

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

- ◆ 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, 12A (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 and 15V
- ◆ Solid-state silicon-avalanche technology

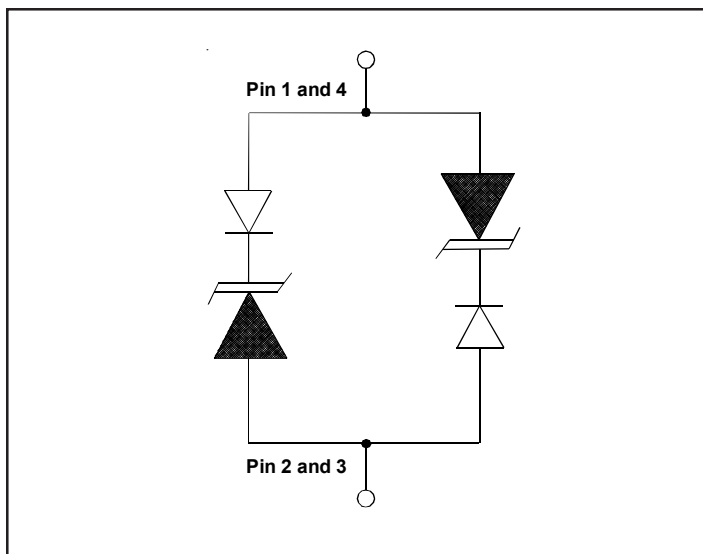
Mechanical Characteristics

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

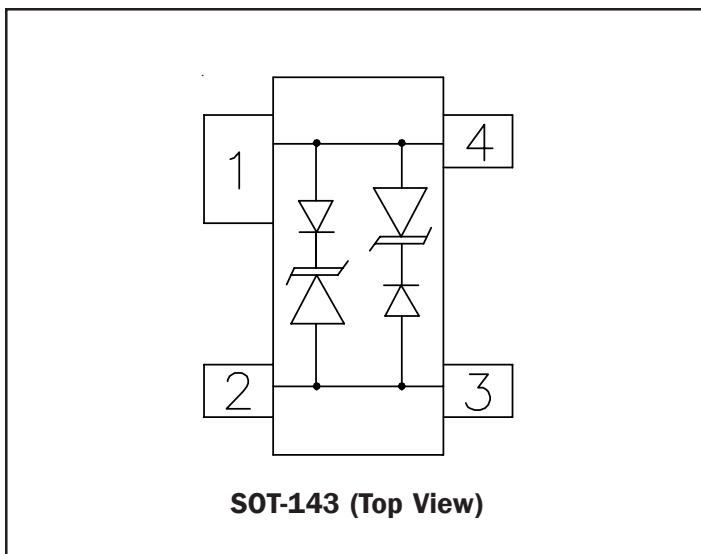
Applications

- ◆ 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



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Absolute Maximum Rating

Rating	Symbol	Value	Units
Peak Pulse Power ($t_p = 8/20\mu s$)	P_{pk}	500	Watts
Lead Soldering Temperature	T_L	260 (10 sec.)	$^{\circ}C$
Operating Temperature	T_J	-55 to +125	$^{\circ}C$
Storage Temperature	T_{STG}	-55 to +150	$^{\circ}C$

Electrical Characteristics

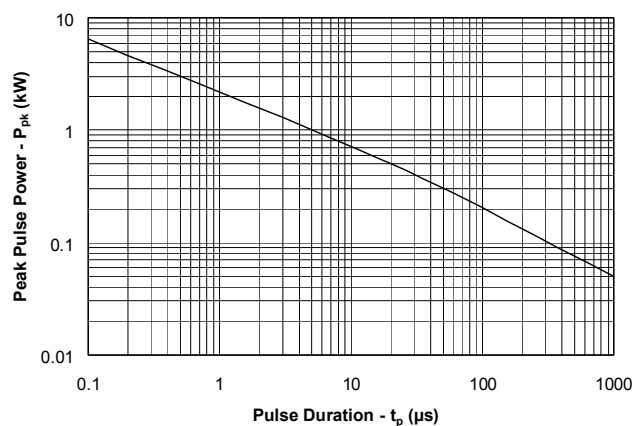
LCDA12C-1						
Parameter	Symbol	Conditions	Minimum	Typical	Maximum	Units
Reverse Stand-Off Voltage	V_{RWM}				12	V
Reverse Breakdown Voltage	V_{BR}	$I_t = 1mA$	13.3			V
Reverse Leakage Current	I_R	$V_{RWM} = 12V, T=25^{\circ}C$			5	μA
Clamping Voltage	V_C	$I_{PP} = 5A, t_p = 8/20\mu s$			19	V
Clamping Voltage	V_C	$I_{PP} = 20A, t_p = 8/20\mu s$			26.6	V
Peak Pulse Current	I_{PP}	$t_p = 8/20\mu s$			20	A
Junction Capacitance	C_J	Between I/O pins and Ground $V_R = 0V, f = 1MHz$		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	$I_{PP} = 1A, t_p = 8/20\mu s$			24	V
Clamping Voltage	V_C	$I_{PP} = 15A, t_p = 8/20\mu s$			33	V
Peak Pulse Current	I_{PP}	$t_p = 8/20\mu s$			15	A
Junction Capacitance	C_J	Between I/O pins and Ground $V_R = 0V, f = 1MHz$		8	15	pF

