

## Description

RClamp03301H-RClamp0801H series is a low capacitance ESD protection device specifically designed to protect high-speed Ethernet lines. They offer desirable characteristics for board-level protection, including fast response time, low operating and clamping voltage, and no device degradation. These devices feature a large cross-sectional area for conducting high surge capability of 30A-36A ( $t_p = 8/20 \mu\text{s}$ ). RClamp03301H-RClamp0801H series has a typical capacitance of only 3.3pF and 3.6pF, which is ideal for high speed lines. Each device will protect one high-speed data line.

RClamp03301H-RClamp0801H is in a 2-pin SOD-323 package; leads are finished with lead-free Matte tin. They may be used to protect 3.3V, 5V and 8V systems. The combination of small size, low capacitance, and high ESD, surge capability makes them ideal for use in industrial and telecom applications.

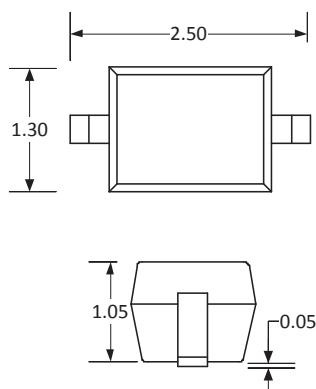
## Applications

- Telecom
- Industrial
- 10/100/1000 Ethernet
- DOCSIS modems
- USB 2.0

## Features

- High ESD withstand Voltage
- IEC 61000-4-2 (ESD): 30kV (Contact), 30kV (Air)
- IEC 61000-4-5 (Lightning): 30A-36A ( $t_p = 8/20 \mu\text{s}$ )
- Protects one high-speed data line
- Working voltage options: 3.3V, 5V, and 8V
- Low capacitance: 3.3pF & 3.6pF typical
- Solid-state silicon-avalanche technology

## Package Dimension

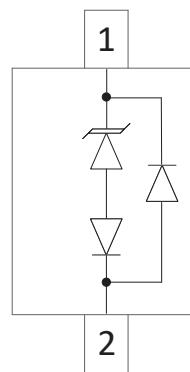


Nominal Dimensions (mm)

## Mechanical Characteristics

- Package: SOD-323
- Pb-free, Halogen Free, RoHS/WEEE compliant
- Lead Finish: Pb-Free
- Marking: Marking Code
- Packaging: Tape and Reel

## Functional Schematic



SOD-323 (Top View)

## Absolute Maximum Rating

RATING	SYMBOL	VALUE	UNITS
Peak Pulse Power ( $t_p = 8/20\mu\text{s}$ )	$P_{PK}$	500-565	W
ESD per IEC 61000-4-2 (Contact) <sup>(1)</sup>	$V_{ESD}$	$\pm 30$	kV
ESD per IEC 61000-4-2 (Air) <sup>(1)</sup>		$\pm 30$	
Operating Temperature	$T_{OP}$	-40 to +125	°C
Storage Temperature	$T_{STG}$	-55 to +150	°C

## Electrical Characteristics

T=25°C unless otherwise specified

All data taken from Pin 1 to 2 unless otherwise specified.

### RCLAMP03301H

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse Stand-Off Voltage	$V_{RWM}$				3.3	V
Reverse Breakdown Voltage	$V_{BR}$	$I_t = 1\text{mA}$	6.5	8.0	11	V
Reverse Leakage Current	$I_R$	$V_{RWM} = 3.3\text{V}$			1	µA
Peak Pulse Current	$I_{PP}$	$t_p = 8/20\mu\text{s}$			36	A
Clamping Voltage	$V_C$	$I_{PP} = 1\text{A}, t_p = 8/20\mu\text{s}$ $I_{PP} = 36\text{A}, t_p = 8/20\mu\text{s}$	8.1	9.7		V
Dynamic Resistance <sup>(2),(3)</sup>	$R_{DYN}$	$t_p = 0.2/100\text{ns}$ (TLP)	0.17			Ω
Junction Capacitance	$C_J$	$V_R = 0\text{V}, f = 1\text{MHz}$	3.6	5		pF

Notes:

(1): ESD Gun return path to Ground Reference Plane (GRP)

(2): Transmission Line Pulse Test (TLP) Settings:  $t_p = 100\text{ns}$ ,  $t_r = 0.2\text{ns}$ ,  $I_{TLP}$  and  $V_{TLP}$  averaging window:  $t_1 = 70\text{ns}$  to  $t_2 = 90\text{ns}$ .

