# Bi-direction ESD Protection Diode

## DESCRIPTION

Package

Designed to protect voltage sensitive electronic components from ESD and other transients. Excellent clamping capability, low leakage, low capacitance, and fast response time provide best in class protection on designs that are exposed to ESD.

The combination of small size, low capacitance, and high level of ESD protection makes them a flexible solution for applications such as HDMI, Display Port TM, and MDDI interfaces. It is designed to replace multiplayer varistors (MLV) in consumer

equipments applications such as mobile phone, notebook, PAD, STB, LCD TV etc.

## FEATURES

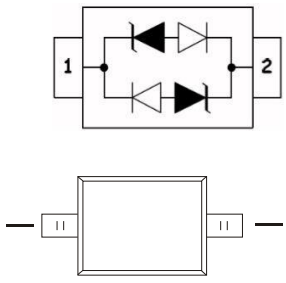
- Bi-directional ESD protection of one line
- Low capacitance: 0．6 pF
- Low reverse stand−off voltage: 3．3 V
- Low reverse clamping voltage

  Low leakage current
- Excellent package:1.7mm×1.3mm×1.0mm
- Fast response time
- JESD22-A114-B ESD Rating of class 3B per human body model
- IEC 61000-4-2 Level 4 ESD protection

## APPLICATIONS

- Cellular phones
- Audio and video equipment
- Handheld-Wireless Systems
- PDAs
- Ethernet – 10/100/1000 Base
- Portable electronics
- USB Interface
- Other electronics equipments communi-cation systems

## PIN CONFIGURATION




Front side

## PACKAGE OUTLINE

## MAXIMUM RATINGS ( $T_a$=25℃ unless otherwise noted )

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| $V_{ESD}$ | ESD per IEC 61000-4-2 (Air)<br>ESD per IEC 61000-4-2 (Contact) | ±30<br>±30 | kV |
| $P_{PP}$ | Peak Pulse Power (8/20μs) | 350 | W |
| $T_{OPT}$ | Operating Temperature | -55/+150 | °C |
| $T_{STG}$ | Storage Temperature | -55/+150 | °C |
| $T_L$ | Lead Soldering Temperature | 260 | °C |

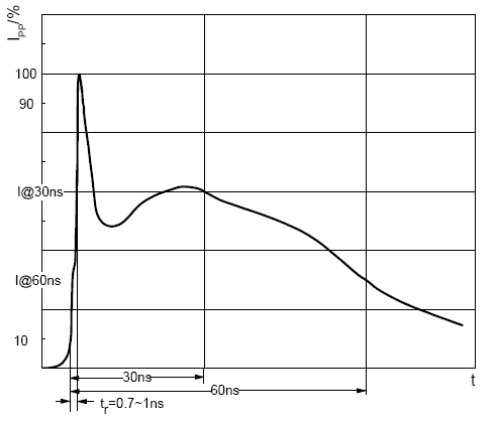
## ESD standards compliance

### IEC61000-4-2 Standard

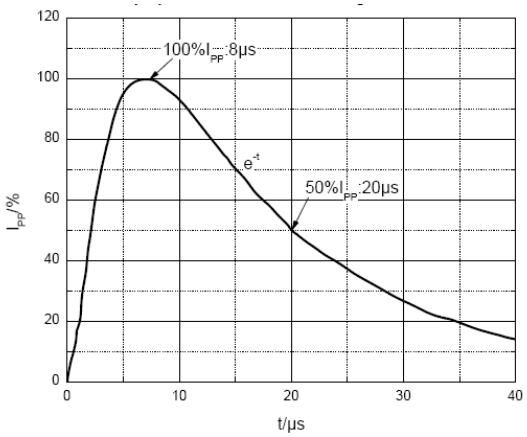
| Contact Discharge | | Air Discharge | |
|---|---|---|---|
| Level | Test Voltage kV | Level | Test Voltage kV |
| 1 | 2 | 1 | 2 |
| 2 | 4 | 2 | 4 |
| 3 | 6 | 3 | 8 |
| 4 | 8 | 4 | 15 |

