

# SP1220

## 20A Discrete Unidirectional TVS Diode

**OBSOLETE** DATE: 9/30/2021 PCN/ECN# ESU270-62  
REPLACED BY: SP1250-01ETG



### Additional Information



Resources

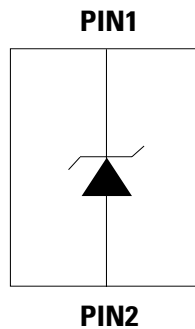


Accessories



Samples

### Pinout and Functional Block Diagram



### Description

The SP1220 unidirectional TVS is fabricated in a proprietary silicon avalanche technology. These diodes provide a high ESD (electrostatic discharge) protection level for electronic equipment. The SP1220 TVS can safely absorb repetitive ESD strikes of  $\pm 30$  kV (contact and air discharge as defined in IEC 61000-4-2) without any performance degradation. Additionally, each TVS can safely dissipate a 20A 8/20 surge event as defined in IEC 61000-4-5 2nd Edition.

### Features & Benefits

- ESD, IEC 61000-4-2,  $\pm 30$ kV contact,  $\pm 30$ kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 20A (8/20 $\mu$ s as defined in IEC 61000-4-5 2nd Edition)
- AEC-Q101 qualified
- Lead-Free and RoHS-Compliant
- Moisture Sensitivity Level (MSL -1)

### Applications

- Switches / Buttons
- Test Equipment / Instrumentation
- Point-of-Sale Terminals
- Medical Equipment
- Notebooks / Desktops / Servers
- Computer Peripherals
- Battery

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.

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### Absolute Maximum Ratings

| Symbol     | Parameter                            | Value      | Units |
|------------|--------------------------------------|------------|-------|
| $P_{pk}$   | Peak Pulse Power ( $t_p=8/20\mu s$ ) | 250        | W     |
| $T_{OP}$   | Operating Temperature                | -40 to 125 | °C    |
| $T_{STOR}$ | Storage Temperature                  | -55 to 150 | °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 ( $T_{OP}=25^{\circ}C$ )

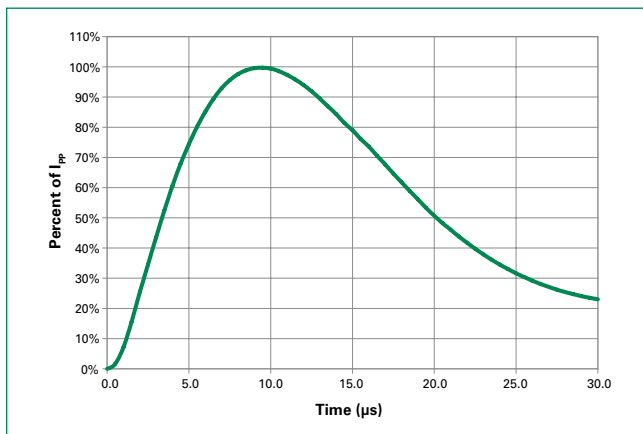
| Parameter                          | Symbol        | Test Conditions                   | Min      | Typ  | Max  | Units    |
|------------------------------------|---------------|-----------------------------------|----------|------|------|----------|
| Reverse Standoff Voltage           | $V_{RWM}$     | $I_R=1\mu A$                      |          |      | 5.0  | V        |
| Breakdown Voltage                  | $V_{BR}$      | $I_R=1mA$                         |          | 7.0  | 9.5  | V        |
| Reverse Leakage Current            | $I_{LEAK}$    | $V_R=5.75V$                       |          |      | 1.0  | $\mu A$  |
| Clamp Voltage <sup>1</sup>         | $V_C$         | $I_{PP}=1A, t_p=8/20\mu s$        |          | 7.5  |      | V        |
|                                    |               | $I_{PP}=20A, t_p=8/20\mu s$       |          |      | 11.0 | V        |
| Dynamic Resistance <sup>2</sup>    | $R_{DYN}$     | TLP, $t_p=100ns$ , I/O to GND     |          | 0.33 |      | $\Omega$ |
| Peak Pulse Current                 | $I_{PP}$      | $t_p=8/20\mu s$                   | 20       |      |      | A        |
| ESD Withstand Voltage <sup>1</sup> | $V_{ESD}$     | IEC 61000-4-2 (Contact Discharge) | $\pm 30$ |      |      | kV       |
|                                    |               | IEC 61000-4-2 (Air Discharge)     | $\pm 30$ |      |      | kV       |
| Diode Capacitance <sup>1</sup>     | $C_{I/O-GND}$ | Reverse Bias=0V, $f=1MHz$         |          | 290  |      | pF       |

