

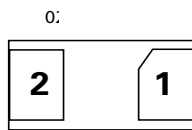
SP1053 8.5pF 8kV 01005 DFN Plastic Unidirectional Discrete TVS



**OBSOLETE** DATE: 6/10/2020 PCN/ECN# ESU270-51  
REPLACED BY: SP1021-01WTG



**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 ±8kV (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.

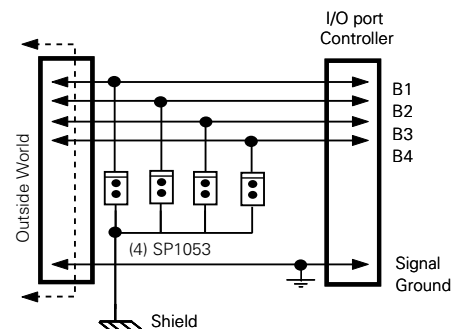
**Features**

- ESD, IEC 61000-4-2, ±8kV contact, ±15kV 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<sub>R</sub>=0V)
- Low leakage current of 0.02µA (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 ( $T_{OP}=25^\circ C$ )

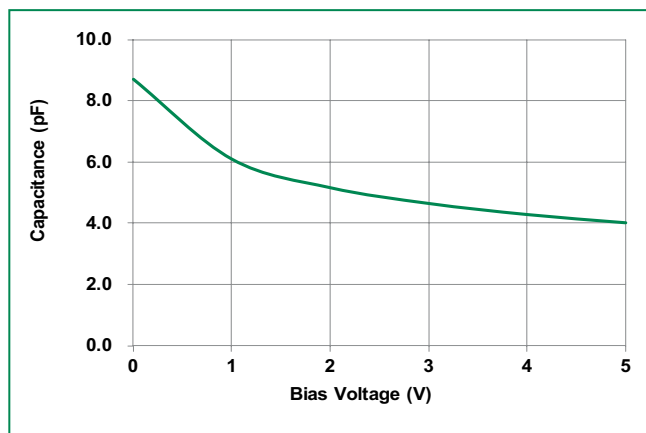
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$				6.0	V
Breakdown Voltage	$V_{BR}$	$I_R=1mA$ ,	6.5	7.0		V
Leakage Current	$I_{LEAK}$	$V_R=5V$ with 1 pin at GND		0.02	0.5	$\mu A$
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP}=1A$ , $t_p=8/20\mu s$ , Fwd		9	12	V
Dynamic 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:

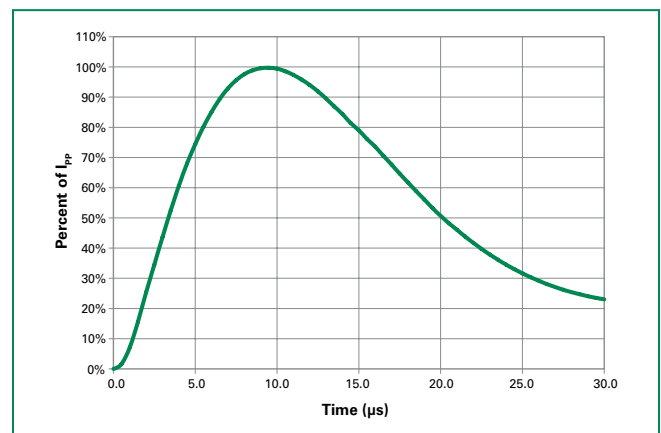
1 Parameter is guaranteed by design and/or component characterization.

