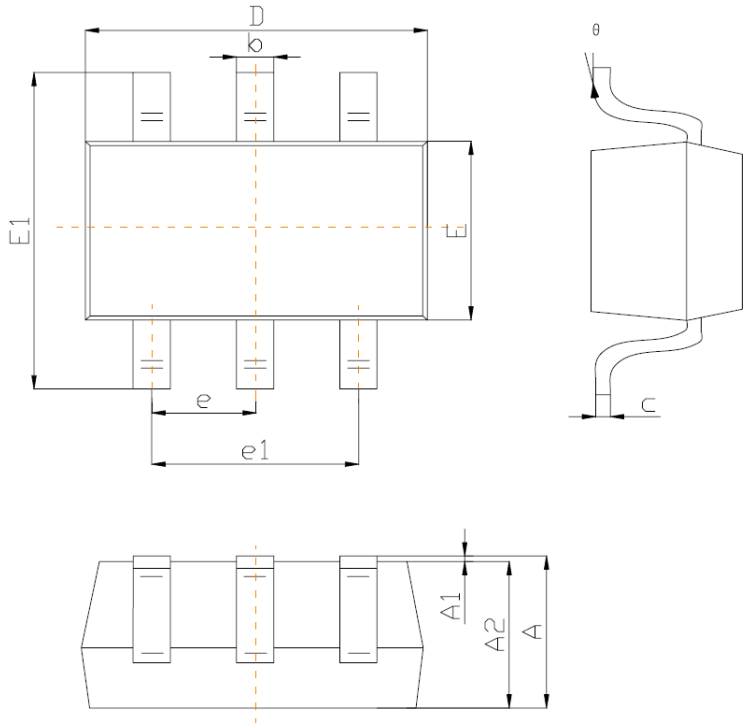



Figure 4. ESD Clamping (-8kV Contact per IEC 61000-4-2)



## PACKAGE INFORMATION

Dimension in SC-74 Package (Unit: mm)




| Symbol | Millimeters | | Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1.050 | 1.250 | 0.041 | 0.049 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.050 | 1.150 | 0.041 | 0.045 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.100 | 0.200 | 0.004 | 0.008 |
| D | 2.820 | 3.020 | 0.111 | 0.119 |
| E | 1.500 | 1.700 | 0.059 | 0.067 |
| E1 | 2.650 | 2.950 | 0.104 | 0.116 |
| e | 0.950 (BSC) | | 0.037 (BSC) | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.300 | 0.600 | 0.012 | 0.024 |
| θ | 0° | 8° | 0° | 8° |

## IMPORTANT NOTICE

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