

Low Capacitance TVS Array

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

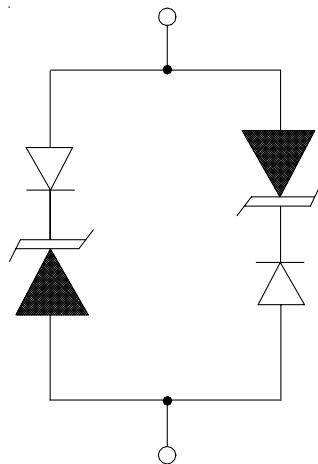
Mechanical Characteristics

- ◆ 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

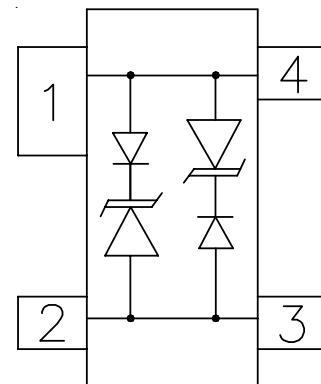
Applications

- ◆ 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



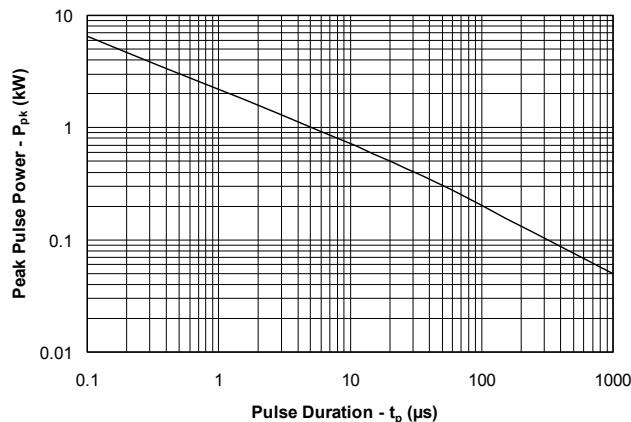
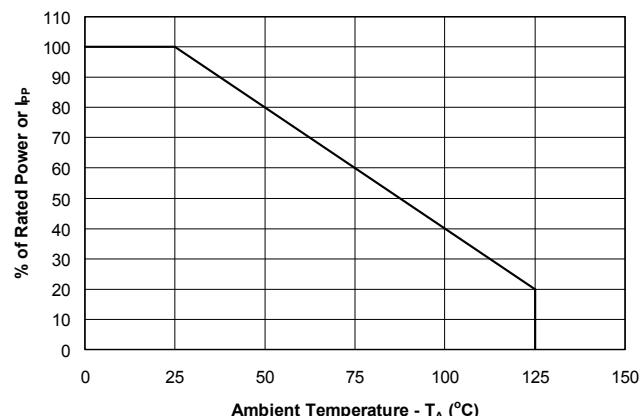
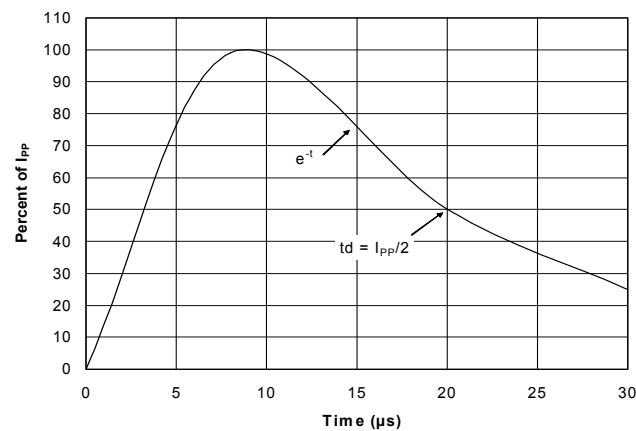
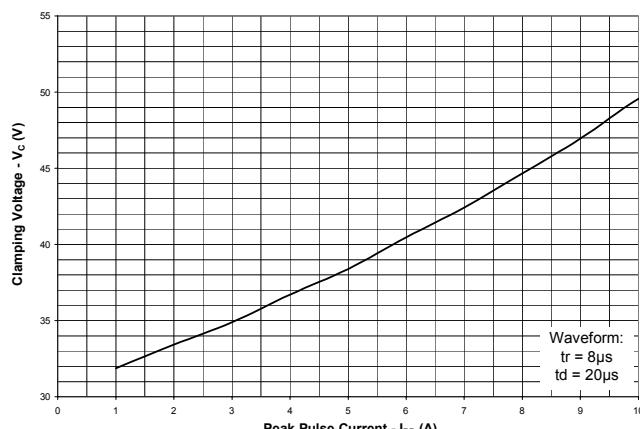
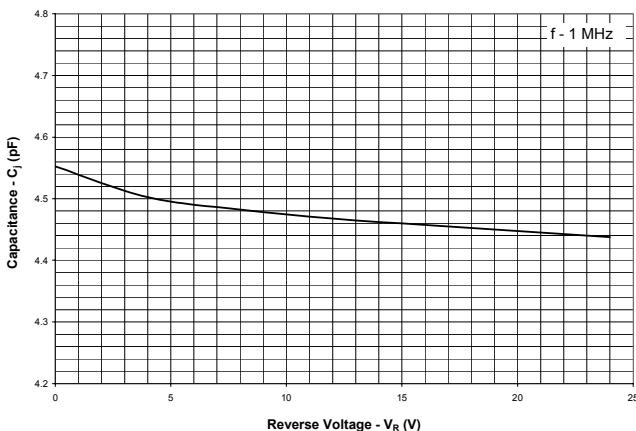
SOT-143 (Top View)

