

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 (< 15pF) 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 μ 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

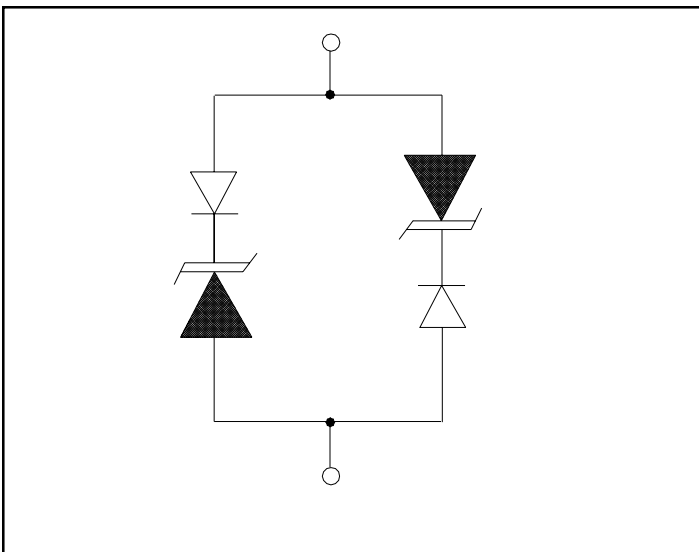
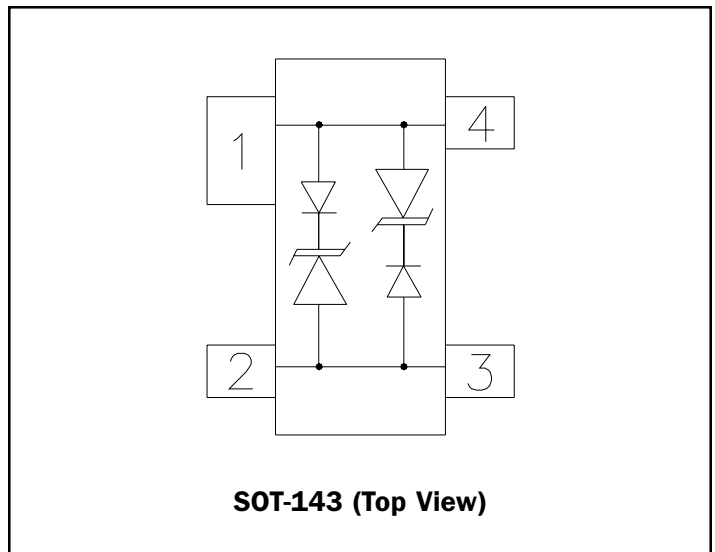
- ◆ ESD protection to **IEC 61000-4-2, Level 4**
- ◆ Lightning protection per **IEC 61000-4-5** (20A, tp=8/20 μ s)
- ◆ Configuration optimized for easy board layout
- ◆ Protects one line pair
- ◆ Low capacitance (<15pF) for high-speed interfaces
- ◆ Low clamping voltage
- ◆ Low leakage current
- ◆ Operating 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_{pk}	500	Watts
Peak Pulse Current (tp = 8/20μs)	I_{pp}	20	A
Lead Soldering Temperature	T_L	260 (10 sec.)	°C
Operating Temperature	T_J	-55 to +125	°C
Storage Temperature	T_{STG}	-55 to +150	°C

Electrical Characteristics

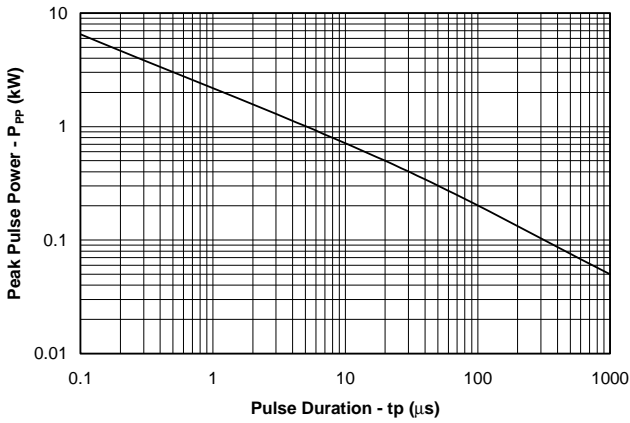
LCDA12C-1						
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}				12	V
Reverse Breakdown Voltage	V_{BR}	$I_t = 1mA$	13.3			V
Reverse Leakage Current	I_R	$V_{RWM} = 12V, T=25^\circ C$			5	μA
Clamping Voltage	V_C	$I_{pp} = 5A, tp = 8/20\mu s$			19	V
Clamping Voltage	V_C	$I_{pp} = 20A, tp = 8/20\mu s$			26.6	V
Junction Capacitance	C_j	Between I/O pins and Gnd $V_R = 0V, f = 1MHz$		8	15	pF

