

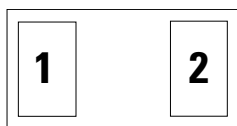
## SP1008 Series 6pF 15kV Bidirectional Discrete TVS Protection



### Description

The SP1008 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 above the maximum level specified in the IEC 61000-4-2 international standard ( $\pm 15\text{kV}$  contact discharge) without performance degradation. The back-to-back configuration provides symmetrical ESD protection for data lines when AC signals are present.

### Pinout

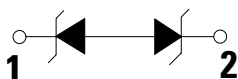


Note: Drawing not to scale

### Features

- RoHS compliant, Halogen-free and Lead-free
- ESD, IEC 61000-4-2,  $\pm 15\text{kV}$  contact,  $\pm 15\text{kV}$  air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 3A (8/20 $\mu\text{s}$  as defined in IEC 61000-4-5 2nd Edition)
- Low capacitance of 6pF (@  $V_R=5\text{V}$ )
- Low leakage current of 0.1 $\mu\text{A}$  at 5V
- Space efficient 0201 footprint

### Functional Block Diagram



### Applications

- Mobile phones
- MP3/PMP
- PDA
- Camcorders
- Smart phones
- External storage
- Tablets
- Digital cameras

### Additional Information



Datasheet

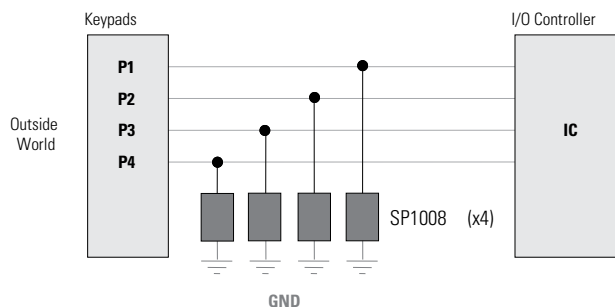


Resources



Samples

### 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.

## Absolute Maximum Ratings

| Symbol     | Parameter                        | Value      | Units |
|------------|----------------------------------|------------|-------|
| $I_{PP}$   | Peak Current ( $t_p=8/20\mu s$ ) | 3.0        | 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.

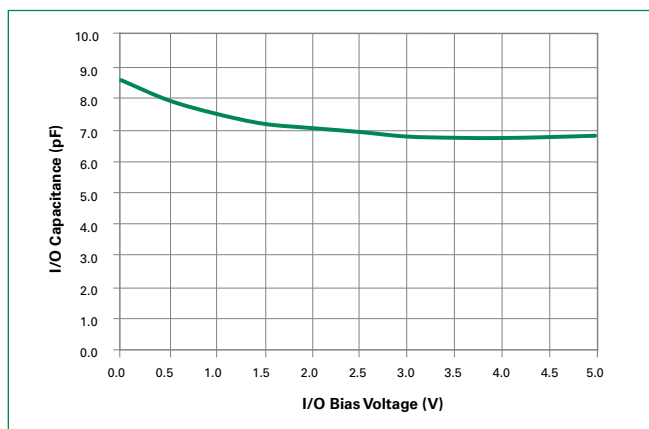
## Electrical Characteristics ( $T_{OP}=25^\circ C$ )

| Parameter                          | Symbol     | Test Conditions                           | Min      | Typ  | Max | Units   |
|------------------------------------|------------|-------------------------------------------|----------|------|-----|---------|
| Reverse Standoff Voltage           | $V_{RWM}$  |                                           |          |      | 6.0 | V       |
| Breakdown Voltage                  | $V_{BR}$   | $I_R=1mA$                                 |          | 7.0  | 8.5 | V       |
| Leakage Current                    | $I_{LEAK}$ | $V_R=5V$ with 1 pin at GND                |          | 0.1  |     | $\mu A$ |
| Clamp Voltage <sup>1</sup>         | $V_C$      | $I_{PP}=1A$ , $t_p=8/20\mu s$ , Fwd       |          | 10.7 |     | V       |
|                                    |            | $I_{PP}=2A$ , $t_p=8/20\mu s$ , Fwd       |          | 12.0 |     | V       |
| Dynamic Resistance                 | $R_{DYN}$  | $(V_{C2} - V_{C1}) / (I_{PP2} - I_{PP1})$ |          | 1.3  |     | W       |
| ESD Withstand Voltage <sup>1</sup> | $V_{ESD}$  | IEC 61000-4-2 (Contact Discharge)         | $\pm 15$ |      |     | kV      |
|                                    |            | IEC 61000-4-2 (Air Discharge)             | $\pm 15$ |      |     | kV      |
| Diode Capacitance <sup>1</sup>     | $C_D$      | Reverse Bias=5.0V                         |          | 6    | 9   | pF      |

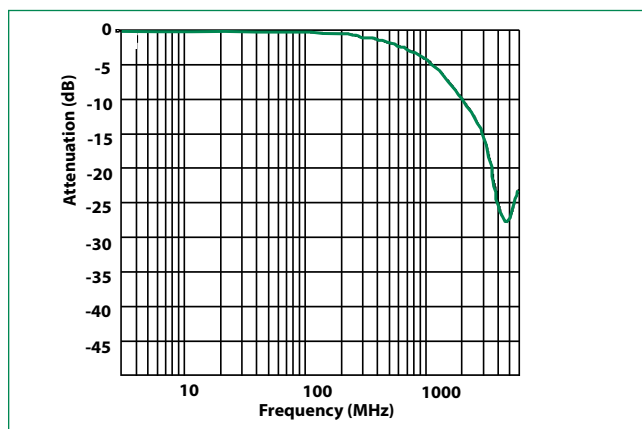
**Note:**

<sup>1</sup>Parameter is guaranteed by design and/or device characterization.

