

## Low Capacitance TVS Diode Array

### PROTECTION PRODUCTS

#### Description

The LCDAxxC-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 ( $< 15\text{pF}$ ) making them suitable for use on high-speed telecom and datacom interfaces without signal degradation.

The configuration of the LCDAxxC-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 20 Amps for an 8/20 $\mu\text{s}$  lightning impulse. The low inductance construction minimizes voltage overshoot during high current surges.

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

#### Features

- ◆ ESD protection to **IEC 61000-4-2, Level 4**
- ◆ Lightning protection per **IEC 61000-4-5** (20A,  $t_p=8/20\mu\text{s}$ )
- ◆ Configuration optimized for easy board layout
- ◆ Protects one line pair
- ◆ Low capacitance ( $<15\text{pF}$ ) for high-speed interfaces
- ◆ Low clamping voltage
- ◆ Low leakage current
- ◆ Operating voltage: 12V & 15V
- ◆ Solid-state silicon-avalanche technology

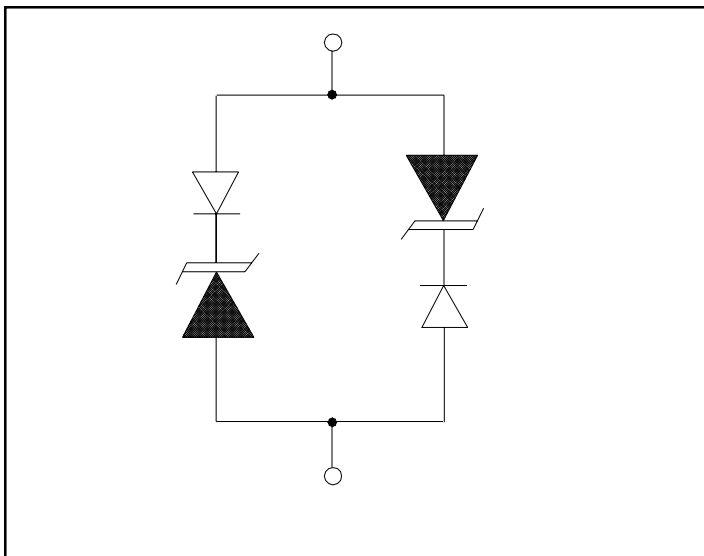
#### Mechanical Characteristics

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

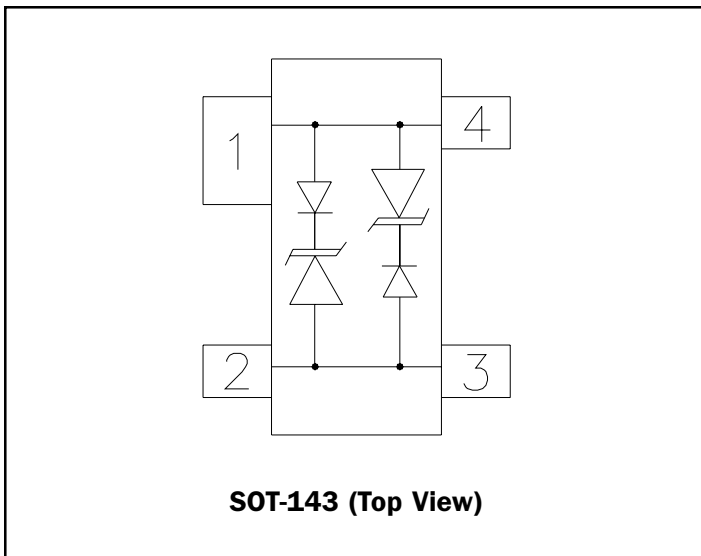
#### Applications

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

#### Circuit Diagram



#### Schematic & PIN Configuration



## PROTECTION PRODUCTS

### Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Power (tp = 8/20μs)	P <sub>pk</sub>	500	Watts
Peak Pulse Current (tp = 8/20μs)	I <sub>pp</sub>	20	A
Lead Soldering Temperature	T <sub>L</sub>	260 (10 sec.)	°C
Operating Temperature	T <sub>J</sub>	-55 to +125	°C
Storage Temperature	T <sub>STG</sub>	-55 to +150	°C