LCDA15C-1						
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}				15	V
Reverse Breakdown Voltage	V_{BR}	$I_t = 1mA$	16.7			V
Reverse Leakage Current	I_R	$V_{RWM} = 15V, T=25^\circ C$			5	μA
Clamping Voltage	V_C	$I_{pp} = 1A, tp = 8/20\mu s$			24	V
Clamping Voltage	V_C	$I_{pp} = 15A, tp = 8/20\mu s$			33	V
Junction Capacitance	C_j	Between I/O pins and Gnd $V_R = 0V, f = 1MHz$		8	15	pF

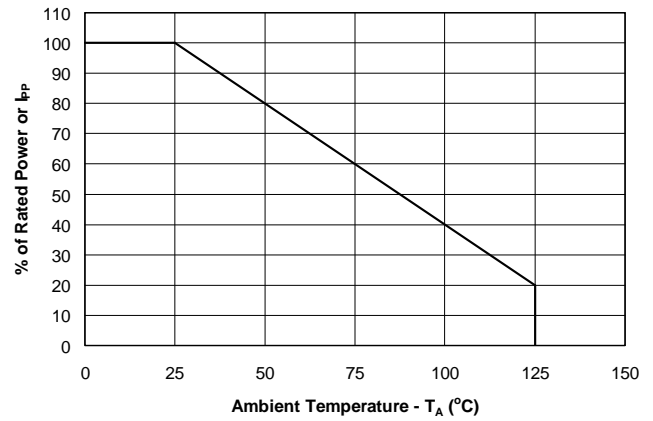
PROTECTION PRODUCTS

Typical Characteristics

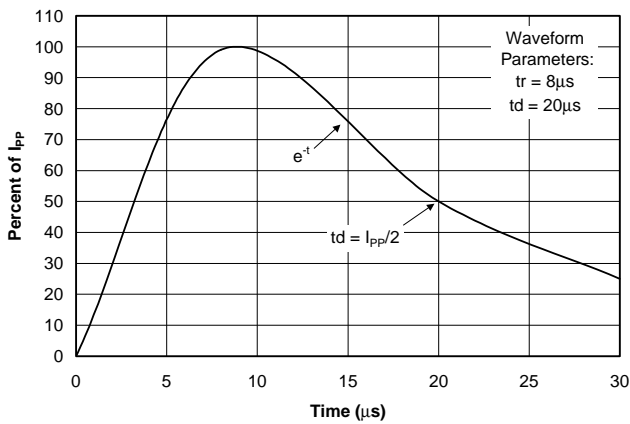
Non-Repetitive Peak Pulse Power vs. Pulse Time



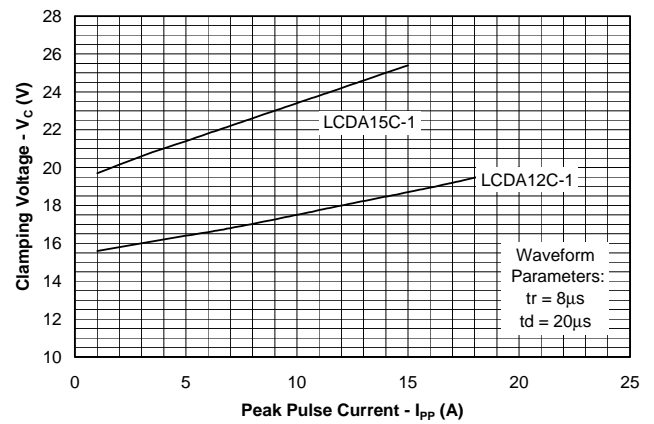
Power Derating Curve



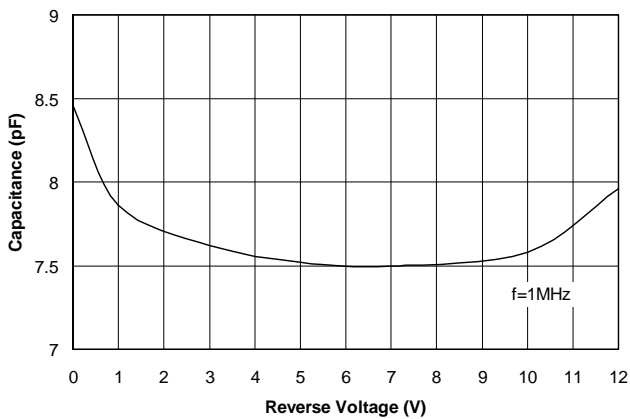
Pulse Waveform



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.