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

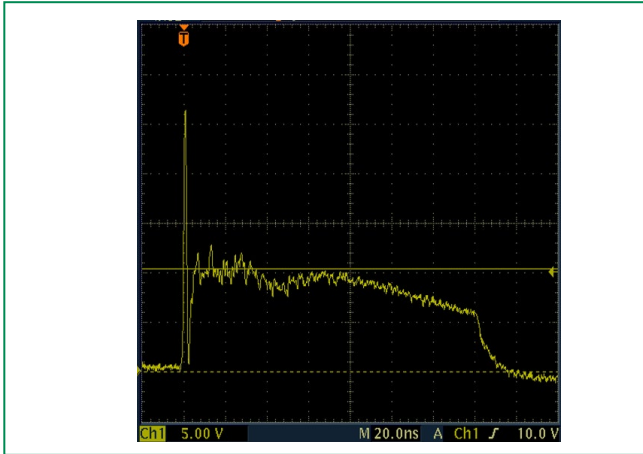
### Capacitance vs. Reverse Bias



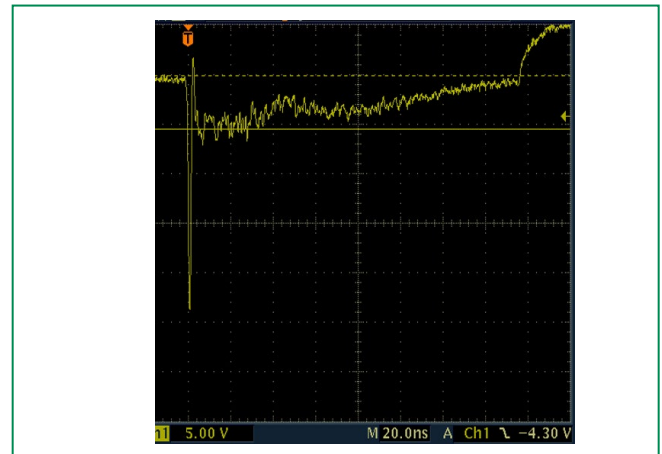
### 8/20 $\mu s$ Pulse Waveform



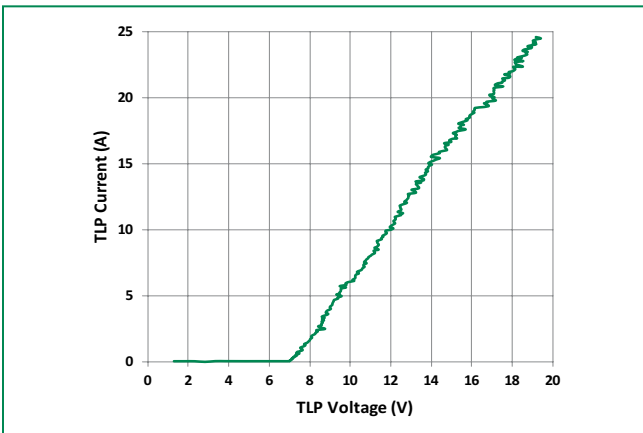
**IEC 61000-4-2 +8 kV Contact ESD Clamping Voltage**



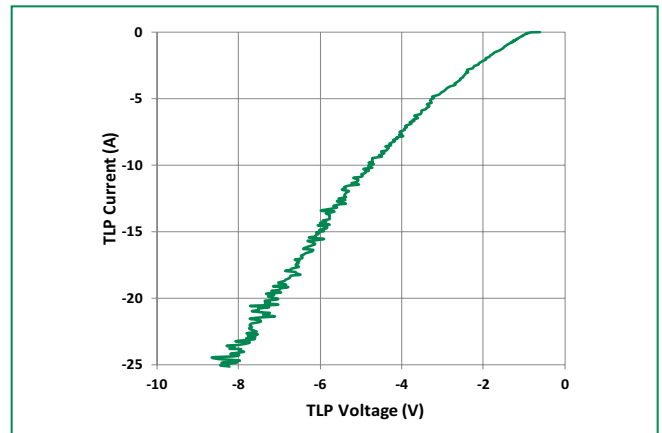
**IEC 61000-4-2 -8 kV Contact ESD Clamping Voltage**