(3): Dynamic resistance calculated from  $I_{TLP} = 4\text{A}$  to  $I_{TLP} = 16\text{A}$

## Electrical Characteristics

T=25°C unless otherwise specified

All data taken from Pin 1 to 2 unless otherwise specified.

### RCLAMP0501H

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse Stand-Off Voltage	$V_{RWM}$				5	V
Reverse Breakdown Voltage	$V_{BR}$	$I_t = 1\text{mA}$	6.5	8.3	12	V
Reverse Leakage Current	$I_R$	$V_{RWM} = 5\text{V}$			1	$\mu\text{A}$
Peak Pulse Current	$I_{PP}$	$t_p = 8/20\mu\text{s}$			32	A
Clamping Voltage	$V_C$	$I_{PP} = 1\text{A}, t_p = 8/20\mu\text{s}$ $I_{PP} = 32\text{A}, t_p = 8/20\mu\text{s}$		8.4 13.4	10.0 15.5	V
Dynamic Resistance <sup>(2),(3)</sup>	$R_{DYN}$	$t_p = 0.2/100\text{ns (TLP)}$		0.17		$\Omega$
Junction Capacitance	$C_J$	$V_R = 0\text{V}, f = 1\text{MHz}$	3.6	5		$\text{pF}$

### RCLAMP0801H

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Reverse Stand-Off Voltage	$V_{RWM}$				8	V
Reverse Breakdown Voltage	$V_{BR}$	$I_t = 1\text{mA}$	9.5	11	14	V
Reverse Leakage Current	$I_R$	$V_{RWM} = 8\text{V}$			1	$\mu\text{A}$
Peak Pulse Current	$I_{PP}$	$t_p = 8/20\mu\text{s}$			30	A
Clamping Voltage	$V_C$	$I_{PP} = 1\text{A}, t_p = 8/20\mu\text{s}$ $I_{PP} = 30\text{A}, t_p = 8/20\mu\text{s}$		11.1 15.1	13.0 17.5	V
Dynamic Resistance <sup>(2),(3)</sup>	$R_{DYN}$	$t_p = 0.2/100\text{ns (TLP)}$		0.14		$\Omega$
Junction Capacitance	$C_J$	$V_R = 0\text{V}, f = 1\text{MHz}$	3.3	5		$\text{pF}$

Notes:

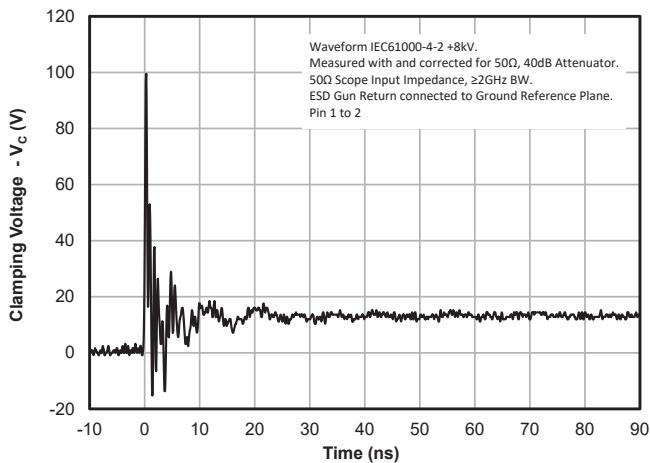
(1): ESD Gun return path to Ground Reference Plane (GRP)

(2): Transmission Line Pulse Test (TLP) Settings:  $t_p = 100\text{ns}$ ,  $t_r = 0.2\text{ns}$ ,  $I_{TLP}$  and  $V_{TLP}$  averaging window:  $t_1 = 70\text{ns}$  to  $t_2 = 90\text{ns}$ .