### JESD22-A114-B Standard

| ESD Class | Human Body Discharge V |
|---|---|
| 0 | 0～249 |
| 1A<br>1B<br>1C | 250～499<br>500～999<br>1000～1999 |
| 2 | 2000～3999 |
| 3A<br>3B | 4000～7999<br>8000～15999 |



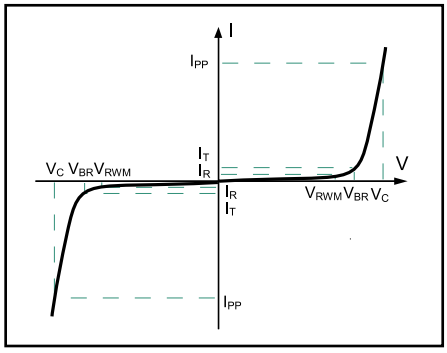

ESD pulse waveform according to IEC61000-4-2




8/20μs pulse waveform according to IEC 61000-4-5

## ELECTRICAL PARAMETER

| Symbol | Parameter |
|---|---|
| $V_C$ | Clamping Voltage @ $I_{PP}$ |
| $I_{PP}$ | Peak Pulse Current |
| $V_{BR}$ | Breakdown Voltage @ $I_T$ |
| $I_T$ | Test Current |
| $I_R$ | Reverse Leakage Current @ $V_{RWM}$ |
| $V_{RWM}$ | Reverse Standoff Voltage |

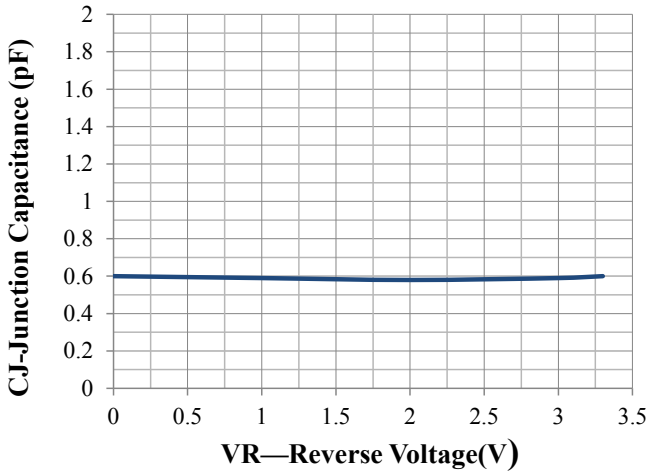



**V-I characteristics for a Bi-directional TVS**

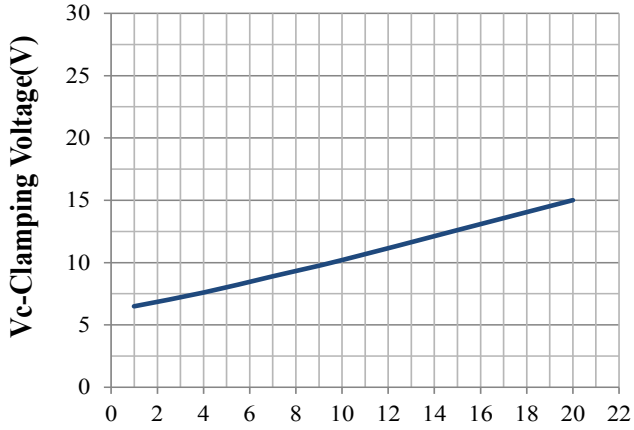
## ELECTRICAL CHARACTERISTICS($T_a$=25℃ unless otherwise specified)

| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Reverse Working Voltage | $V_{RWM}$ | | | | 3.3 | V |
| Breakdown Voltage | $V_{BR}$ | $I_T$ = 1mA | 4.0 | 5.0 | 6.0 | V |
| Reverse Leakage Current | $I_R$ | $V_{RWM}$ = 3.3 V | | | 0.2 | μA |
| Clamping Voltage | $V_C$ | $I_{PP}$ = 1A (8 x 20μs pulse) | | 7 | 9 | V |
| Clamping Voltage | $V_C$ | $I_{PP}$ = 20A (8 x 20μs pulse) | | 16 | 20 | V |
| Junction Capacitance | $C_J$ | VR = 0V, f = 1MHz | | 0.6 | 0.9 | pF |