### Electrical Characteristics

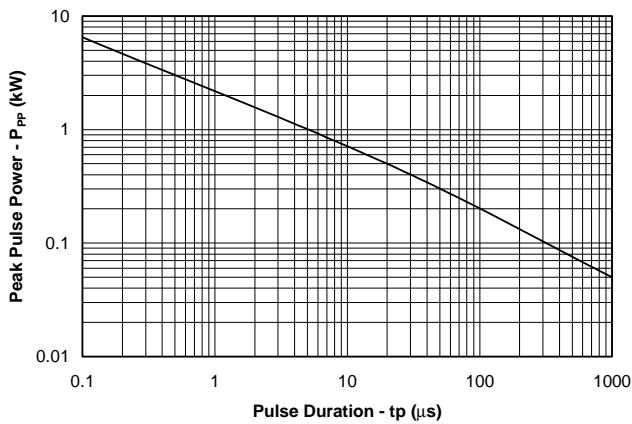
LCDA12C-1						
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V <sub>RWM</sub>				12	V
Reverse Breakdown Voltage	V <sub>BR</sub>	I <sub>t</sub> = 1mA	13.3			V
Reverse Leakage Current	I <sub>R</sub>	V <sub>RWM</sub> = 12V, T=25°C			5	μA
Clamping Voltage	V <sub>C</sub>	I <sub>pp</sub> = 5A, tp = 8/20μs			19	V
Clamping Voltage	V <sub>C</sub>	I <sub>pp</sub> = 20A, tp = 8/20μs			26.6	V
Junction Capacitance	C <sub>J</sub>	Between I/O pins and Gnd V <sub>R</sub> = 0V, f = 1MHz		8	15	pF

LCDA15C-1						
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V <sub>RWM</sub>				15	V
Reverse Breakdown Voltage	V <sub>BR</sub>	I <sub>t</sub> = 1mA	16.7			V
Reverse Leakage Current	I <sub>R</sub>	V <sub>RWM</sub> = 15V, T=25°C			5	μA
Clamping Voltage	V <sub>C</sub>	I <sub>pp</sub> = 1A, tp = 8/20μs			24	V
Clamping Voltage	V <sub>C</sub>	I <sub>pp</sub> = 15A, tp = 8/20μs			33	V
Junction Capacitance	C <sub>J</sub>	Between I/O pins and Gnd V <sub>R</sub> = 0V, f = 1MHz		8	15	pF

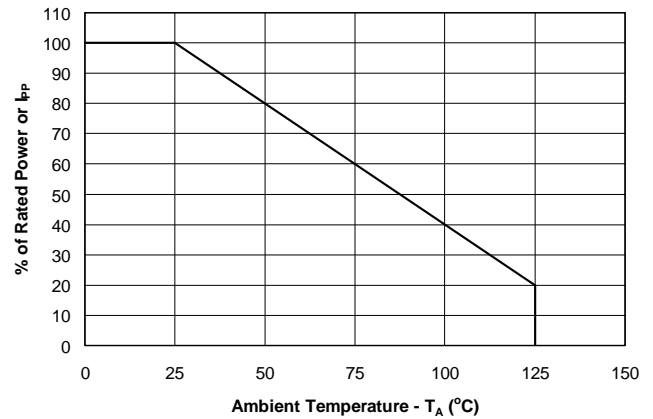
## PROTECTION PRODUCTS

### Typical Characteristics

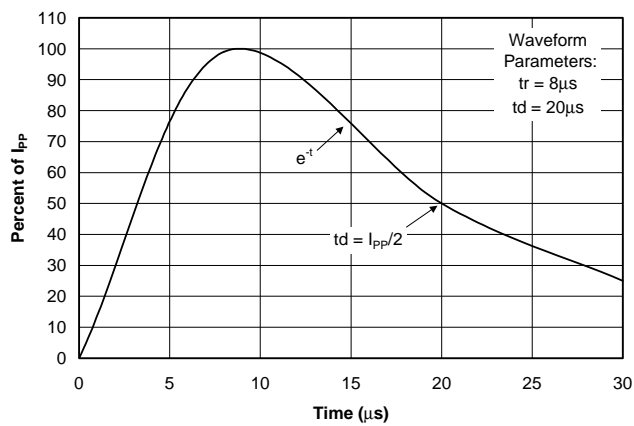
**Non-Repetitive Peak Pulse Power vs. Pulse Time**