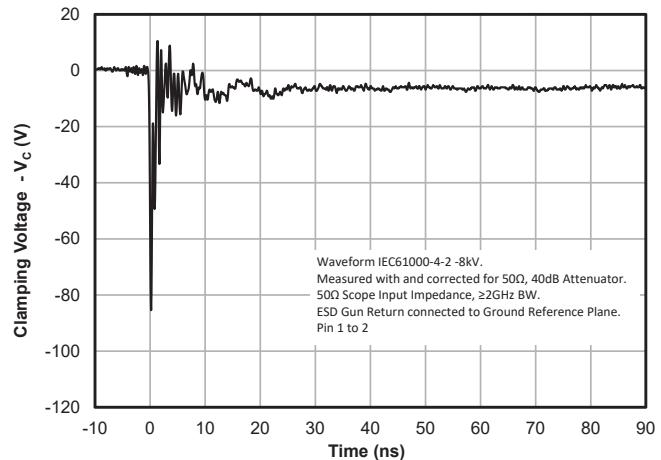
(3): Dynamic resistance calculated from  $I_{TLP} = 4\text{A}$  to  $I_{TLP} = 16\text{A}$

## Typical Characteristics-RClamp03301H

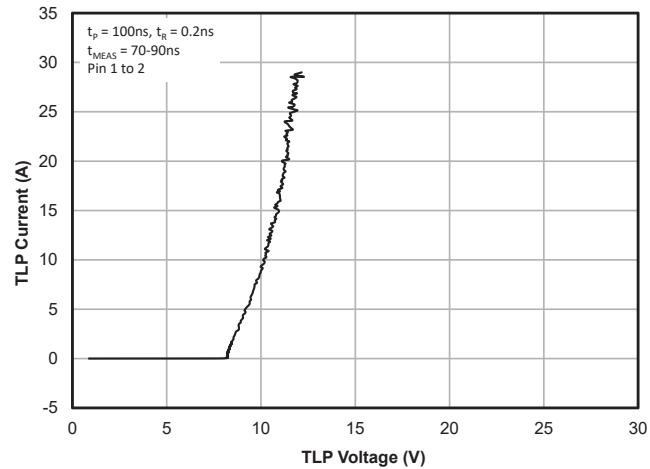
ESD Clamping (+8kV Contact per IEC 61000-4-2)



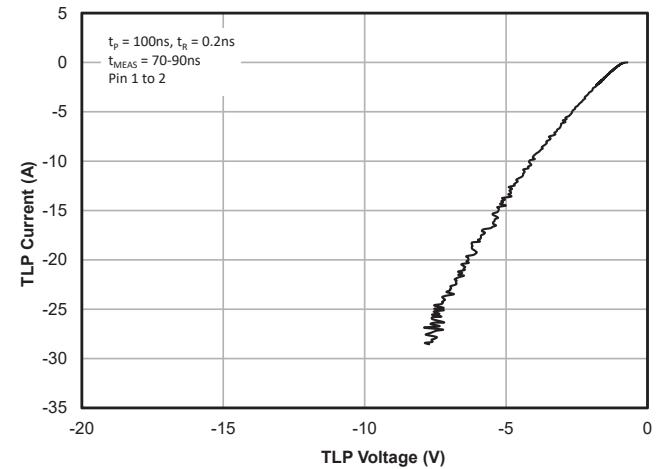
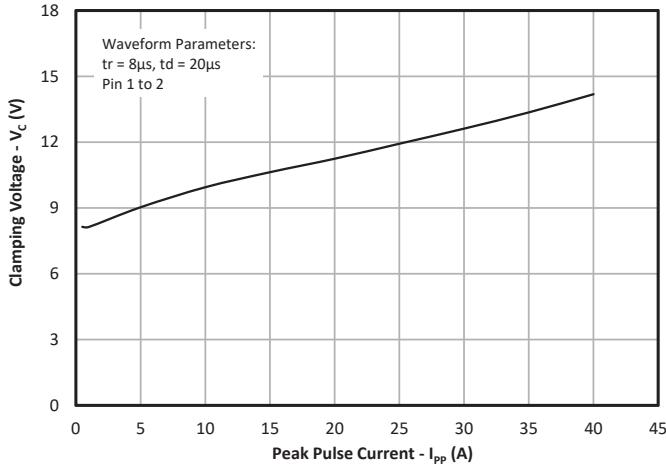
ESD Clamping (-8kV Contact per IEC 61000-4-2)



