

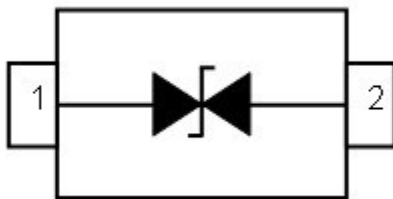
# ESD Protection Diodes

Low Capacitance Bidirectional ESD and Transient Voltage Protection

SD1208D52L SOD523



## Pinout and Functional Block Diagram



## Applications

- Microprocessor based equipment
- Cell Phone Handsets and Accessories
- Personal Digital Assistants (PDA's)
- Notebooks, Desktops, and Servers
- Portable Instrumentation
- Networking and Telecom
- Serial and Parallel Ports
- Peripherals
- Pagers

## Order Information

| Type       | Package | Marking Code | Delivery Form | Delivery Quantity |
|------------|---------|--------------|---------------|-------------------|
| SD1208D52L | SOD523  | AXB          | 7" T&R        | 5000 PCS          |

## Description

The SD1208D52L is designed to protect voltage sensitive component from ESD and transient voltage events. Excellent clamping capability, low leakage, and fast response time, make these parts ideal for ESD protection on designs where board space is at a premium. Because of its small size, it is suited for use in cellular phones, portable devices, digital cameras, power supplies and many other portable applications where board space comes at a premium. Also because of its low capacitance, it is suited for use in high frequency designs such as high speed line application. This device has been specifically designed to protect sensitive components which are connected to data and transmission lines from overvoltage caused by ESD (electrostatic discharge), and EFT (electrical fast transients).

## Features

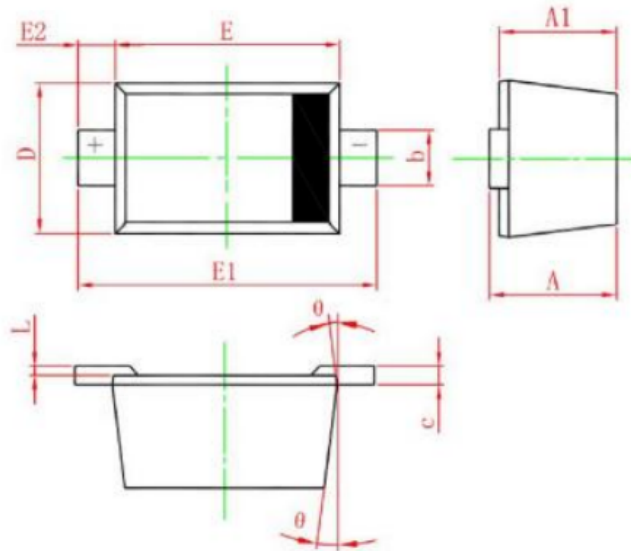
- ESD Per IEC 61000-4-2  $\pm 30$  kV (Contact)
- ESD Per IEC 61000-4-2  $\pm 30$  kV (Air)
- IEC61000-4-4 (EFT) 40 A (5 / 50 ns)
- IEC61000-4-5(Lightning): 8 A (8 / 20  $\mu$ s)
- Protects One Vcc or Data Line
- Low Clamping Voltage
- Low Leakage Current
- Low Capacitance
- High Temperature to Reflow Soldering Guaranteed: 260 °C / 10 sec
- Flammability Rating: UL 94 V-0
- Halogen Free and RoHS Compliant

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## Package Dimensions - SOD523



| Symbol | Millimeters |      | Inches    |       |
|--------|-------------|------|-----------|-------|
|        | Min.        | Max. | Min.      | Max.  |
| A      | 0.51        | 0.77 | 0.020     | 0.031 |
| A1     | 0.50        | 0.70 | 0.020     | 0.028 |
| b      | 0.25        | 0.35 | 0.010     | 0.014 |
| c      | 0.08        | 0.15 | 0.003     | 0.006 |
| D      | 0.70        | 0.90 | 0.028     | 0.035 |
| E      | 1.10        | 1.30 | 0.043     | 0.051 |
| E1     | 1.50        | 1.70 | 0.059     | 0.067 |
| E2     | 0.20 REF    |      | 0.008 REF |       |
| L      | 0.01        | 0.07 | 0.001     | 0.003 |
| φ      | 7 ° REF     |      | 7 ° REF   |       |