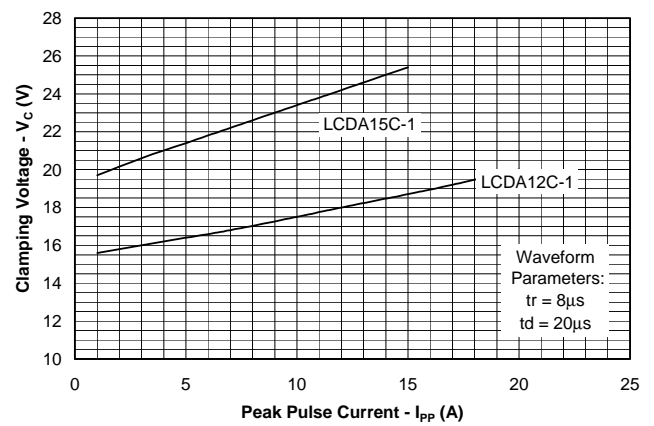
**Power Derating Curve**



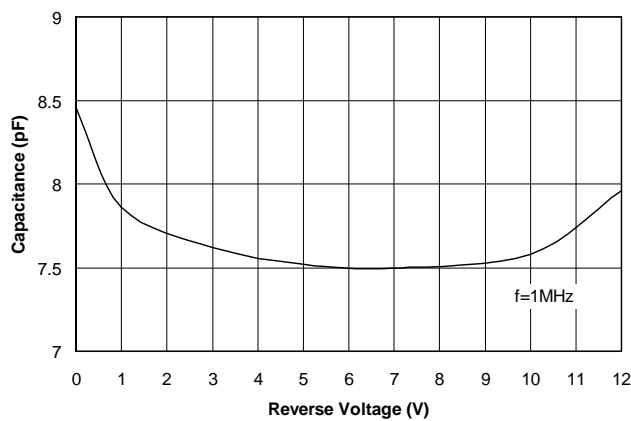
**Pulse Waveform**



**Clamping Voltage vs. Peak Pulse Current**



**Variation of Capacitance vs. Reverse Voltage**

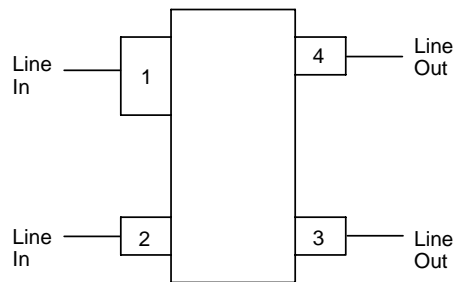


**PROTECTION PRODUCTS**
**Applications Information**
**Device Connection for Metallic Protection of High-Speed Data Lines**

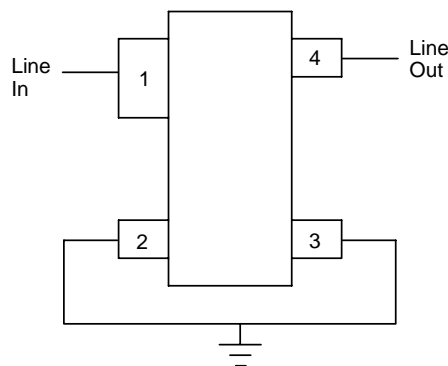
The LCDAxxC-1 is designed to protect high-speed data lines from transient over-voltages which result from lightning and ESD. The device is designed to protect one line in common mode (Line-to-Ground) or one line pair in metallic (Line-to-Line) mode. For metallic mode protection, the input of line 1 is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

**ADSL Protection**

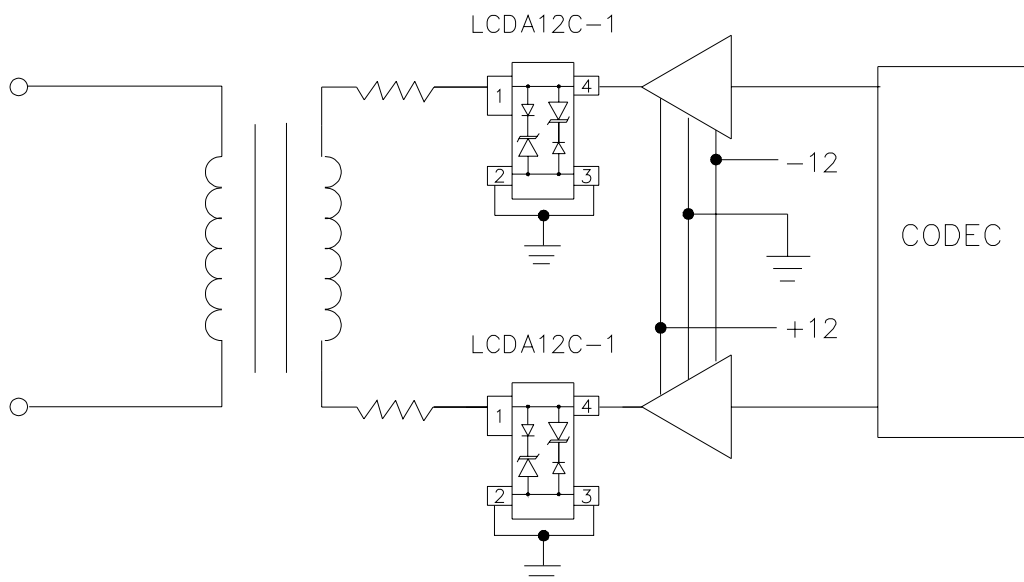
A typical ADSL protection circuit is shown in Figure 3. The LCDA12C-1 (or LCDA15C-1 for 15 volt drivers) is connected from each line to ground on the IC side of the line. They provide lightning and ESD protection for the sensitive line driver IC.