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	$V_{RWM} = 24V, T=25°C$			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

PROTECTION PRODUCTS
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 two 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.

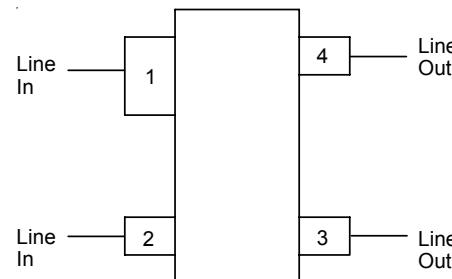


Figure 1 - Connection for Differential Protection (Line-to-Line)

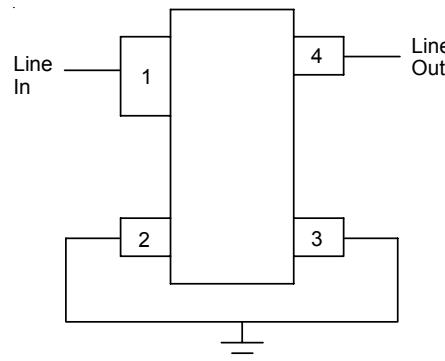
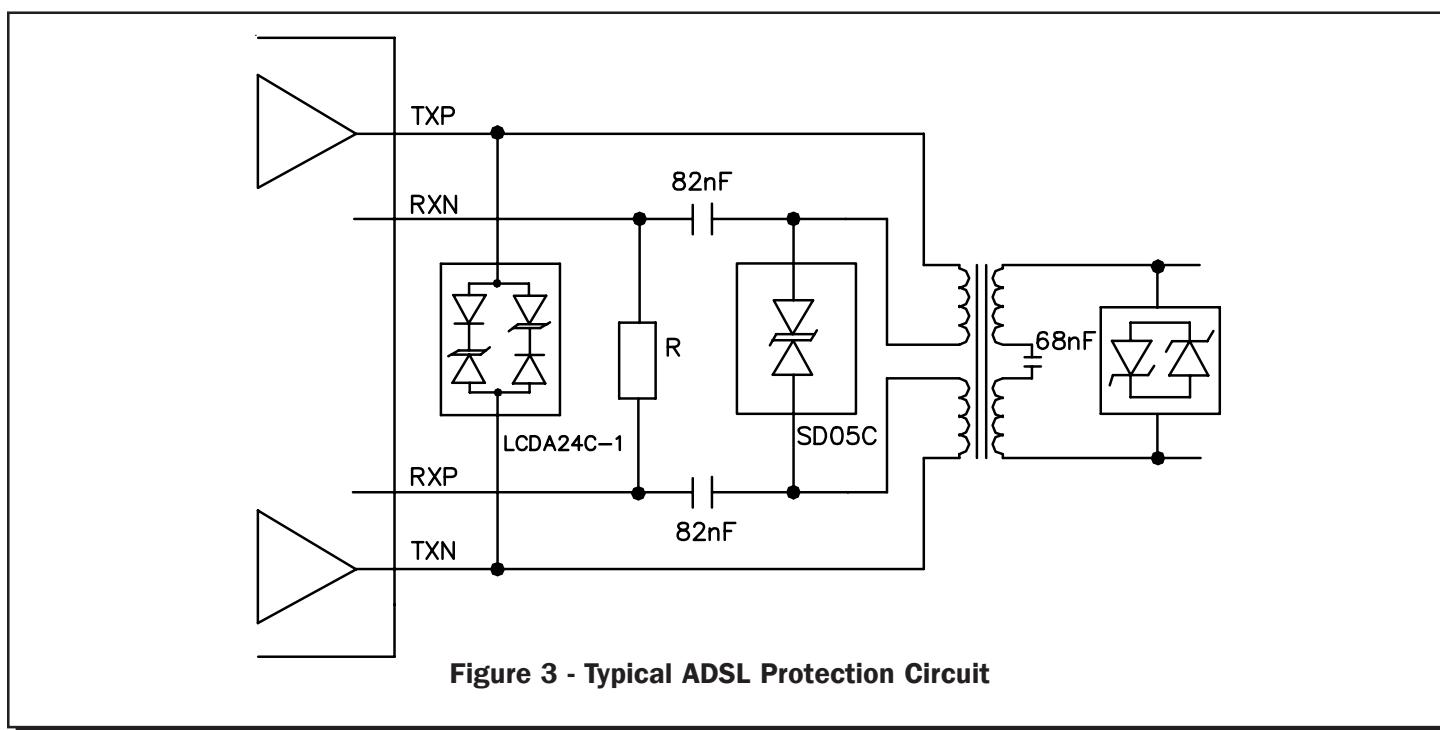
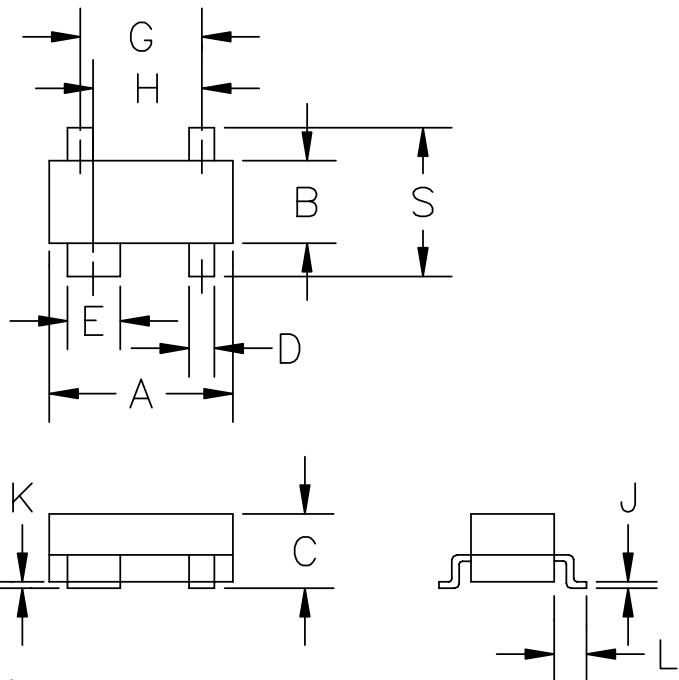