## Limiting Values

(T<sub>A</sub> = 25 °C, unless otherwise specified)

| Symbol           | Parameter                       | Conditions                       | Min | Max | Unit |
|------------------|---------------------------------|----------------------------------|-----|-----|------|
| V <sub>ESD</sub> | Electrostatic Discharge Voltage | IEC 61000-4-2; Contact Discharge | -   | 30  | kV   |
|                  |                                 | IEC 61000-4-2; Air Discharge     | -   | 30  | kV   |
| I <sub>PP</sub>  | Peak Pulse Power (8 / 20 μs)    | -                                |     | 8   | A    |
| T <sub>A</sub>   | Operating Temperature Range     | -                                | -55 | 125 | °C   |
| T <sub>stg</sub> | Storage Temperature Range       | -                                | -55 | 150 | °C   |

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## Electrical Characteristics

( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise specified)

| Symbol    | Parameter                 | Conditions                                                | Min  | Typ | Max | Unit          |
|-----------|---------------------------|-----------------------------------------------------------|------|-----|-----|---------------|
| $V_{RWM}$ | Reverse Working Voltage   | -                                                         | -    | -   | 12  | V             |
| $V_{BR}$  | Reverse Breakdown Voltage | $I_T = 1\text{ mA}$                                       | 13.3 | -   | -   | V             |
| $I_R$     | Reverse Leakage Current   | $V_{RWM} = 5\text{ V}$                                    | -    | -   | 0.5 | $\mu\text{A}$ |
| $V_C$     | Clamping Voltage          | $I_{PP} = 8\text{ A}$ , $t_p = 8 / 20\text{ }\mu\text{s}$ | -    | 16  | -   | V             |
| $C_J$     | Junction Capacitance      | $V_R = 0\text{ V}$ , Measured at 1 MHz                    | -    | 10  | -   | pF            |

## Performance Curve for Reference

( $T_A=25\text{ }^\circ\text{C}$  unless otherwise noted)