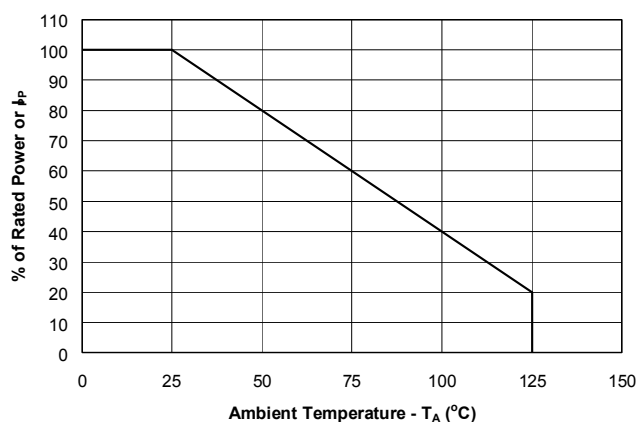
PROTECTION PRODUCTS

Typical Characteristics

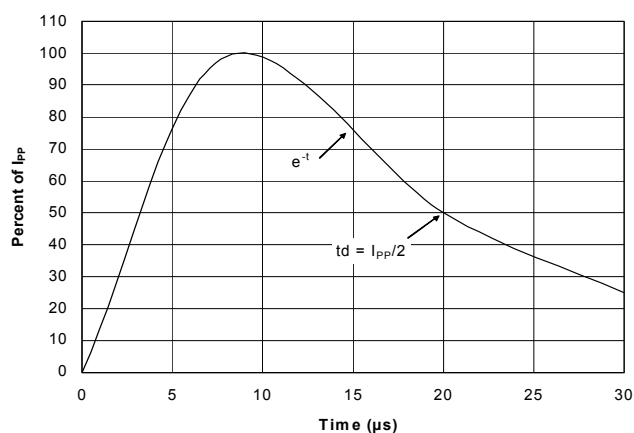
Non-Repetitive Peak Pulse Power vs. Pulse Time



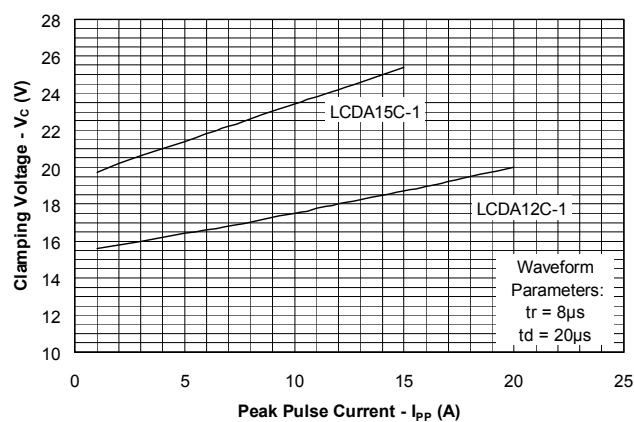
Power Derating Curve



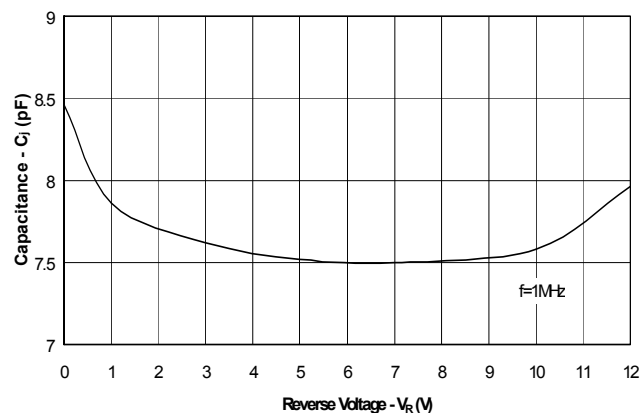
Pulse Waveform



Clamping Voltage vs. Peak Pulse Current



Capacitance vs. Reverse Voltage



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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 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. 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.

Matte Tin Lead Finish

Matte tin has become the industry standard lead-free replacement for SnPb lead finishes. A matte tin finish is composed of 100% tin solder with large grains. Since the solder volume on the leads is small compared to the solder paste volume that is placed on the land pattern of the PCB, the reflow profile will be

determined by the requirements of the solder paste. Therefore, these devices are compatible with both lead-free and SnPb assembly techniques. In addition, unlike other lead-free compositions, matte tin does not have any added alloys that can cause degradation of the solder joint.

