

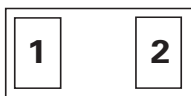
SP1312 11pF 24kV Bidirectional Discrete TVS



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 ± 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 2nd Edition.

Pinout



Note: Drawing not to scale

Features

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

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{PP}	Peak Current ($t_p=8/20\mu s$)	3 ¹	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 ($T_{OP}=25^{\circ}C$)

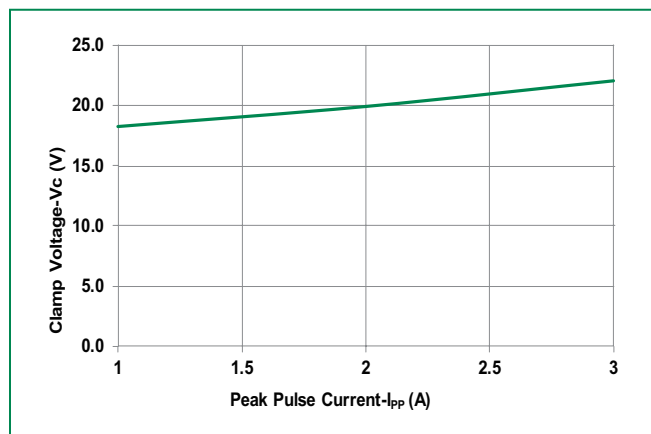
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	$I_R \leq 1\mu A$			12	V
Breakdown Voltage	V_{BR}	$I_R = 1mA$	13	15		V
Reverse Leakage Current	I_{LEAK}	$V_R = 12V$		0.02	0.5	μA
Clamp Voltage ¹	V_C	$I_{PP} = 1A, t_p = 8/20\mu s, Fwd$		18.5	22	V
		$I_{PP} = 3A, t_p =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

Note:

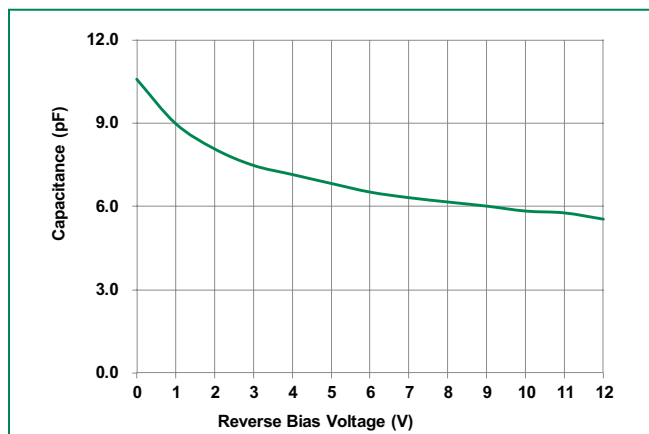
1 Parameter is guaranteed by design and/or component characterization.

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

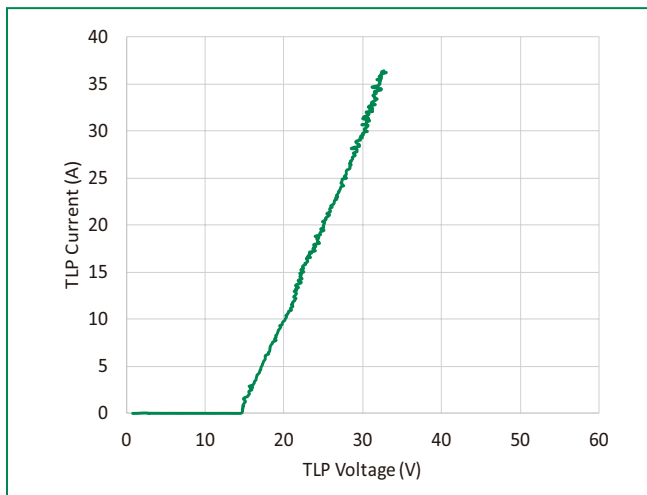
Clamp voltage vs. I_{PP} for 8/20 μs Waveshape



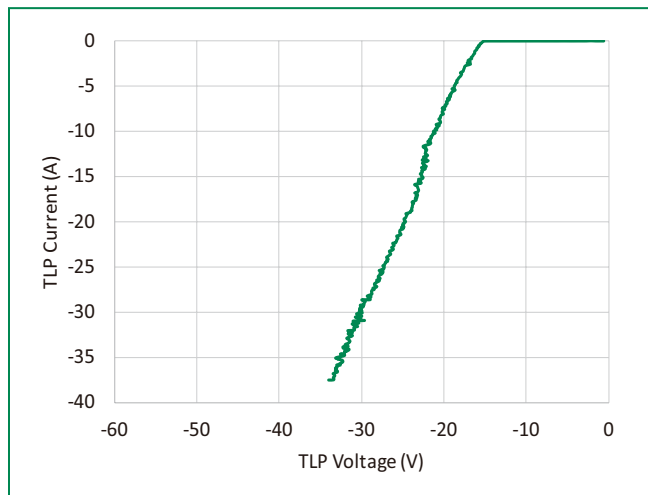
Capacitance vs. Reverse Bias



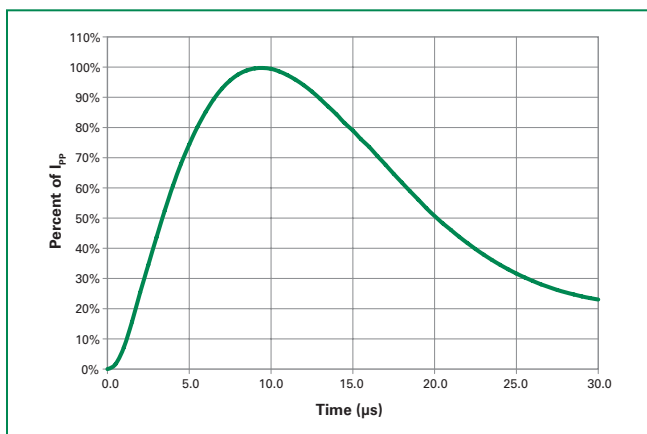
Positive Transmission Line Pulsing (TLP) Plot



