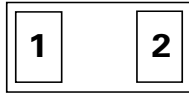


SP1020 Series 20pF 30kV Bidirectional Discrete TVS

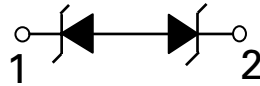


Pinout



Note: Drawing not to scale

Functional Block Diagram



Description

The SP1020 includes back-to-back Zener 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 above the maximum level specified in the IEC 61000-4-2 international standard (Level 4, ±8kV contact discharge) without performance degradation. The back-to-back configuration provides symmetrical ESD protection for data lines when AC signals are present.

Features

- RoHS compliant, Halogen-free and Lead-free
- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, IEC 61000-4-5, 2nd Edition, 5A ($t_p=8/20\mu s$)
- Low capacitance of 20pF (@ $V_R=0V$)
- Low leakage current of 0.1µA at 5V
- Industry's smallest ESD footprint available (01005)

Applications

- Mobile Phones
- Smart Phones
- Portable Medical
- Digital Cameras
- Wearable Technology
- Portable Navigation Devices
- Tablets

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 ($t_p=8/20\mu s$) | 5.0 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 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 ($T_{OP}=25^\circ C$)

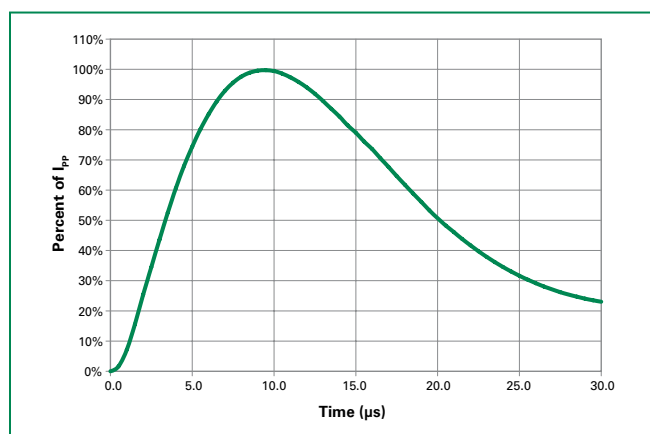
| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|------------------------------------|------------|--|----------|------|-----|----------|
| Reverse Standoff Voltage | V_{RWM} | | | | 6.0 | V |
| Leakage Current | I_{LEAK} | $V_R=3.3V$ with 1 pin at GND ¹ | | | 10 | nA |
| | | $V_R=5V$ with 1 pin at GND | | 0.1 | 0.5 | μA |
| Clamp Voltage ¹ | V_C | $I_{PP}=1A$, $t_p=8/20\mu s$, Fwd | | 9.3 | | V |
| | | $I_{PP}=2A$, $t_p=8/20\mu s$, Fwd | | 10.0 | | V |
| Dynamic Resistance ² | R_{DYN} | TLP, $t_p=100ns$, I/O to GND, 8/20 μs Dynamic Resistance | | 0.32 | | Ω |
| ESD Withstand Voltage ¹ | V_{ESD} | IEC 61000-4-2 (Contact Discharge) | ± 30 | | | kV |
| | | IEC 61000-4-2 (Air Discharge) | ± 30 | | | kV |
| Diode Capacitance ¹ | C_D | Reverse Bias=0V | | 20 | | pF |

Note:

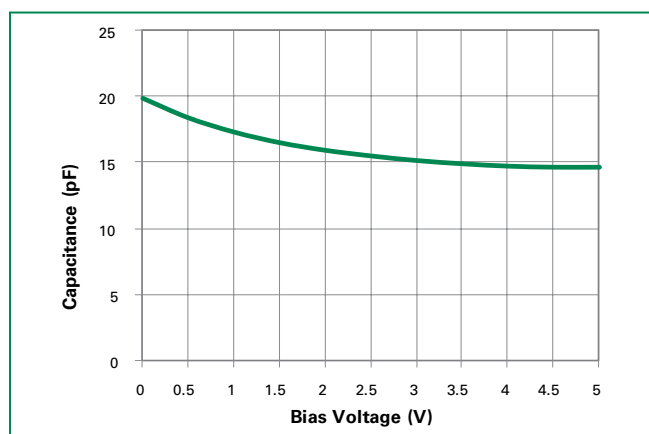
1 Parameter is guaranteed by design and/or device characterization.