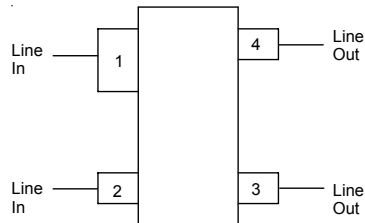


Figure 1 - Connection for Differential Protection (Line-to-Line)

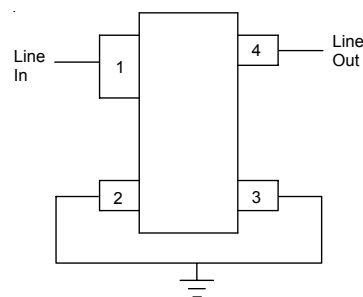


Figure 2 - Connection for Common Mode Protection (Line-to-Ground)

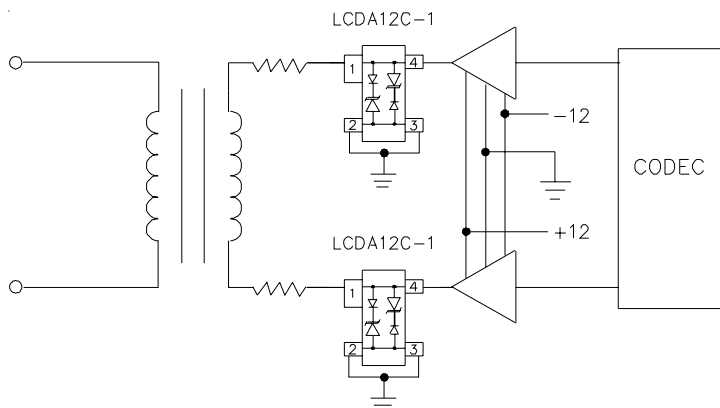
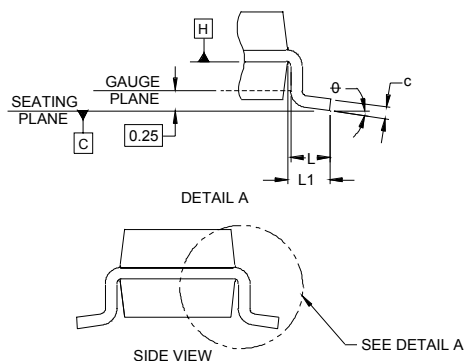
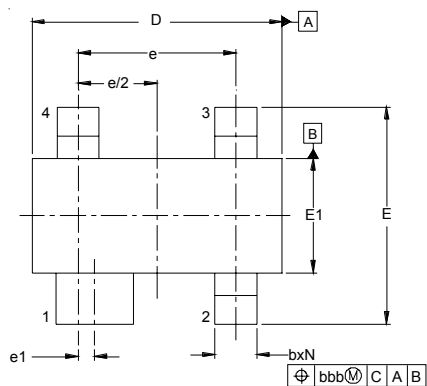


Figure 3 - ADSL Protection Circuit

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Outline Drawing - SOT-143

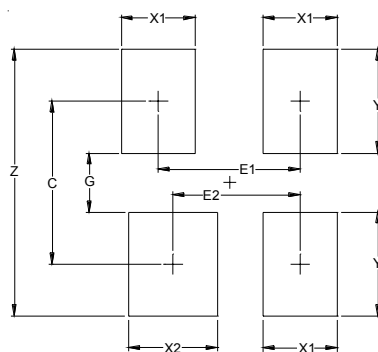


DIM	INCHES			MILLIMETERS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	.031	-	.048	0.80	-	1.22
A1	.000	-	.006	0.013	-	0.15
A2	.029	.035	.042	0.75	0.90	1.07
b	.011	-	.020	0.30	-	0.51
b1	.029	-	.037	0.76	-	0.94
c	.003	-	.008	0.08	-	0.20
D	.110	.114	.120	2.80	2.90	3.04
E	.082	.093	.104	2.10	2.37	2.64
E1	.047	.051	.055	1.20	1.30	1.40
e	.075	-	-	1.92	BSC	-
e1	.008	-	-	0.20	BSC	-
L	.015	.020	.024	0.40	0.50	0.60
L1	(.021)			(0.54)		
N	4			4		
φ	0°	-	8°	0°	-	8°
aaa	.006			0.15		
bbb	.008			0.20		
ccc	.004			0.10		

NOTES:

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. DATUMS **-A-** AND **-B-** TO BE DETERMINED AT DATUM PLANE **-H-**
3. DIMENSIONS "E1" AND "D" DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
4. REFERENCE JEDEC STD TO-253, VARIATION D.

Land Pattern - SOT-143



DIM	DIMENSIONS	
	INCHES	MILLIMETERS
C	(.087)	(2.20)
E1	.076	1.92
E2	.068	1.72
G	.031	0.80
X1	.039	1.00
X2	.047	1.20
Y	.055	1.40
Z	.141	3.60

NOTES:

1. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.
2. REFERENCE IPC-SM-782A

PROTECTION PRODUCTS**Marking Codes**

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

Ordering Information

Part Number	Lead Finish	Qty per Reel	Reel Size
LCDA12C-1.TC	SnPb	3,000	7 Inch
LCDA15C-1.TC	SnPb	3,000	7 Inch
LCDA12C-1.TCT	Pb Free	3,000	7 Inch
LCDA15C-1.TCT	Pb Free	3,000	7 Inch

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