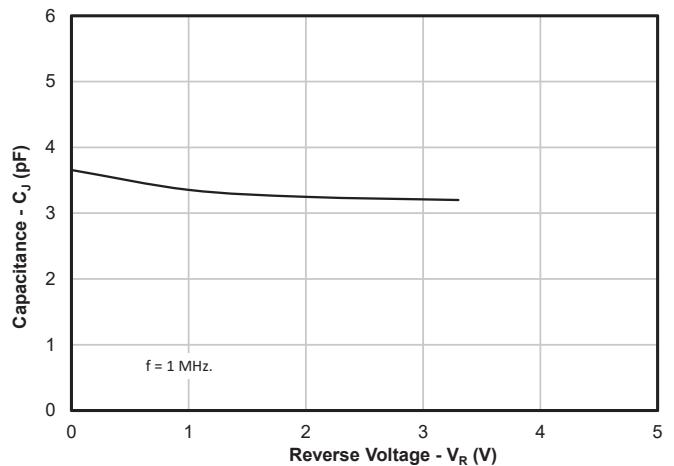
TLP Characteristics (Positive Pulse)



TLP Characteristics (Negative Pulse)

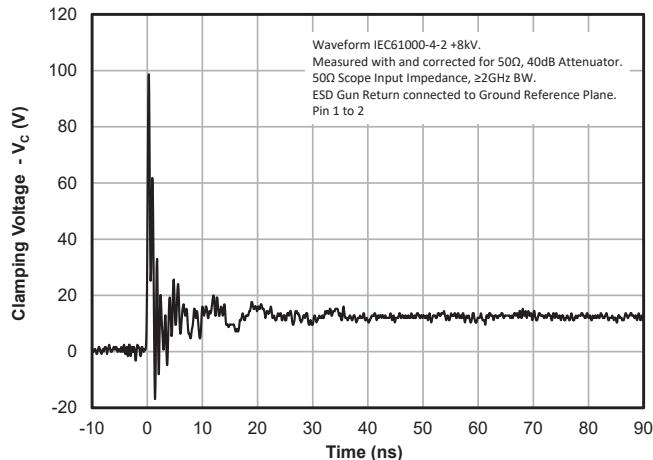
Clamping Voltage vs. Peak Pulse Current ( $t_p = 8/20\mu\text{s}$ )

Capacitance vs. Reverse Voltage

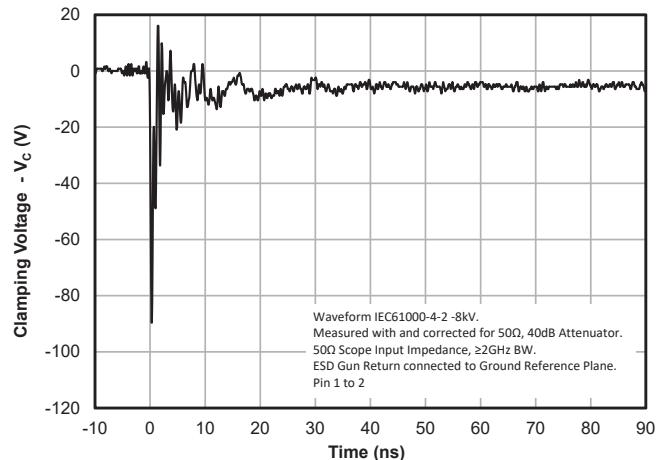


## Typical Characteristics-RClamp0501H

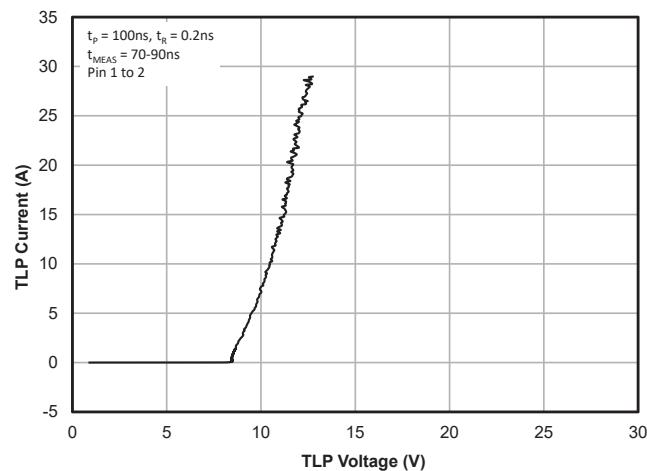
ESD Clamping (+8kV Contact per IEC 61000-4-2)



