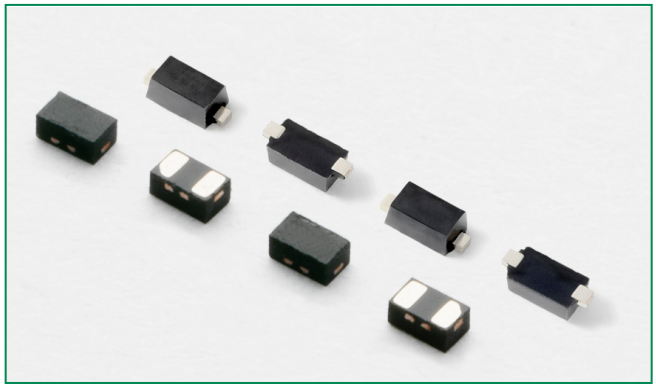
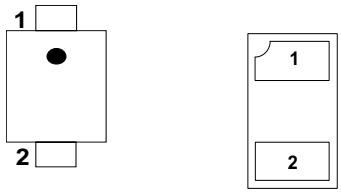
# SP1003 Series - 30pF 30kV Unidirectional Discrete TVS

AUTOMOTIVE GRADE | HF | RoHS | Pb | GREEN

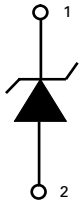


## Pinout




**SOD723** | **SOD882** (AEC-Q101 qualified)

## Functional Block Diagram




## Additional Information

**Datasheet** | **Resources** | **Samples**

## Description

Zener diodes fabricated in a proprietary silicon avalanche technology protect each I/O pin to provide a high level of protection for electronic equipment that may experience destructive electrostatic discharges (ESD). These robust diodes can safely absorb repetitive ESD strikes at ±30kV (contact discharge, IEC 61000-4-2) without performance degradation. Additionally, each diode can safely dissipate 7A of 8/20µs surge current (IEC61000-4-5) with very low clamping voltages.

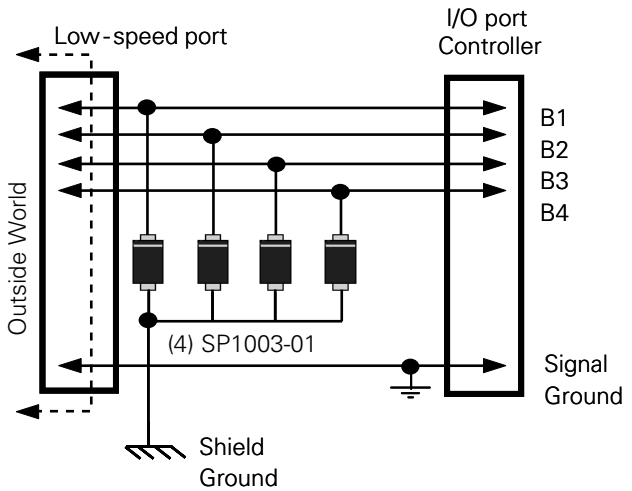
## Features

- RoHS compliant, Halogen-free and Lead-free
- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, IEC 61000-4-5 2nd edition, 7A (8/20µs)
- Low leakage current of 100nA (MAX) at 5V
- Tiny SOD723/ SOD882 (JEDEC MO-236) package saves board space
- Fits solder footprint of industry standard 0402 (1005) devices
- AEC-Q101 qualified (SOD882 package)
- Moisture Sensitivity Level (MSL Level-1)

## Applications

- Mobile phones
- Smart phones
- Tablets
- Portable navigation devices
- Digital cameras
- Portable medical devices
- Wearable Technology

## Application Example




Life Support Note:

**Not Intended for Use in Life Support or Life Saving Applications**

The products shown herein are not designed for use in life sustaining or life saving applications unless otherwise expressly indicated.