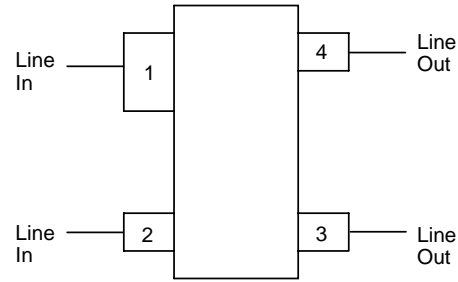


Figure 1 - Connection for Differential Protection (Line-to-Line)

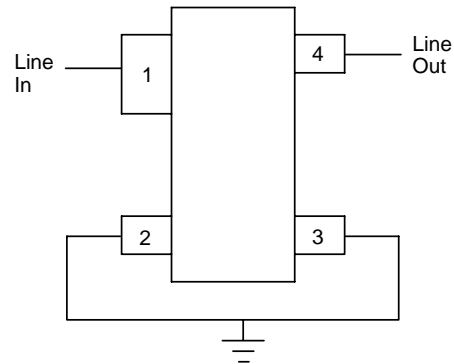


Figure 2 - Connection for Common Mode Protection (Line-to-Ground)

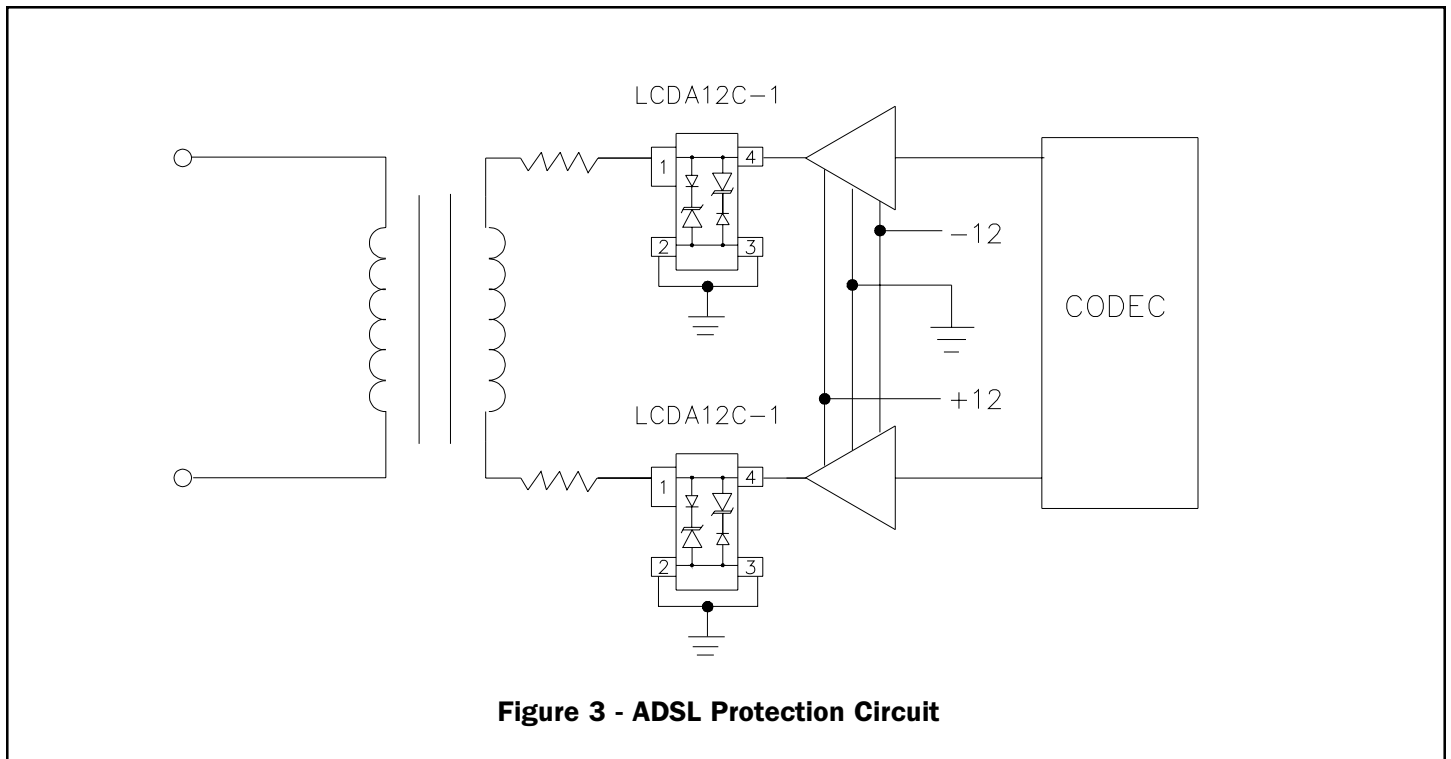
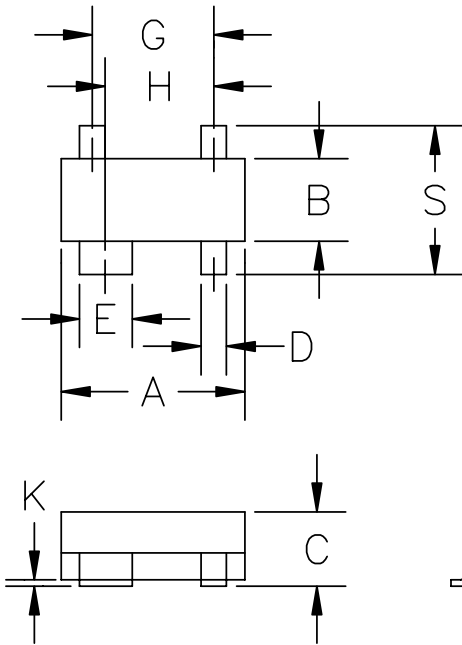


