# ESDA5U0R1T2

**4-Line Uni-directional TVS Diode**

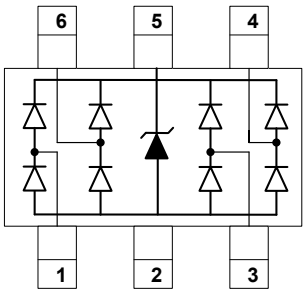
## Features

- Ultra low capacitance: 0. 6pF typical
- Ultra low leakage: nA level
- Low operating voltage: 5.0V
- Up to 4 data lines and one power line protects
- Low clamping voltage
- Complies with following standards:
  - IEC 61000-4-2 (ESD) immunity test
    Air : ±20kV; discharge: ±15kV
  - IEC61000-4-5 (Lightning) 4A (8/20μs)
- SOT23-6 Package
- RoHS Compliant

## Description

The ESDA5U0R1T2 is an ultra low capacitance TVS array, 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 ESDA5U0R1T2 has an ultra- low capacitance with a typical value at 0. 6 pF, and complies with the IEC 61000-4-2 (ESD) standard with ±20kV air and ±15kV contact discharge. It is assembled into a 6-pin lead-free SOT23-6 package. The combination of small size, ultra low capacitance, and high ESD surge capability make it ideal for use in applications such as multimedia, and other high speed ports.

## Circuit Diagram




## Applications

- Monitors and flat panel displays
- Set-top box and Digital TV
- Video graphics cards
- Digital Video Interface (DVI)
- Notebook Computers
- PCI Express and Serial SATA Ports

## Absolute Maximum Ratings： ($T_C$=25℃ unless otherwise noted)

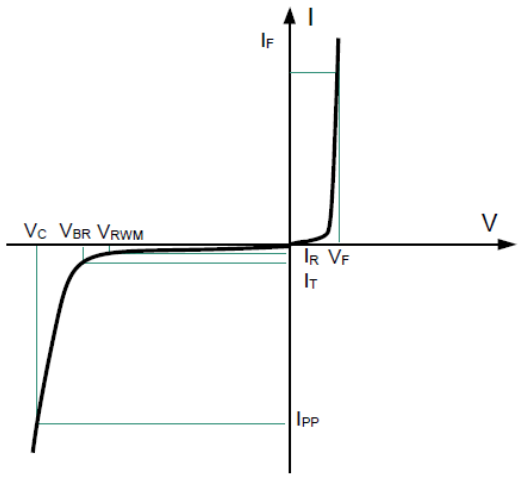
| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Peak Pulse Power (8/20μs,I/O-GND) | Ppk | 60 | W |
| Peak Pulse Power (8/20μs,Vcc-GND) | Ppk | 270 | W |
| Peak Pulse Current (8/20μs,I/O-GND) | IPP | 4.0 | A |
| Peak Pulse Current (8/20μs,Vcc-GND) | IPP | 15.0 | A |
| ESD per IEC 61000−4−2 (Air)<br>ESD per IEC 61000−4−2 (Contact) | $V_{ESD,VDD}$<br>$V_{ESD,I/O}$ | ±20<br>±15 | kV |
| Operating Temperature Range | TJ | −55 to +125 | °C |
| Storage Temperature Range | Tstg | −55 to +150 | °C |