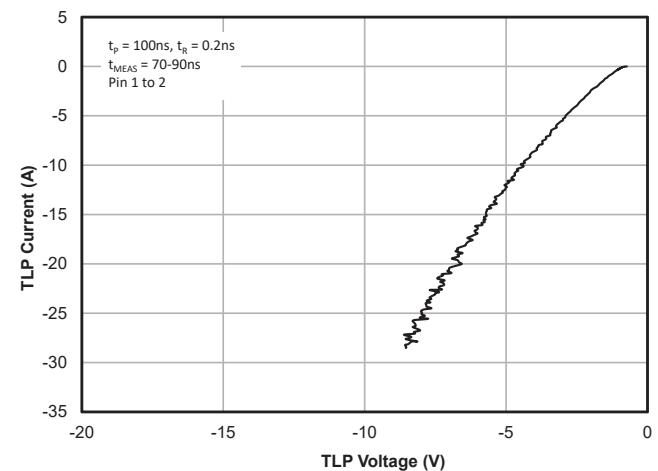
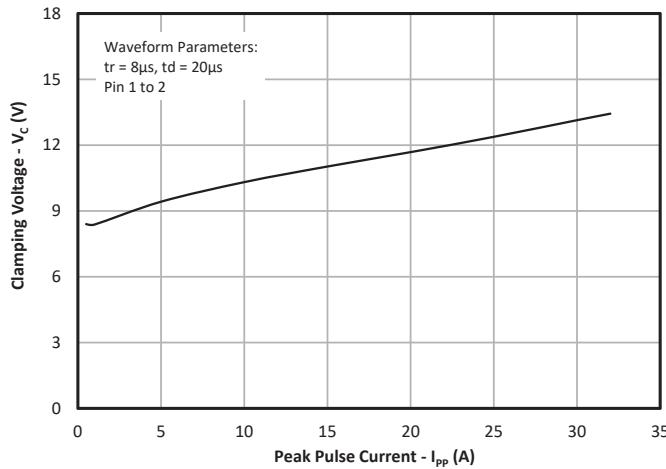
ESD Clamping (-8kV Contact per IEC 61000-4-2)



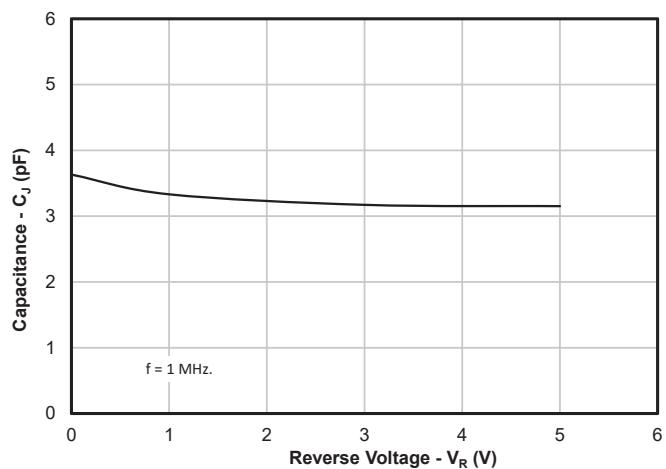
TLP Characteristics (Positive Pulse)



TLP Characteristics (Negative Pulse)

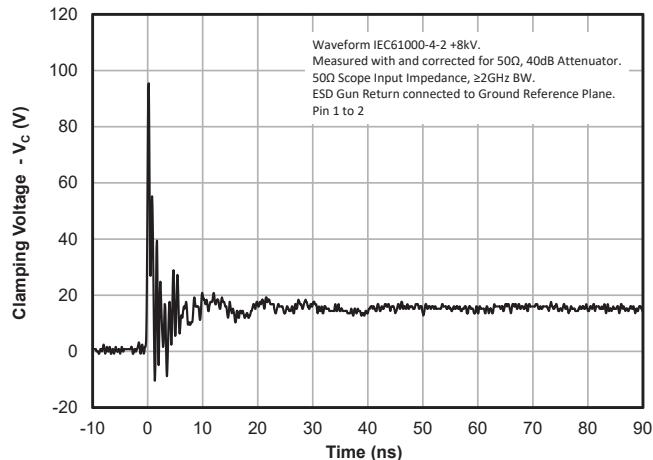
Clamping Voltage vs. Peak Pulse Current ( $t_p = 8/20\mu\text{s}$ )

