## Description

The ASRV05-4 is a 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 ASRV05-4 complies with the IEC 61000-4-2 (ESD) with ±30kV air and ±30kV contact discharge. It is assembled into a 6-lead SOT23-6 lead-free package. The leads are finished with lead-free matte tin. Each device will protect up to four high-speed lines. The combination of small size, low capacitance, and high surge capability makes them ideal for use in applications such as 10/100 Ethernet, USB 2.0, and visual interfaces.

## Features

- Low capacitance: 1.5pF typical (I/O to I/O)
- Ultra low leakage: nA level
- Low operating voltage: 5V
- Low clamping voltage
- Up to 4 lines and one power line protects
- Complies with following standards:
  - IEC 61000-4-2 (ESD) immunity test
    - Air discharge: ±30kV
    - Contact discharge: ±30kV
  - IEC61000-4-5 (Lightning) 25A (8/20μs)
- RoHS Compliant

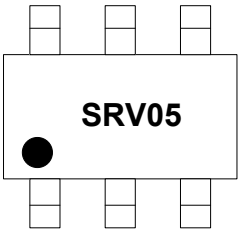
## Mechanical Characteristics

- Package: SOT23-6
- Lead Finish: Matte Tin
- Case Material: “Green” Molding Compound
- Moisture Sensitivity: Level 3 per J-STD-020
- Terminal Connections: See Diagram Below
- Marking Information: See Below

## Applications

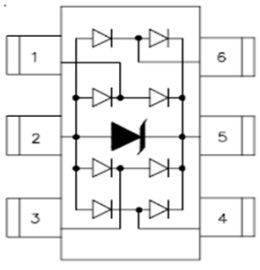
- USB 2.0 power and data line
- Monitors and flat panel displays
- Set-top box and digital TV
- Video graphics cards
- Digital visual interface (DVI)
- Notebook Computers
- SIM Ports
- 10/100 Ethernet
- IEEE 1394 firewire ports

## Marking Information




SRV05 = Device Marking Code
Dot denotes Pin1

## Dimensions and Pin Configuration




SOT-23 6L (Top View)

Circuit and Pin Schematic

## Ordering Information

| Part Number | Packaging | Reel Size |
|---|---|---|
| ASRV05-4 | 3000/Tape & Reel | 7 inch |



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## Absolute Maximum Ratings ($T_A$=25°C unless otherwise specified)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Peak Pulse Power (8/20μs) | Ppk | 500 | W |
| Peak Pulse Current (8/20μs) | $I_{PP}$ | 25 | A |
| ESD per IEC 61000−4−2 (Air)<br>ESD per IEC 61000−4−2 (Contact) | $V_{ESD}$ | ±30<br>±30 | kV |
| Operating Temperature Range | $T_J$ | −55 to +125 | °C |
| Storage Temperature Range | Tstg | −55 to +150 | °C |

## Electrical Characteristics ($T_A$=25°C unless otherwise specified)

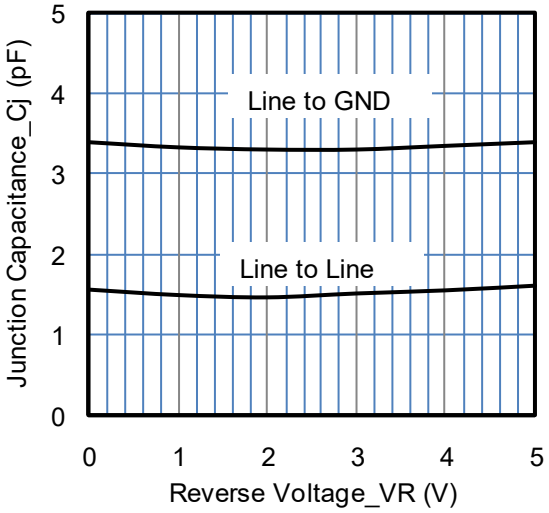
| Parameter | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| Reverse Working Voltage | $V_{RWM}$ | | | 5 | V | |
| Breakdown Voltage | $V_{BR}$ | 6 | | | V | $I_T$ = 1mA, Pin 5 to Pin 2 |
| Reverse Leakage Current | $I_R$ | | | 1 | μA | $V_{RWM}$ = 5V, Pin 5 to Pin 2 |
| Forward Voltage | $V_F$ | | | 1.2 | V | $I_F$ = 15mA |
| Clamping Voltage | $V_C$ | | | 12 | V | $I_{PP}$ = 1A (8 x 20μs pulse), any I/O pin to ground |
| Clamping Voltage | $V_C$ | | | 20 | V | $I_{PP}$ = 25A (8 x 20μs pulse), any I/O pin to ground |
| Junction Capacitance | $C_J$ | | 1.5 | | pF | VR = 0V, f = 1MHz, between I/O pins |
| Junction Capacitance | $C_J$ | | 3.0 | 5.0 | pF | VR = 0V, f = 1MHz, any I/O pin to ground |