**Note:**

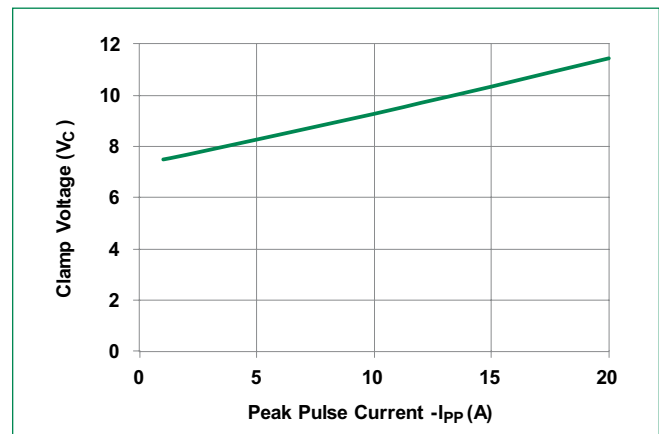
1. Parameter is guaranteed by design and/or component characterization.

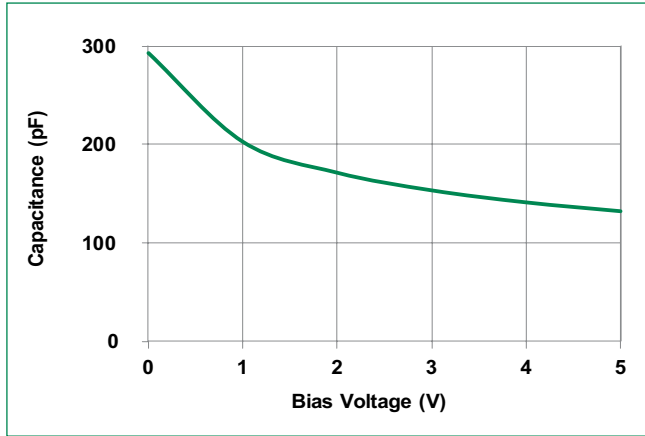
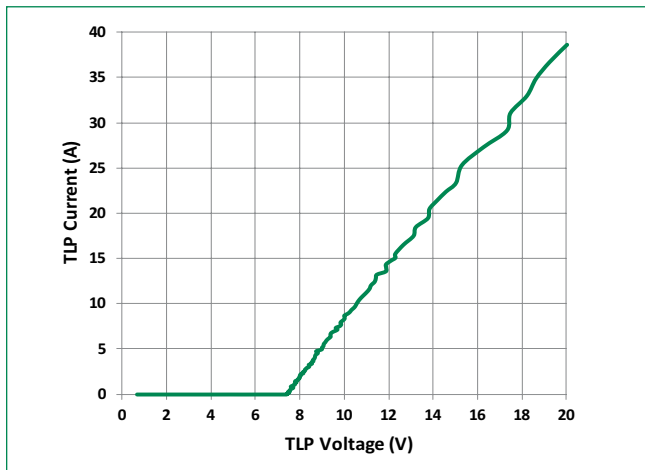
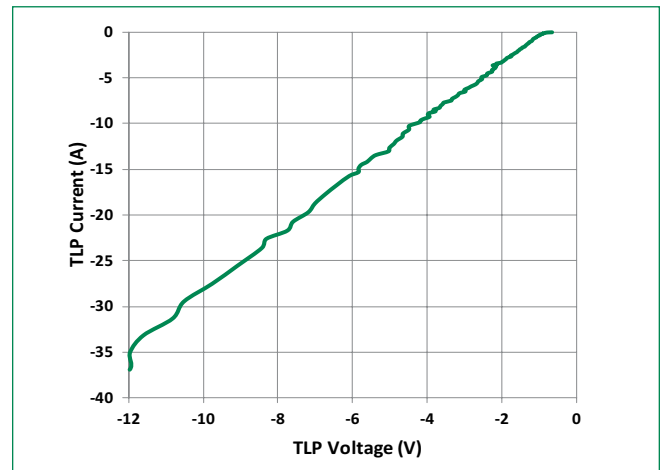
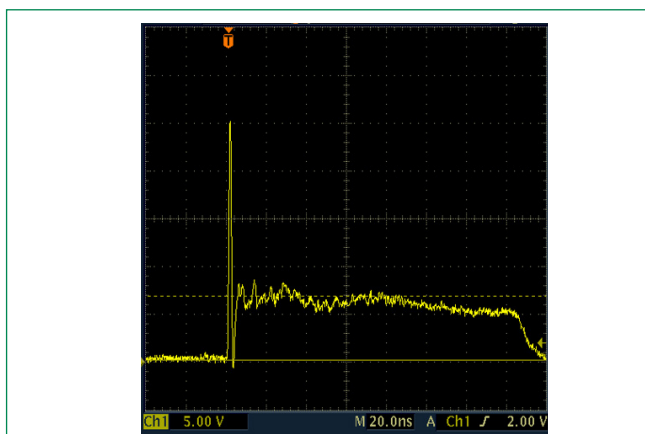
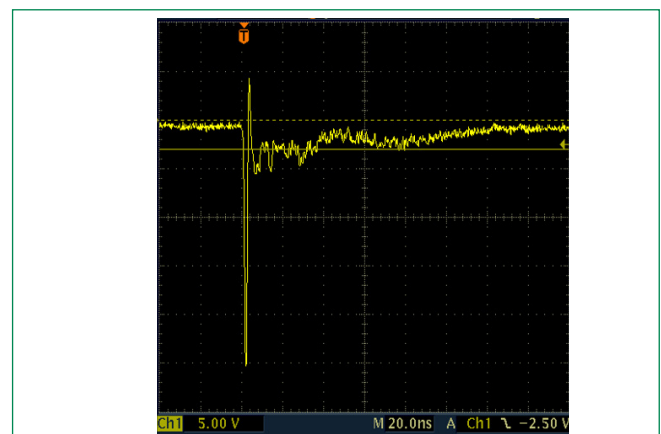
2. Transmission Line Pulse (TLP) with 100ns width, 2ns rise time, and average window  $t_1=70ns$  to  $t_2=90ns$