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## Absolute Maximum Ratings

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| $I_{PP}$ | Peak Pulse Current ($t_p$=8/20µs) | 7.0 | A |
| $T_{OP}$ | Operating Temperature | –40 to 125 | °C |
| $T_{STOR}$ | Storage Temperature | –55 to 150 | °C |

*CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.*

## Thermal Information

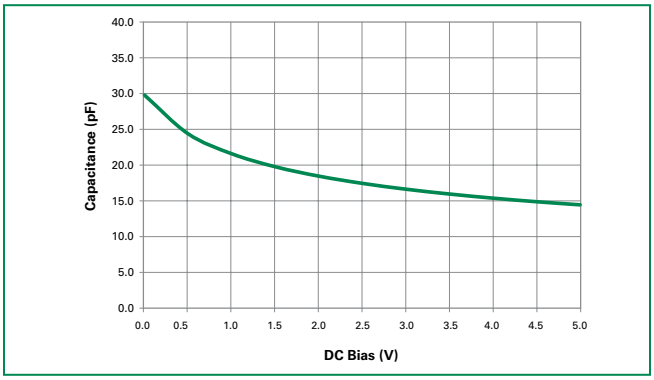
| Parameter | Rating | Units |
|---|---|---|
| Storage Temperature Range | –55 to 150 | °C |
| Maximum Junction Temperature | 150 | °C |
| Maximum Lead Temperature (Soldering 20-40s) | 260 | °C |

## Electrical Characteristics ($T_{OP}$=25°C)

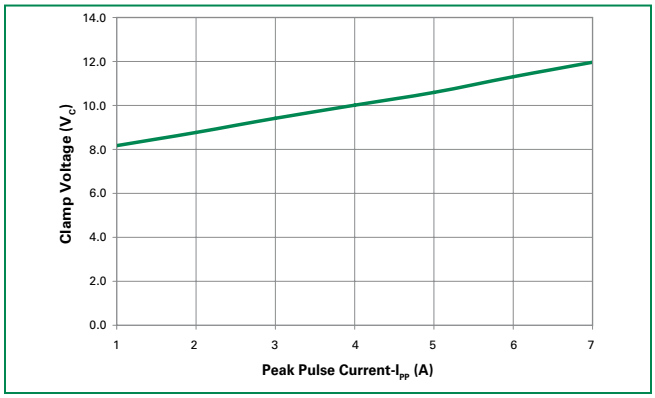
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Forward Voltage Drop | $V_F$ | $I_F$ = 10mA | | 0.8 | 1.2 | V |
| Reverse Voltage Drop | $V_R$ | $I_R$=1mA | 6.0 | 7.8 | 8.5 | V |
| Reverse Standoff Voltage | $V_{RWM}$ | $I_R$≤1µA | | | 5.0 | V |
| Reverse Leakage Current | $I_{LEAK}$ | $V_R$=5V | | | 100 | nA |
| Clamp Voltage[1] | $V_C$ | $I_{pp}$=6A $t_p$=8/20µs | | 11.4 | | V |
| | | $I_{pp}$=7A $t_p$=8/20µs | | 12.0 | | V |
| Dynamic Resistance | $R_{DYN}$ | TLP, $t_p$=100ns, 1/O to GND | | 0.25 | | Ω |
| ESD Withstand Voltage[1] | $V_{ESD}$ | IEC61000-4-2 (Contact Discharge) | | ±30 | | kV |
| | | IEC61000-4-2 (Air Discharge) | | ±30 | | kV |
| Diode Capacitance[1] | $C_D$ | Reverse Bias=0V | | 30 | | pF |

Note: [1] Parameter is guaranteed by design and/or device characterization.