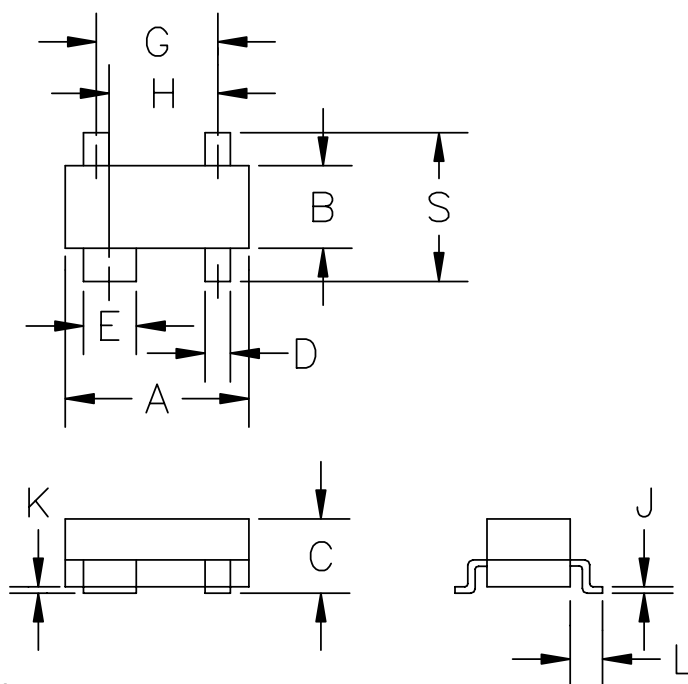
**Figure 1 - Connection for Differential Protection (Line-to-Line)**



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



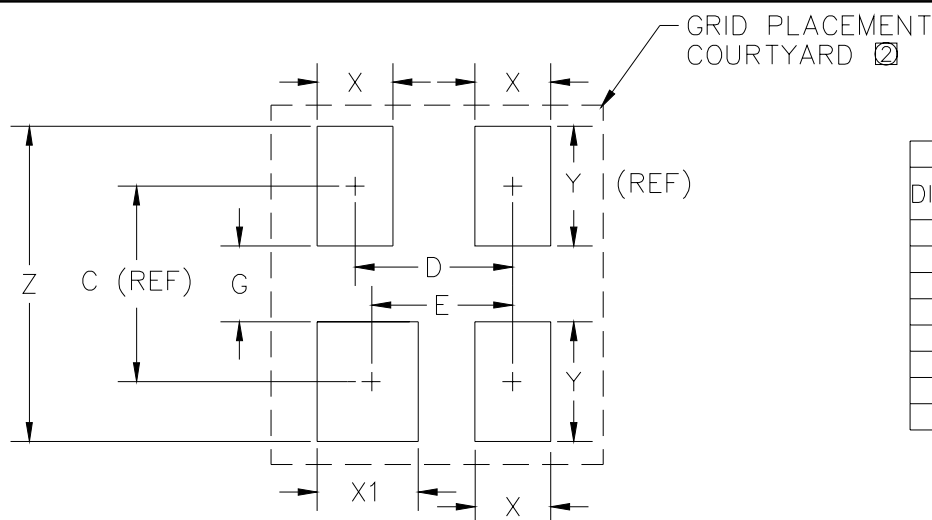
**Figure 3 - ADSL Protection Circuit**

**PROTECTION PRODUCTS**
**Outline Drawing - SOT-143**


DIM <sup>N</sup>	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 <sup>N</sup>	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****Marking Codes**

<b>Part Number</b>	<b>Marking Code</b>
LCDA12C-1	12L
LCDA15C-1	15L

**Ordering Information**

<b>Part Number</b>	<b>Working Voltage</b>	<b>Qty per Reel</b>	<b>Reel Size</b>
LCDA12C-1.TC	12V	3,000	7 Inch
LCDA15C-1.TC	15V	3,000	7 Inch

**Contact Information**

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