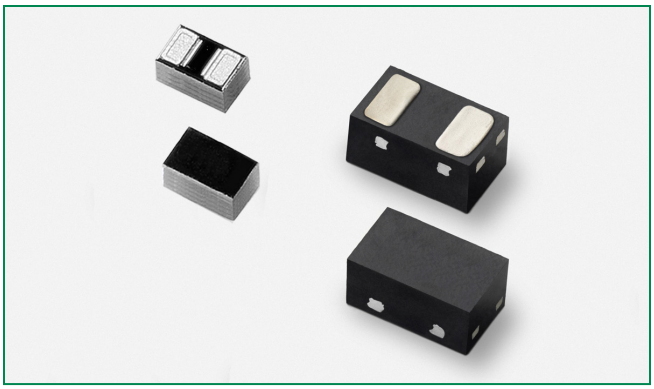
# SP3118 Series 0.3pF 10KV Bidirectional Discrete TVS

RoHS Pb GREEN

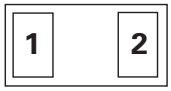


## Description

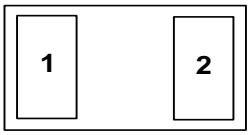
The SP3118 includes back-to-back TVS diodes fabricated in a proprietary silicon avalanche technology to provide protection for electronic equipment that may experience destructive electrostatic discharges (ESD). These robust diodes can safely absorb repetitive ESD strikes up to the maximum level specified in the IEC61000-4-2 international standard without performance degradation. The back-to back configuration provides symmetrical ESD protection for data lines when AC signals are present.

## Pinout

0201 Flipchip



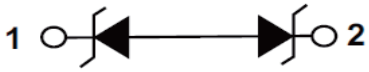

SOD882




## Features

- ESD protection of ±10kV contact discharge, ±15kV air discharge, (IEC61000-4-2)
- EFT protection, IEC61000-4-4, 40A (tp=5/50ns)
- Lightning Protection, IEC61000-4-5 2nd edition, 2A ($t_p$=8/20µs)
- Low capacitance of 0.3pF @ $V_R$=0V
- Low leakage current of 50nA (max) at 18V
- Space efficient 0201 and 0402 footprint
- Halogen free, Lead free and RoHS compliant
- SP3118-01ETG MSL Level 1

## Functional Block Diagram




## Applications

- Tablets
- Ultrabook
- eReader
- Smart Phones
- Digital Cameras
- MP3/ PMP
- Set Top Boxes
- Portable Medical
- NFC and FeliCa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# TVS Diode Arrays (SPA® Diodes)

## Low Capacitance ESD Protection - SP3118 Series

## Absolute Maximum Ratings

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| $I_{PP}$ | Peak Current ($t_p$=8/20μs) | 2.0 | 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 Lead Temperature (Soldering 20-40s) | 260 | °C |

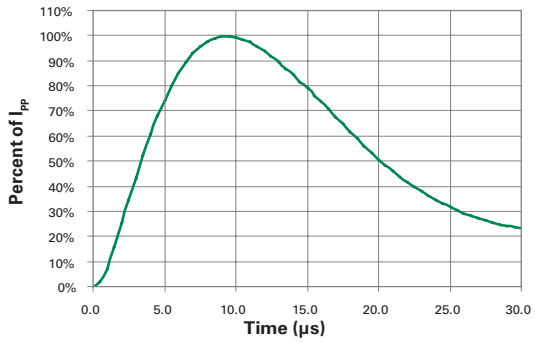
## Electrical Characteristics ($T_{OP}$=25°C)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Reverse Standoff Voltage | $V_{RWM}$ | | | | 18 | V |
| Reverse Leakage Current | $I_{LEAK}$ | $V_R$=18V with 1pin at GND | | 10 | 50 | nA |
| Clamp Voltage[1] | $V_C$ | $I_{PP}$=1A, $t_p$=8/20μs, Fwd | | 31 | 35 | V |
| | | $I_{PP}$=2A, $t_p$=8/20μs, Fwd | | 34 | 38 | V |
| ESD Withstand Voltage[1] | $V_{ESD}$ | IEC61000-4-2 (Contact) | ±10 | | | kV |
| | | IEC61000-4-2 (Air) | ±15 | | | kV |
| Dynamic Resistance[2] | $R_{DYN}$ | TLP, $t_p$=100ns, I/O to GND | | 0.75 | | Ω |
| Diode Capacitance[1] | $C_{I/O-I/O}$ | Reverse Bias=0V, f=1 MHz | | 0.3 | 0.45 | pF |