## Capacitance vs. Reverse Bias

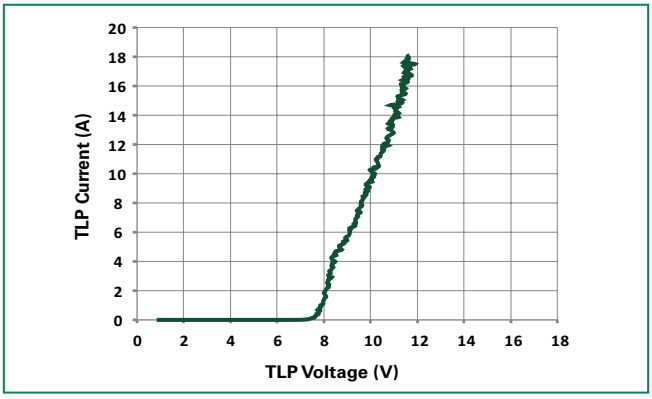



## Clamping Voltage vs. $I_{PP}$

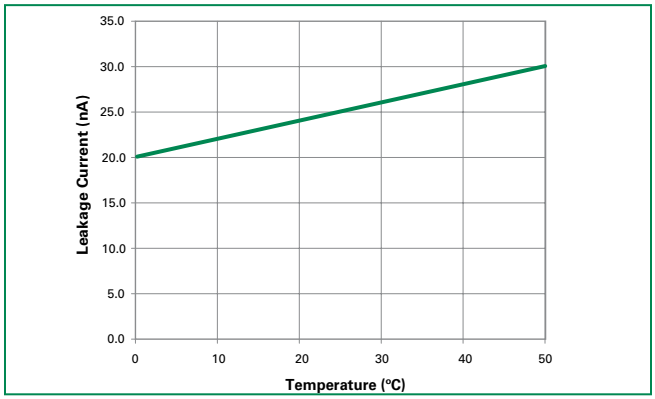



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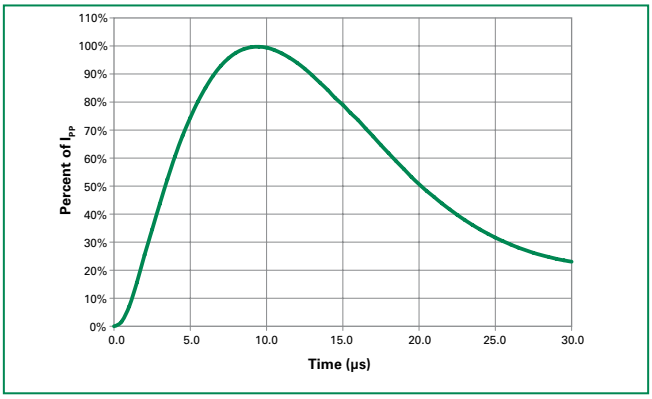
## Transmission Line Pulsing (TLP) Plot




## Leakage vs. Temperature

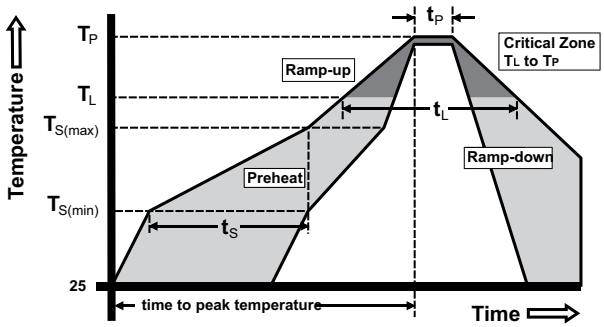



## Pulse Waveform




## Soldering Parameters

| | | |
|---|---|---|
| Reflow Condition | | Pb – 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 – 180 secs |
| 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 |
| | -Temperature ($t_L$) | 60 – 150 seconds |
| Peak Temperature ($T_P$) | | $260^{+0/-5}$ °C |
| Time within 5°C of actual peak Temperature ($t_p$) | | 20 – 40 seconds |
| Ramp-down Rate | | 6°C/second max |
| Time 25°C to peak Temperature ($T_P$) | | 8 minutes Max. |
| Do not exceed | | 260°C |




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# TVS Diode Arrays (SPA® Diodes)