Capacitance vs. Reverse Voltage

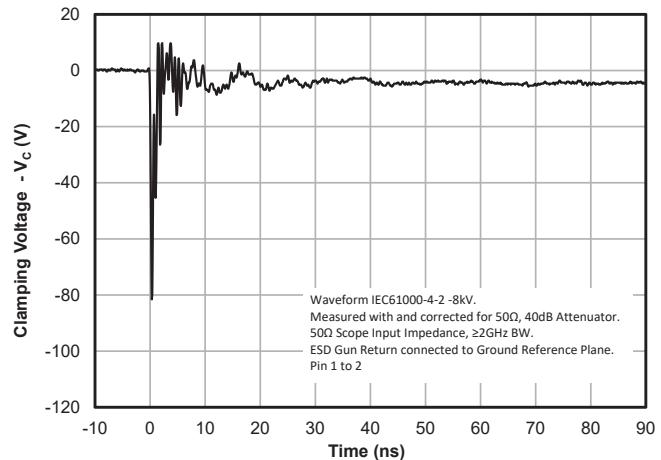


## Typical Characteristics-RClamp0801H

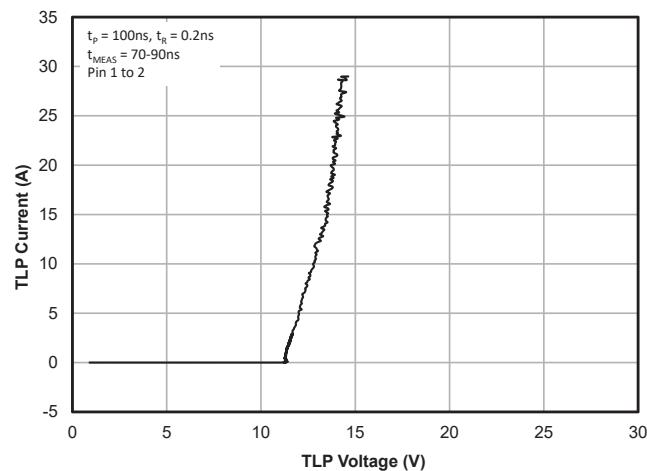
ESD Clamping (+8kV Contact per IEC 61000-4-2)



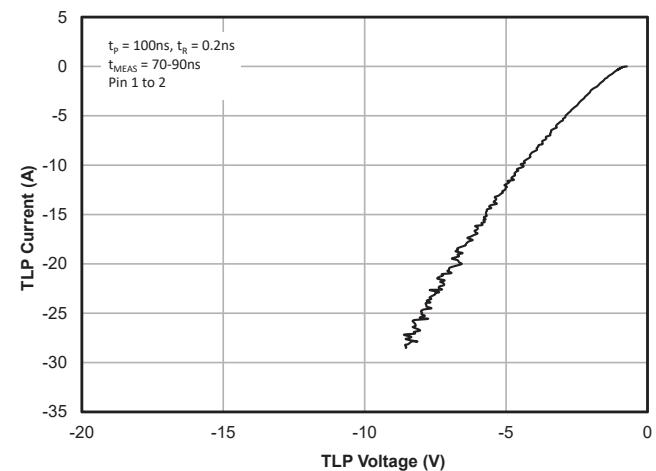
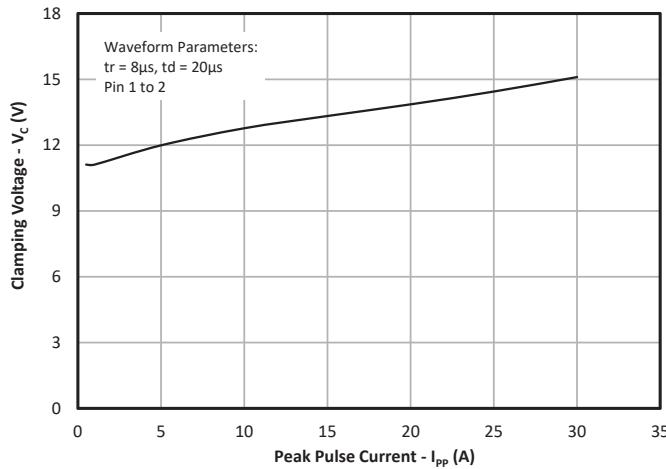
ESD Clamping (-8kV Contact per IEC 61000-4-2)



