

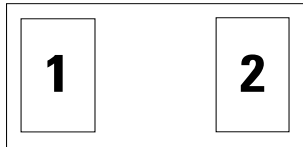
SP3042 Series 0.35pF 30kV Bidirectional Discrete TVS



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 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



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 0.35pF @ $V_R=0\text{V}$ (TYP)
- Low leakage current of 100nA at 5.3V (MAX)
- Space efficient 01005 footprint
- Lead free and RoHS compliant

Functional Block Diagram



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 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.

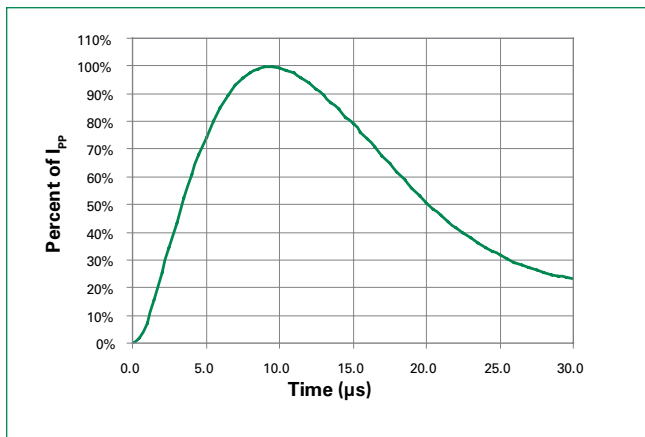
Electrical Characteristics ($T_{OP}=25^\circ C$)

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

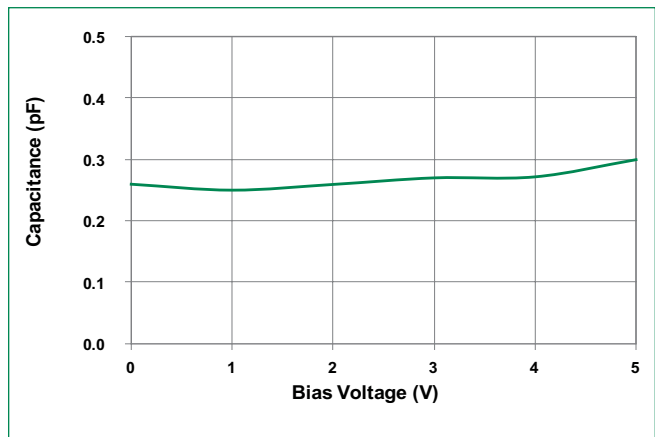
Note:

- 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 $t_2=90ns$

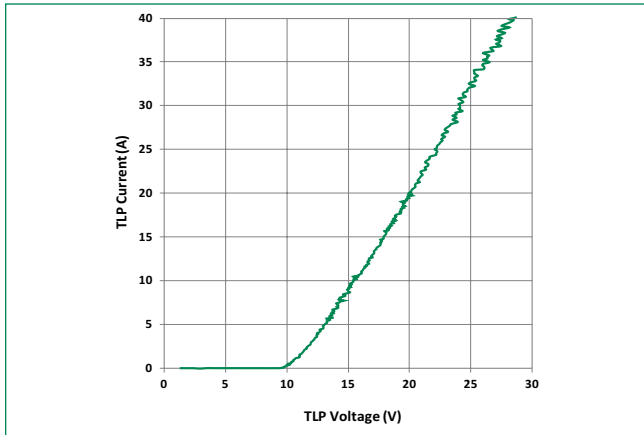
8/20 μs Pulse Waveform



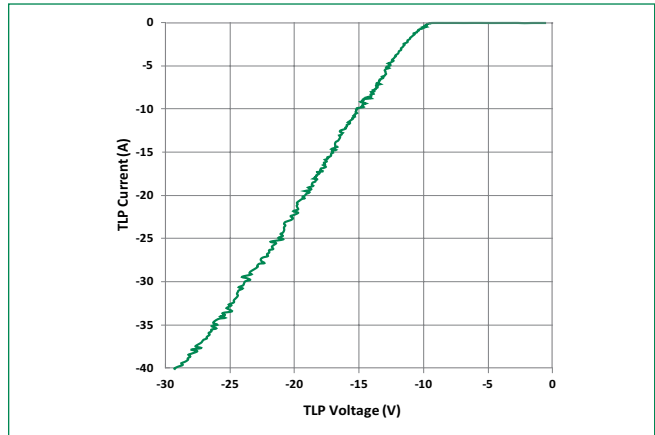
Capacitance vs Reverse Bias



Positive Transmission Line Pulsing (TLP) Plot

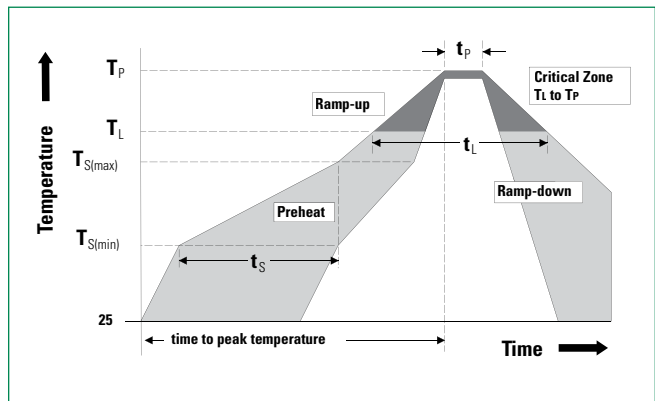


Negative Transmission Line Pulsing (TLP) Plot



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 ^{+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 |



Product Characteristics of 01005 Flipchip

| | |
|---------------------------|----------|
| Lead Plating | Sn |
| Lead Material | Copper |
| Lead Coplanarity | 6µm(max) |
| Substrate material | Silicon |
| Body Material | Silicon |

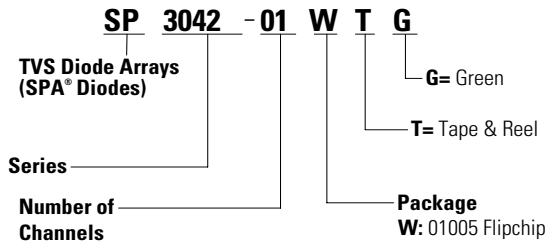
Notes :

1. All dimensions are in millimeters
2. Dimensions include solder plating.
3. Dimensions are exclusive of mold flash & metal burr.

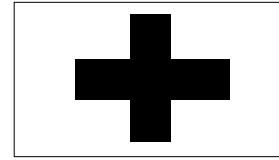
Ordering Information

| 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 |

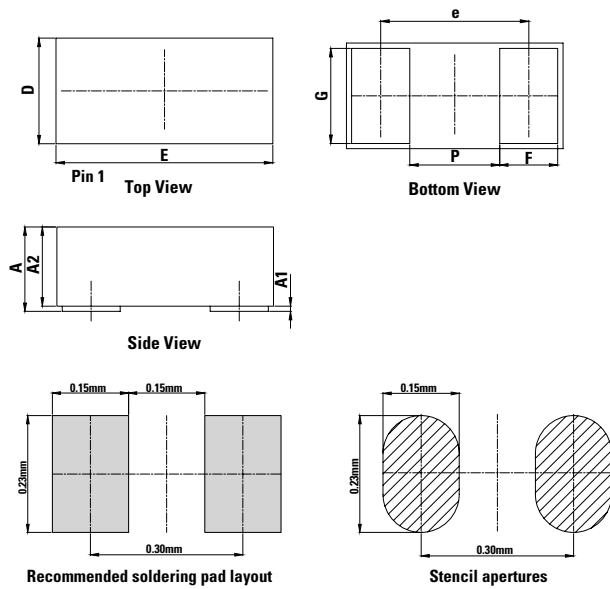
Part Numbering System



Part Marking System

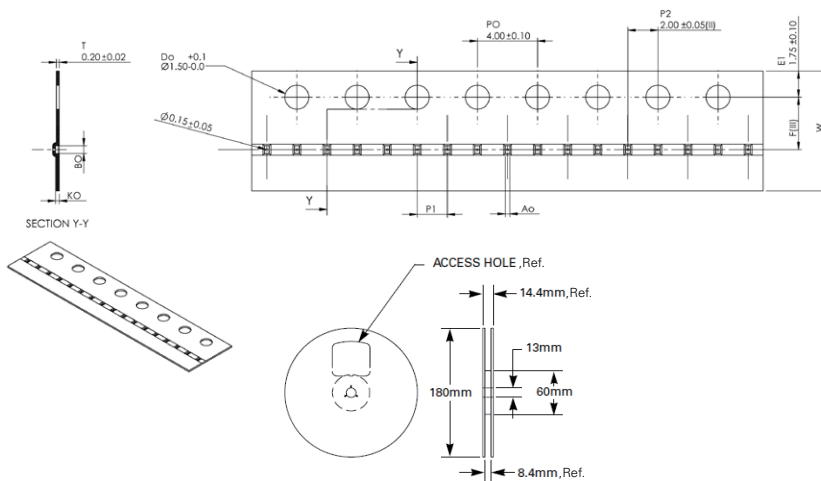


Package Dimensions — 01005 Flipchip



| 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 |