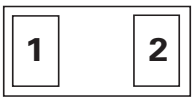
SP1312 11pF 24kV Bidirectional Discrete TVS

HF RoHS Pb GREEN

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, ±24kV contact, ±30kV 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 0.02µA(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

Revision: 06/06/18

TVS Diode Arrays (SPA® Diodes)

General Purpose ESD Protection - SP1312

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{PP}	Peak Current (t_p=8/20µs)	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°C)

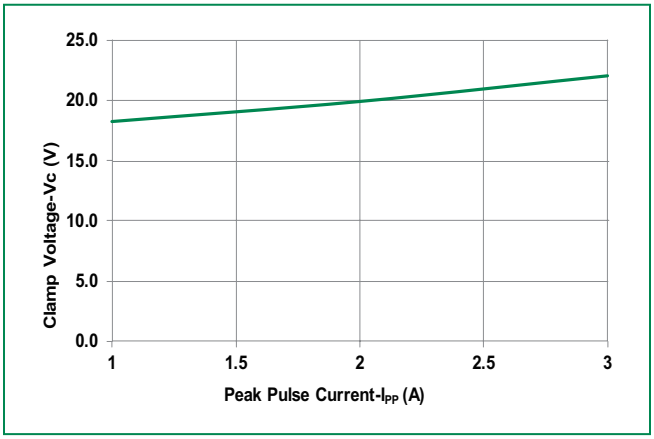
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}	I_R≤1µA			12	V
Breakdown Voltage	V_{BR}	I_R=1mA	13	15		V
Reverse Leakage Current	I_{LEAK}	V_R=12V		0.02	0.5	µA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20µs, Fwd		18.5	22	V
		I_{PP}=3A, t_p=8/20µs, Fwd		22.5	27	V
Dynamic 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:

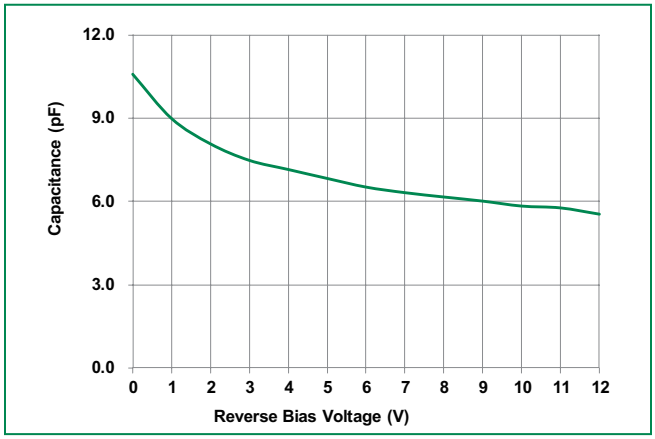
1 Parameter is guaranteed by design and/or component characterization.