Note 1: I/O pins are Pin 1, 3, 4 and 6

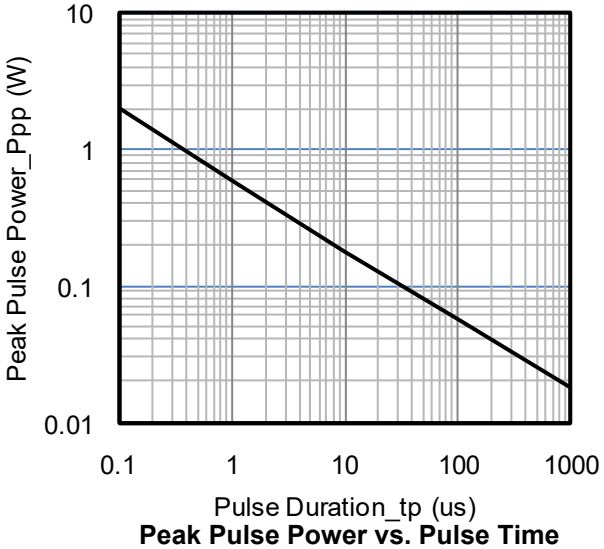


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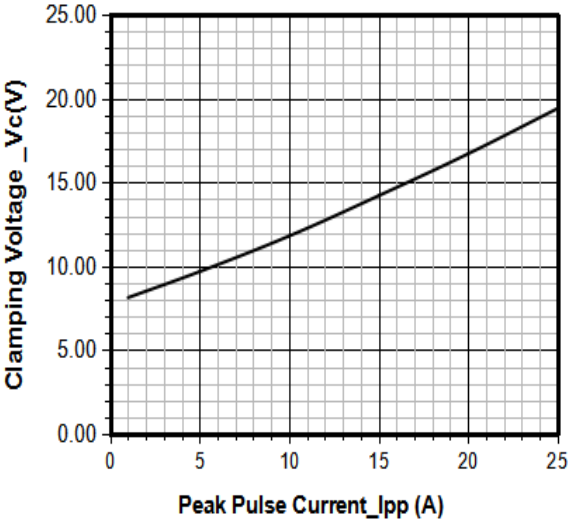
## Typical Performance Characteristics ($T_A$=25°C unless otherwise Specified)



