

PROTECTION PRODUCTS

Description

The LCDA24C-1 is a low capacitance transient voltage suppressor (TVS) diode array. It is designed to protect sensitive CMOS ICs from the damaging effects of ESD and lightning. Each device will protect one line in common (line-to-ground) mode or one line pair in metallic (Line-to-line) mode. They are low capacitance (< 15pF) making them suitable for use on high-speed telecom and datacom interfaces without signal degradation.

The configuration of the LCDA24C-1 has been optimized for easy layout on high density boards. The small SOT-143 package minimizes required board space. These devices will handle up to 10 Amps for an 8/20 μ s lightning impulse. The low inductance construction minimizes voltage overshoot during high current surges.

The LCDA24C-1 may be used to protect ADSL interfaces, multi-protocol serial transceivers, portable electronics, and wireless systems.

Features

- ◆ Transient protection to 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 (5/50ns)
IEC 61000-4-5 (Lightning) 0.5kV, 10A (8/20 μ s)
- ◆ Configuration optimized for easy board layout
- ◆ Protects one line pair
- ◆ Low capacitance (<10pF) for high-speed interfaces
- ◆ Low clamping voltage
- ◆ Low leakage current
- ◆ Operating voltage: 24V
- ◆ Solid-state silicon-avalanche technology

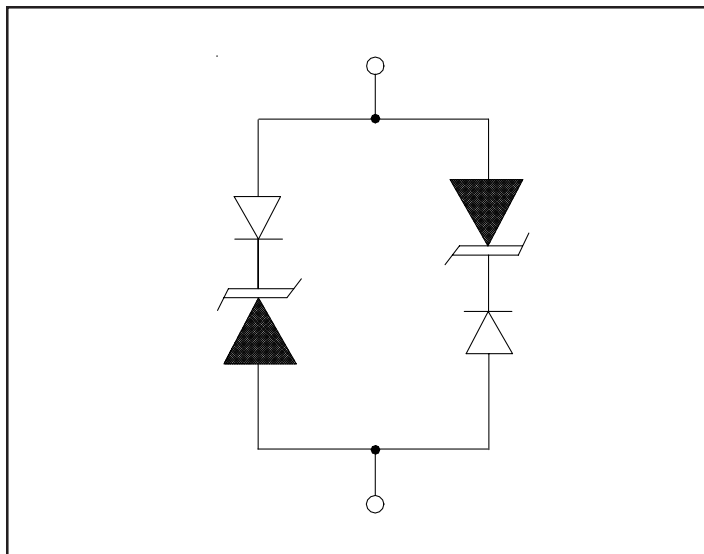
Mechanical Characteristics

- ◆ JEDEC SOT-143 package
- ◆ Lead Finish: Matte Tin
- ◆ Molding compound flammability rating: UL 94V-0
- ◆ Marking: Marking code
- ◆ Packaging: Tape and Reel per EIA 481

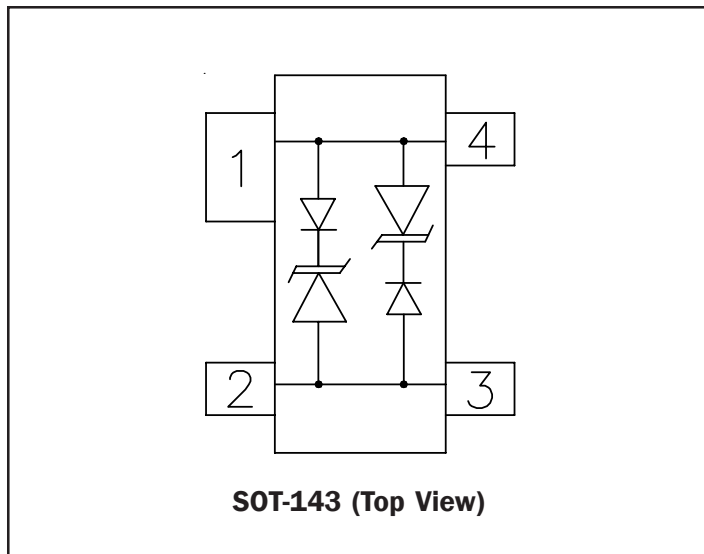
Applications

- ◆ ADSL Interfaces
- ◆ RS-232, RS-422, V.90 Interfaces
- ◆ Multi-Protocol Serial Transceivers
- ◆ High-Speed Data Lines
- ◆ Portable Electronics
- ◆ WAN/LAN Equipment

