

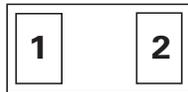
## SP3042 Series 0.35pF 30kV Bidirectional Discrete TVS



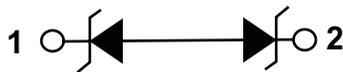
### Description

The SP3042 includes back-to-back TVS diodes fabricated in a proprietary silicon avalanche technology to provide protection for electronic equipment that may experience destructive electrostatic discharges (ESD). These robust diodes can safely absorb repetitive ESD strikes up to the maximum level specified in the IEC 61000-4-2 international standard ( $\pm 30\text{kV}$  contact discharge) without performance degradation. The back-to-back configuration provides symmetrical ESD protection for data lines when AC signals are present and the low loading capacitance makes it ideal for protecting high speed data lines such as HDMI, USB2.0, USB3.0 and eSATA.

### Pinout



### Functional Block Diagram



### Features

- ESD protection of  $\pm 30\text{kV}$  contact discharge,  $\pm 30\text{kV}$  air discharge, (IEC 61000-4-2)
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, IEC 61000-4-5 2nd edition, 2A ( $t_p=8/20\mu\text{s}$ )
- Low capacitance of  $0.35\text{pF}$  @  $V_R=0\text{V}$  (TYP)
- Low leakage current of  $100\text{nA}$  at  $5.3\text{V}$  (MAX)
- Space efficient 01005 footprint
- Lead free and RoHS compliant

### Applications

- USB 3.0/USB 2.0/MHL
- MIPI Camera and Display
- HDMI 2.0, DisplayPort 1.3, eSATA
- IoT Modules
- Smart Phones
- External Storage
- Ultrabooks, Notebooks
- Tablets, eReaders
- Security Modules

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
$P_{PK}$	Peak Pulse Power ( $t_p=8/20\mu s$ )	20	W
$I_{PP}$	Peak Current ( $t_p=8/20\mu s$ )	2.0	A
$T_{OP}$	Operating Temperature	-40 to 125	°C

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device 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 ( $T_{OP}=25^\circ C$ )

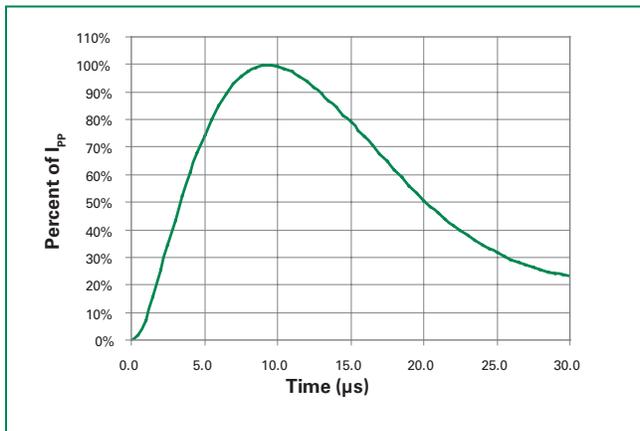
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$				5.3	V
Reverse Breakdown Voltage	$V_{BR}$	$I_R=1mA$		7.8		V
Reverse Leakage Current	$I_{LEAK}$	$V_R=5.3V$			100	nA
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP}=1A, t_p=8/20\mu s, Fwd$		12.5		V
Dynamic Resistance <sup>2</sup>	$R_{DYN}$	TLP, $t_p=100ns, I/O$ to GND		0.5		$\Omega$
ESD Withstand Voltage <sup>1</sup>	$V_{ESD}$	IEC 61000-4-2 (Contact)	$\pm 30$			kV
		IEC 61000-4-2 (Air)	$\pm 30$			kV
Diode Capacitance <sup>1</sup>	$C_D$	Reverse Bias=0V		0.35	0.5	pF

Note:

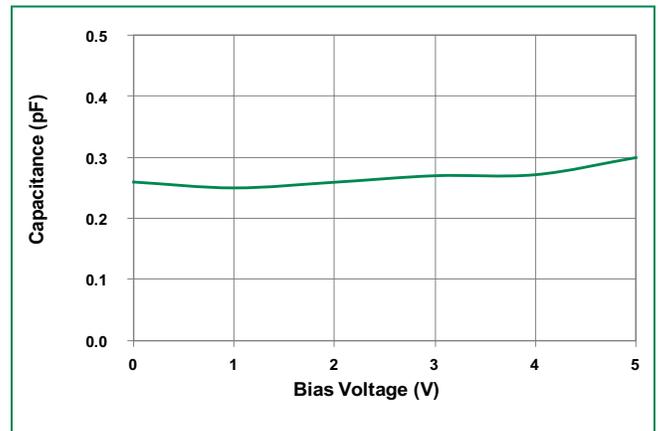
<sup>1</sup> Parameter is guaranteed by design and/or device characterization.

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

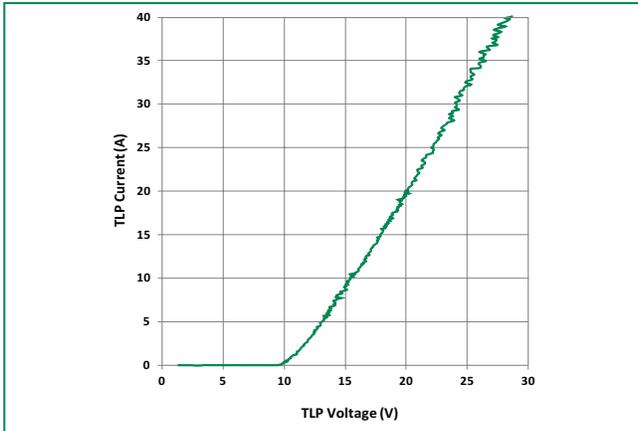
### 8/20 $\mu s$ Pulse Waveform



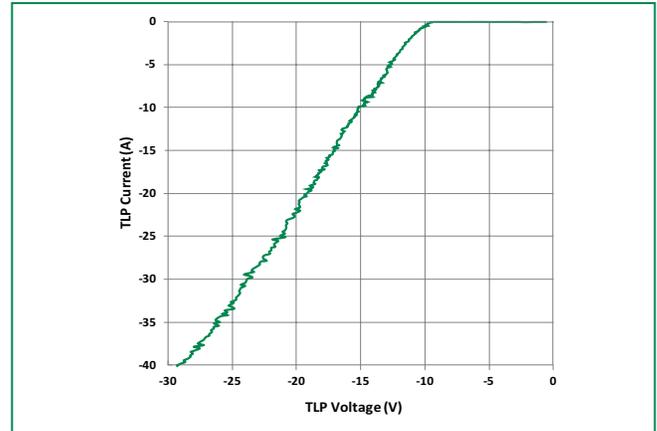
### Capacitance vs Reverse Bias



### Positive Transmission Line Pulsing (TLP) Plot

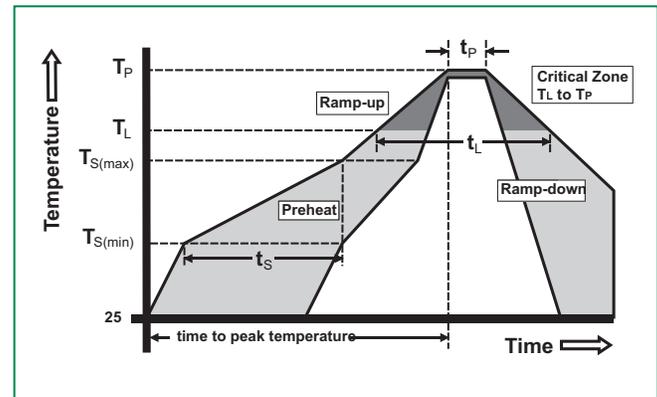


### Negative Transmission Line Pulsing (TLP) Plot



### 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 of 01005 Flipchip

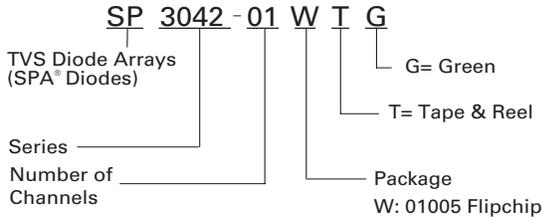
<b>Lead Plating</b>	Sn
<b>Lead Material</b>	Copper
<b>Lead Coplanarity</b>	6µm(max)
<b>Substrate material</b>	Silicon
<b>Body Material</b>	Silicon

- Notes :
1. All dimensions are in millimeters
  2. Dimensions include solder plating.
  3. Dimensions are exclusive of mold flash & metal burr.