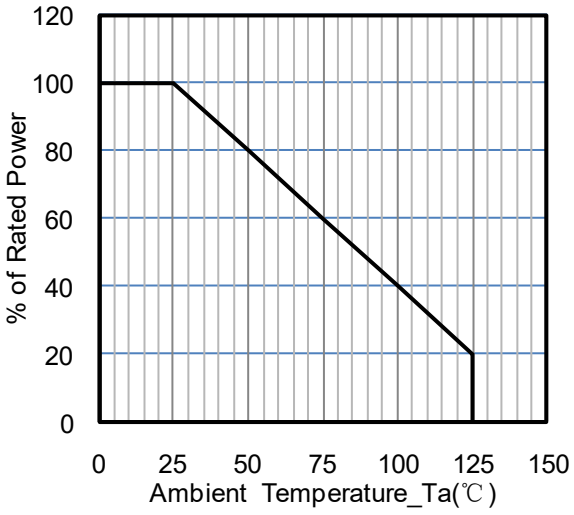

**Junction Capacitance vs. Reverse Voltage**



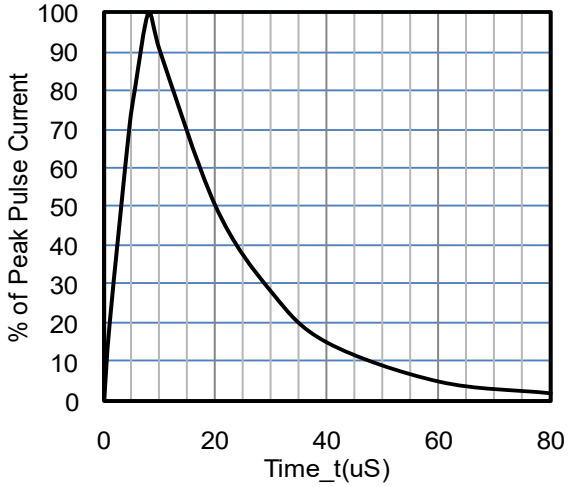

**Peak Pulse Power vs. Pulse Time**



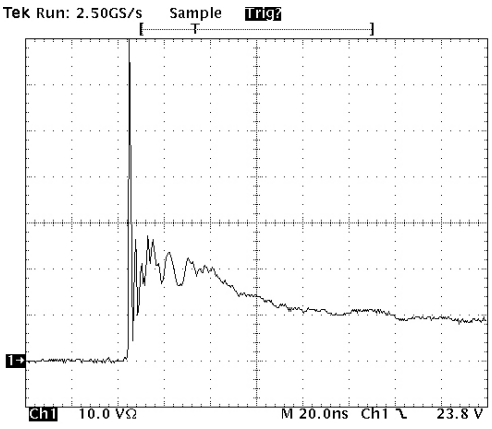

**Clamping Voltage vs. Peak Pulse Current**




**Power Derating Curve**




**8 X 20μs Pulse Waveform**




**ESD Clamping Voltage**

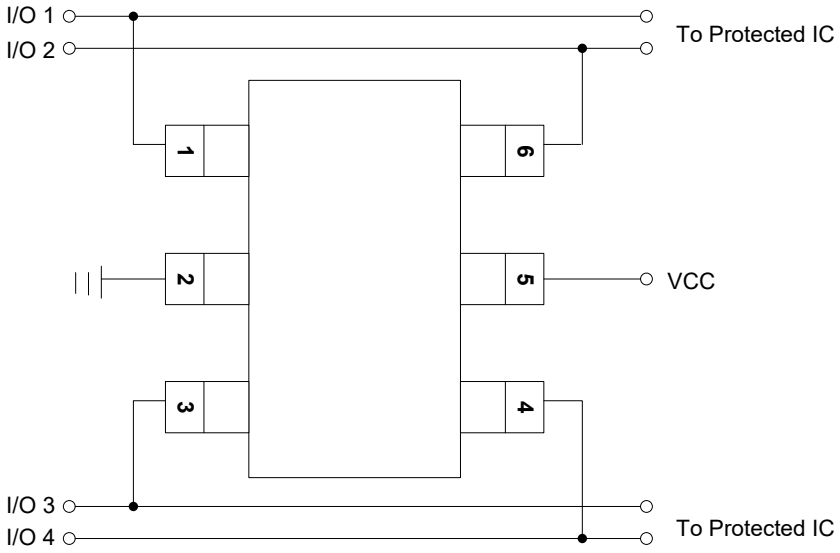
**8 kV Contact per IEC61000−4−2**



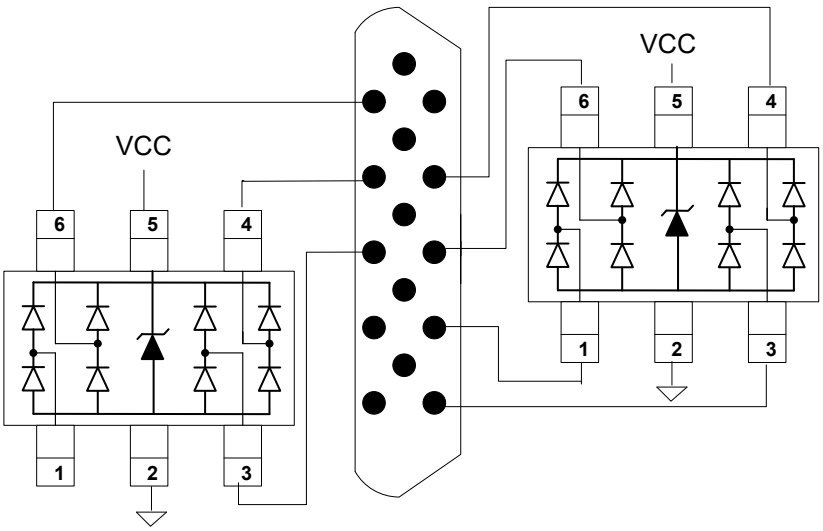
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## Typical Application

The ASRV05-4 is designed to protect four data lines from transient over-voltages by clamping them to fixed reference. When the voltage on the protected line exceeds the reference voltage (plus diode VF) the steering diodes are forward biased, conducting the transient current away from the sensitive circuitry. Data lines are connected at pins 1, 3, 4 and 6. The negative reference (REF1) is connected at pin 2. This pin should be connected directly to a ground plane on the board for best results. The path length is kept as short as possible to minimize parasitic inductance. The positive reference (REF2) is connected at pin 5.