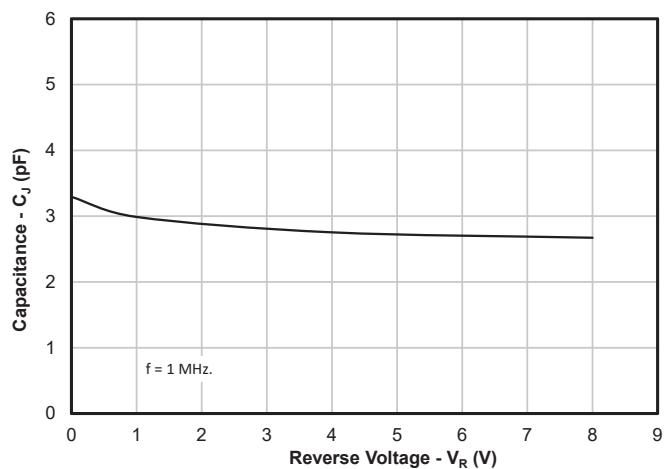
TLP Characteristics (Positive Pulse)



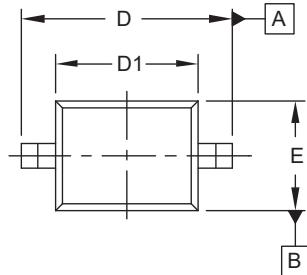
TLP Characteristics (Negative Pulse)

Clamping Voltage vs. Peak Pulse Current ( $t_p = 8/20\mu\text{s}$ )

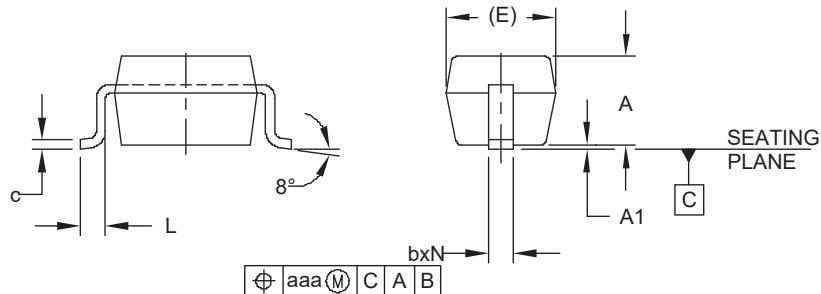
Capacitance vs. Reverse Voltage



## Outline Drawing - SOD-323



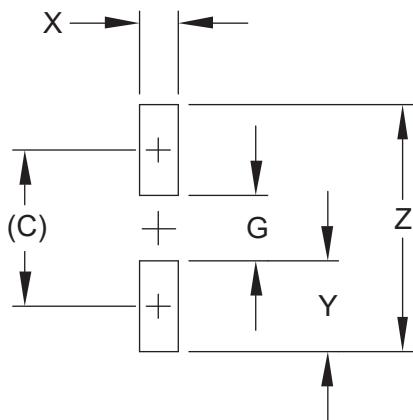
DIMENSIONS			
DIM	MILLIMETERS		
	MIN	NOM	MAX
A	1.00	1.05	1.10
A1	0.00	0.05	0.10
b	0.25	0.30	0.35
c	0.10	0.11	0.15
D	2.30	2.50	2.70
D1	1.60	1.70	1.80
E	1.20	1.30	1.40
L	0.20	0.30	0.40
N	2		
aaa	0.20		



## NOTES:

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. DIMENSIONS "D1" AND "E" DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