Circuit Diagram



Schematic & PIN Configuration



PROTECTION PRODUCTS
Absolute Maximum Rating

| Rating | Symbol | Value | Units |
|--|-----------|-------------|-------|
| Peak Pulse Power ($t_p = 8/20\mu s$) | P_{pk} | 500 | Watts |
| Peak Pulse Current ($t_p = 8/20\mu s$) | I_{pp} | 10 | Amps |
| Operating Temperature | T_J | -55 to +125 | °C |
| Storage Temperature | T_{STG} | -55 to +150 | °C |

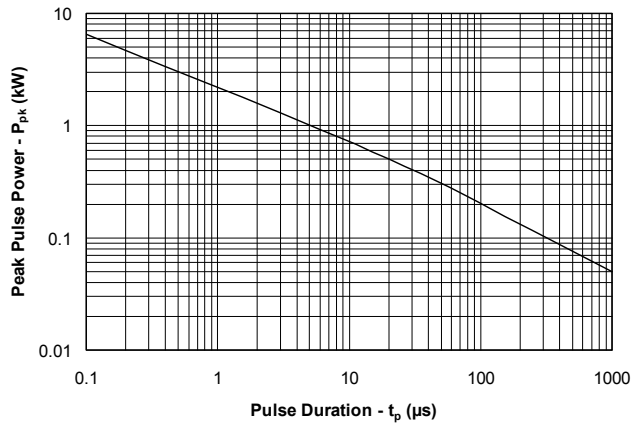
Electrical Characteristics (T=25°C)

| Parameter | Symbol | Conditions | Minimum | Typical | Maximum | Units |
|---------------------------|-----------|---|---------|---------|---------|---------|
| Reverse Stand-Off Voltage | V_{RWM} | | | | 24 | V |
| Reverse Breakdown Voltage | V_{BR} | $I_t = 1mA$ | 26.7 | | | V |
| Reverse Leakage Current | I_R | $V_{RWM} = 24V, T=25^\circ C$ | | | 1 | μA |
| Clamping Voltage | V_C | $I_{pp} = 1A, t_p = 8/20\mu s$ | | | 43 | V |
| Clamping Voltage | V_C | $I_{pp} = 10A, t_p = 8/20\mu s$ | | | 50 | V |
| Peak Pulse Current | I_{pp} | $t_p = 8/20\mu s$ | | | 10 | A |
| Junction Capacitance | C_J | Between I/O pins and Ground $V_R = 0V, f = 1MHz$ | | | 10 | pF |

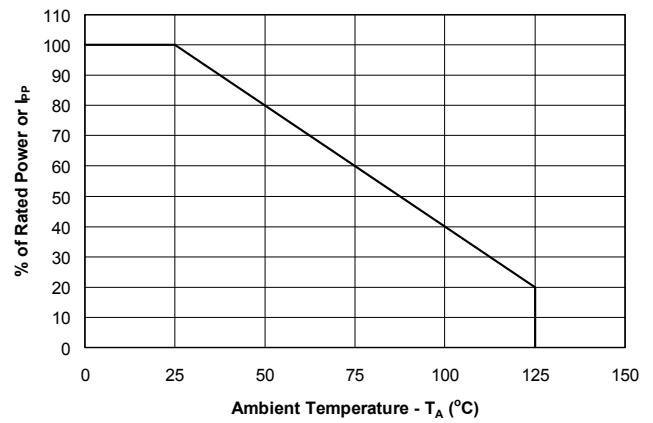
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Typical Characteristics

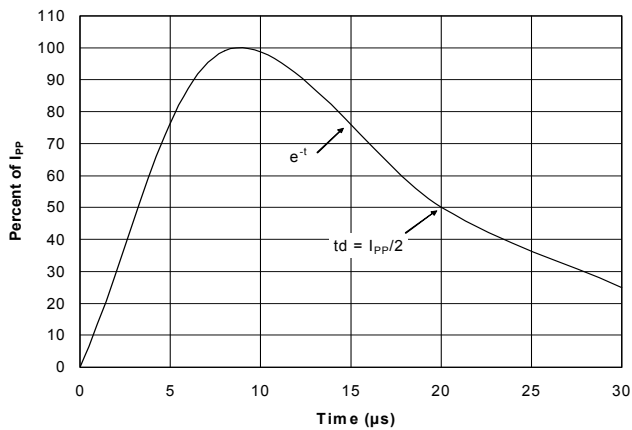
Non-Repetitive Peak Pulse Power vs. Pulse Time