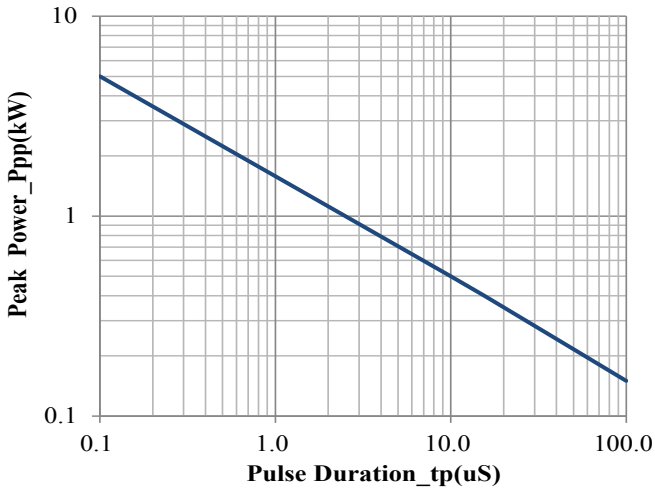
## Typical Performance Characteristics ($T_A$=25°C unless otherwise Specified)



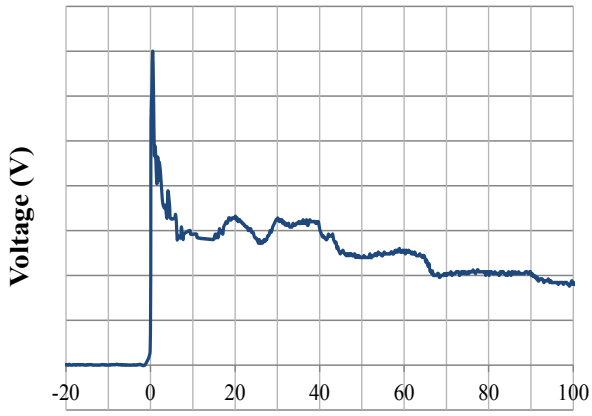

Junction Capacitance vs. Reverse Voltage



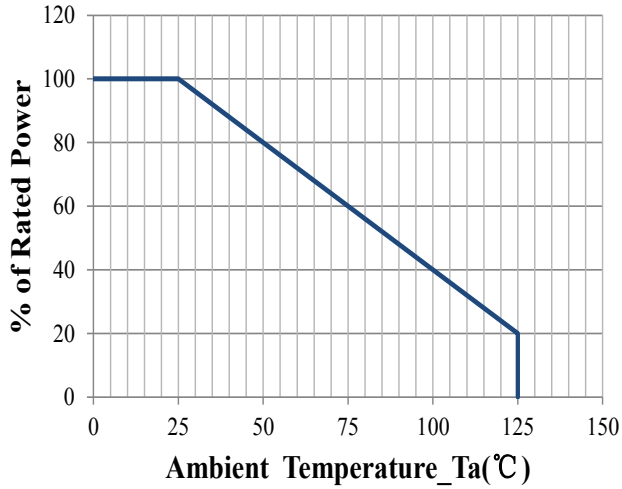

Clamping Voltage vs. Peak Pulse Current



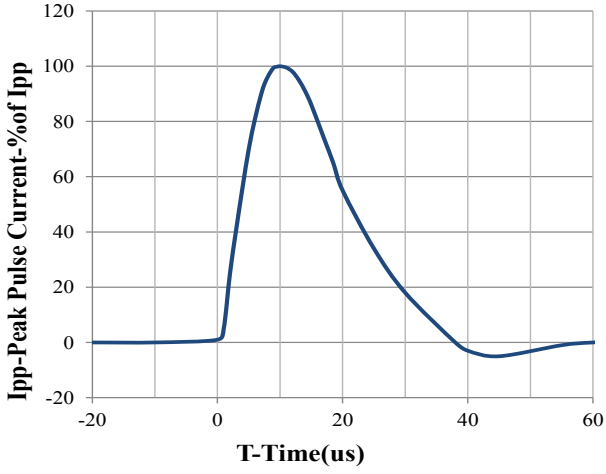

Peak Pulse Power vs. Pulse Time




IEC61000-4-2 Pulse Waveform



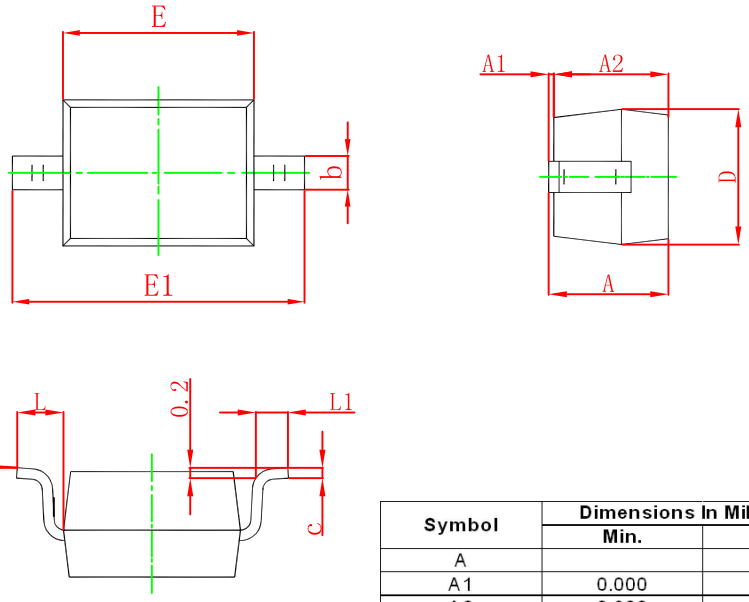

Power Derating Curve




8 X 20us Pulse Waveform

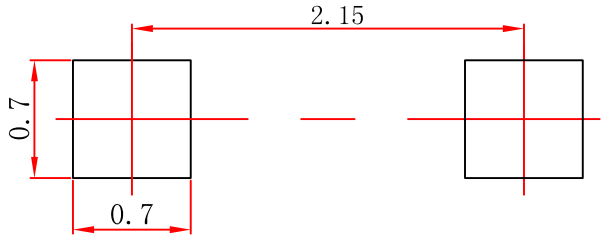
## PACKAGE OUTLINE AND PAD LAYOUT INFORMATION

### SOD-323 Package Outline Dimensions




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | | 1.000 | | 0.039 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.800 | 0.900 | 0.031 | 0.035 |
| b | 0.250 | 0.350 | 0.010 | 0.014 |
| c | 0.080 | 0.150 | 0.003 | 0.006 |
| D | 1.200 | 1.400 | 0.047 | 0.055 |
| E | 1.600 | 1.800 | 0.063 | 0.071 |
| E1 | 2.550 | 2.750 | 0.100 | 0.108 |
| L | 0.475 REF. | | 0.019 REF. | |
| L1 | 0.250 | 0.400 | 0.010 | 0.016 |
| θ | 0° | 8° | 0° | 8° |

### SOD-323 Suggested Pad Layout




**Note:**
1.Controlling dimension:in millimeters.
2.General tolerance:± 0.05mm.
3.The pad layout is for reference purposes only.