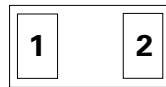


**SP3118 Series**

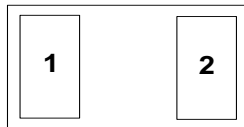
0.3pF 10 kV Bidirectional Discrete TVS

**Pinout**

0201 Flipchip



SOD882

**Functional Block Diagram****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 IEC 61000-4-2 international standard without performance degradation. The back-to-back configuration provides symmetrical ESD protection.

**Features & Benefits**

- ESD protection of  $\pm 10\text{kV}$  contact discharge,  $\pm 15\text{kV}$  air discharge, (IEC 61000-4-2)
- EFT protection, IEC 61000-4-4, 40A (tp=5/50ns)
- Lightning, 2A (8/20 $\mu\text{s}$  as defined in IEC 61000-4-5 2<sup>nd</sup> edition)
- Low capacitance of 0.3pF @  $V_a=0\text{V}$
- Low leakage current of 50nA (max) at 18V
- Space efficient 0201 and SOD882 footprint
- Halogen free, Lead free and RoHS compliant
- Moisture Sensitivity Level (MSL -1)
- AEC-Q101 qualified (SOD882)

**Applications**

- Tablets
- Ultrabook
- eReader
- Smart Phones
- Digital Cameras
- MP3/ PMP
- Set Top Boxes
- Portable Medical
- NFC and FeliCa

# SP3118 Series

## 0.3pF 10 kV Bidirectional Discrete TVS

### Absolute Maximum Ratings

| Symbol     | Parameter                        | Value      | Units |
|------------|----------------------------------|------------|-------|
| $I_{PP}$   | Peak Current ( $t_p=8/20\mu s$ ) | 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 component. This is a stress only rating and operation of the component at these or any other conditions above those indicated in the operational sections of this specification is not implied.

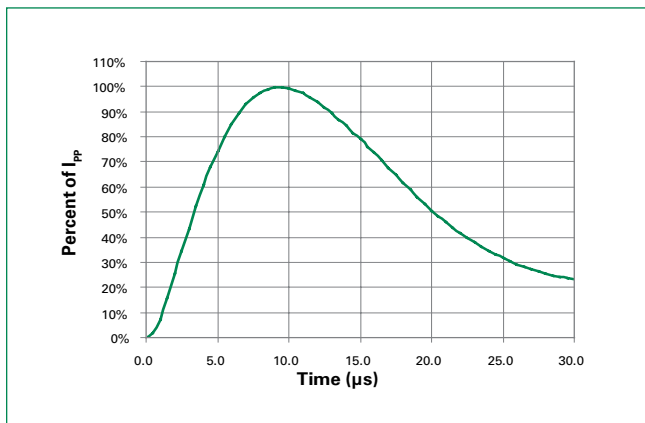
### Electrical Characteristics ( $T_{OP}=25^\circ C$ )

| Parameter                          | Symbol        | Test Conditions                  | Min      | Typ  | Max  | Units    |
|------------------------------------|---------------|----------------------------------|----------|------|------|----------|
| Reverse Standoff Voltage           | $V_{RWM}$     |                                  |          |      | 18   | V        |
| Reverse Leakage Current            | $I_{LEAK}$    | $V_R=18V$                        |          | 10   | 50   | nA       |
| Clamp Voltage <sup>1</sup>         | $V_C$         | $I_{PP}=1A, t_p=8/20\mu s$ , Fwd |          | 31   | 35   | V        |
|                                    |               | $I_{PP}=2A, t_p=8/20\mu s$ , Fwd |          | 34   | 38   | V        |
| ESD Withstand Voltage <sup>1</sup> | $V_{ESD}$     | IEC 61000-4-2 (Contact)          | $\pm 10$ |      |      | kV       |
|                                    |               | IEC 61000-4-2 (Air)              | $\pm 15$ |      |      | kV       |
| Dynamic Resistance <sup>2</sup>    | $R_{DYN}$     | TLP, $t_p=100ns$ , I/O to GND    |          | 0.75 |      | $\Omega$ |
| Diode Capacitance <sup>1</sup>     | $C_{I/O-I/O}$ | Reverse Bias=0V, f=1 MHz         |          | 0.3  | 0.45 | pF       |