Figure 3 - ADSL Protection Circuit

PROTECTION PRODUCTS

Outline Drawing - SOT-143

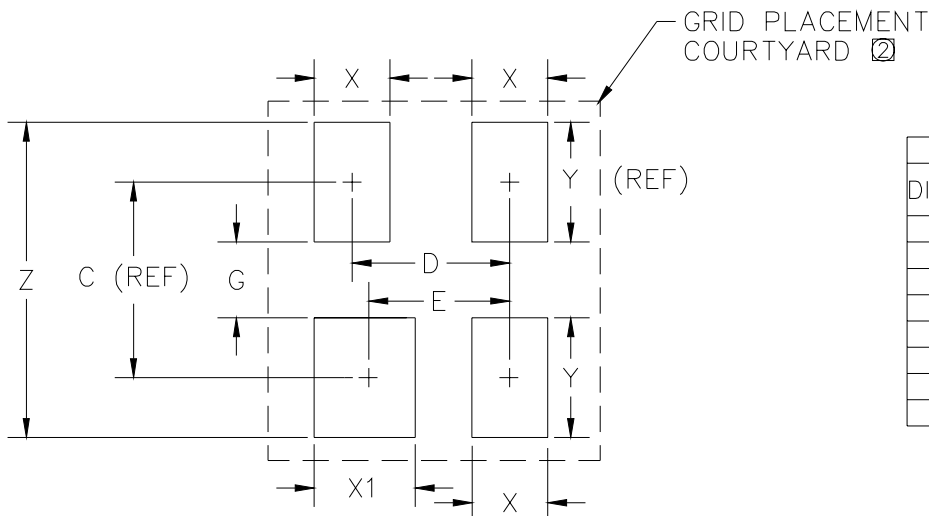


DIM ^N	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.110	.120	2.80	3.04	—
B	.047	.055	1.20	1.40	—
C	.031	.047	.80	1.20	—
D	.014	.018	.37	.510	—
E	.030	.035	.76	.940	—
G	.076	BSC	1.92	BSC	—
H	.068	BSC	1.72	BSC	—
J	.003	.005	.085	.180	—
K	.002	.005	.013	0.10	—
L	.010	.022	—	.55	REF
S	.082	.104	2.10	2.64	—

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**Marking Codes**

Part Number	Marking Code
LCDA12C-1	12L
LCDA15C-1	15L

Ordering Information

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

Contact Information

Semtech Corporation
Protection Products Division
652 Mitchell Rd., Newbury Park, CA 91320
Phone: (805)498-2111 FAX (805)498-3804