## Electrical Characteristics： ($T_C$=25℃ unless otherwise noted)

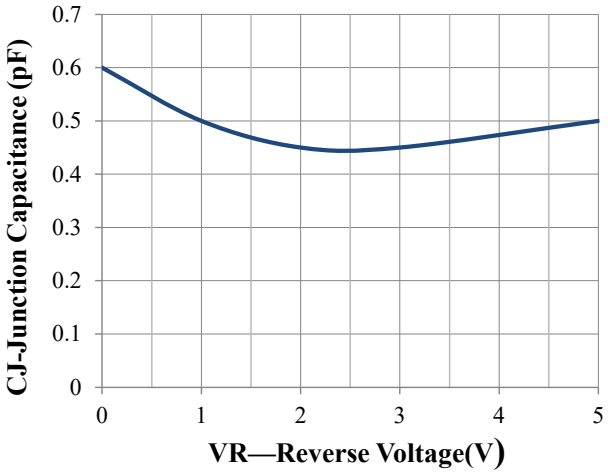
| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Reverse Working Voltage | $V_{RWM}$ | | | | 5. 0 | V |
| Breakdown Voltage | $V_{BR}$ | $I_T$ = 1mA，I/O-GND | 6.5 | 7.4 | 8.0 | V |
| Breakdown Voltage | $V_{BR}$ | $I_T$ = 1mA，I/O-I/O | 7.0 | 8.3 | 9.0 | V |
| Breakdown Voltage | $V_{BR}$ | $I_T$ = 1mA，VCC-GND | 6.0 | 7.0 | 8.0 | V |
| Reverse Leakage Current | $I_R$ | $V_{RWM}$ = 5V | | | 0.1 | μA |
| Clamping Voltage | $V_C$ | $I_{PP}$ = 1A (8 / 20μs pulse)，I/O-GND | | 8.0 | 12.0 | V |
| Clamping Voltage | $V_C$ | $I_{PP}$ = 4A (8 / 20μs pulse)，I/O-GND | | 11.0 | 15.0 | V |
| Clamping Voltage | $V_C$ | $I_{PP}$ = 1A (8 / 20μs pulse)，I/O-I/O | | 10.0 | 12.0 | V |
| Clamping Voltage | $V_C$ | $I_{PP}$ = 4A (8 / 20μs pulse)，I/O-I/O | | 19.0 | 21.0 | V |
| Clamping Voltage | $V_C$ | $I_{PP}$ = 1A (8 / 20μs pulse)，VCC-GND | | 7.5 | 9.0 | V |
| Clamping Voltage | $V_C$ | $I_{PP}$ = 15A (8 / 20μs pulse)，VCC-GND | | | 18.0 | V |
| Junction Capacitance | $C_J$ | VR = 0V, f = 1MHz，I/O-GND | | 0.6 | 0.8 | pF |
| Junction Capacitance | $C_J$ | VR = 0V, f = 1MHz，I/O-I/O | | 0.3 | 0.4 | pF |

## Portion Electronics Parameter

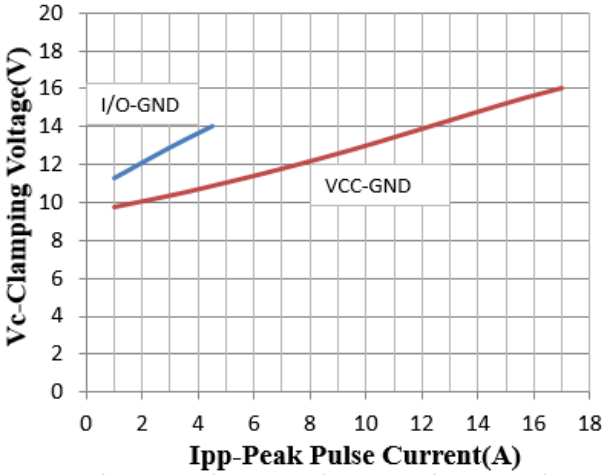
| Symbol | Parameter |
|---|---|
| $V_{RWM}$ | Peak Reverse Working Voltage |
| $I_R$ | Reverse Leakage Current @ $V_{RWM}$ |
| $V_{BR}$ | Breakdown Voltage @$I_T$ |
| $I_T$ | Test Current |
| $I_{PP}$ | Maximum Reverse Peak Pulse Current |
| $V_C$ | Clamping Voltage @$I_{PP}$ |
| $V_F$ | Forward Voltage @$I_F$ |



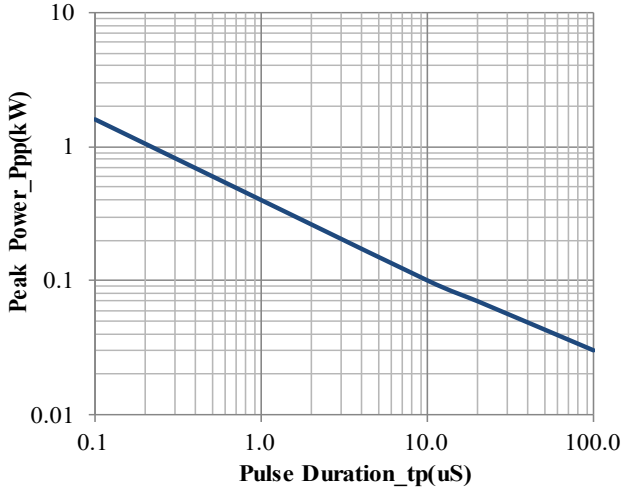
## Typical Characteristics： ($T_C$=25℃ unless otherwise noted)