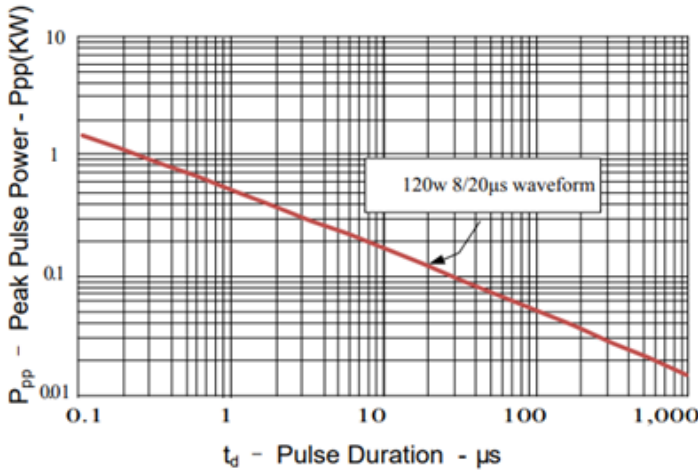


FIGURE 1  
Peak Pulse Power VS. Pulse Time

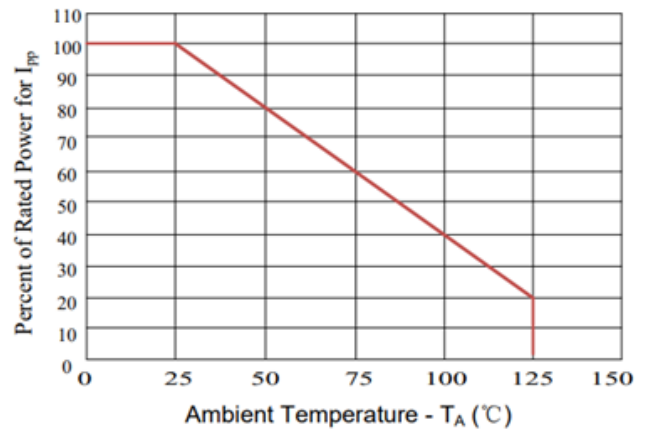


FIGURE 2  
Power Derating Curve

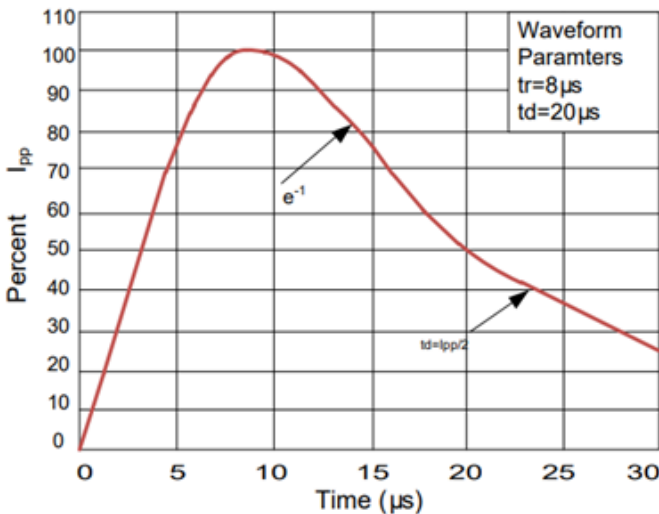


FIGURE 3  
Pulse Waveform

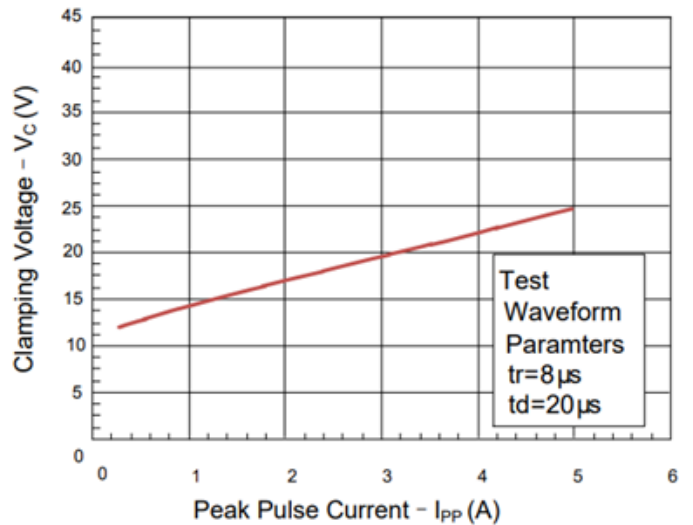


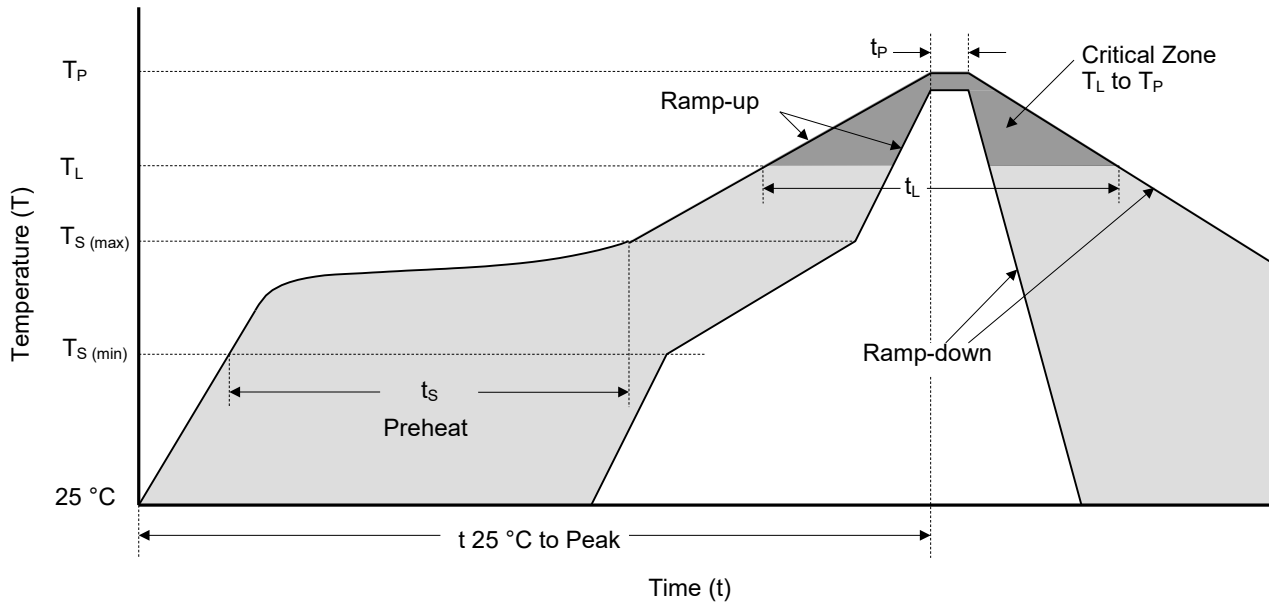
FIGURE 4  
Clamping Voltage VS.  $I_{PP}$