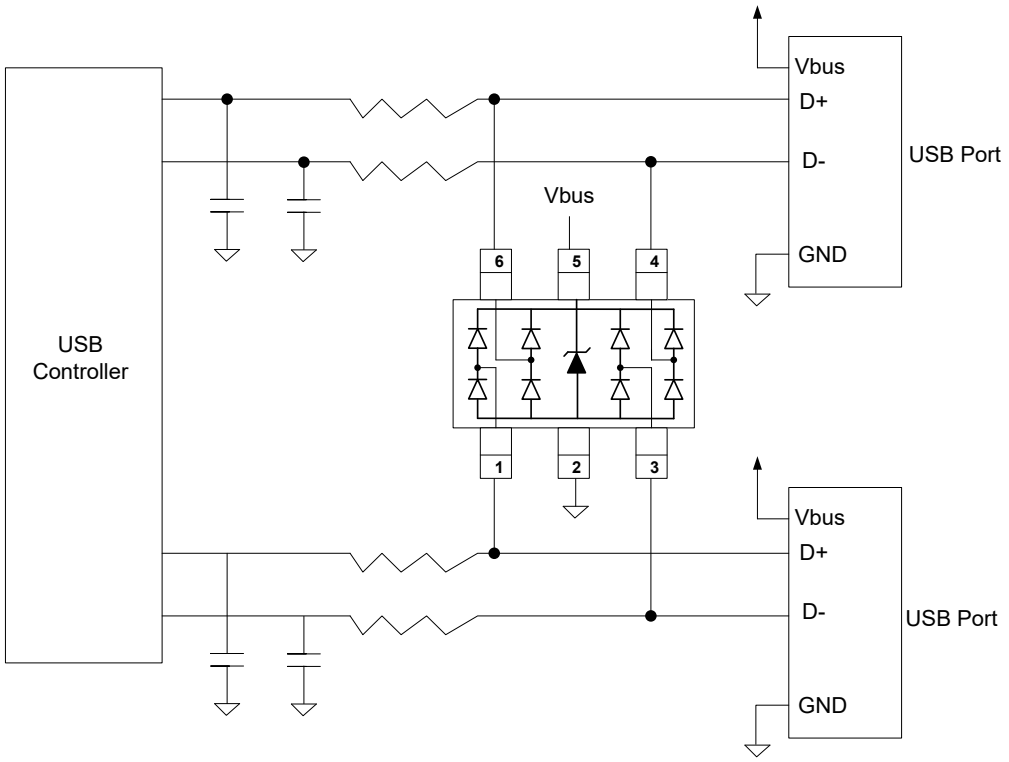

## ASRV05-4 on Video Interface Application



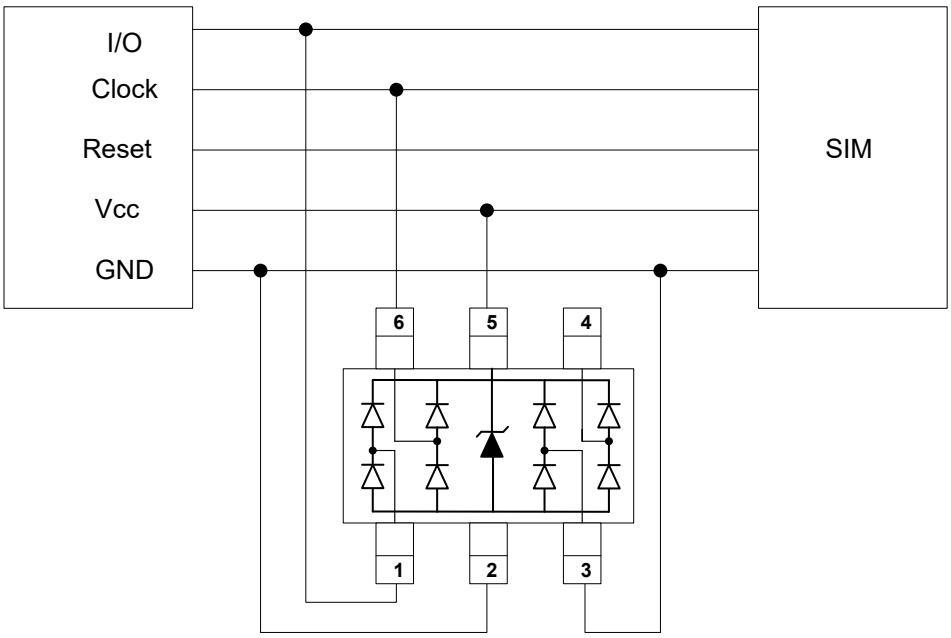



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## ASRV05-4 on USB Port Application