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



### Clamping Voltage vs $I_{PP}$ for 8/20 $\mu s$ waveshape



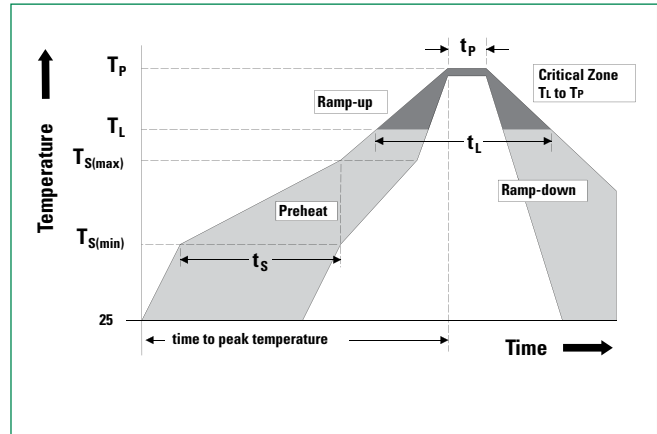
**SP1220****20A Discrete Unidirectional TVS Diode****Capacitance vs. Bias****Positive Transmission Line Pulsing (TLP) Plot****Negative Transmission Line Pulsing (TLP) Plot****IEC 61000-4-2 +8 kV Contact ESD Clamping Voltage****IEC 61000-4-2 -8 kV Contact ESD Clamping Voltage**