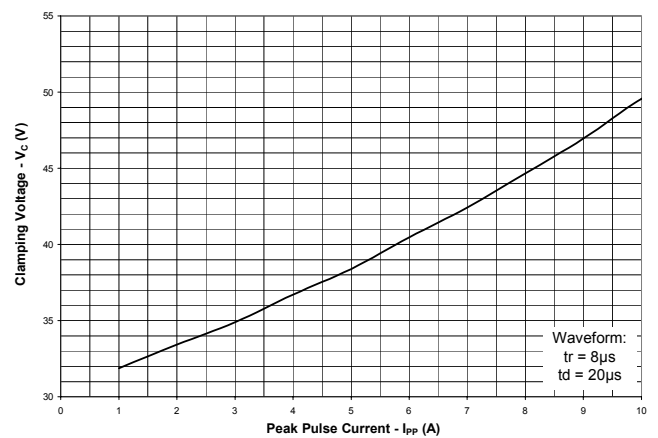
Power Derating Curve



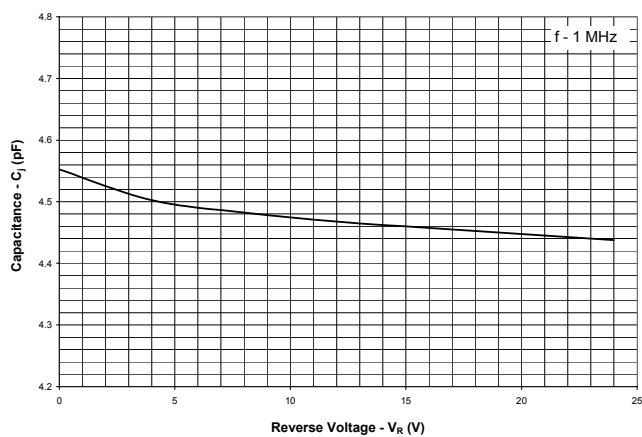
Pulse Waveform



Clamping Voltage vs. Peak Pulse Current



Capacitance vs. Reverse Voltage



PROTECTION PRODUCTS

Applications Information

Device Connection for Metallic Protection of High-Speed Data Lines

The LCDA24C-1 is designed to protect high-speed data lines from transient over-voltages which result from lightning and ESD. The device is designed to protect one line in common mode (Line-to-Ground) or one line pair in metallic (Line-to-Line) mode. For metallic mode protection, the input of line 1 is connected at pin 1 and the output is connected at pin 4. Likewise, the input of line 2 is connected at pin 2 and the output is connected at pin 3. For common mode protection, ground either pins 1 and 4 or pins 2 and 3. The ground connection should be made directly to the ground plane for best results.

ADSL Protection

A typical ADSL protection circuit is shown in Figure 3. A protection device with an operating voltage of 270 volts is connected on the line side of the circuit. A high voltage device is used due to the presence of the ring signal. Secondary IC side protection is achieved with low voltage TVS devices. The LCDA24C-1 is connected between to transmit line pairs. Since the LCDA24C-1 has a working voltage of 24 volts, it may be used on pairs with signal swings as high as +/-12 volts. The SD05C is used to protect the receive pairs. The signal swings on these lines can be as high as +/- 5 volts.

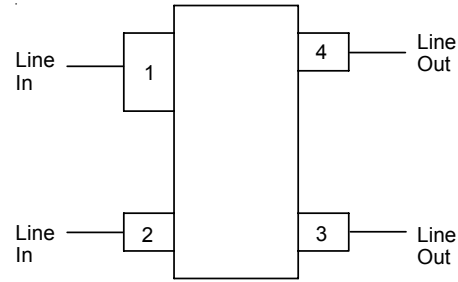


Figure 1 - Connection for Differential Protection (Line-to-Line)

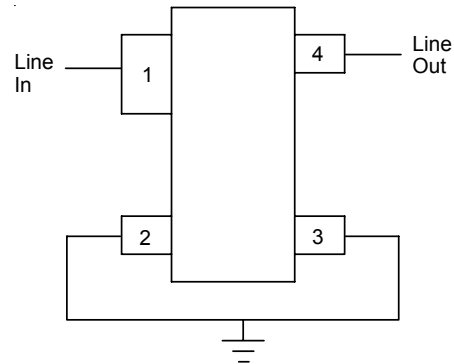


Figure 2 - Connection for Common Mode Protection (Line-to-Ground)