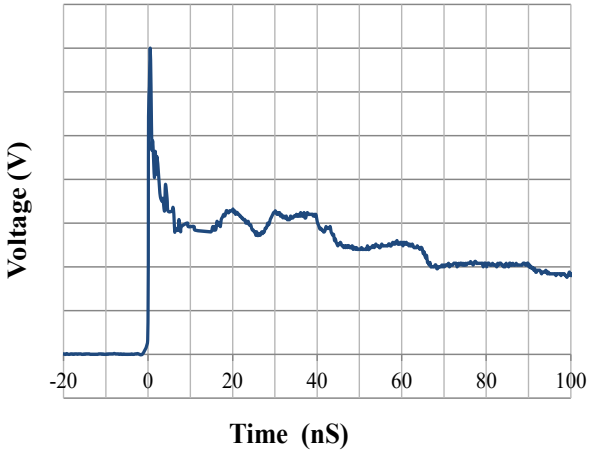

Junction Capacitance vs. Reverse Voltage



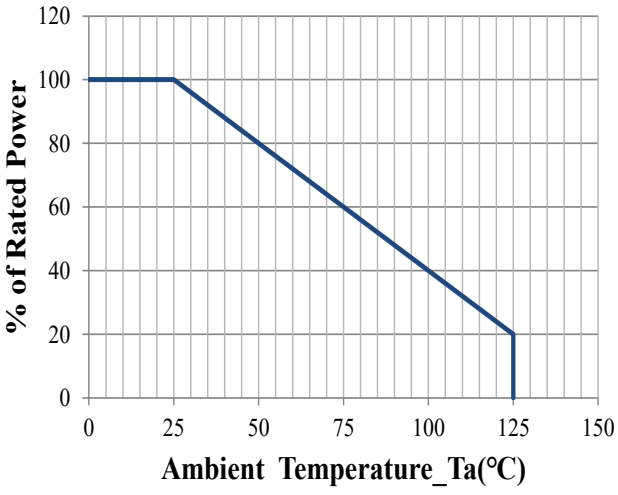

Clamping Voltage vs. Peak Pulse Current



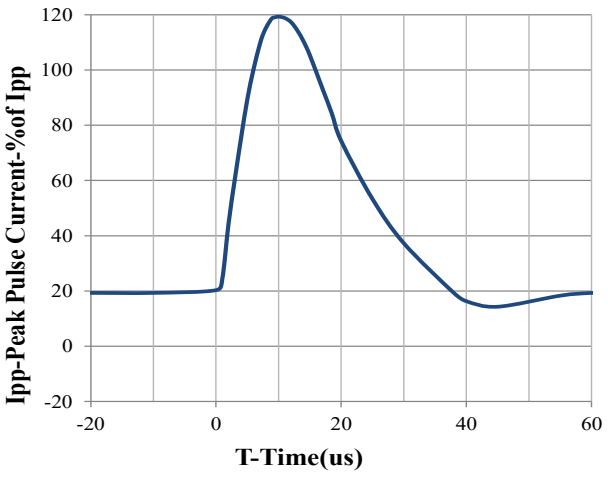

Peak Pulse Power vs. Pulse Time




IEC61000−4−2 Pulse Waveform

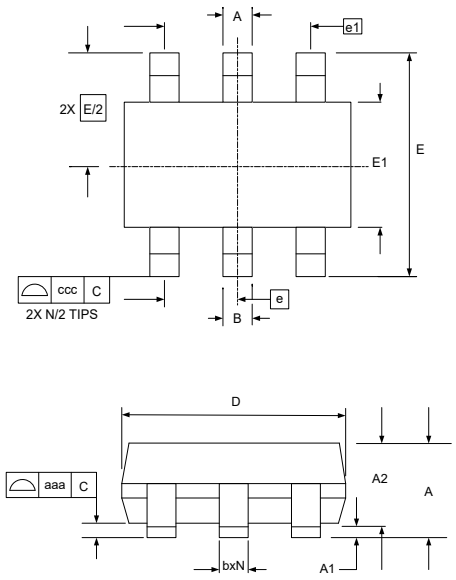



Power Derating Curve



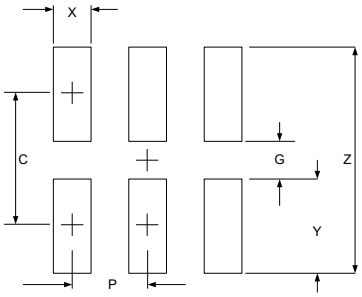

8 X 20us Pulse Waveform

## SOT23-6 Package Outline Drawing



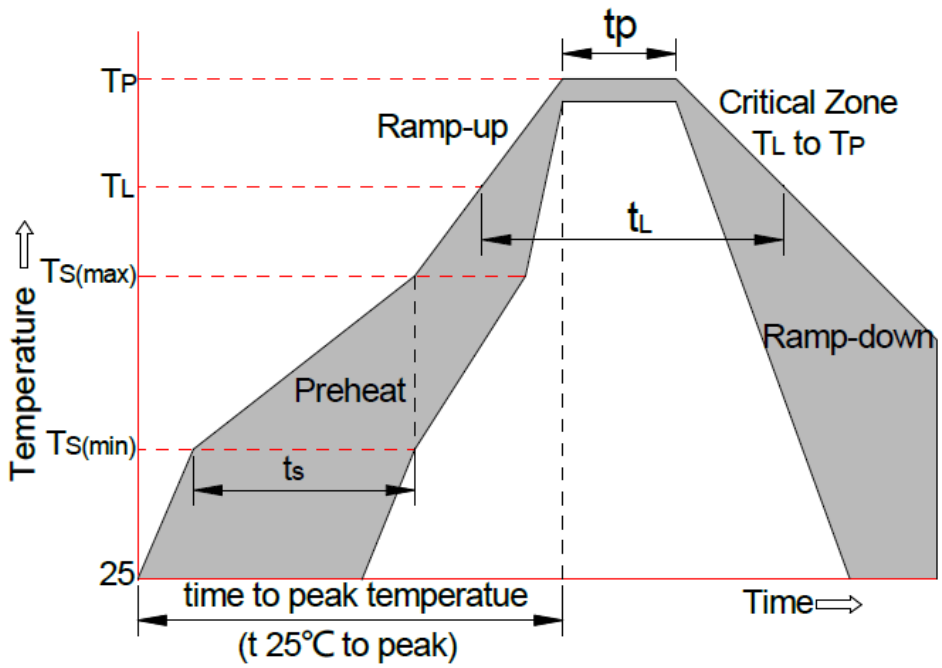

| SYM | DIMENSIONS | | | | | |
|---|---|---|---|---|---|---|
| | MILLIMETERS | | | INCHES | | |
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.90 | | 1.45 | 0.035 | | 0.057 |
| A1 | 0.00 | | 0.15 | 0.000 | | 0.006 |
| A2 | 0.90 | 1.15 | 1.30 | 0.035 | 0.045 | 0.051 |
| b | 0.25 | | 0.50 | 0.010 | | 0.020 |
| c | 0.08 | | 0.22 | 0.003 | | 0.009 |
| D | 2.80 | 2.90 | 3.10 | 0.110 | 0.114 | 0.122 |
| E1 | 1.50 | 1.60 | 1.75 | 0.060 | 0.063 | 0.069 |
| E | 2.80 BSC | | | 0.110 BSC | | |
| e | 0.95 BSC | | | 0.037 BSC | | |