## Landing Pattern - SOD-323

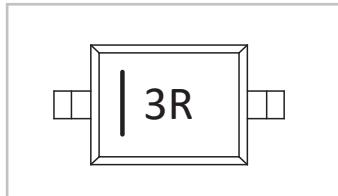


DIMENSIONS	
DIM	MILLIMETERS
C	(2.15)
G	0.90
X	0.53
Y	1.25
Z	3.40

## NOTES:

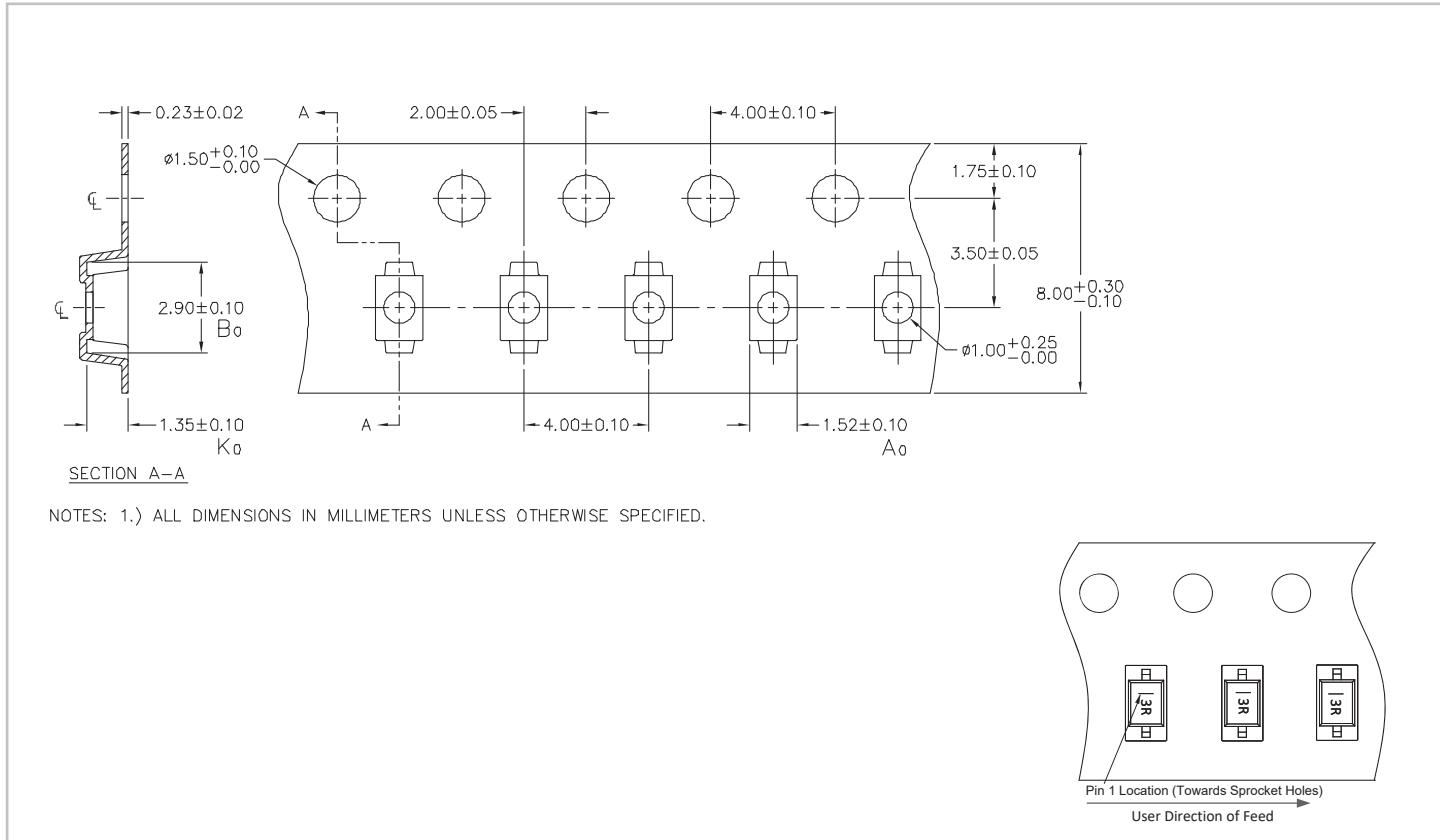
1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES).
2. THIS LAND PATTERN IS FOR REFERENCE PURPOSES ONLY.  
CONSULT YOUR MANUFACTURING GROUP TO ENSURE YOUR COMPANY'S MANUFACTURING GUIDELINES ARE MET.

## Marking Code



Note: Bar indicates Pin 1 location.

## Tape and Reel Specification



## Order Information

PART NUMBER	MARKING CODE	WORKING VOLTAGE	QTY PER REEL	REEL SIZE
RClamp03301H.C	3R	3.3	3,000	7"
RClamp0501H.C	5R	5.0	3,000	7"
RClamp0801H.C	8R	8.0	3,000	7"

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