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## 20A Discrete Unidirectional TVS Diode

### Soldering Parameters

|                                                                        |                                    |                         |
|------------------------------------------------------------------------|------------------------------------|-------------------------|
| <b>Reflow Condition</b>                                                |                                    | Pb – Free assembly      |
| <b>Pre Heat</b>                                                        | - Temperature Min ( $T_{s(min)}$ ) | 150°C                   |
|                                                                        | - Temperature Max ( $T_{s(max)}$ ) | 200°C                   |
|                                                                        | - Time (min to max) ( $t_s$ )      | 60 – 180 secs           |
| <b>Average ramp up rate (Liquidus) Temp (<math>T_L</math>) to peak</b> |                                    | 3°C/second max          |
| <b><math>T_{s(max)}</math> to <math>T_L</math> - Ramp-up Rate</b>      |                                    | 3°C/second max          |
| <b>Reflow</b>                                                          | - Temperature ( $T_L$ ) (Liquidus) | 217°C                   |
|                                                                        | - Temperature ( $t_L$ )            | 60 – 150 seconds        |
| <b>Peak Temperature (<math>T_p</math>)</b>                             |                                    | 260 <sup>+0/-5</sup> °C |
| <b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>   |                                    | 20 – 40 seconds         |
| <b>Ramp-down Rate</b>                                                  |                                    | 6°C/second max          |
| <b>Time 25°C to peak Temperature (<math>T_p</math>)</b>                |                                    | 8 minutes Max.          |
| <b>Do not exceed</b>                                                   |                                    | 260°C                   |



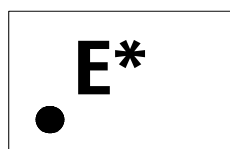
### Ordering Information

| Part Number  | Package | Min. Order Qty. |
|--------------|---------|-----------------|
| SP1220-01ETG | SOD882  | 10000           |

### Product Characteristics

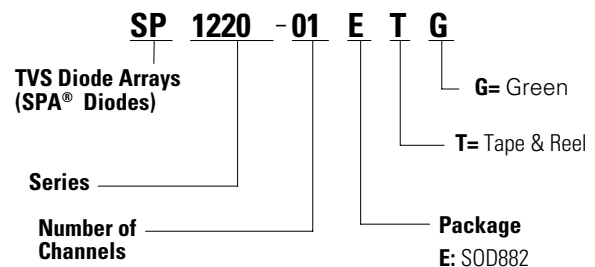
|                           |                                                        |
|---------------------------|--------------------------------------------------------|
| <b>Lead Plating</b>       | Matte Tin                                              |
| <b>Lead Material</b>      | Copper Alloy                                           |
| <b>Substrate Material</b> | Silicon                                                |
| <b>Body Material</b>      | Molded Compound                                        |
| <b>Flammability</b>       | UL Recognized compound meeting flammability rating V-0 |

