

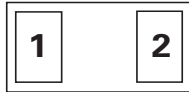
# SP1312 11pF 24kV Bidirectional Discrete TVS



## Description

The SP1312 bidirectional TVS is fabricated in a proprietary silicon avalanche technology. These diodes provide a high ESD (electrostatic discharge) protection level for electronic equipment. The SP1312 TVS can safely absorb repetitive ESD strikes of  $\pm 24$  kV (contact and air discharge as defined in IEC 61000-4-2) without any performance degradation. Additionally, each TVS can safely dissipate a 3A 8/20 surge event as defined in IEC 61000-4-5 2<sup>nd</sup> Edition.

## Pinout



Note: Drawing not to scale

## Features

- ESD, IEC 61000-4-2,  $\pm 24$ kV contact,  $\pm 30$ kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 3A (8/20 as defined in IEC 61000-4-5 2<sup>nd</sup> edition)
- Low capacitance of 11pF (@  $V_R=0V$ )
- Low leakage current of 0.02 $\mu$ A(TYP) at 12V
- 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.

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Revision: 06/06/18

**Absolute Maximum Ratings**

Symbol	Parameter	Value	Units
$I_{PP}$	Peak Current ( $t_p=8/20\mu s$ )	3 <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 ( $T_{OP}=25^\circ C$ )**

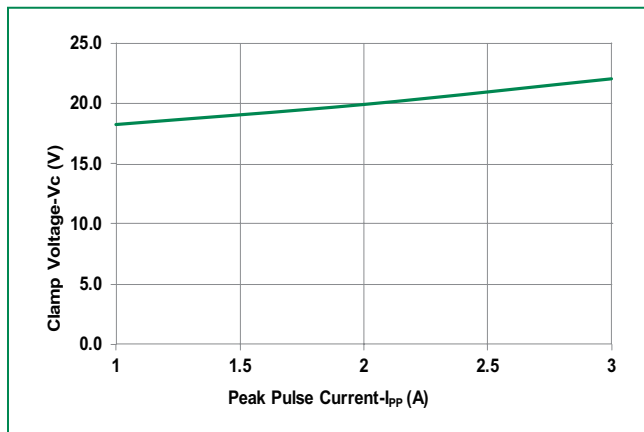
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$	$I_R \leq 1\mu A$			12	V
Breakdown Voltage	$V_{BR}$	$I_R = 1mA$	13	15		V
Reverse Leakage Current	$I_{LEAK}$	$V_R = 12V$		0.02	0.5	$\mu A$
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP} = 1A, t_p = 8/20\mu s, Fwd$		18.5	22	V
		$I_{PP} = 3A, t_p = 8/20\mu s, Fwd$		22.5	27	V
Dynamic Resistance <sup>2</sup>	$R_{DYN}$	TLP, $t_p = 100ns, I/O$ to $I/O$		0.48		$\Omega$
ESD Withstand Voltage <sup>1</sup>	$V_{ESD}$	IEC 61000-4-2 (Contact Discharge)	$\pm 24$			kV
		IEC 61000-4-2 (Air Discharge)	$\pm 30$			kV
Diode Capacitance <sup>1</sup>	$C_D$	Reverse Bias=0V		11	14	pF

Note:

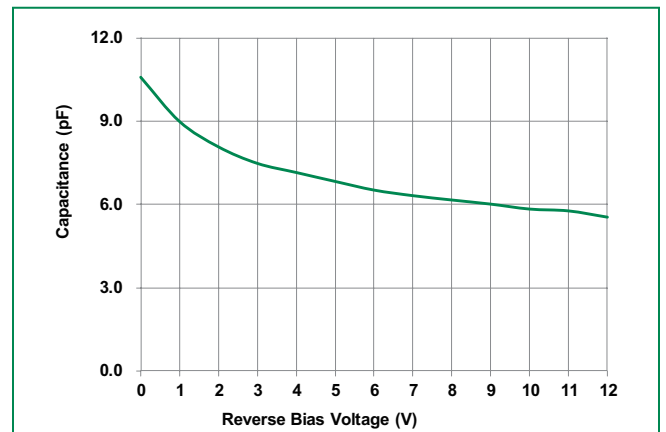
1 Parameter is guaranteed by design and/or component characterization.