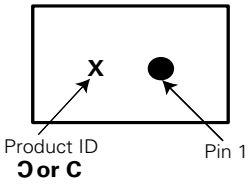
## General Purpose ESD Protection - SP1003 Series

## Part Numbering System

SP 1003 - 01 * T G

- SP 1003: TVS Diode Arrays (SPA® Diodes)
- 01: Series
- *: Number of Channels
  - -01 = 1 Channel
- T: T= Tape & Reel
- G: G= Green
- Package
  - D: SOD723
  - E: SOD882

## Part Marking System




## Product Characteristics

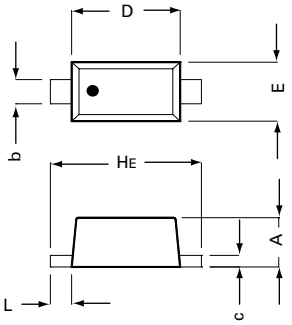
| | |
|---|---|
| **Lead Plating** | Pre-Plated Frame or Matte Tin |
| **Lead Material** | Copper Alloy |
| **Lead Coplanarity** | 0.0004 inches (0.102mm) |
| **Substitute Material** | Silicon |
| **Body Material** | Molded Epoxy |
| **Flammability** | UL 94 V-0 |

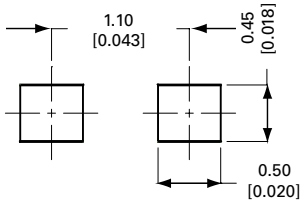
Notes :
1. All dimensions are in millimeters
2. Dimensions include solder plating.
3. Dimensions are exclusive of mold flash & metal burr.
4. Blo is facing up for mold and facing down for trim/form, i.e. reverse trim/form.
5. Package surface matte finish VDI 11-13.

## Ordering Information

| Part Number | Package | Marking | Min. Order Qty. |
|---|---|---|---|
| SP1003-01DTG | SOD723 | Ↄ or C | 8,000 |
| SP1003-01ETG | SOD882 | Ↄ or C | 10,000 |

## Package Dimensions — SOD723

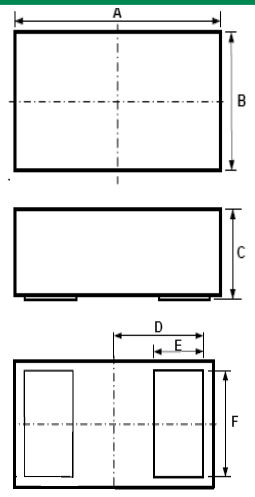


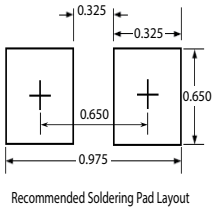




Recommended Solder Pad Layout
Millimeters (Inches)

| Symbol | SOD723 | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min | Max | Min | Max |
| **A** | 0.46 | 0.65 | 0.018 | 0.026 |
| **b** | 0.23 | 0.35 | 0.009 | 0.014 |
| **c** | 0.08 | 0.13 | 0.003 | 0.005 |
| **D** | 0.90 | 1.10 | 0.035 | 0.043 |
| **E** | 0.58 | 0.64 | 0.023 | 0.025 |
| **HE** | 1.37 | 1.47 | 0.054 | 0.058 |
| **L** | 0.15 | 0.25 | 0.006 | 0.010 |