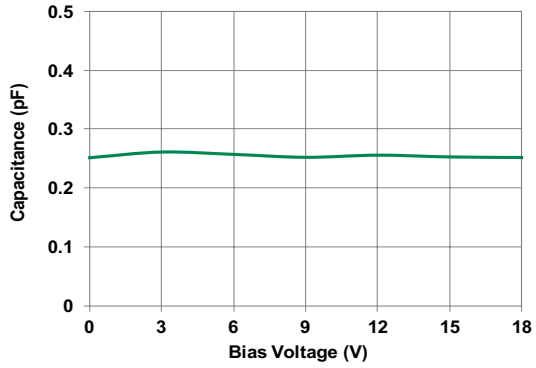
Note: 1. Parameter is guaranteed by design and/or device characterization.

2 Transmission Line Pulse (TLP) with 100ns width, 2ns rise time, and average window t1=70ns to t2= 90ns

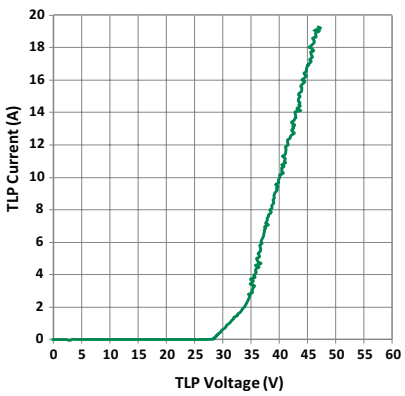
## 8/20μS Pulse Waveform



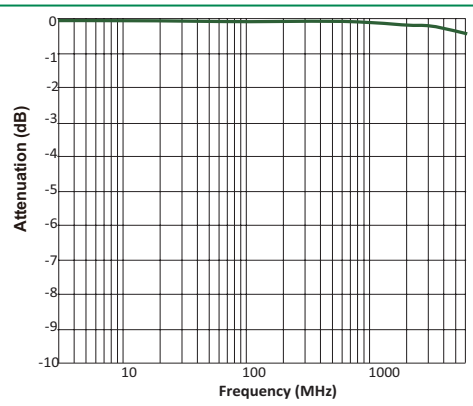

## Capacitance vs. Reverse Bias




## Transmission Line Pulsing (TLP) Plot




## Insertion Loss (S21)



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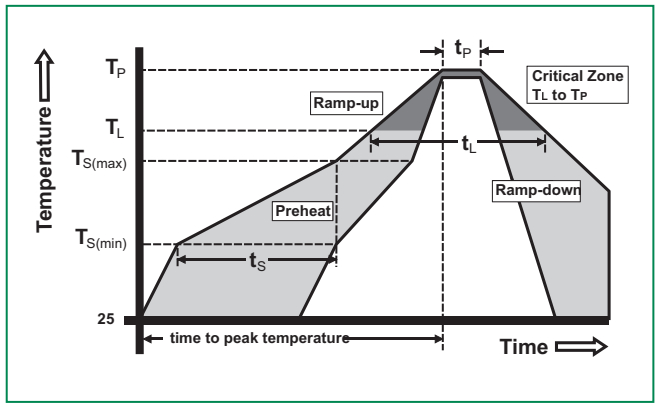
# TVS Diode Arrays (SPA® Diodes)

## Low Capacitance ESD Protection - SP3118 Series

## 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 |



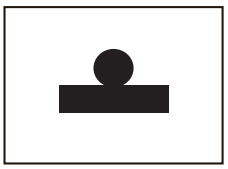

## Part Numbering System

SP 3118 - 01 x T G

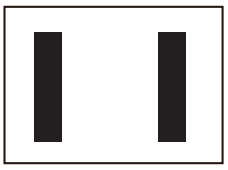
- SP 3118: TVS Diode Arrays (SPA® Diodes)
- 01: Series
- x: Number of Channels
- T: T= Tape & Reel
- G: G= Green
- Package: W: 0201 Flipchip; E: SOD882

## Part Marking System

SP3118-01WTG



SP3118-01ETG



## Product Characteristics of 0201 Flipchip

| | |
|---|---|
| **Lead Plating** | Sn |
| **Lead Material** | Copper |
| **Lead Coplanarity** | 6µm(max) |
| **Substrate material** | Silicon |
| **Body Material** | Silicon |

