

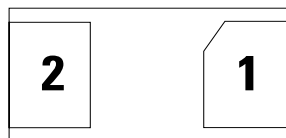
SP1054 25pF 30kV 01005 DFN Plastic Unidirectional Discrete TVS

HF RoHS Pb GREEN

**OBSOLETE** DATE: 6/10/2020 PCN/ECN# ESU270-51  
REPLACED BY: SP1020-01WTG

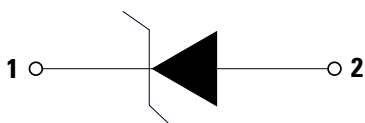


### Pinout



Note: Drawing not to scale

### Functional Block Diagram



### Description

Avalanche breakdown 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 withstand 2.5A surge (8/20 waveshape as defined in IEC 61000-4-5 2<sup>nd</sup> edition) at a very low clamping voltage.

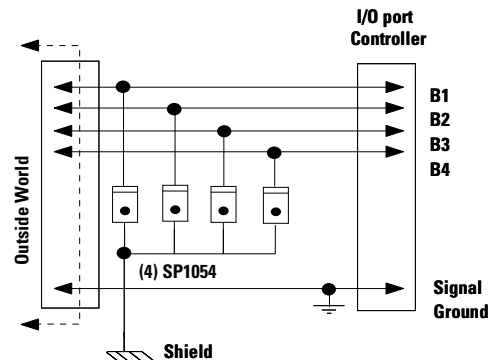
### Features

- ESD, IEC 61000-4-2,  $\pm 30\text{kV}$  contact,  $\pm 30\text{kV}$  air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 2.5A (8/20 as defined in IEC 61000-4-5 2<sup>nd</sup> edition)
- Low capacitance of 25.5 pF (@  $V_R=0\text{V}$ )
- Low leakage current of 0.02 $\mu\text{A}$  (TYP) at 5V
- Unidirectional solutions presents half the dynamic resistance of a bidirectional device protects faster and better
- Industry's smallest ESD footprint available (01005 DFN plastic)
- Moisture Sensitivity Level(MSL -1)
- Halogen free, lead free and RoHS compliant
- AEC-Q101 qualified

### Applications

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

### 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 ( $t_p=8/20\mu s$ ) | 2.5 <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 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 ( $T_{OP}=25^{\circ}C$ )

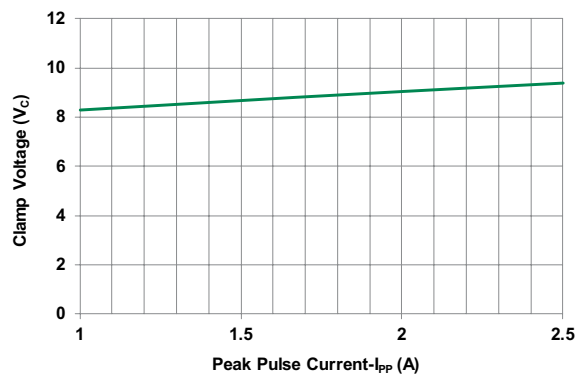
| Parameter                          | Symbol     | Test Conditions                   | Min      | Typ  | Max | Units    |
|------------------------------------|------------|-----------------------------------|----------|------|-----|----------|
| Reverse Standoff Voltage           | $V_{RWM}$  | $I_R \leq 1\mu A$                 | -        | -    | 6.0 | V        |
| Breakdown Voltage                  | $V_{BR}$   | $I_R=1mA$                         | 6.5      | 7.2  | -   | V        |
| Leakage Current                    | $I_{LEAK}$ | $V_R=5V$ with 1 pin at GND        | -        | 0.02 | 0.5 | $\mu A$  |
| Clamp Voltage <sup>1</sup>         | $V_C$      | $I_{PP}=1A, t_p=8/20\mu s$ , Fwd  | -        | 8.5  | 11  | V        |
|                                    |            | $I_{PP}=2A, t_p=8/20\mu s$ , Fwd  | -        | 9.5  | 13  | V        |
| Dynamic Resistance <sup>2</sup>    | $R_{DYN}$  | TLP, $t_p=100ns$ , I/O to GND     | -        | 0.21 | -   | $\Omega$ |
| 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                   | -        | 26   | -   | pF       |

**Note:**

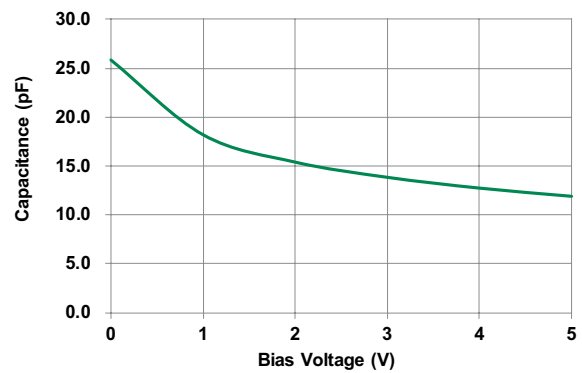
**1** Parameter is guaranteed by design and/or component characterization.