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

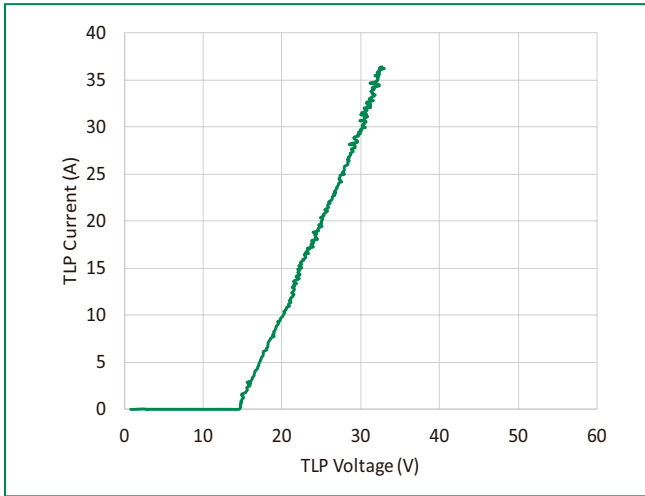
**Clamp voltage vs.  $I_{PP}$  for 8/20 $\mu s$  Waveshape**



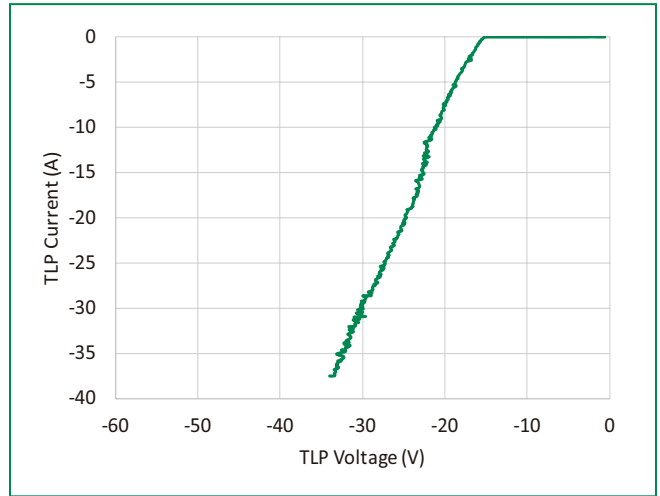
**Capacitance vs. Reverse Bias**



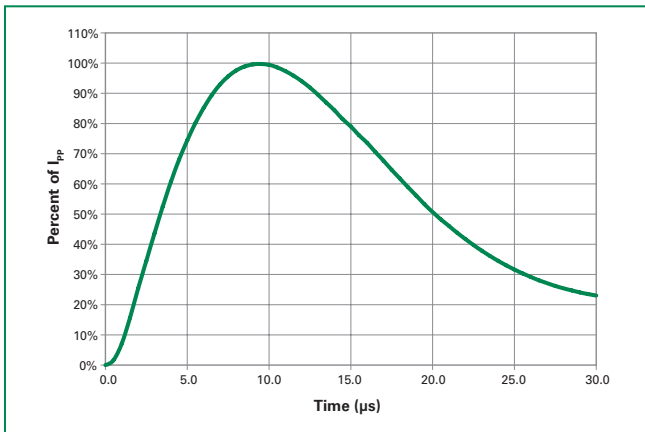
**Positive Transmission Line Pulsing (TLP) Plot**



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

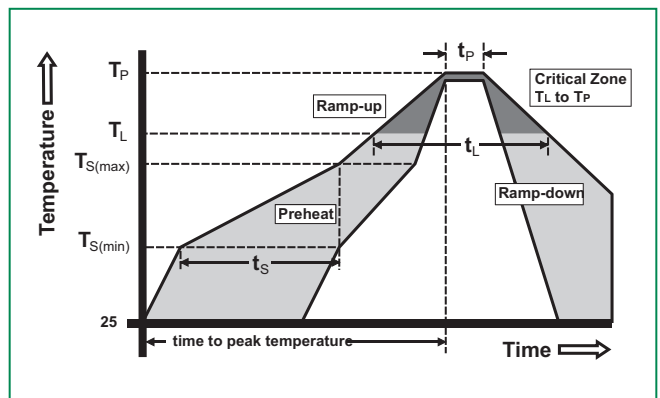


**8/20µs Pulse Waveform**



**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



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**Part Marking System**



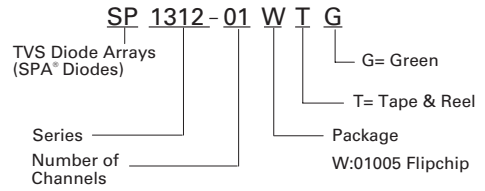
**Product Characteristics**

<b>Lead Plating</b>	Tin plating
<b>Lead Material</b>	Copper bump
<b>Substrate material</b>	Silicon
<b>Flammability</b>	UL Recognized compound meeting flammability rating V-0