## Product Characteristics of SOD882

| | |
|---|---|
| **Lead Plating** | Pre-Plated Frame |
| **Lead Material** | Copper Alloy |
| **Lead Coplanarity** | 0.004 inches(0.102mm) |
| **Substrate 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.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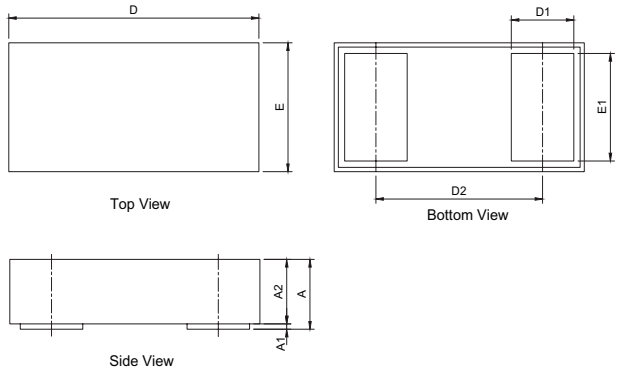
# TVS Diode Arrays (SPA® Diodes)

## Low Capacitance ESD Protection - SP3118 Series

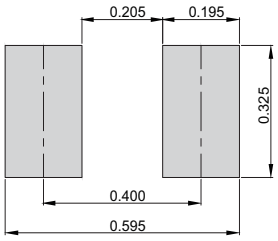
## Ordering Information

| Part Number | Package | Marking | Min. Order Qty. | Packaging Option | P0/P1 | Packaging Specification |
|---|---|---|---|---|---|---|
| SP3118-01WTG | 0201 Flipchip |  | 10000 | Tape & Reel – 8mm tape/7" reel | 4mm/2mm | EIA RS-481 |
| SP3118-01ETG | SOD882 |  | 10000 | Tape & Reel – 8mm tape/7" reel | 4mm/2mm | EIA RS-481 |

## Package Dimensions — 0201 Flipchip

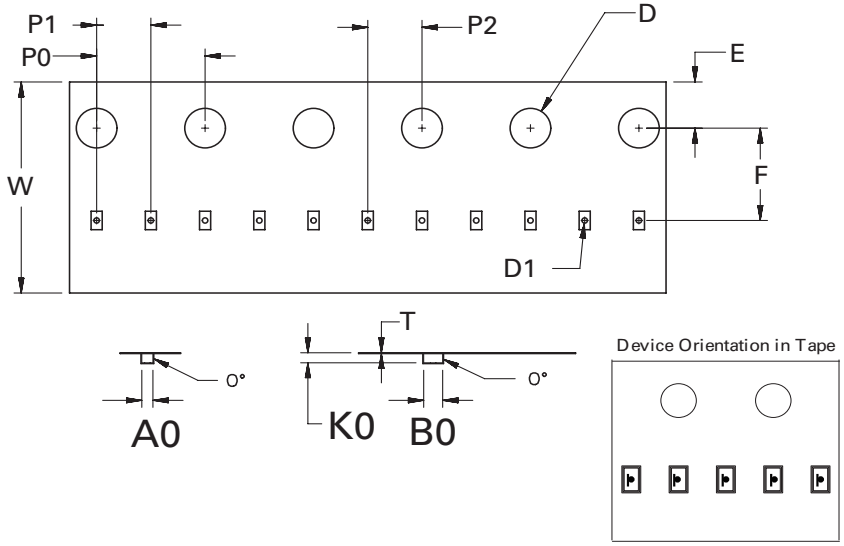



| Symbol | 0201 Flipchip | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min | Max | Min | Max |
| **D** | 0.605 | 0.655 | 0.0238 | 0.0258 |
| **E** | 0.305 | 0.355 | 0.0120 | 0.0140 |
| **D1** | 0.145 | 0.155 | 0.0057 | 0.0061 |
| **E1** | 0.245 | 0.255 | 0.0096 | 0.0100 |
| **D2** | 0.400 BSC | | 0.0157 BSC | |
| **A** | 0.273 | 0.329 | 0.0107 | 0.0130 |
| **A2** | 0.265 | 0.315 | 0.0104 | 0.0124 |
| **A1** | 0.008 | 0.014 | 0.0003 | 0.0006 |



Recommended Soldering Pad Layout (mm)