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## Soldering Parameters



Reflowing Condition

| Reflow Soldering Parameters                              |                                   | Lead-Free Assembly      |
|----------------------------------------------------------|-----------------------------------|-------------------------|
| Pre-heat                                                 | Temperature Min ( $T_{S (min)}$ ) | 150 °C                  |
|                                                          | Temperature Max ( $T_{S (max)}$ ) | 200 °C                  |
|                                                          | Time (min to max) ( $t_s$ )       | 60 ~ 120 seconds        |
| Average Ramp Up Rate (Liquidus Temp ( $T_L$ ) to Peak)   |                                   | 3 °C / second max.      |
| $T_{S (max)}$ to $T_L$ Ramp-up Rate                      |                                   | 3 °C / second max.      |
| Reflow                                                   | Temperature ( $T_L$ ) (Liquidus)  | 217 °C                  |
|                                                          | Time (min to max) ( $t_L$ )       | 60 ~ 150 seconds        |
| Peak Temperature ( $T_P$ )                               |                                   | 260 <sup>+0/-5</sup> °C |
| Time of within 5 °C of Actual Peak Temperature ( $t_p$ ) |                                   | 20 ~ 40 seconds         |
| Ramp-down Rate                                           |                                   | 6 °C / second max.      |
| Time from 25 °C to Peak Temperature                      |                                   | 8 Minutes max.          |
| Do Not Exceed                                            |                                   | 260 °C                  |



# ATTENTION

## Usage

1. TVS must be operated in the specified ambient temp.
2. Do not clean the TVS with strong polar solvent such as ketone, esters, benzene and halogenated hydrocarbon, to avoid damaging the encapsulating layer.
3. Please do not apply severe vibration, shock or pressure to TVS, to avoid element cracking.

## Replacement

1. If TVS is visually damaged, please replace it.
2. TVS is a non-repairable product. For safety sake, please use equivalent TVS for replacement.

## Storage

1. Storage Temp. Range: (-55 to 150) °C.
2. Do not store the TVS at the high temp., high humidity or corrosive gas environment, to avoid influencing the solder- ability of the lead wires. The product shall be used up within 1 year after receiving the goods.

## Environmental Conditions













































1. TVS should not be exposed to the open air, nor direct sunshine.
2. TVS should avoid rain, water vapor or other condition of high temp. and high humidity.
3. TVS should avoid sand dust, salt mist, or other harmful gases.

## Max. Typical Capacitance of TVS

The typical capacitance of TVS is listed in the specifications. Designers may refer to it when designing TVS in High frequency circuit.

## Installation Mechanical Stress

1. Do not knock TVS when installing, to avoid mechanical damage.
2. Please do not apply severe vibration, shock or pressure to TVS, to avoid surface resin or element cracking.

| Package Outline                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | Circuit Diagram                                                                       |                                                                                       |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|    |    |    |    |    |    |    |    |    |    |    |
| DFN0603                                                                             | DFN1006                                                                             | DFN1006-3L                                                                          | DFN1610                                                                             | DFN2020-3L                                                                          | 1CH/UNI                                                                               | 1CH/BI                                                                                | 2CH/UNI                                                                               | 2CH/BI                                                                                | 1CH/BI                                                                                | 1CH/UNI                                                                               |
|    |    |    |    |    |    |    |    |    |    |    |
| DFN1610-6L                                                                          | DFN2010-8L                                                                          | DFN2510                                                                             | DFN2626-10L                                                                         | DFN3810-9L                                                                          | 1CH/UNI                                                                               | 1CH/BI                                                                                | 1CH/UNI                                                                               | 1CH/BI                                                                                | 2CH/UNI                                                                               | 2CH/BI                                                                                |
|    |    |    |    |    |    |    |    |    |    |    |
| SOD-923                                                                             | SOD-523                                                                             | SOD-323                                                                             | SOD-123                                                                             | SOT-143                                                                             | 1CH/UNI                                                                               | 2CH/UNI                                                                               | 2CH/UNI                                                                               | 4CH/UNI                                                                               | 5CH/UNI                                                                               | 4CH/UNI                                                                               |
|  |  |  |  |  |  |  |  |  |  |  |
| SOT-523                                                                             | SOT-323                                                                             | SOT-23                                                                              | SOT-363                                                                             | SOT-23-6L                                                                           | 2CH/BI                                                                                | 4CH/UNI                                                                               | 4CH/UNI                                                                               | 8CH/UNI                                                                               | 8CH/UNI                                                                               | 8CH/UNI                                                                               |