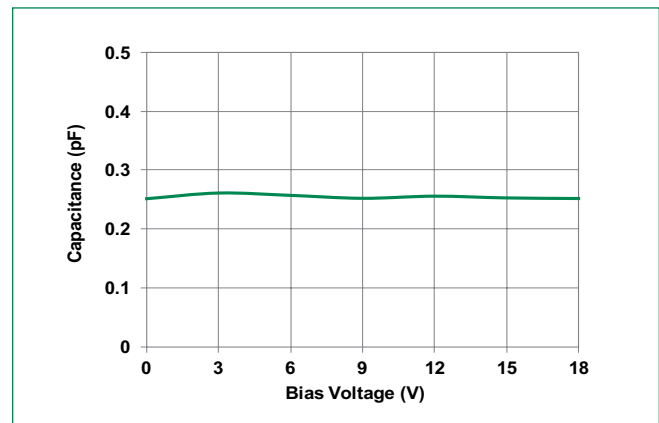
**Note:** 1. Parameter is guaranteed by design and/or component characterization.

2. Transmission Line Pulse (TLP) with 100ns width, 2ns rise time, and average window  $t_1=70ns$  to  $t_2=90ns$

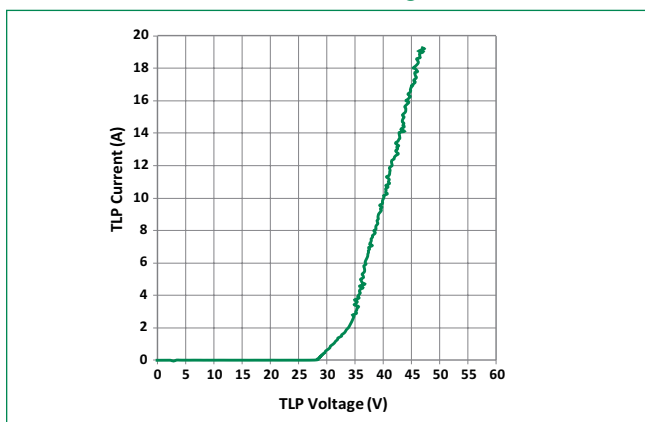
#### 8/20 $\mu s$ Pulse Waveform



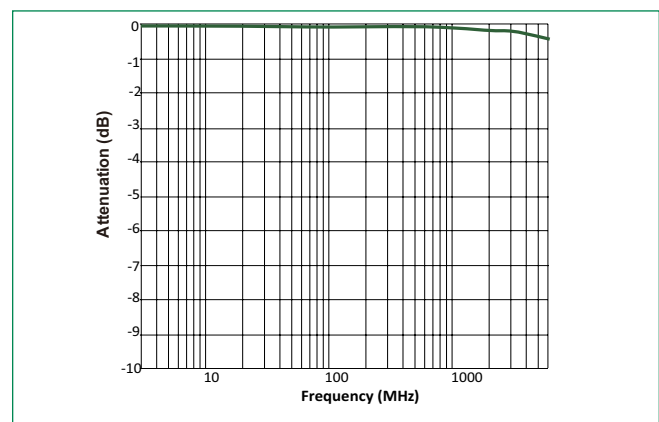
#### Capacitance vs. Reverse Bias



#### Transmission Line Pulsing (TLP) Plot



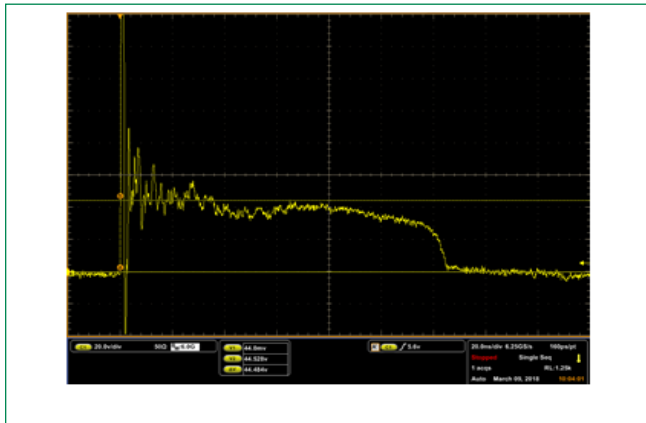
#### Insertion Loss (S21)