## Embossed Carrier Tape & Reel Specification — 0201 Flipchip




| Symbol | Millimeters |
|---|---|
| **A0** | 0.41+/-0.03 |
| **B0** | 0.70+/-0.03 |
| **D** | ø 1.50 + 0.10 |
| **D1** | ø 0.20 +/- 0.05 |
| **E** | 1.75+/-0.10 |
| **F** | 3.50+/-0.05 |
| **K0** | 0.38+/-0.03 |
| **P0** | 4.00+/-0.10 |
| **P1** | 2.00+/-0.05 |
| **P2** | 2.00+/-0.05 |
| **W** | 8.00+0.30/-0.10 |
| **T** | 0.23+/-0.02 |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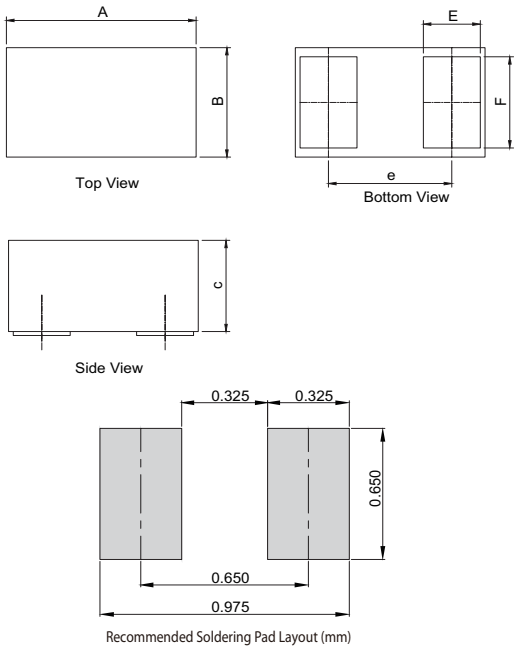
# TVS Diode Arrays (SPA® Diodes)

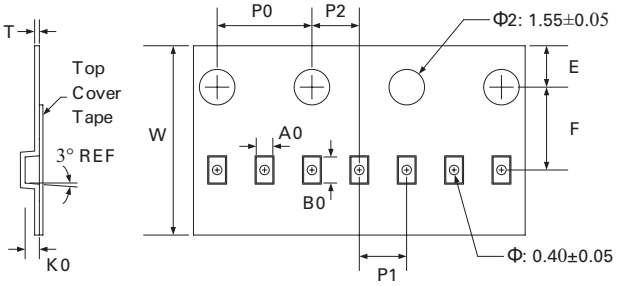
## Low Capacitance ESD Protection - SP3118 Series

## Package Dimensions — SOD882

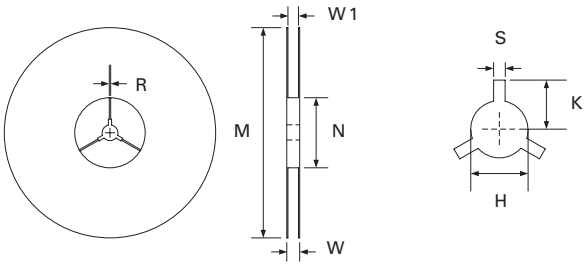



| Symbol | Package | SOD882 | | |
|---|---|---|---|---|
| | JEDEC | MO-236 | | |
| | Millimeters | | Inches | |
| | Min | Max | Min | Max |
| **A** | 0.90 | 1.10 | 0.035 | 0.043 |
| **B** | 0.50 | 0.70 | 0.020 | 0.028 |
| **C** | 0.40 | 0.60 | 0.016 | 0.024 |
| **E** | 0.20 | 0.35 | 0.008 | 0.014 |
| **F** | 0.45 | 0.55 | 0.018 | 0.022 |
| **e** | 0.65 BSC | | 0.026 BSC | |

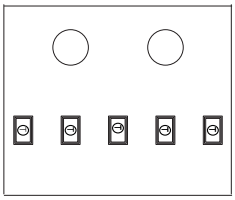
## Embossed Carrier Tape & Reel Specification — SOD882




**Reel Size 7 Inch**




Device Orientation in Tape



| Tape Dimensions | | |
|---|---|---|
| Symbol | Millimetres | |
| | Min | Max |
| **A0** | 0.65 | 0.75 |
| **B0** | 1.10 | 1.20 |
| **K0** | 0.50 | 0.60 |
| **E** | 1.65 | 1.85 |
| **F** | 3.45 | 3.55 |
| **P0** | 3.90 | 4.10 |
| **P1** | 1.90 | 2.10 |
| **P2** | 1.95 | 2.05 |
| **T** | 1.95 | 2.05 |
| **W** | 7.90 | 8.10 |

| Reel Dimensions (Size Φ178) | | |
|---|---|---|
| Symbol | Millimetres | |
| | Min | Max |
| **M** | 177.0 | 179.0 |
| **N** | 59.0 | 61.0 |
| **W** | 11.0 | 12.0 |
| **W1** | 8.5 | 9.5 |
| **H** | 12.5 | 13.5 |
| **S** | 1.9 | 2.1 |
| **K** | 10.8 | 11.2 |
| **R** | 0.95 | 1.05 |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