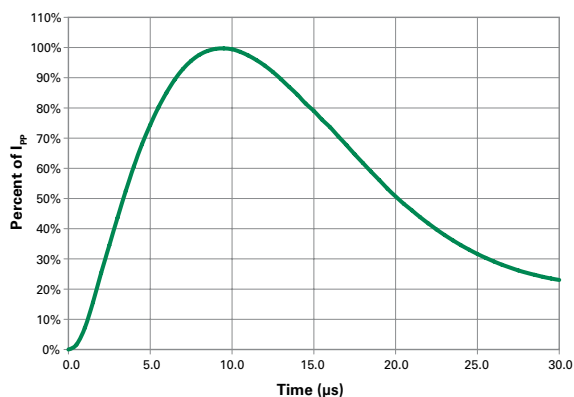
## Capacitance vs. Reverse Bias



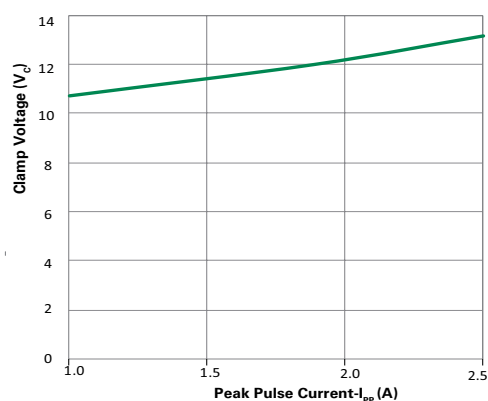
## Insertion Loss (S21) I/O to GND



### Pulse Waveform

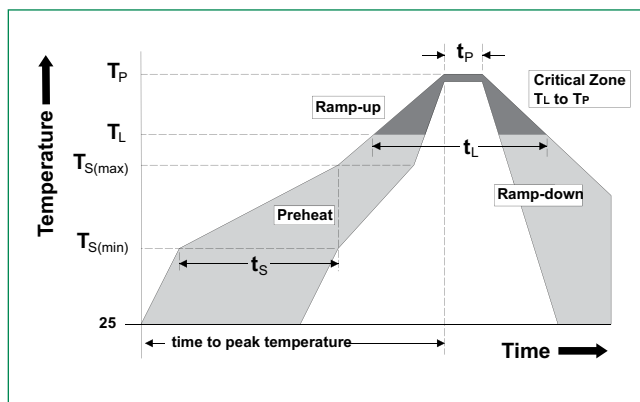


### Clamping Voltage vs. $I_{PP}$

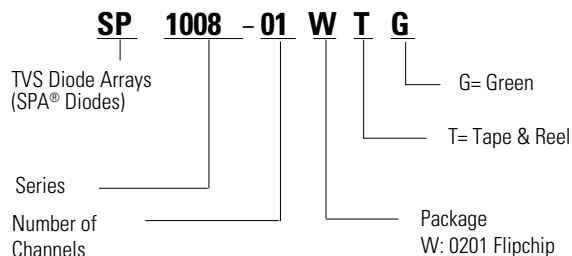


### Soldering Parameters

| 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 <sup>+0/-5</sup> °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                   |



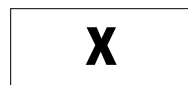
## Part Numbering System



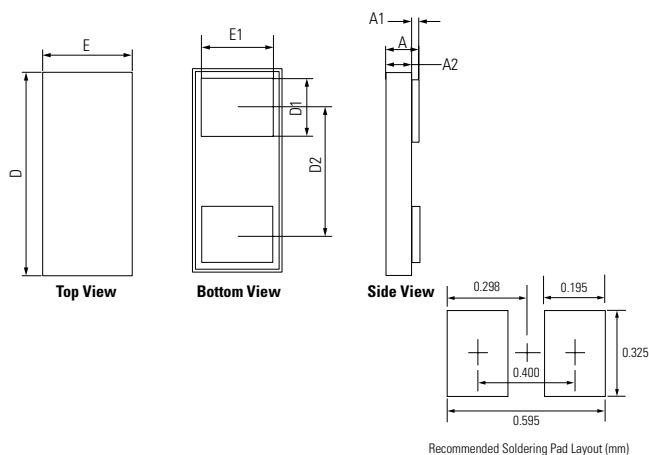
## Ordering Information

| Part Number  | Package       | Min. Order Qty. |
|--------------|---------------|-----------------|
| SP1008-01WTG | 0201 Flipchip | 10000           |

## Part Marking System

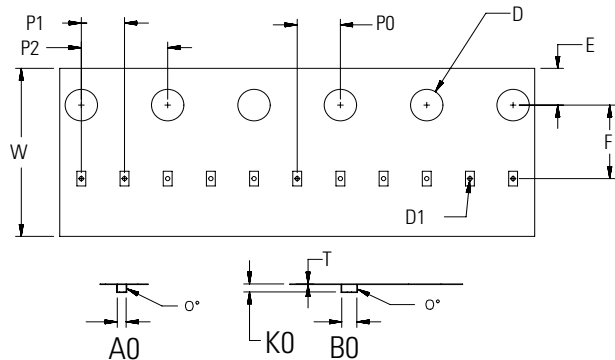


## Package Dimensions — 0201 Flipchip



| Symbol | 0201 Flipchip |       |            |        |
|--------|---------------|-------|------------|--------|
|        | Millimeters   |       | Inches     |        |
|        | Min           | Max   | Min        | Max    |
| D      | 0.605         | 0.655 | 0.0238     | 0.0258 |
| E      | 0.305         | 0.345 | 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 |

## 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     | 2.00±0.05         |
| P1     | 2.00±0.05         |
| P2     | 4.00±0.10         |
| W      | 8.00 + 0.30 -0.10 |
| T      | 0.23±0.02         |