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

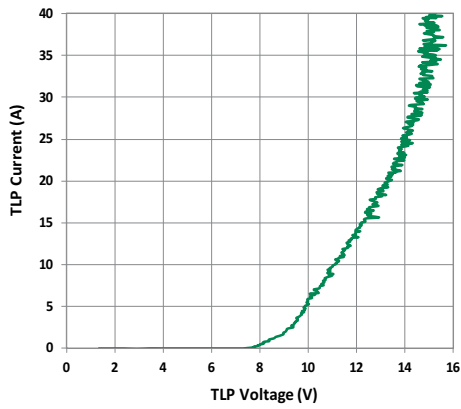
### Clamping voltage vs. $I_{PP}$ for 8/20 $\mu s$ Waveshape



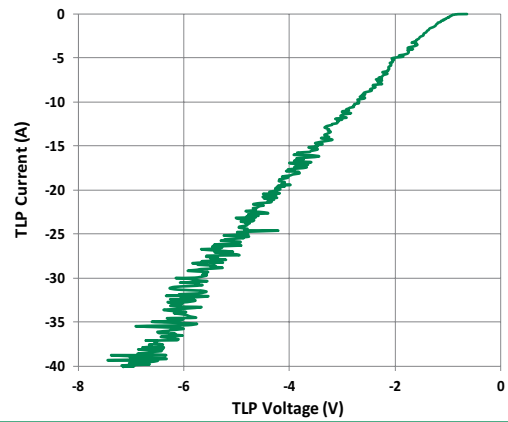
### Capacitance vs. Bias



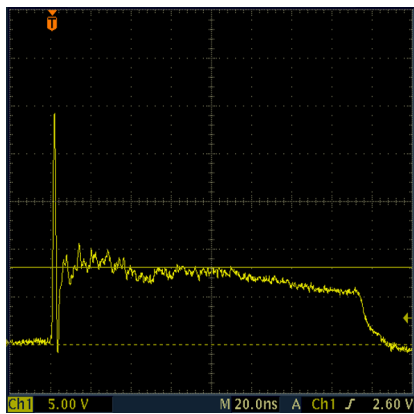
**Positive Transmission Line Pulsing (TLP) Plot**



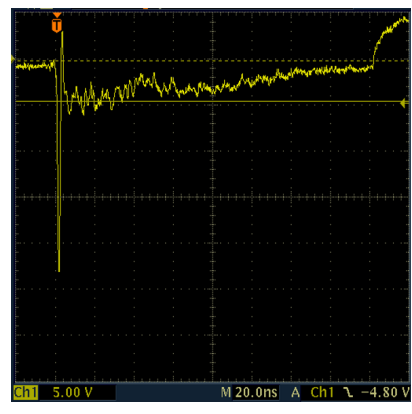
**Negative Transmission Line Pulsing (TLP) Plot**



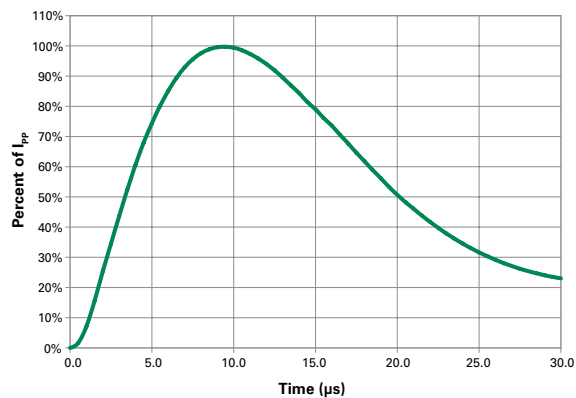
**IEC 61000-4-2 +8 kV Contact ESD Clamping Voltage**



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

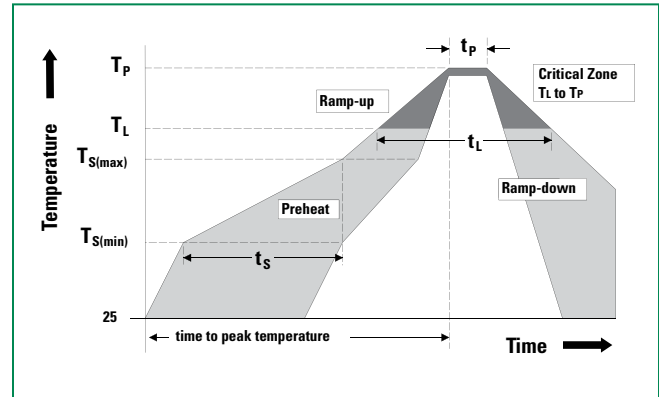


**8/20μs Pulse Waveform**

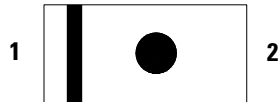


### Soldering Parameters

|                                                                        |                                    |                         |
|------------------------------------------------------------------------|------------------------------------|-------------------------|
| <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 – 180 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 ( $t_L$ )            | 60 – 150 seconds        |
| <b>Peak Temperature (<math>T_p</math>)</b>                             |                                    | 260 <sup>+0/-5</sup> °C |
| <b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>   |                                    | 20 – 40 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 Marking System



