

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



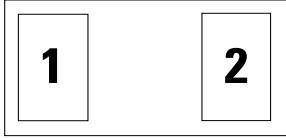
**OBSOLETE** DATE: 6/10/2020 PCN/ECN# ESU270-51  
REPLACED BY: SP1020-01WTG



**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 dissipate 3A of 8/20 $\mu\text{s}$  surge current (IEC 61000-4-5 2nd edition) with very low clamping voltages

**Pinout**

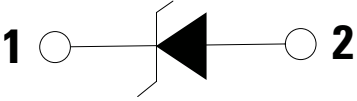


Note: Drawing not to scale

**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 Components
- 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

**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.

### 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

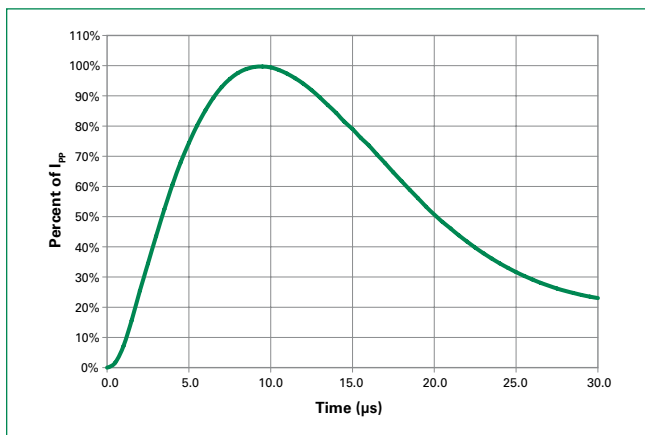
### Electrical Characteristics ( $T_{OP}=25^{\circ}C$ )

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

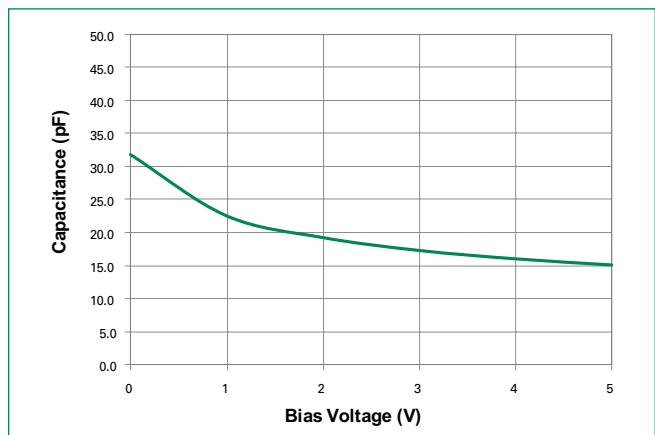
**Notes:**

- Parameter is guaranteed by design and/or component characterization.
- Transmission Line Pulse (TLP) with 100ns width, 2ns rise time, and average window  $t_1=70ns$  to  $t_2=90ns$

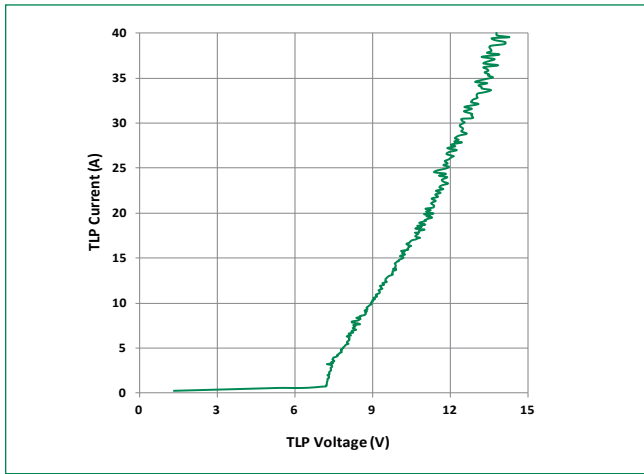
### 8/20 $\mu s$ Pulse Waveform



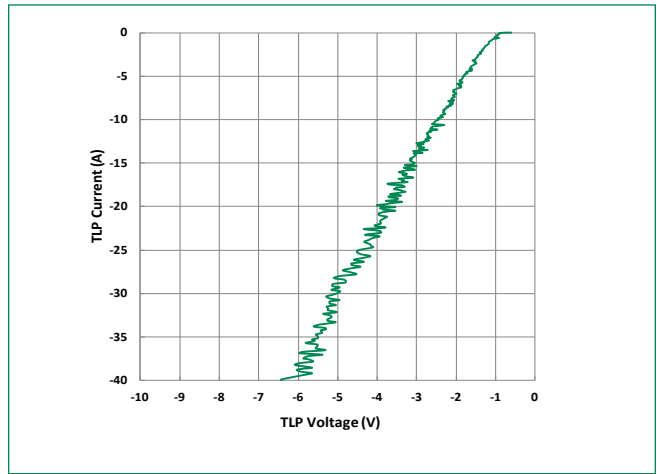
### Capacitance vs. Reverse Bias



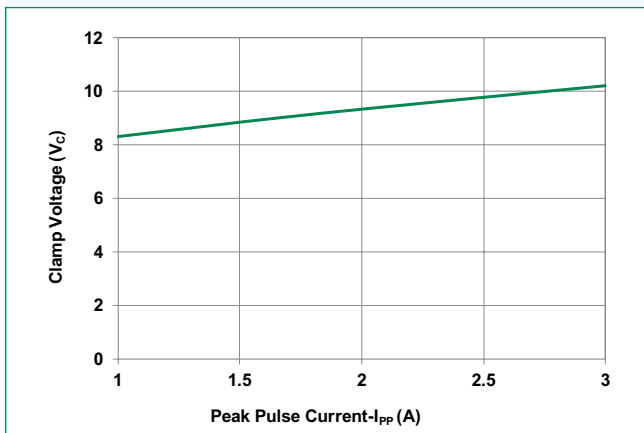
### Positive Transmission Line Pulsing(TLP) Plot