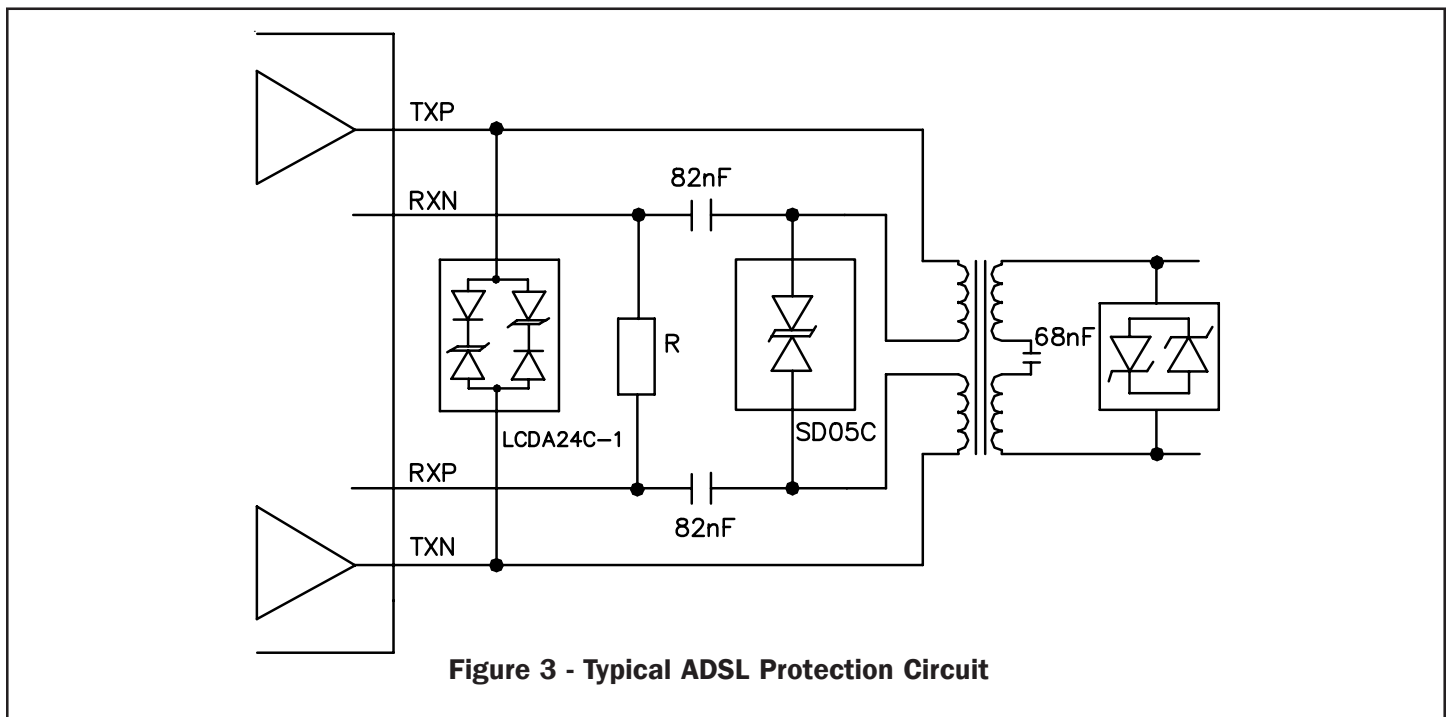
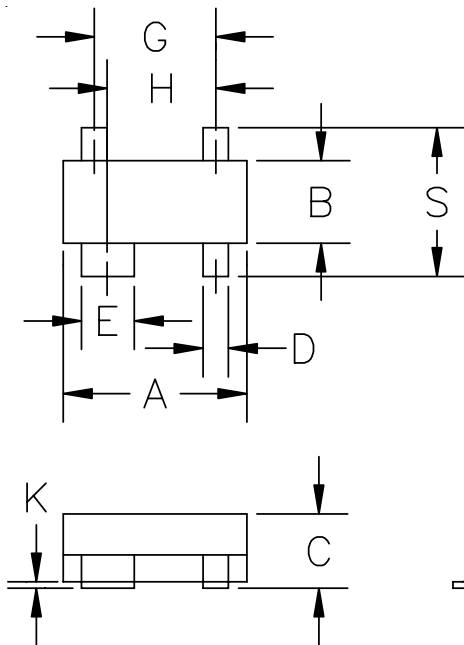