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

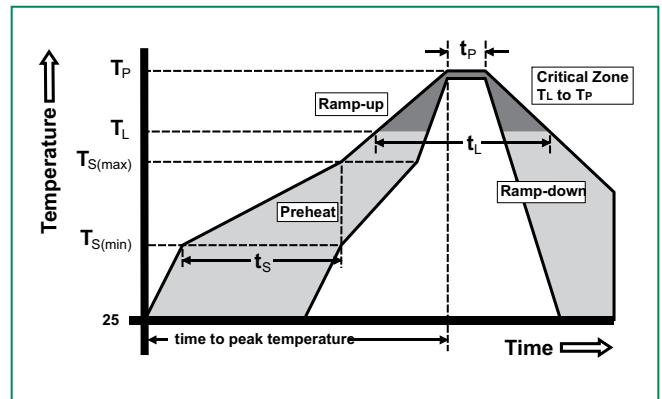


**Negative Transmission Line Pulsing (TLP) Plot**



**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

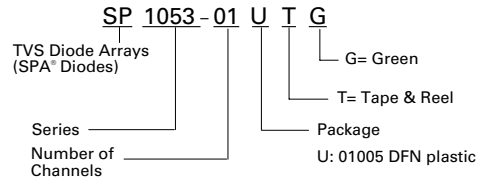


**Product Characteristics**

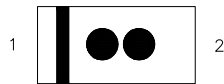
<b>Lead Plating</b>	Pre-Plated Frame
<b>Lead Material</b>	Copper Alloy
<b>Substrate material</b>	Silicon
<b>Body Material</b>	Molded Compound
<b>Flammability</b>	UL Recognized compound meeting flammability rating V-0.

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

**Part Numbering System**



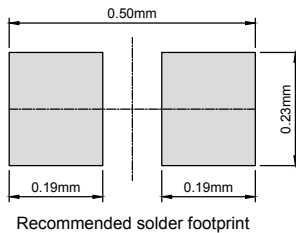
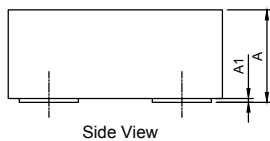
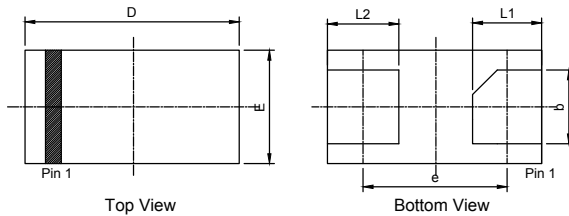
**Part Marking System**



**Ordering Information**

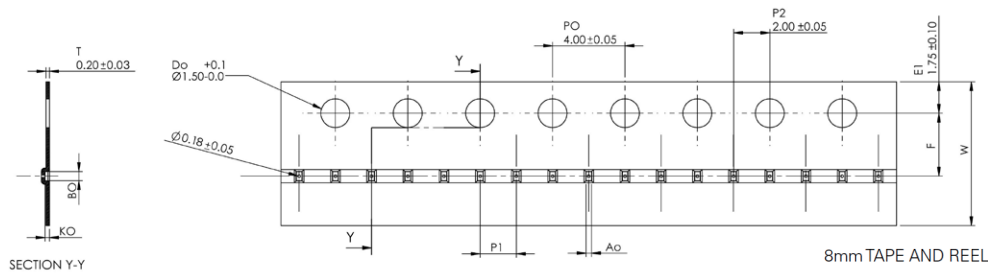
Part Number	Package	Min. Order Qty.
SP1053-01UTG	01005 DFN plastic	20000

**Package Dimensions — 01005 DFN plastic**



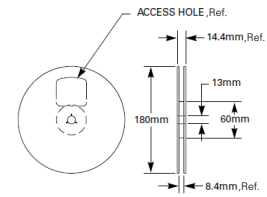
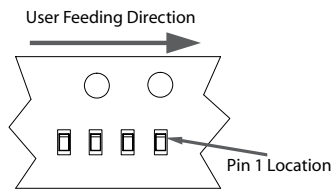
Symbol	01005 DFN					
	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
<b>A</b>	0.235	0.250	0.265	0.0093	0.0098	0.0104
<b>A1</b>	-	0.015	0.020	-	0.0006	0.0008
<b>b</b>	0.100	0.150	0.200	0.0039	0.0059	0.0079
<b>D</b>	0.385	0.435	0.485	0.0152	0.0171	0.0191
<b>E</b>	0.200	0.250	0.300	0.0079	0.0098	0.0118
<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**



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

SECTION Y-Y



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