2 Transmission Line Pulse (TLP) with 100ns width and 200ps rise time.

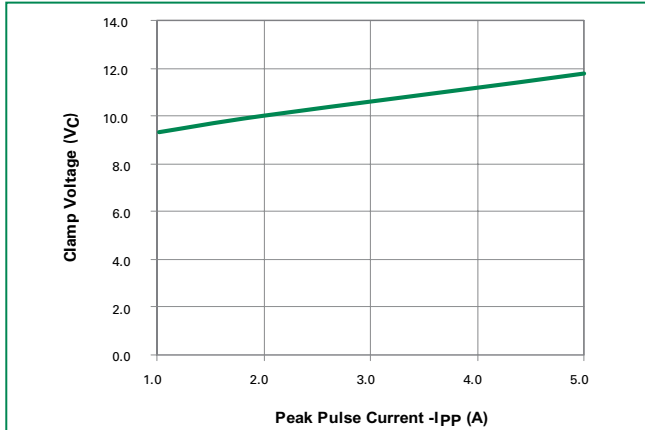
Pulse Waveform



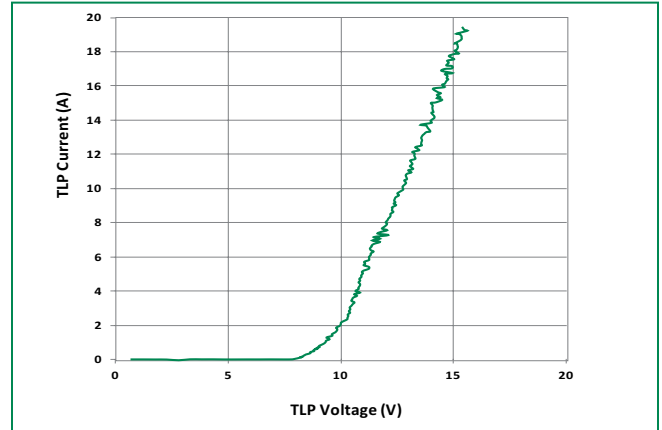
Capacitance vs. Reverse Bias



Clamping Voltage vs I_{pp}

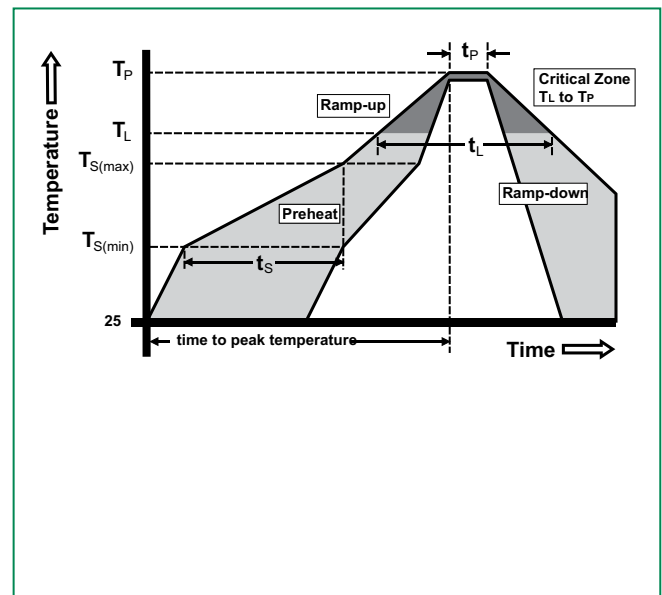


Transmission Line Pulsing (TLP) Plot

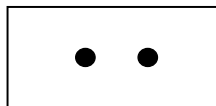


Soldering Parameters

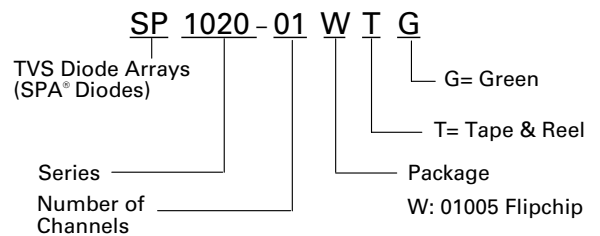
| | | |
|--|--|-------------------------|
| Reflow Condition | Pb – Free assembly | |
| Pre Heat | - Temperature Min (T _{s(min)}) | 150°C |
| | - Temperature Max (T _{s(max)}) | 200°C |
| | - Time (min to max) (t _s) | 60 – 180 secs |
| Average ramp up rate (Liquidus) Temp (T _L) to peak | | 3°C/second 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 |