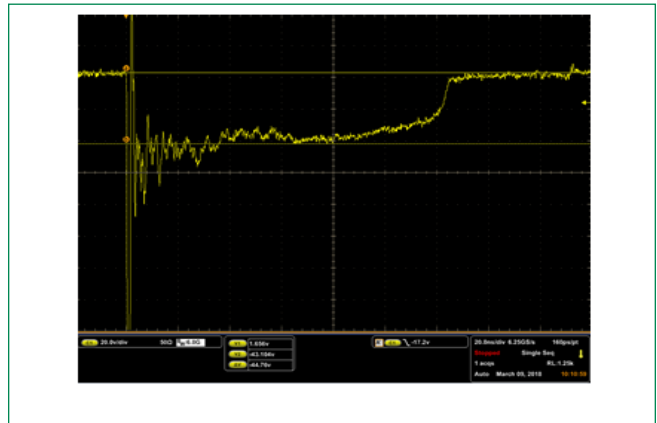
# SP3118 Series

## 0.3pF 10 kV Bidirectional Discrete TVS

IEC 61000-4-2 +8kV Contact ESD Clamping Voltage

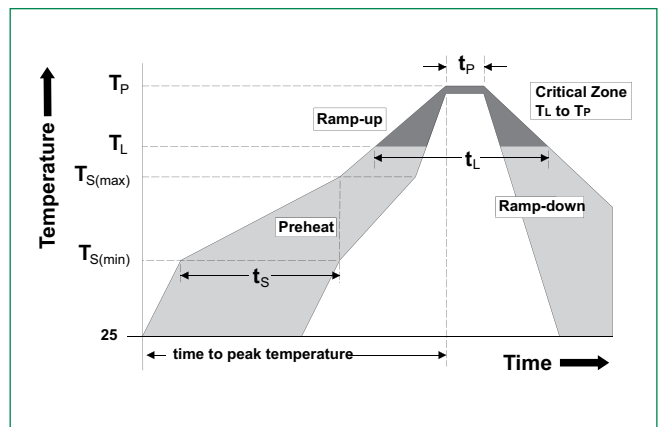


IEC 61000-4-2 -8kV Contact ESD Clamping Voltage

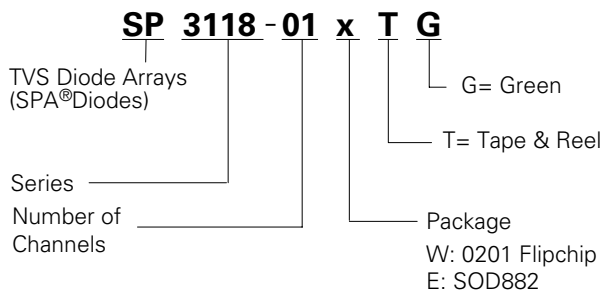


### Soldering Parameters

|  |                                    |                    |
|--|------------------------------------|--------------------|
| <b>Reflow Condition</b>  |                                    | Pb – Free assembly |
| <b>Pre Heat</b>  | - Temperature Min ( $T_{s(min)}$ ) | 150°C              |
|  | - Temperature Max ( $T_{s(max)}$ ) | 200°C              |
|  | - Time (min to max) ( $t_s$ )      | 60 – 120 secs      |
| <b>Average ramp up rate (Liquidus) Temp (<math>T_L</math>) to peak</b> |                                    | 3°C/second max     |
| <b><math>T_{s(max)}</math> to <math>T_L</math> - Ramp-up Rate</b>      |                                    | 3°C/second max     |
| <b>Reflow</b>  | - Temperature ( $T_L$ ) (Liquidus) | 217°C              |
|  | - Temperature ( $t_t$ )            | 60 – 150 seconds   |
| <b>Peak Temperature (<math>T_p</math>)</b>                             |                                    | 260+0/-5 °C        |
| <b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>   |                                    | 30 seconds         |
| <b>Ramp-down Rate</b>  |                                    | 6°C/second max     |
| <b>Time 25°C to peak Temperature (<math>T_p</math>)</b>                |                                    | 8 minutes Max.     |
| <b>Do not exceed</b>   |                                    | 260°C              |



