

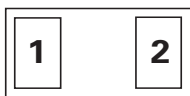
### SP1044 Series 30pF 30kV Unidirectional Discrete TVS



#### 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  $\pm 30\text{kV}$  (contact discharge, IEC 61000-4-2) without performance degradation. Additionally, each diode can safely dissipate 3A of 8/20 $\mu\text{s}$  surge current (IEC 61000-4-5 2nd edition) with very low clamping voltages

#### Pinout



Note: Drawing not to scale

#### Features

- ESD, IEC 61000-4-2,  $\pm 30\text{kV}$  contact,  $\pm 30\text{kV}$  air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, IEC 61000-4-5, 2nd edition, 3A ( $t_p=8/20\mu\text{s}$ )
- Low capacitance of 30pF (@  $V_R=0\text{V}$ )
- Low leakage current of 0.1 $\mu\text{A}$  at 5V
- Industries smallest ESD footprint available (01005)
- Halogen free, Lead free and RoHS compliant

#### Functional Block Diagram



#### Applications

- Mobile Phones
- Smart Phones
- Camcorders
- Portable Medical
- Digital Cameras
- Wearable Technology
- Portable Navigation Devices
- Tablets
- Point of Sale Terminals

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 <sup>1</sup> | A     |
| $T_{OP}$   | Operating Temperature            | -40 to 125       | °C    |
| $T_{STOR}$ | Storage Temperature              | -55 to 150       | °C    |

Notes:

1. 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 ( $T_{OP}=25^{\circ}C$ )

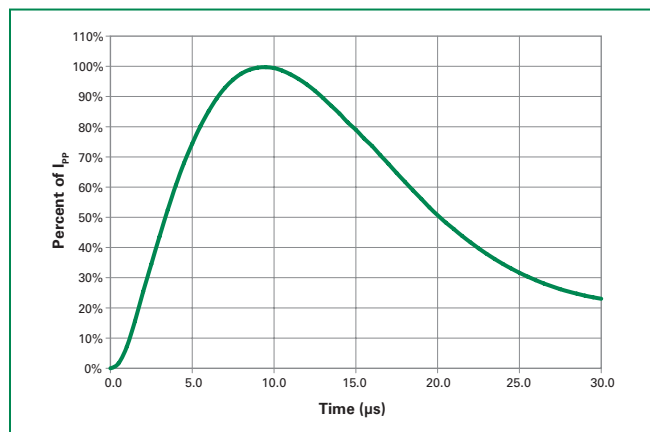
| Parameter                          | Symbol     | Test Conditions                     | Min      | Typ  | Max | Units    |
|------------------------------------|------------|-------------------------------------|----------|------|-----|----------|
| Reverse Standoff Voltage           | $V_{RWM}$  |                                     |          |      | 6.0 | V        |
| Leakage Current                    | $I_{LEAK}$ | $V_R=5V$ with 1 pin at GND          |          | 0.1  | 0.5 | $\mu A$  |
| Clamp Voltage <sup>1</sup>         | $V_C$      | $I_{PP}=1A$ , $t_p=8/20\mu s$ , Fwd |          | 8.3  |     | V        |
|                                    |            | $I_{PP}=2A$ , $t_p=8/20\mu s$ , Fwd |          | 9.3  |     | V        |
| Dynamic Resistance <sup>2</sup>    | $R_{DYN}$  | TLP, $t_p=100ns$ , I/O to GND       |          | 0.18 |     | $\Omega$ |
| ESD Withstand Voltage <sup>1</sup> | $V_{ESD}$  | IEC 61000-4-2 (Contact Discharge)   | $\pm 30$ |      |     | kV       |
|                                    |            | IEC 61000-4-2 (Air Discharge)       | $\pm 30$ |      |     | kV       |
| Diode Capacitance <sup>1</sup>     | $C_D$      | Reverse Bias=0V                     |          | 30   | 35  | pF       |

Note:

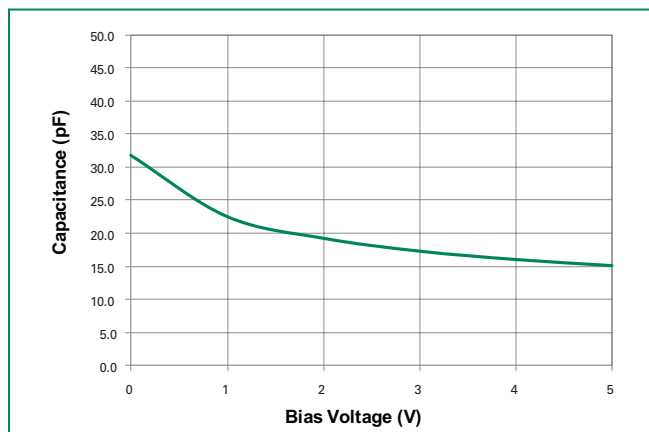
1 Parameter is guaranteed by design and/or device characterization.

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

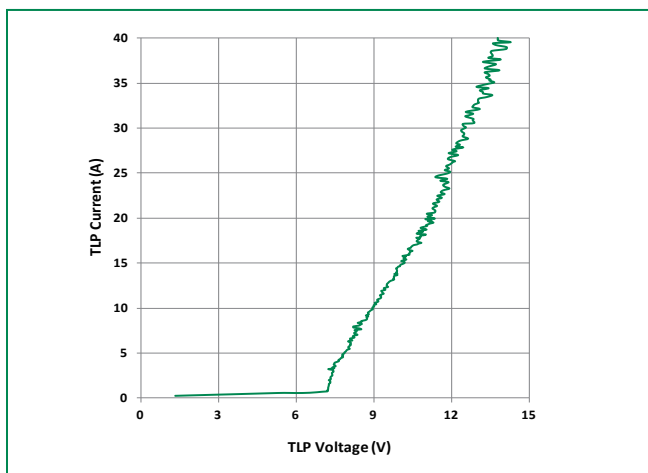
### 8/20 $\mu s$ Pulse Waveform



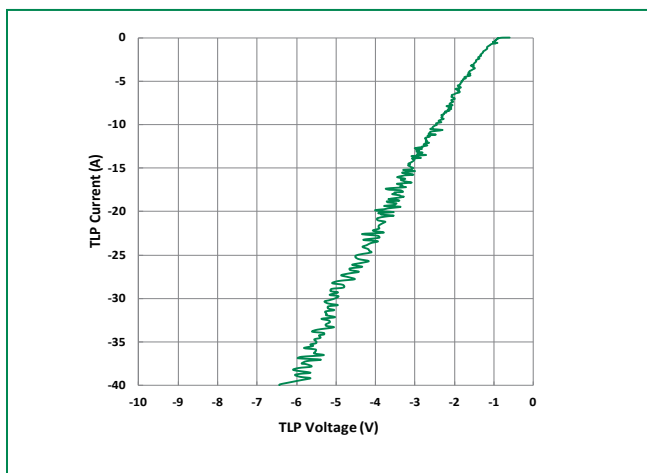
### Capacitance vs. Reverse Bias



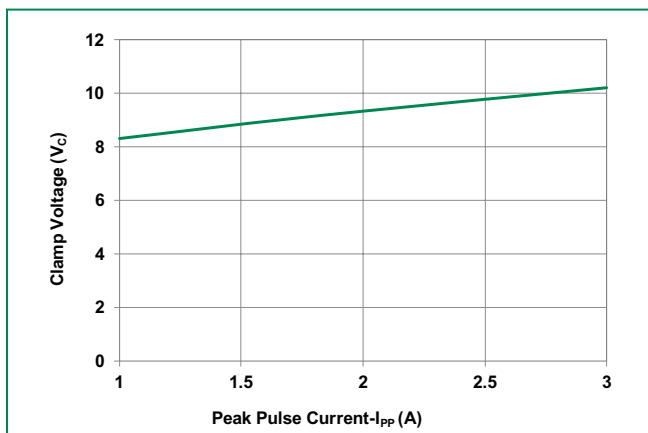
### Positive Transmission Line Pulsing(TLP) Plot