### Negative Transmission Line Pulsing(TLP) Plot

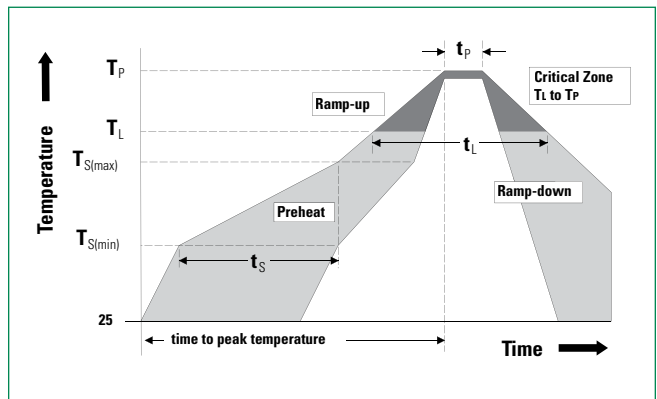


### Clamping Voltage vs I<sub>pp</sub>

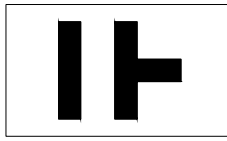


### Soldering Parameters

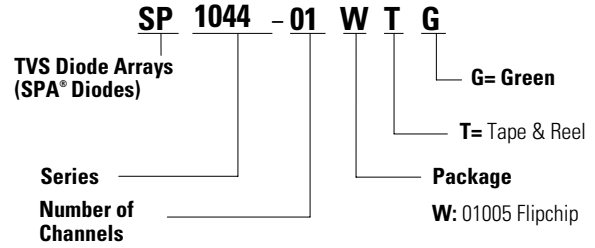
<b>Reflow Condition</b>		Pb – Free assembly
<b>Pre Heat</b>	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 – 180 secs
<b>Average ramp up rate (Liquidus) Temp (<math>T_L</math>) to peak</b>		3°C/second max
<b><math>T_{s(max)}</math> 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**



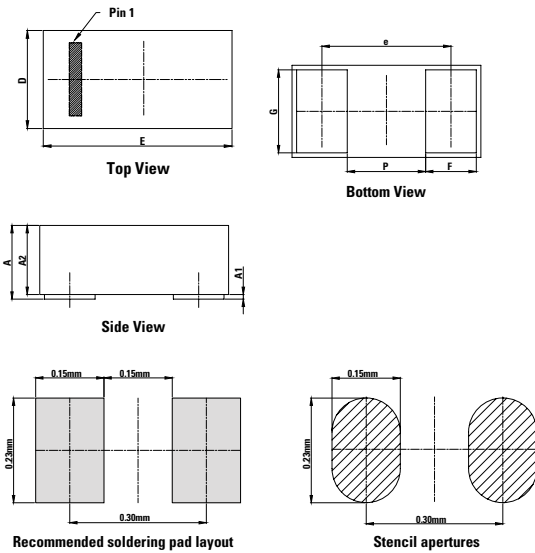
**Part Numbering System**



**Ordering Information**

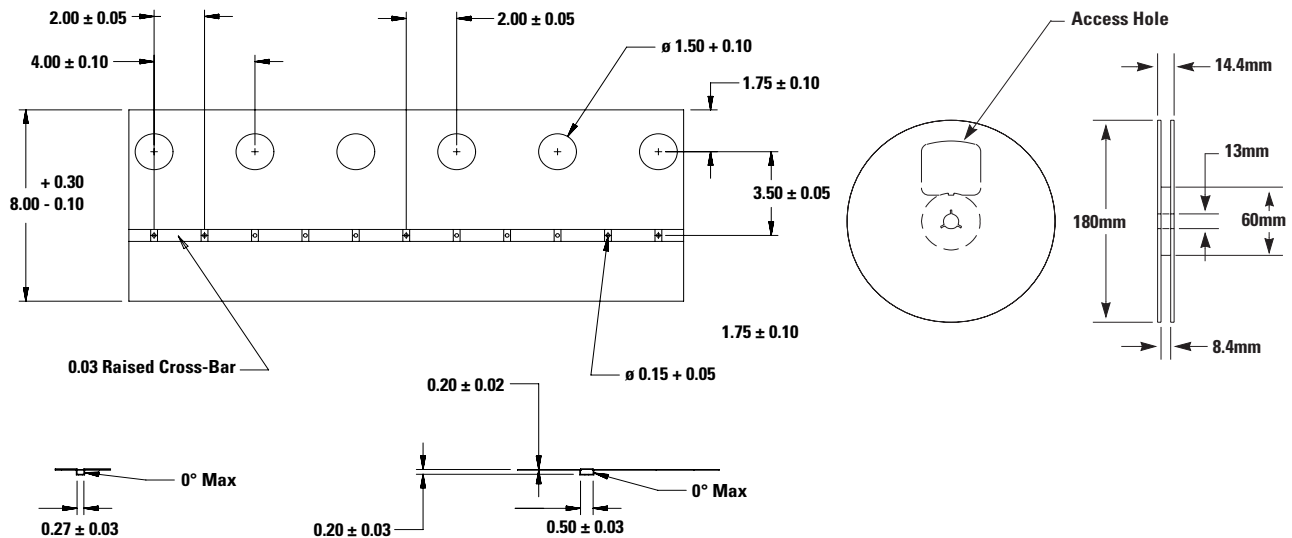
Part Number	Package	Min. Order Qty.
SP1044-01WTG	01005 Flipchip	15000

**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**



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