### Part Marking System



E = Part Code  
\* = Date Code

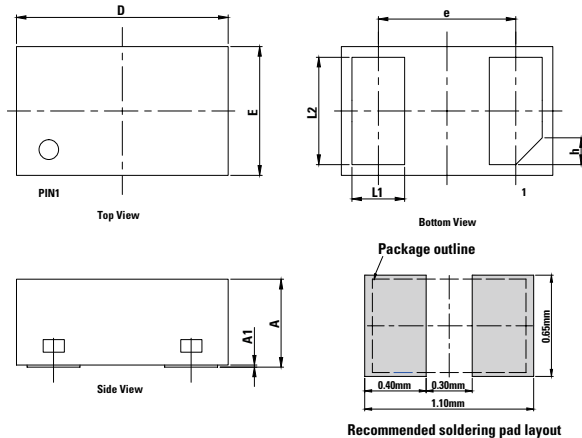
### Part Numbering System



# SP1220

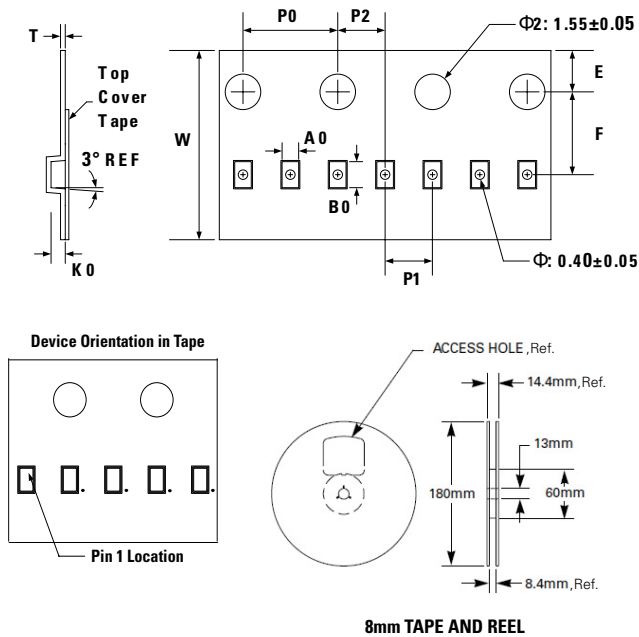
## 20A Discrete Unidirectional TVS Diode

### Package Dimensions — SOD882



| Symbol | Package<br>JEDEC | SOD882          |      |      |                 |       |       |
|--------|------------------|-----------------|------|------|-----------------|-------|-------|
|        |                  | MO-236          |      |      |                 |       |       |
|        |                  | Millimeters     |      |      | Inches          |       |       |
|        |                  | Min             | Typ  | Max  | Min             | Typ   | Max   |
| A      |                  | 0.50            | 0.55 | 0.60 | 0.020           | 0.022 | 0.024 |
| A1     |                  | 0.00            | 0.02 | 0.05 | 0.000           | 0.001 | 0.002 |
| L1     |                  | 0.20            | 0.25 | 0.30 | 0.008           | 0.010 | 0.012 |
| L2     |                  | 0.45            | 0.50 | 0.55 | 0.018           | 0.020 | 0.022 |
| D      |                  | 0.90            | 1.00 | 1.10 | 0.035           | 0.039 | 0.043 |
| E      |                  | 0.50            | 0.60 | 0.70 | 0.020           | 0.024 | 0.028 |
| e      |                  | 0.65 BSC        |      |      | 0.026 BSC       |       |       |
| h      |                  | 0.125 ( x 45° ) |      |      | 0.005 ( x 45° ) |       |       |

### Embossed Carrier Tape & Reel Specification — SOD882



| Symbol | Tape Dimensions |      |
|--------|-----------------|------|
|        | Millimeters     |      |
|        | Min             | Max  |
| A0     | 0.65            | 0.75 |
| B0     | 1.10            | 1.20 |
| K0     | 0.50            | 0.60 |
| E      | 1.65            | 1.85 |
| F      | 3.45            | 3.55 |
| P0     | 3.90            | 4.10 |
| P1     | 1.90            | 2.10 |
| P2     | 1.95            | 2.05 |
| T      | 1.95            | 2.05 |
| W      | 7.90            | 8.10 |

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