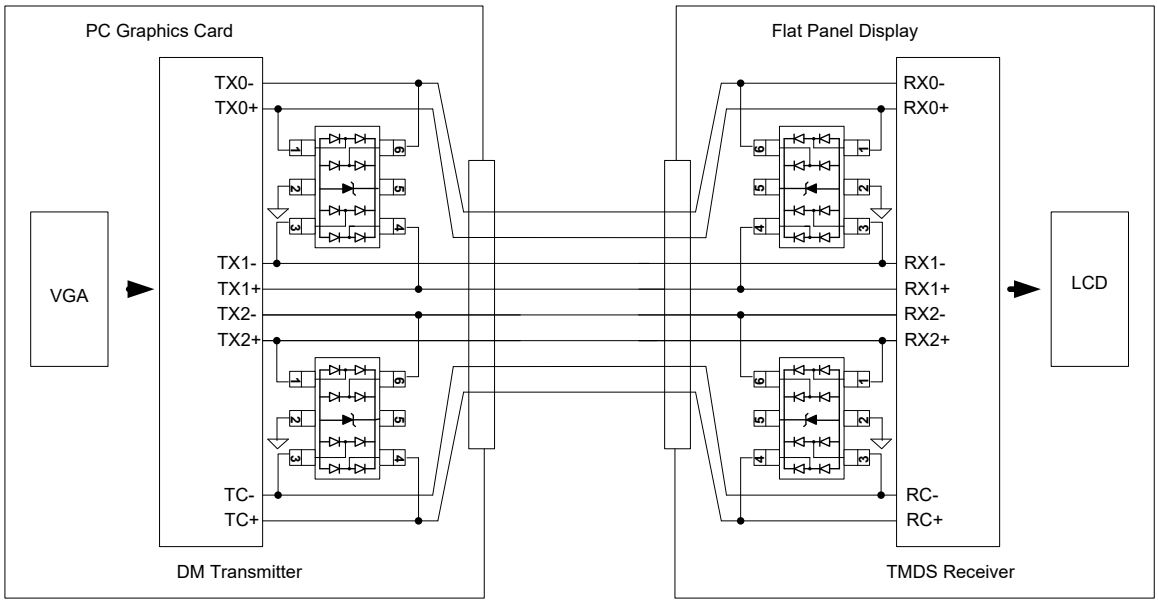

## ASRV05-4 on SIM Port Application



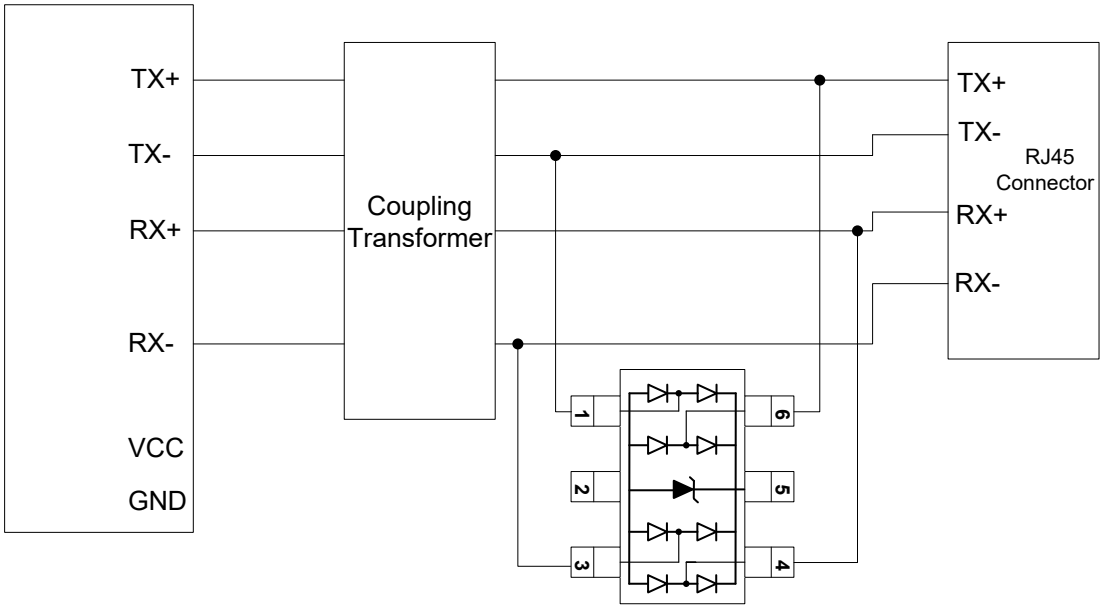



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## ASRV05-4 on Digital Visual Interface (DVI) Application



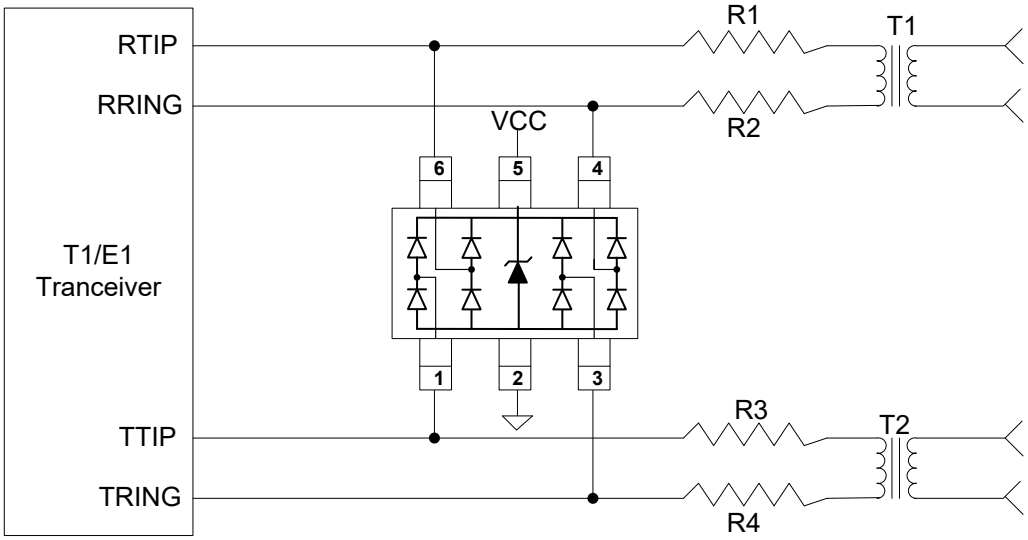

## ASRV05-4 on Ethernet 10/100 (Differential mode) Application






