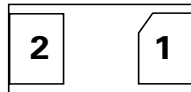


**SP1053 8.5pF 8kV 01005 DFN Plastic Unidirectional Discrete TVS** HF RoHS PP GREEN



**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  $\pm 8\text{kV}$  (contact discharge, IEC 61000-4-2) without performance degradation. Additionally, each diode can safely withstand 1.0A surge (8/20 waveshape as defined in IEC 61000-4-5 2nd edition) at a very low clamping voltage.

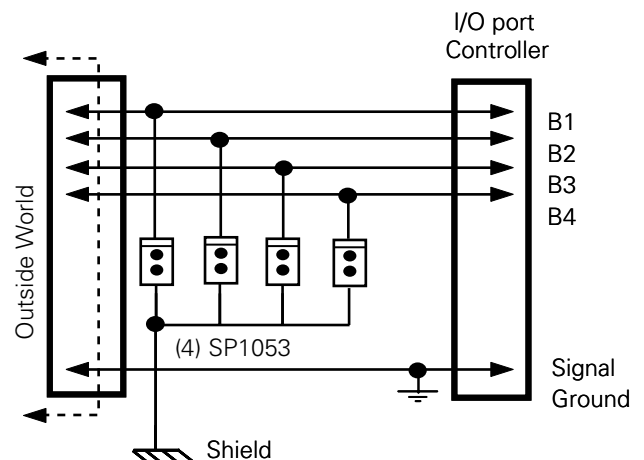
**Features**

- ESD, IEC 61000-4-2,  $\pm 8\text{kV}$  contact,  $\pm 15\text{kV}$  air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 1.0A (8/20 as defined in IEC 61000-4-5 2<sup>nd</sup> edition)
- Low capacitance of 8.5 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)
- Halogen free, Lead free and RoHS compliant
- Moisture Sensitivity Level(MSL -1)
- 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 ( $t_p=8/20\mu s$ ) | 1.0 <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 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 ( $T_{OP}=25^{\circ}C$ )

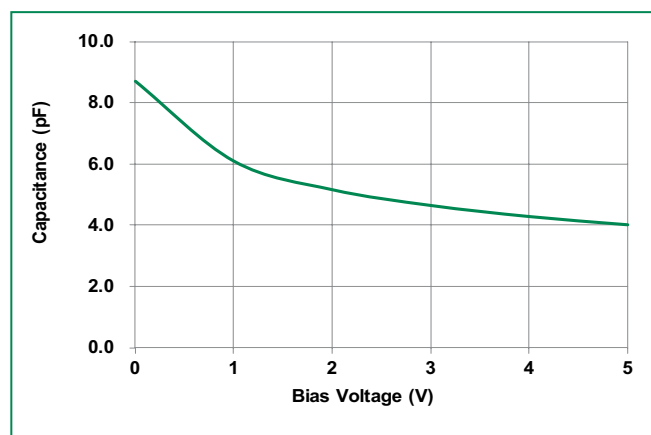
| Parameter                          | Symbol     | Test Conditions                     | Min      | Typ  | Max | Units    |
|------------------------------------|------------|-------------------------------------|----------|------|-----|----------|
| Reverse Standoff Voltage           | $V_{RWM}$  |                                     |          |      | 6.0 | V        |
| Breakdown Voltage                  | $V_{BR}$   | $I_R=1mA$ ,                         | 6.5      | 7.0  |     | 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 |          | 9    | 12  | V        |
| Dynamic Resistance <sup>2</sup>    | $R_{DYN}$  | TLP, $t_p=100ns$ , I/O to GND       |          | 0.47 |     | $\Omega$ |
| ESD Withstand Voltage <sup>1</sup> | $V_{ESD}$  | IEC 61000-4-2 (Contact Discharge)   | $\pm 8$  |      |     | kV       |
|                                    |            | IEC 61000-4-2 (Air Discharge)       | $\pm 15$ |      |     | kV       |
| Diode Capacitance <sup>1</sup>     | $C_D$      | Reverse Bias=0V                     |          | 8.5  |     | pF       |

Note:

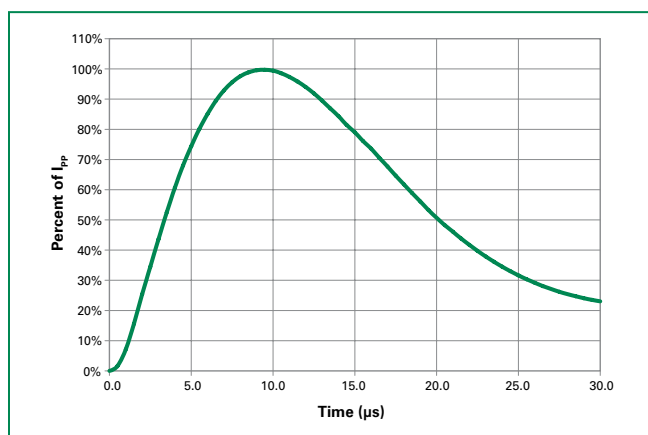
1. Parameter is guaranteed by design and/or component characterization.

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

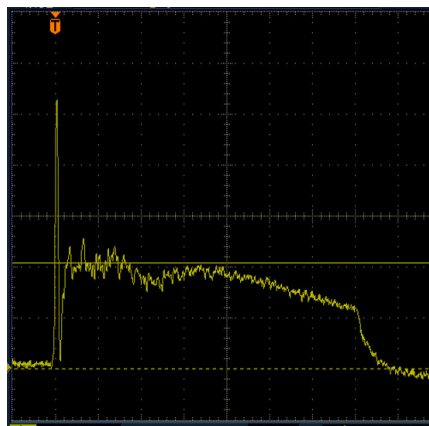
### Capacitance vs. Reverse Bias



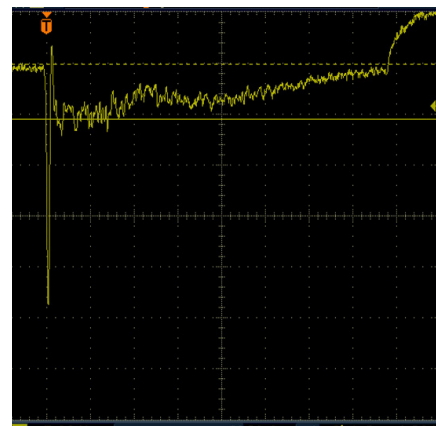
### 8/20 $\mu s$ Pulse Waveform



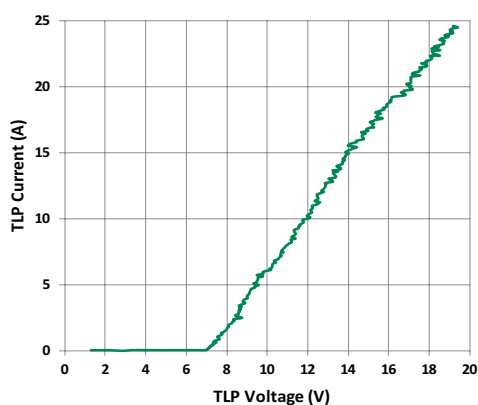
### IEC 61000-4-2 +8 kV Contact ESD Clamping Voltage



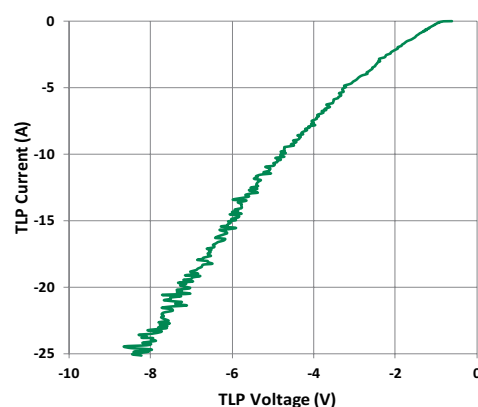
### IEC 61000-4-2 -8 kV Contact ESD Clamping Voltage