### Part Numbering System



### Part Marking System

SP3118-01WTG



SP3118-01ETG



### Product Characteristics of 0201 Flipchip

|                           |          |
|---------------------------|----------|
| <b>Lead Plating</b>       | Sn       |
| <b>Lead Material</b>      | Copper   |
| <b>Lead Coplanarity</b>   | 6µm(max) |
| <b>Substrate material</b> | Silicon  |
| <b>Body Material</b>      | Silicon  |

### Product Characteristics of SOD882

|                           |  |
|---------------------------|--|
| <b>Lead Plating</b>       | Pre-Plated Frame                                     |
| <b>Lead Material</b>      | Copper Alloy   |
| <b>Substrate material</b> | Silicon  |
| <b>Body Material</b>      | Molded Epoxy   |
| <b>Flammability</b>       | UL Recognized epoxy meeting flammability rating V-0. |

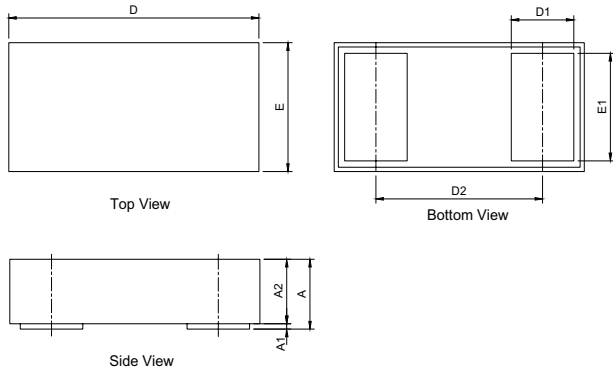
### Ordering Information

| Part Number  | Package       | Min. Order Qty. |
|--------------|---------------|-----------------|
| SP3118-01WTG | 0201 Flipchip | 10000           |
| SP3118-01ETG | SOD882        | 10000           |

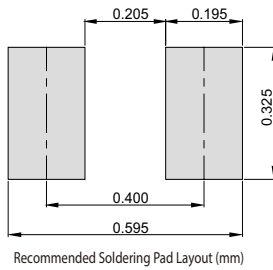
# SP3118 Series

## 0.3pF 10 kV Bidirectional Discrete TVS

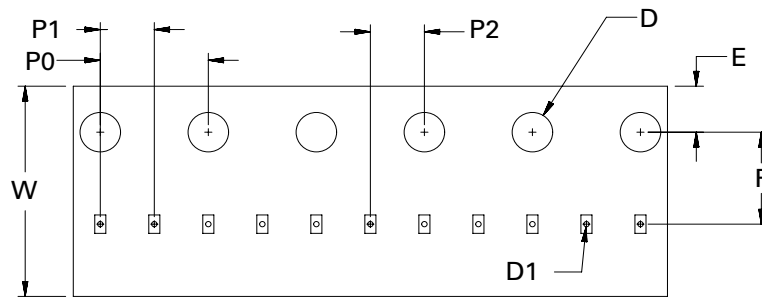
### Package Dimensions — 0201 Flipchip



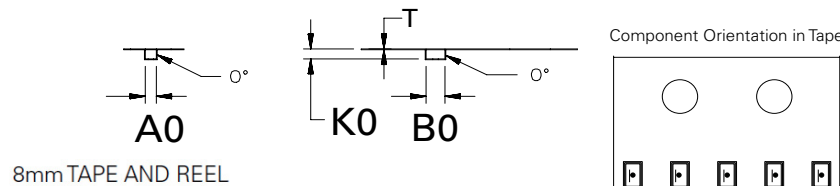
| Symbol    | 0201 Flipchip |       |            |        |
|-----------|---------------|-------|------------|--------|
|           | Millimeters   |       | Inches     |        |
|           | Min           | Max   | Min        | Max    |
| <b>D</b>  | 0.605         | 0.655 | 0.0238     | 0.0258 |
|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