  4. Blo is facing up for mold and facing down for trim/form, i.e. reverse trim/form.
  5. Package surface matte finish VDI 11-13.

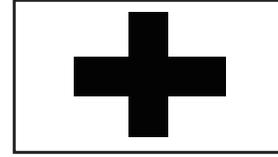
### Ordering Information

Part Number	Package	Marking	Min. Order Qty.	Packaging Option	P0/P1	Packaging Specification
SP3042-01WTG	01005 Flipchip	+	15000	Tape & Reel – 8mm tape/7" reel	4mm/2mm	EIA RS-481

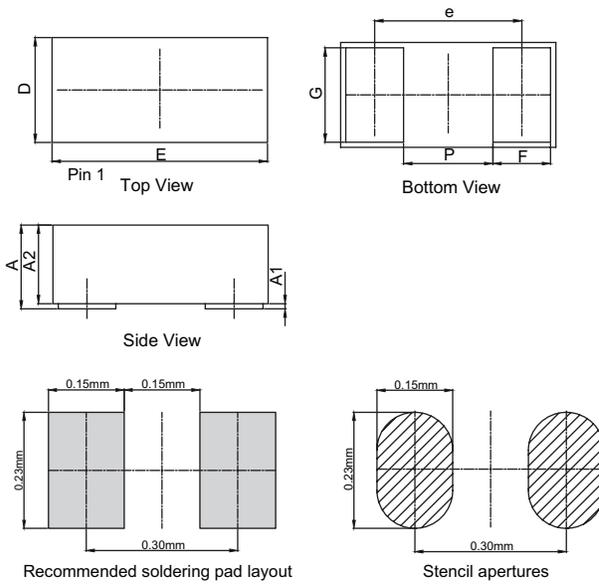
**Part Numbering System**



**Part Marking System**

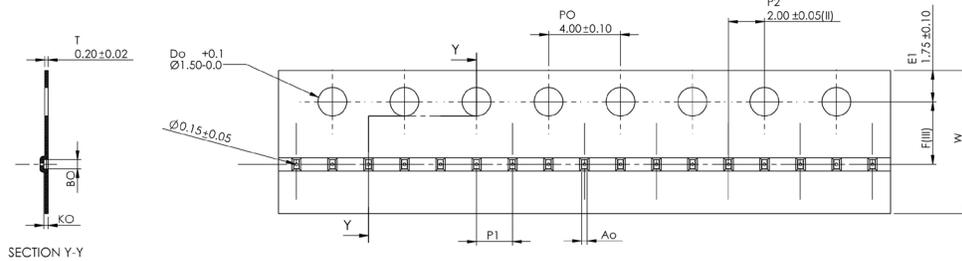


**Package Dimensions — 01005 Flipchip**



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			0.011 BSC		
D	0.200	0.230	0.260	0.0079	0.0091	0.0102
E	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	0.130	0.150	0.170	0.0051	0.0059	0.0067

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



Symbol	Millimeters
A0	0.30+/-0.03
B0	0.51+/-0.03
K0	0.20 + 0.03
F	3.50 +/- 0.05
P1	2.00+/-0.10
W	8.00+/-0.10