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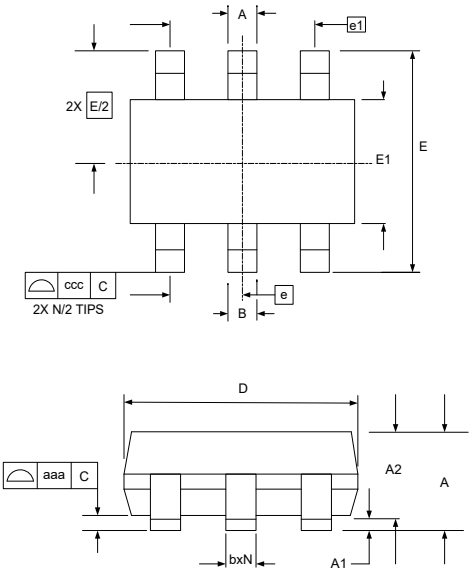
## ASRV05-4 on T1/E1 Interface Application





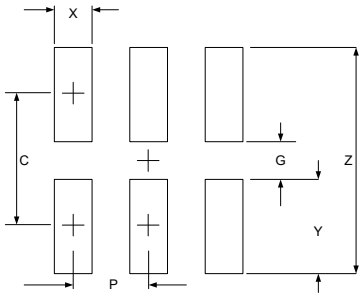

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## SOT23-6 Package Outline Drawing




| 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 |

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