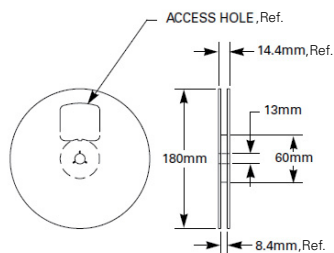
### Embossed Carrier Tape & Reel Specification — 0201 Flipchip



| Symbol    | Millimeters          |
|-----------|----------------------|
| <b>A0</b> | 0.41 +/- 0.03        |
| <b>B0</b> | 0.70 +/- 0.03        |
| <b>D</b>  | ø 1.50 + 0.10        |
| <b>D1</b> | ø 0.20 +/- 0.05      |
| <b>E</b>  | 1.75 +/- 0.10        |
| <b>F</b>  | 3.50 +/- 0.05        |
| <b>K0</b> | 0.38 +/- 0.03        |
| <b>P0</b> | 4.00 +/- 0.10        |
| <b>P1</b> | 2.00 +/- 0.05        |
| <b>P2</b> | 2.00 +/- 0.05        |
| <b>W</b>  | 8.00 + 0.30 / - 0.10 |
| <b>T</b>  | 0.23 +/- 0.02        |



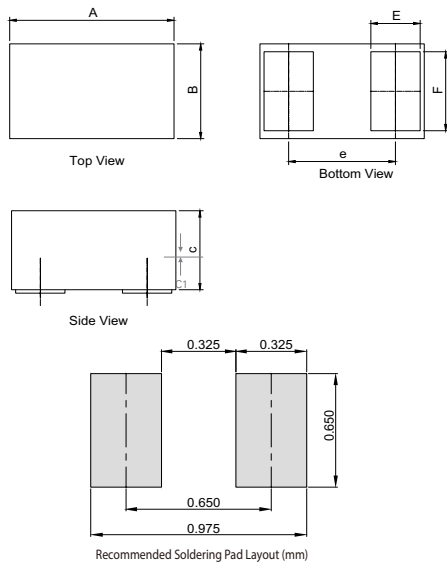
8mm TAPE AND REEL



# SP3118 Series

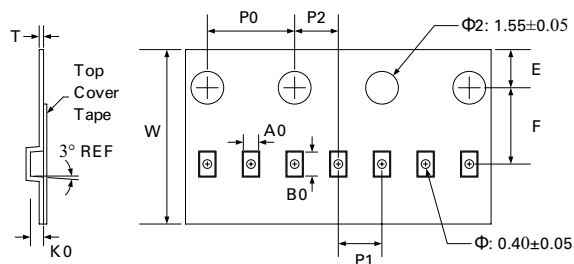
## 0.3pF 10 kV Bidirectional Discrete TVS

### Package Dimensions – SOD882

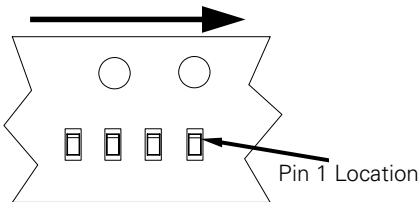


| Symbol | Package     |      | SOD882    |       |
|--------|-------------|------|-----------|-------|
|        | JEDEC       |      | MO-236    |       |
|        | Millimeters |      | Inches    |       |
|        | Min         | Max  | Min       | Max   |
| A      | 0.90        | 1.10 | 0.035     | 0.043 |
| B      | 0.50        | 0.70 | 0.020     | 0.028 |
| C      | 0.40        | 0.60 | 0.016     | 0.024 |
| C1     | 0.00        | 0.05 | 0.000     | 0.002 |
| 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 |       |

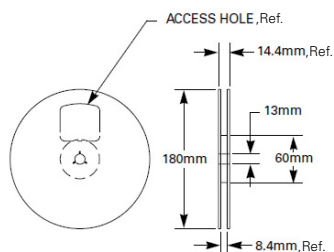
### Embossed Carrier Tape & Reel Specification – SOD882



User Feeding Direction



8mm TAPE AND REEL



| Symbol | Tape Dimensions |      |
|--------|-----------------|------|
|        | 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 |

| Symbol | Reel Dimensions (Size Φ178) |       |
|--------|-----------------------------|-------|
|        | 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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