## Package Dimensions — SOD882



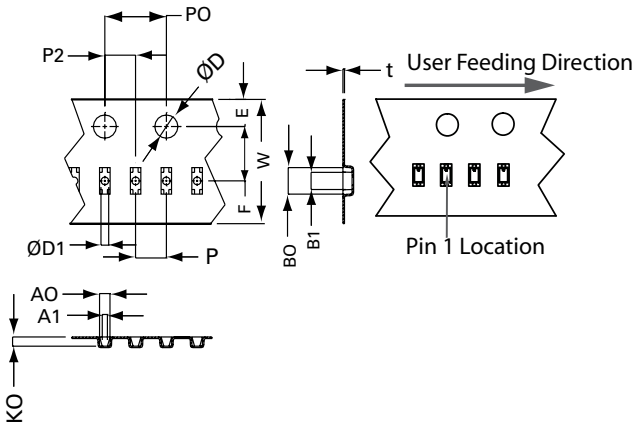




Recommended Soldering Pad Layout

| Symbol | Package | SOD882 | | | | |
|---|---|---|---|---|---|---|
| | JEDEC | MO-236 | | | | |
| | Millimeters | | | Inches | | |
| | Min | Typ | Max | Min | Typ | Max |
| **A** | 0.90 | 1.00 | 1.10 | 0.035 | 0.039 | 0.043 |
| **B** | 0.50 | 0.60 | 0.70 | 0.020 | 0.024 | 0.028 |
| **C** | 0.40 | 0.50 | 0.60 | 0.016 | 0.020 | 0.024 |
| **D** | | 0.45 | | | 0.018 | |
| **E** | 0.20 | 0.25 | 0.35 | 0.008 | 0.010 | 0.012 |
| **F** | 0.45 | 0.50 | 0.55 | 0.018 | 0.020 | 0.022 |

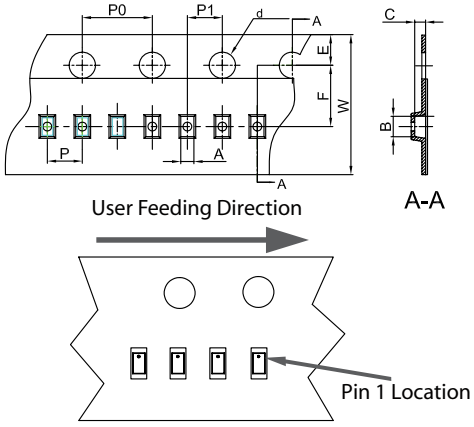
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## Embossed Carrier Tape & Reel Specification — SOD723




| Symbol | Millimetres | | Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| **E** | 1.65 | 1.85 | 0.064 | 0.072 |
| **F** | 3.40 | 3.60 | 0.134 | 0.142 |
| **D1** | 0.45 | 0.55 | 0.017 | 0.021 |
| **D** | 1.50 | - - | 0.060 | - - |
| **PO** | 3.90 | 4.10 | 0.153 | 0.161 |
| **10PO** | 40.0± 0.20 | | 1.570±0.010 | |
| **W** | 7.90 | 8.20 | 0.311 | 0.322 |
| **P2/P** | 1.90 | 2.10 | 0.074 | 0.082 |
| **AO** | 0.60 | 0.80 | 0.024 | 0.032 |
| **A1** | 0.33 REF | | 0.010 REF | |
| **BO** | 1.61 | 1.81 | 0.063 | 0.071 |
| **B1** | 1.10 REF | | 0.040 REF | |
| **KO** | 0.54 | 0.78 | 0.021 | 0.031 |
| **t** | - - | 0.21 | - - | 0.008 |

## Embossed Carrier Tape & Reel Specification — SOD882




| Symbol | Millimetres | | Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| **A** | 0.65 | 0.70 | 0.026 | 0.028 |
| **B** | 1.10 | 1.20 | 0.043 | 0.047 |
| **C** | 0.50 | 0.60 | 0.020 | 0.024 |
| **dØ** | 1.40 | 1.60 | 0.055 | 0.063 |
| **E** | 1.65 | 1.85 | 0.065 | 0.073 |
| **F** | 3.40 | 3.60 | 0.134 | 0.142 |
| **P0** | 3.90 | 4.10 | 0.154 | 0.161 |
| **P** | 1.90 | 2.10 | 0.075 | 0.083 |
| **P1** | 1.90 | 2.10 | 0.075 | 0.083 |
| **W** | 7.90 | 8.10 | 0.311 | 0.319 |

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