**Description**

The SP1250 unidirectional TVS is fabricated in a proprietary silicon avalanche technology. These diodes provide a high ESD (electrostatic discharge) protection level for electronic equipment. The SP1250 TVS can safely absorb repetitive ESD strikes of ±30 kV (contact and air discharge as defined in IEC 61000-4-2) without any performance degradation. Additionally, each TVS can safely dissipate a 50A 8/20μs surge event as defined in IEC 61000-4-5 2\textsuperscript{nd} edition.

**Features**

- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 50A (8/20μs as defined in IEC 61000-4-5 2\textsuperscript{nd} edition)
- Low leakage current of 0.02μA (TYP) at 5V
- Halogen free, lead free and RoHS compliant
- Moisture Sensitivity Level (MSL-1)
- AEC-Q101 Qualified

**Applications**

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

---

**Pinout**

![Pinout Diagram](image)

1  2

Note: This package image is for example and reference only. For detail package drawing, please refer to the package section in this datasheet.

---

**Functional Block Diagram**

![Functional Block Diagram](image)

1  2

---

**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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Revision: 08/05/20
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.

### Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>I_{pp}</td>
<td>Peak Current (t_{p}=8/20μs)</td>
<td>50</td>
<td>A</td>
</tr>
<tr>
<td>T_{OP}</td>
<td>Operating Temperature</td>
<td>-40 to 125</td>
<td>°C</td>
</tr>
<tr>
<td>T_{STOR}</td>
<td>Storage Temperature</td>
<td>-55 to 150</td>
<td>°C</td>
</tr>
</tbody>
</table>

### Electrical Characteristics (T_{OP}=25°C)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Test Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse Standoff Voltage</td>
<td>V_{RWM}</td>
<td>I_{R}=1μA</td>
<td>5</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Breakdown Voltage</td>
<td>V_{BR}</td>
<td></td>
<td>5.1</td>
<td>5.5</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Reverse Leakage Current</td>
<td>I_{LEAK}</td>
<td>V_{R}=5V</td>
<td>0.02</td>
<td>0.1</td>
<td></td>
<td>μA</td>
</tr>
<tr>
<td>Clamp Voltage¹</td>
<td>V_{C}</td>
<td>I_{pp}=50A, t_{p}=8/20μs</td>
<td>8.7</td>
<td>10</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Dynamic Resistance²</td>
<td>R_{DYN}</td>
<td>TLP, t_{p}=100ns</td>
<td>0.05</td>
<td></td>
<td></td>
<td>Ω</td>
</tr>
<tr>
<td>ESD Withstand Voltage¹</td>
<td>V_{ESD}</td>
<td>IEC 61000-4-2 (Contact Discharge)</td>
<td>±30</td>
<td></td>
<td></td>
<td>kV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IEC 61000-4-2 (Air Discharge)</td>
<td>±30</td>
<td></td>
<td></td>
<td>kV</td>
</tr>
<tr>
<td>Diode Capacitance¹</td>
<td>C_{IO,GND}</td>
<td>Reverse Bias=0V, f=1MHz</td>
<td>120</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
</tbody>
</table>

**Note:**

1. Parameter is guaranteed by design and/or component characterization.
2. Transmission Line Pulse (TLP) with 100ns width, 0.2ns rise time, and average window t1=70ns to t2=90ns

### Capacitance vs. Reverse Bias

<table>
<thead>
<tr>
<th>Bias Voltage (V)</th>
<th>Capacitance (pF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>120.0</td>
</tr>
<tr>
<td>1</td>
<td>100.0</td>
</tr>
<tr>
<td>2</td>
<td>80.0</td>
</tr>
<tr>
<td>3</td>
<td>60.0</td>
</tr>
<tr>
<td>4</td>
<td>40.0</td>
</tr>
<tr>
<td>5</td>
<td>20.0</td>
</tr>
</tbody>
</table>

### Clamping voltage vs. I_{pp} for 8/20μs waveshape

<table>
<thead>
<tr>
<th>Peak Pulse Current * IPP (A)</th>
<th>Clamp Voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>10.0</td>
</tr>
<tr>
<td>20</td>
<td>10.0</td>
</tr>
<tr>
<td>25</td>
<td>10.0</td>
</tr>
<tr>
<td>30</td>
<td>10.0</td>
</tr>
<tr>
<td>35</td>
<td>10.0</td>
</tr>
<tr>
<td>40</td>
<td>10.0</td>
</tr>
<tr>
<td>45</td>
<td>10.0</td>
</tr>
<tr>
<td>50</td>
<td>10.0</td>
</tr>
</tbody>
</table>
Negative Transmission Line Pulsing (TLP) Plot