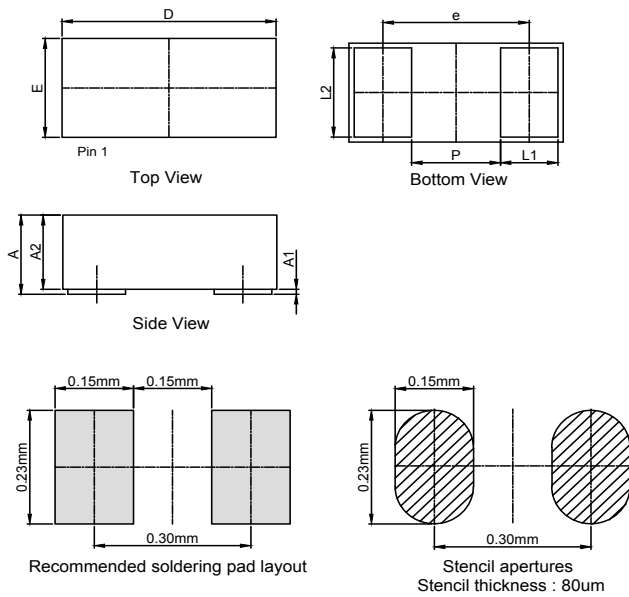
**Ordering Information**

Part Number	Package	Min. Order Qty.
SP1312-01WTG	01005 Flipchip	15000

**Part Numbering System**



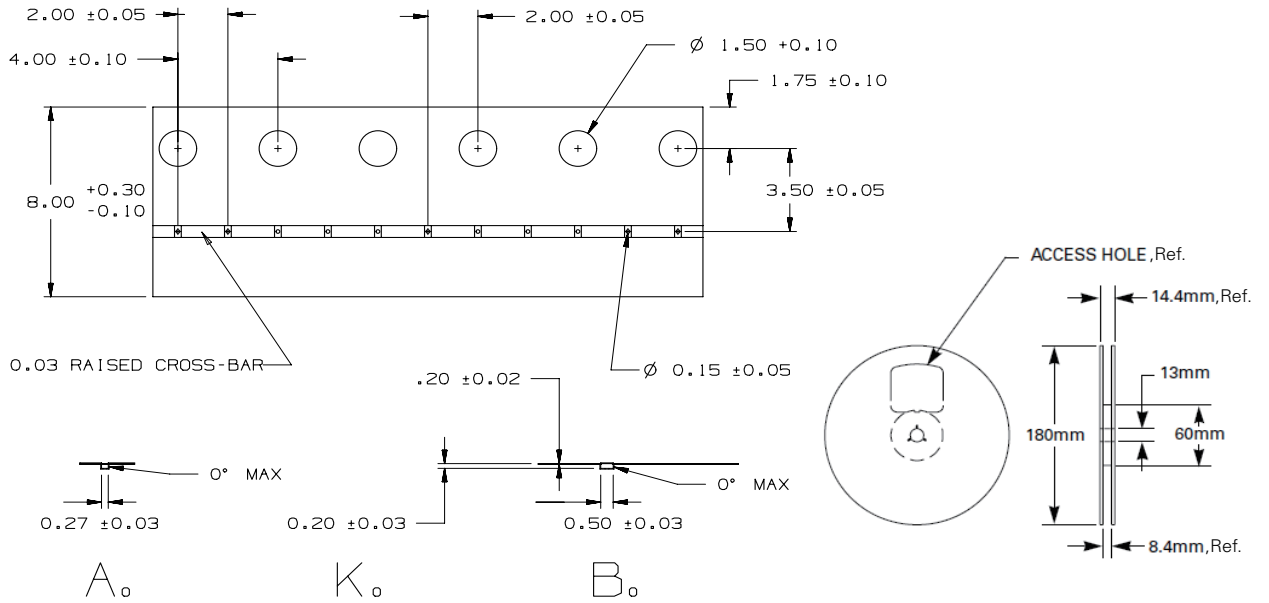
**Package Dimensions — 01005 Flipchip**



Drawing# : W01-A

Symbol	01005 Flipchip					
	Millimeters			Inches		
	Min	Typ	Max	Min	Typ	Max
<b>A</b>	0.168	0.181	0.194	0.0066	0.0071	0.0076
<b>A1</b>	0.008	0.011	0.014	0.0003	0.0004	0.0006
<b>A2</b>	0.160	0.170	0.180	0.0063	0.0067	0.0071
<b>e</b>	0.280 BSC			0.0110 BSC		
<b>E</b>	0.200	0.230	0.260	0.0079	0.0091	0.0102
<b>D</b>	0.400	0.430	0.460	0.0157	0.0169	0.0181
<b>F</b>	0.110	0.130	0.150	0.0043	0.0051	0.0059
<b>G</b>	0.180	0.200	0.220	0.0071	0.0079	0.0087
<b>P</b>	0.150	0.170	0.190	0.0059	0.0067	0.0075

**Embossed Carrier Tape & Reel Specification – 01005 Flipchip**



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