### Positive Transmission Line Pulsing (TLP) Plot

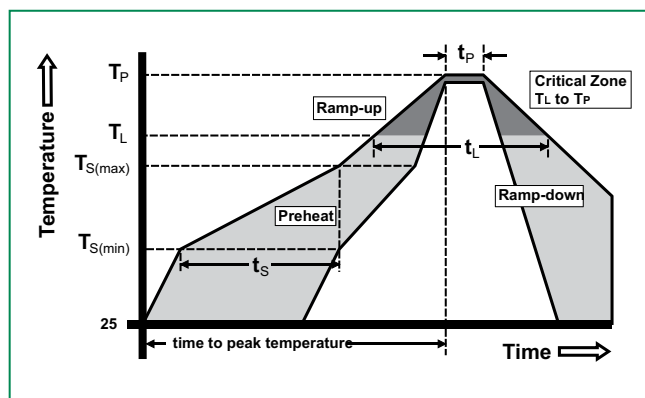


### Negative Transmission Line Pulsing (TLP) Plot



### 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                   |



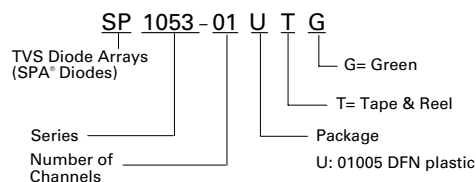
### Product Characteristics

|                           |                                                         |
|---------------------------|---------------------------------------------------------|
| <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. |

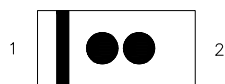
Notes :

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

### Part Numbering System



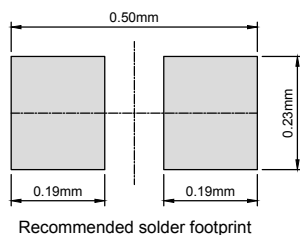
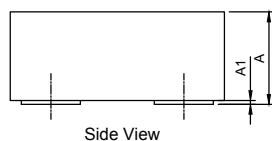
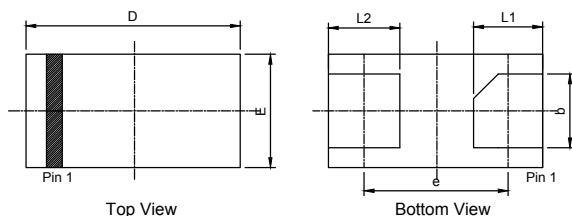
### Part Marking System



### Ordering Information

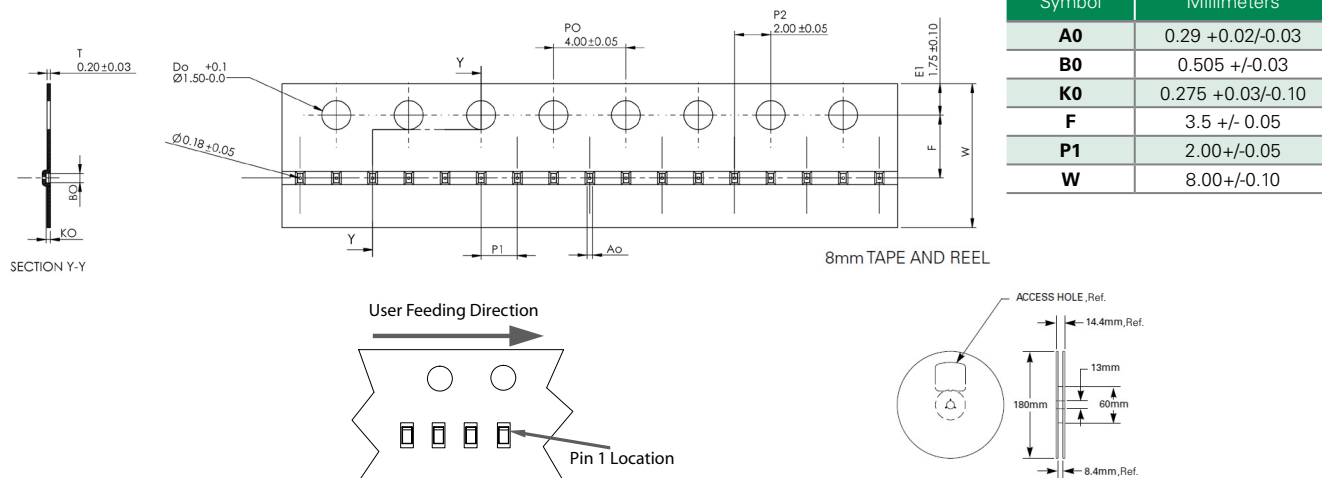
| Part Number  | Package           | Min. Order Qty. |
|--------------|-------------------|-----------------|
| SP1053-01UTG | 01005 DFN plastic | 20000           |

### Package Dimensions — 01005 DFN plastic



| Symbol    | 01005 DFN   |       |       |        |        |        |
|-----------|-------------|-------|-------|--------|--------|--------|
|           | 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**



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