### Negative Transmission Line Pulsing(TLP) Plot

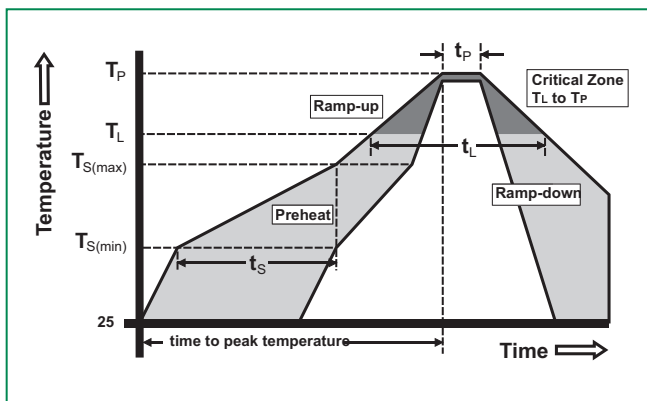


### Clamping Voltage vs $I_{pp}$



### 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                   |



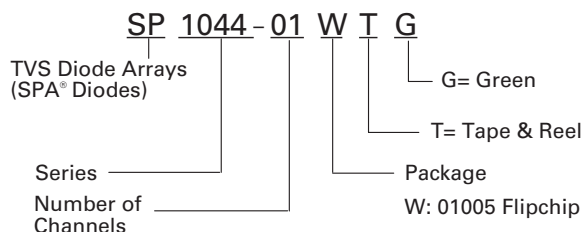
### Part Marking System



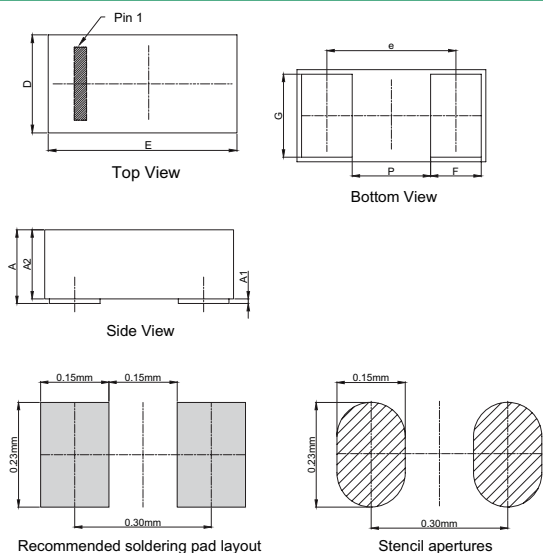
### Ordering Information

| Part Number  | Package        | Min. Order Qty. |
|--------------|----------------|-----------------|
| SP1044-01WTG | 01005 Flipchip | 15000           |

### Part Numbering System



### Package Dimensions — 01005 Flipchip



| Symbol | 01005 Flipchip |       |       |           |       |       |
|--------|----------------|-------|-------|-----------|-------|-------|
|        | Millimeters    |       |       | Inches    |       |       |
|        | Min            | Typ   | Max   | Min       | Typ   | Max   |
| A      | 0.168          | 0.181 | 0.194 | 0.007     | 0.007 | 0.008 |
| A1     | 0.008          | 0.011 | 0.014 | 0.000     | 0.000 | 0.001 |
| A2     | 0.160          | 0.170 | 0.180 | 0.006     | 0.007 | 0.007 |
| e      | 0.280 BSC      |       |       | 0.011 BSC |       |       |
| D      | 0.200          | 0.230 | 0.260 | 0.008     | 0.009 | 0.010 |
| E      | 0.400          | 0.430 | 0.460 | 0.016     | 0.017 | 0.018 |
| F      | 0.110          | 0.130 | 0.150 | 0.004     | 0.005 | 0.006 |
| G      | 0.180          | 0.200 | 0.220 | 0.007     | 0.008 | 0.009 |
| P      | 0.130          | 0.150 | 0.170 | 0.005     | 0.006 | 0.007 |

### Embossed Carrier Tape & Reel Specification — 01005 Flipchip