Figure 3 - Typical ADSL Protection Circuit

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Outline Drawing - SOT-143

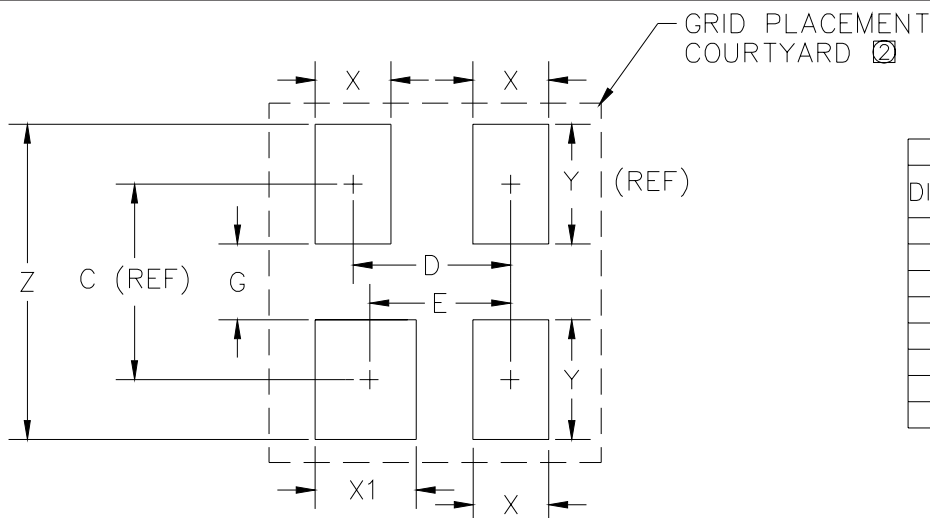


| DIM ^N | INCHES | | MM | | NOTE |
|------------------|--------|------|------|------|------|
| | MIN | MAX | MIN | MAX | |
| A | .110 | .120 | 2.80 | 3.04 | — |
| B | .047 | .055 | 1.20 | 1.40 | — |
| C | .031 | .047 | .80 | 1.20 | — |
| D | .014 | .018 | .37 | .510 | — |
| E | .030 | .035 | .76 | .940 | — |
| G | .076 | BSC | 1.92 | BSC | — |
| H | .068 | BSC | 1.72 | BSC | — |
| J | .003 | .005 | .085 | .180 | — |
| K | .002 | .005 | .013 | 0.10 | — |
| L | .010 | .022 | — | .55 | REF |
| S | .082 | .104 | 2.10 | 2.64 | — |

Notes:

- (1) Controlling dimension: Inch (unless otherwise specified).
- (2) Dimension A and B do not include mold protrusions. Mold protrusions are .006" max.

Land Pattern - SOT-143

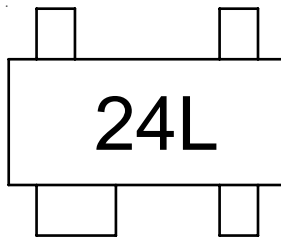


| DIM ^N | INCHES | | MM | | NOTE |
|------------------|--------|------|------|------|------|
| | MIN | MAX | MIN | MAX | |
| C | — | .087 | — | 2.20 | — |
| D | .075 | BSC | 1.90 | BSC | — |
| E | .067 | BSC | 1.70 | BSC | — |
| G | .032 | .040 | .80 | 1.00 | — |
| X | .032 | .040 | .80 | 1.00 | — |
| X1 | .040 | .048 | 1.00 | 1.20 | — |
| Y | — | .055 | — | 1.40 | — |
| Z | .134 | .140 | 3.40 | 3.60 | — |

- ② GRID PLACEMENT COURTYARD IS 8 X 8 ELEMENTS (4mm X 4mm) IN ACCORDANCE WITH THE INTERNATIONAL GRID DETAILED IN IEC PUBLICATION 97.
- ① CONTROLLING DIMENSION: MILLIMETERS.

PROTECTION PRODUCTS

Device Marking



Ordering Information

| Part Number | Working Voltage | Qty per Reel | Reel Size |
|---------------|-----------------|--------------|-----------|
| LCDA24C-1.TCT | 24V | 3,000 | 7 Inch |

Contact Information for Semtech International AG

| | | | |
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