Figure 2 - Connection for Common Mode Protection (Line-to-Ground)

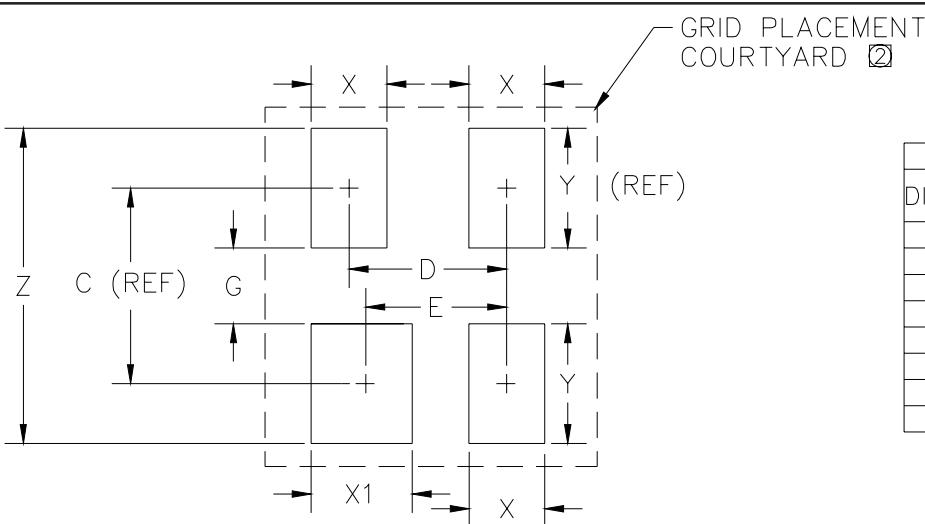


PROTECTION PRODUCTS
Outline Drawing - SOT-143


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	.010	—
L	.010	.022	—	.55	REF
S	.082	.104	2.10	2.64	—

Notes:

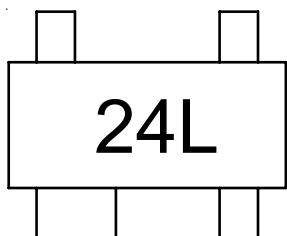
- (1) Controlling dimension: Inch (unless otherwise specified).
- (2) Dimension A and B do not include mold protrusions. Mold protrusions are .006" max.

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

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