2 Transmission Line Pulse (TLP) with 100ns width, 2ns rise time, and average window t1=70ns to t2= 90ns

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



Capacitance vs. Reverse Bias



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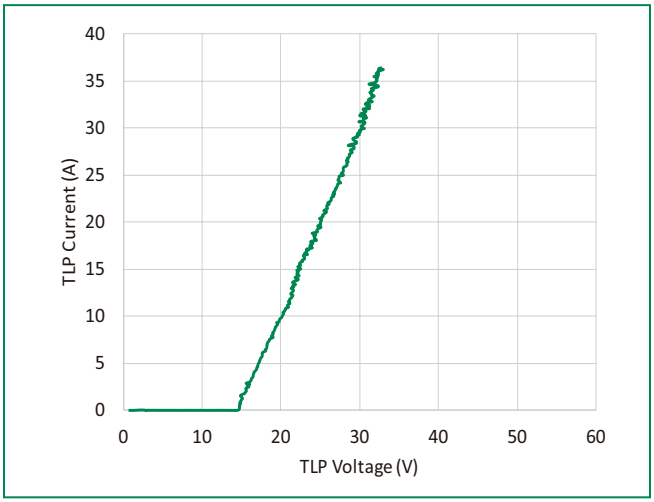
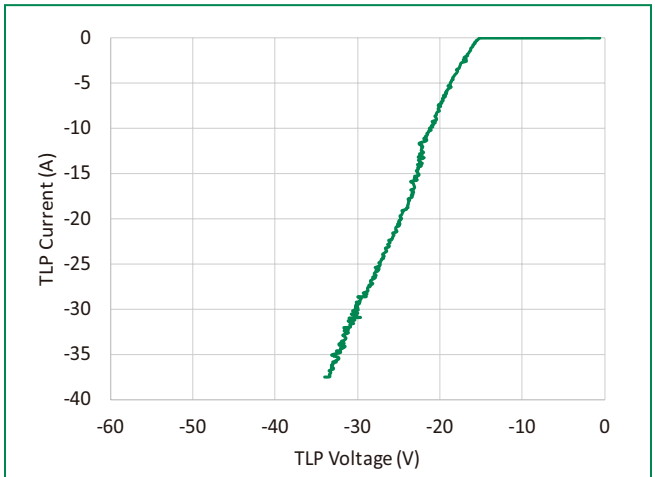
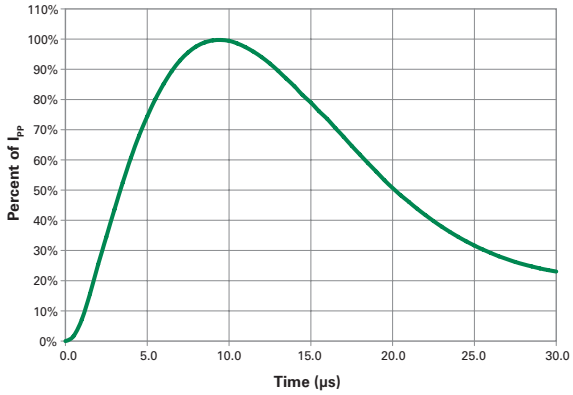
Positive Transmission Line Pulsing (TLP) Plot



Negative Transmission Line Pulsing (TLP) Plot

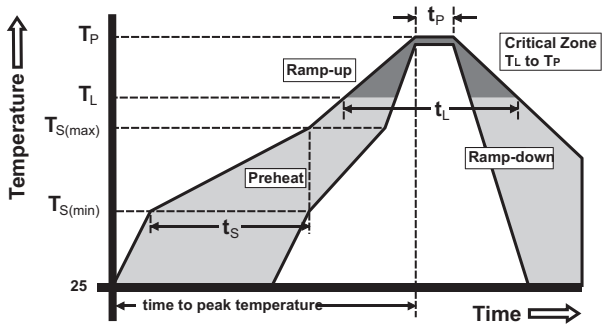


8/20µs Pulse Waveform



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



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TVS Diode Arrays (SPA® Diodes)

General Purpose ESD Protection - SP1312

Part Marking System

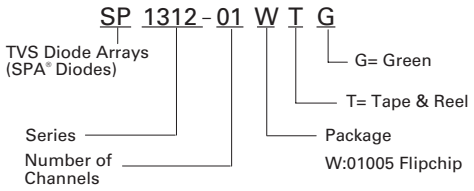
Product Characteristics

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

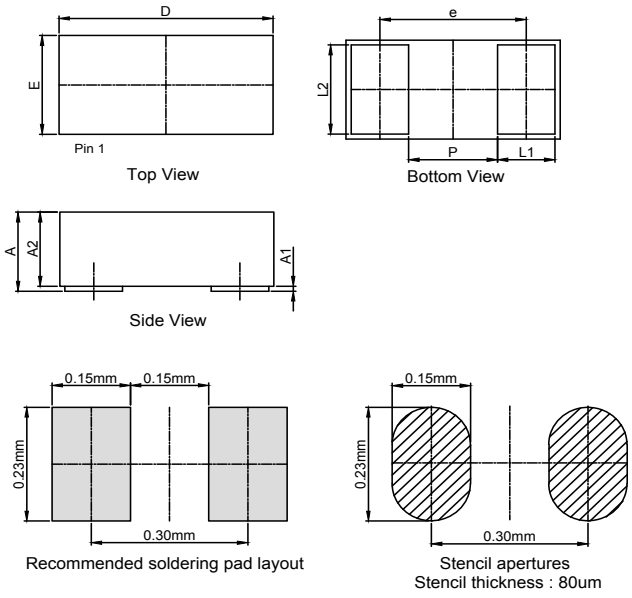
Ordering Information

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
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

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Embossed Carrier Tape & Reel Specification — 01005 Flipchip