Positive 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

8/20μs Pulse Waveform
### Soldering Parameters

<table>
<thead>
<tr>
<th>Reflow Condition</th>
<th>Pb – Free assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Heat</td>
<td></td>
</tr>
<tr>
<td>- Temperature Min (Tₜₕₚₘₜₚ)</td>
<td>150°C</td>
</tr>
<tr>
<td>- Temperature Max (Tₜₕₚₙₖₚ)</td>
<td>200°C</td>
</tr>
<tr>
<td>- Time (min to max) (tₛ)</td>
<td>60 – 180 secs</td>
</tr>
<tr>
<td>Average ramp up rate (Liquidus) Temp (Tₔ)</td>
<td>3°C/second max</td>
</tr>
<tr>
<td>Tₜₕₚₙₖₚ to Tₔ - Ramp-up Rate</td>
<td>3°C/second max</td>
</tr>
<tr>
<td>Reflow</td>
<td></td>
</tr>
<tr>
<td>- Temperature (Tₔ) (Liquidus)</td>
<td>217°C</td>
</tr>
<tr>
<td>- Temperature (tₔ)</td>
<td>60 – 150 seconds</td>
</tr>
<tr>
<td>Peak Temperature (Tₚ)</td>
<td>260°C</td>
</tr>
<tr>
<td>Time within 5°C of actual peak</td>
<td></td>
</tr>
<tr>
<td>Temperature (tₛ)</td>
<td>20 – 40 seconds</td>
</tr>
<tr>
<td>Ramp-down Rate</td>
<td>6°C/second max</td>
</tr>
<tr>
<td>Time 25°C to peak Temperature (Tₔ)</td>
<td>8 minutes Max.</td>
</tr>
<tr>
<td>Do not exceed</td>
<td>260°C</td>
</tr>
</tbody>
</table>

### Product Characteristics

<table>
<thead>
<tr>
<th>Lead Plating</th>
<th>Matte Tin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead material</td>
<td>Copper Alloy</td>
</tr>
<tr>
<td>Substrate Material</td>
<td>Silicon</td>
</tr>
<tr>
<td>Body Material</td>
<td>Molded Compound</td>
</tr>
<tr>
<td>Flammability</td>
<td>UL Recognized compound meeting flammability rating V-0</td>
</tr>
</tbody>
</table>

### Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
<th>Min. Order Qty.</th>
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</thead>
<tbody>
<tr>
<td>SP1250-01ETG</td>
<td>SOD882</td>
<td>10,000</td>
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</table>

### Part Marking System

```
2 1
```

Date code  
Part name

---

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### Package Dimensions — SOD882

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Millimeters</th>
<th>Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Min</td>
<td>Typ</td>
</tr>
<tr>
<td>A</td>
<td>0.40</td>
<td>0.50</td>
</tr>
<tr>
<td>A1</td>
<td>0.00</td>
<td>0.02</td>
</tr>
<tr>
<td>L1</td>
<td>0.20</td>
<td>0.25</td>
</tr>
<tr>
<td>L2</td>
<td>0.45</td>
<td>0.50</td>
</tr>
<tr>
<td>D</td>
<td>0.95</td>
<td>1.00</td>
</tr>
<tr>
<td>E</td>
<td>0.55</td>
<td>0.60</td>
</tr>
<tr>
<td>e</td>
<td>0.65 BSC</td>
<td>0.026 BSC</td>
</tr>
</tbody>
</table>

### Embossed Carrier Tape & Reel Specification — SOD882

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Millimeters</th>
</tr>
</thead>
<tbody>
<tr>
<td>A0</td>
<td>0.70 +/- 0.045</td>
</tr>
<tr>
<td>B0</td>
<td>1.10 +/- 0.045</td>
</tr>
<tr>
<td>K0</td>
<td>0.65 +/- 0.045</td>
</tr>
<tr>
<td>F</td>
<td>3.50 +/- 0.05</td>
</tr>
<tr>
<td>P1</td>
<td>2.00 +/- 0.10</td>
</tr>
<tr>
<td>W</td>
<td>8.00 +/- 0.30</td>
</tr>
</tbody>
</table>

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