Negative Transmission Line Pulsing (TLP) Plot

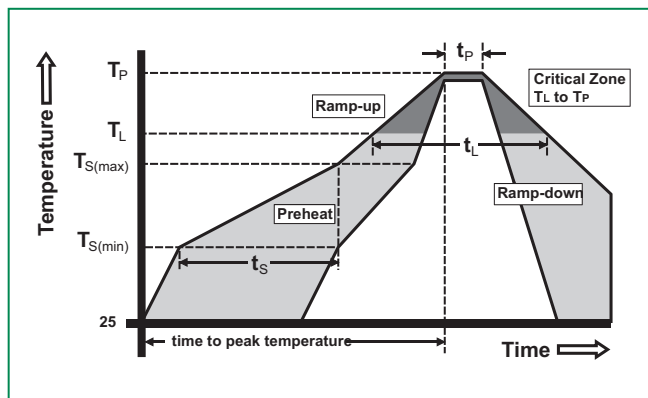


8/20μs Pulse Waveform



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 $^{+0/-5}$ °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



Part Marking System



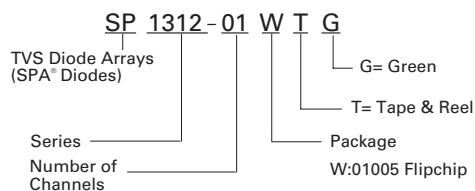
Ordering Information

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

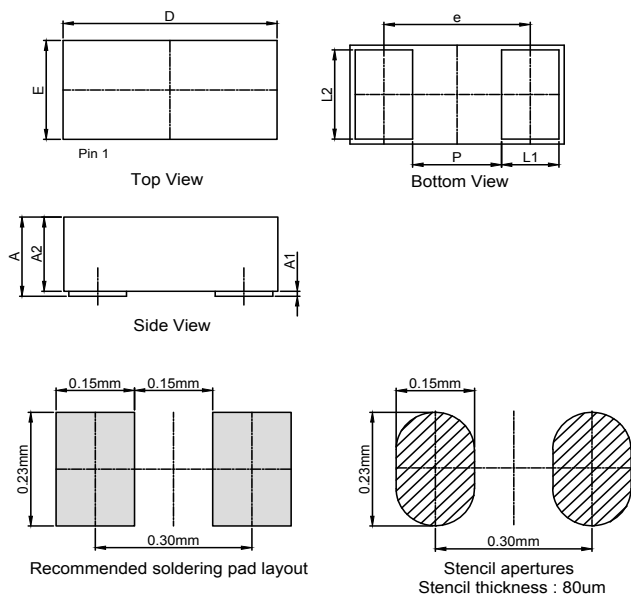
Product Characteristics

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

Part Numbering System



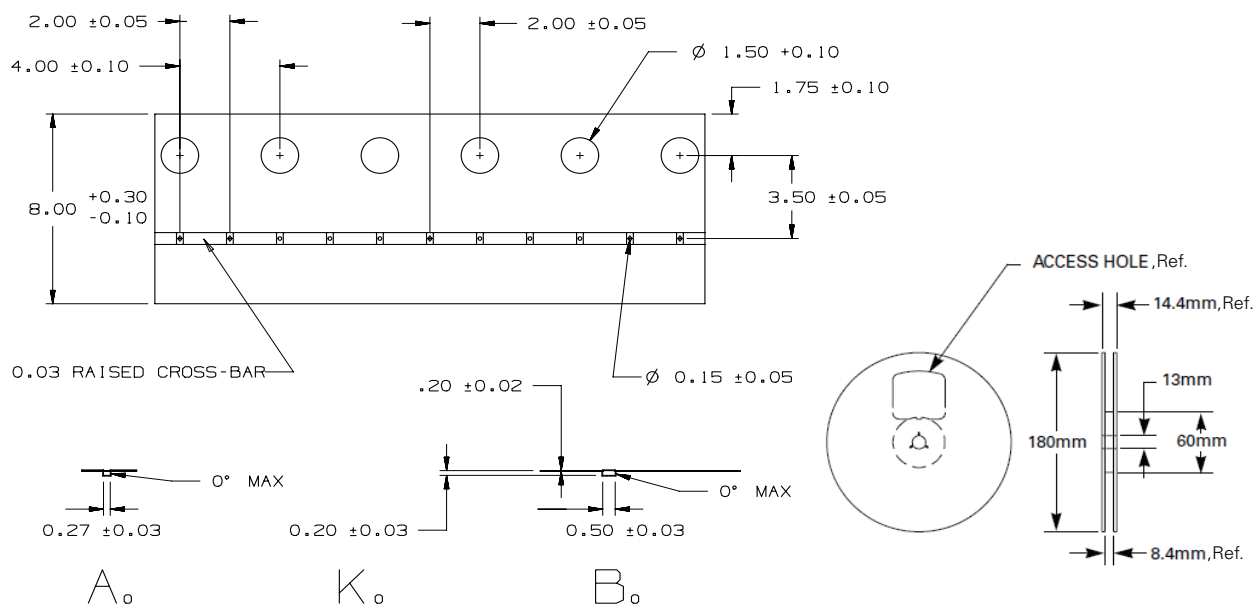
Package Dimensions — 01005 Flipchip



Drawing# : W01-A

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

Embossed Carrier Tape & Reel Specification — 01005 Flipchip



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