| e1 | 1.90 BSC | | | 0.075 BSC | | |
| N | 6 | | | 6 | | |
| aaa | 0.10 | | | 0.004 | | |
| ccc | 0.20 | | | 0.008 | | |

## Suggested Land Pattern




| SYM | DIMENSIONS | |
|---|---|---|
| | MILLIMETERS | INCHES |
| C | 2.50 | 0.098 |
| G | 1.40 | 0.055 |
| P | 0.95 | 0.037 |
| X | 0.60 | 0.024 |
| Y | 1.10 | 0.043 |
| Z | 3.60 | 0.141 |

## Soldering Parameters




| Reflow Condition | | Pb-Free Assembly |
|---|---|---|
| Pre-heat | -Temperature Min ($T_{s\,(min)}$) | +150°C |
| | -Temperature Max ($T_{s\,(max)}$) | +200°C |
| | -Time (Min to Max) (ts) | 60-180 secs |
| Average ramp up rate( Liquid us Temp ($T_L$) to peak) | | 3°C/sec. Max |
| $T_{s\,(max)}$ to $T_L$-Ramp-up Rate | | 3°C/sec. Max |
| Reflow | -Temperature ($T_L$) (Liquid us) | +217°C |
| | -Temperature ($t_L$) | 60-150 secs |
| Peak Temp (Tp) | | +260(+0/-5)°C |
| Time within 5°C of actual Peak Temp (tp) | | 30 secs. Max |
| Ramp-down Rate | | 6 °C/secs. Max |
| xTime 25°C to Peak Temp ($T_P$) | | 8 min. Max |
| Do not exceed | | +260°C |