Part Marking System



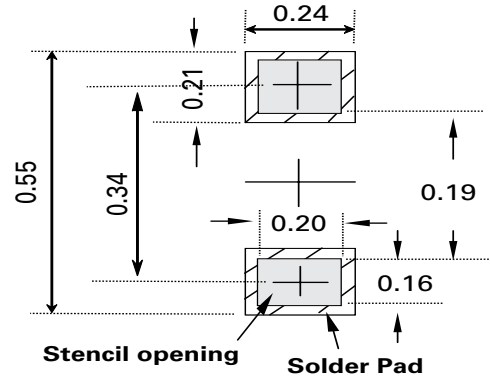
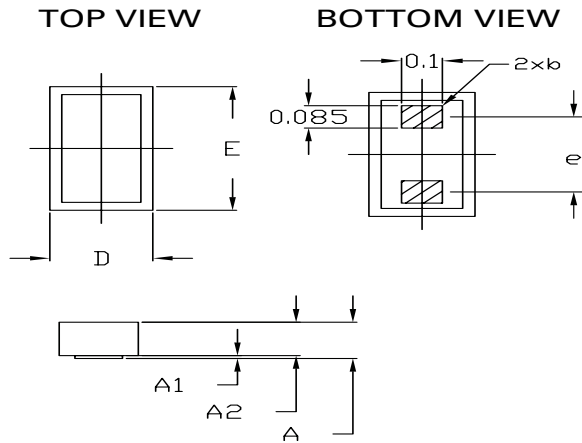
Part Numbering System



Ordering Information

| Part Number | Package | Marking | Min. Order Qty. |
|--------------|----------------|---------|-----------------|
| SP1020-01WTG | 01005 Flipchip | • • | 15000 |

Package Dimensions — 01005 Flipchip



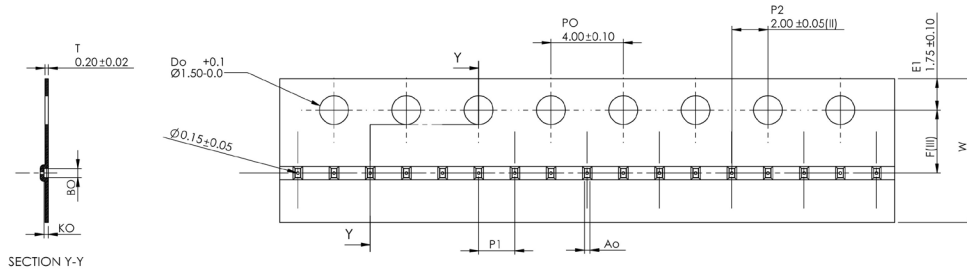
Recommended Solder Pad Footprint and Stencil opening

Thickness of Stencil opening is 0.08mm

***Sizes in mm**

| Symbol | 01005 Flipchip | | | | | |
|-----------|----------------|-------|--------|--------|--------|--------|
| | Millimeters | | | Inches | | |
| | Min | Typ | Max | Min | Typ | Max |
| A | 0.153 | 0.181 | 0.209 | 0.0060 | 0.0071 | 0.0082 |
| A1 | 0.008 | 0.011 | 0.0143 | 0.0003 | 0.0004 | 0.0006 |
| A2 | 0.145 | 0.170 | 0.195 | 0.0057 | 0.0067 | 0.0077 |
| D | 0.205 | 0.230 | 0.255 | 0.0081 | 0.0091 | 0.0100 |
| E | 0.415 | 0.440 | 0.465 | 0.0163 | 0.0173 | 0.0183 |

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 |