### Product Characteristics

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

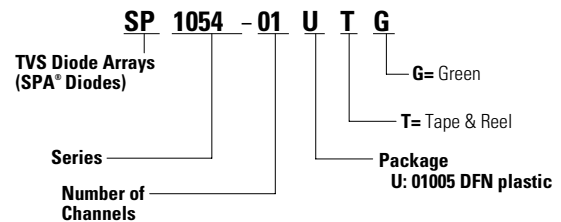
**Notes :**

1. All dimensions are in millimeters
2. Dimensions include solder plating.
3. Dimensions are exclusive of mold flash & metal burr.

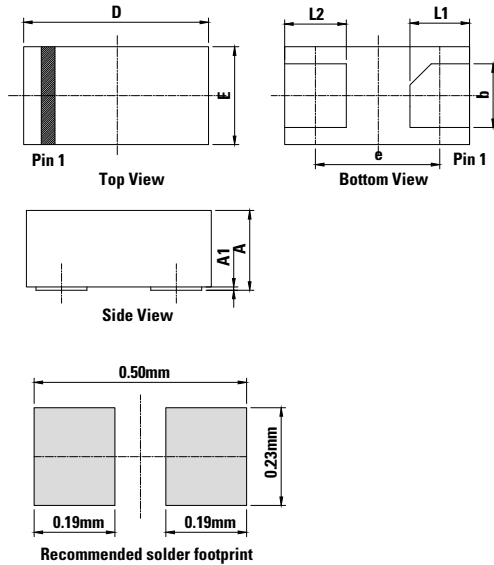
### Ordering Information

| Part Number  | Package           | Min. Order Qty. |
|--------------|-------------------|-----------------|
| SP1054-01UTG | 01005 DFN plastic | 20000           |

### Part Numbering System

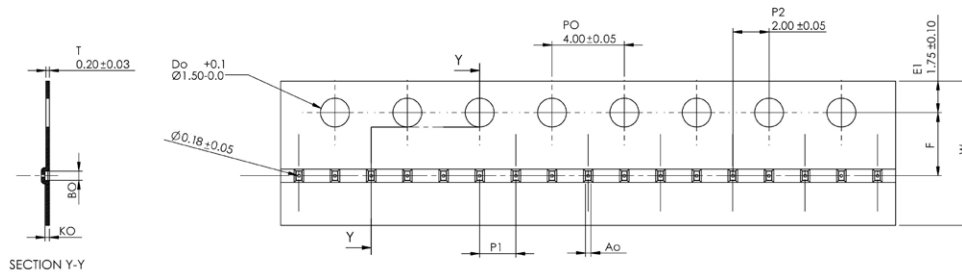


### Package Dimensions — 01005 DFN



| Symbol    | 01005 DFN plastic |       |       |        |        |        |
|-----------|-------------------|-------|-------|--------|--------|--------|
|           | Millimeters       |       |       | Inches |        |        |
|           | Min               | Typ   | Max   | Min    | Typ    | Max    |
| <b>A</b>  | 0.235             | 0.250 | 0.265 | 0.0093 | 0.0098 | 0.0104 |
| <b>A1</b> | -                 | 0.015 | 0.020 | -      | 0.0006 | 0.0008 |
| <b>b</b>  | 0.100             | 0.150 | 0.200 | 0.0039 | 0.0059 | 0.0079 |
| <b>D</b>  | 0.385             | 0.435 | 0.485 | 0.0152 | 0.0171 | 0.0191 |
| <b>E</b>  | 0.200             | 0.250 | 0.300 | 0.0079 | 0.0098 | 0.0118 |
| <b>e</b>  | 0.293             |       |       | 0.0115 |        |        |
| <b>L1</b> | 0.090             | 0.140 | 0.190 | 0.0035 | 0.0055 | 0.0075 |
| <b>L2</b> | 0.095             | 0.145 | 0.195 | 0.0037 | 0.0057 | 0.0077 |

### Embossed Carrier Tape & Reel Specification — 01005 DFN plastic



| Symbol    | Millimeters       |
|-----------|-------------------|
| <b>A0</b> | 0.29 +0.02/-0.03  |
| <b>B0</b> | 0.505 +/-0.03     |
| <b>K0</b> | 0.275 +0.03/-0.10 |
| <b>F</b>  | 3.5 +/- 0.05      |
| <b>P1</b> | 2.00 +/-0.05      |
| <b>W</b>  | 8.00 +/-0.10      |

