The SP3031 is a single channel low capacitance diode that provides protection for electronic equipment that may experience destructive electrostatic discharges (ESD). This robust diode can safely absorb repetitive ESD strikes above the maximum level specified in the IEC 61000-4-2 international standard (Level 4, ±8 kV contact discharge and ±15 kV air discharge) without performance degradation. The low loading capacitance makes it ideal for protecting high speed data lines.

**Features**
- RoHS-Compliant, Lead-Free and Halogen-Free
- ESD protection of ±10kV contact discharge, ±15kV air discharge, (IEC 61000-4-2)
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning protection, IEC 61000-4-5, 2nd Edition: 8/20μs Surge, 5A Surge
- Low capacitance of 0.8pF @ V_R = 0V
- Low leakage current of 1μA at 5V
- Moisture Sensitivity Level (MSL-1)
- AEC-Q101 Qualified

**Applications**
- USB 2.0, Ethernet
- MHL/MIPI/MDDI
- HDMI, Display Port, eSATA
- Set Top Boxes, Game Consoles
- Smart Phones
- External Storage
- Ultrabooks, Notebooks
- Tablets, eReaders
- Automotive

**USB2.0 Application Example**

**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.
TVS Diode Array (SPA® Diodes)
Low Capacitance ESD Protection - SP3031

Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPP</td>
<td>Peak Current (t&lt;sub&gt;p&lt;/sub&gt;=8/20μs)</td>
<td>5.0</td>
<td>A</td>
</tr>
<tr>
<td>TOP</td>
<td>Operating Temperature</td>
<td>–40 to 125</td>
<td>°C</td>
</tr>
<tr>
<td>TSTOR</td>
<td>Storage Temperature</td>
<td>–55 to 150</td>
<td>°C</td>
</tr>
</tbody>
</table>

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 (TOP=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&lt;sub&gt;REVM&lt;/sub&gt;</td>
<td>I&lt;sub&gt;p&lt;/sub&gt;=1μA</td>
<td>5.0</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Breakdown Voltage</td>
<td>V&lt;sub&gt;BR&lt;/sub&gt;</td>
<td>I&lt;sub&gt;p&lt;/sub&gt;=1mA</td>
<td>6.0</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Reverse Leakage Current</td>
<td>I&lt;sub&gt;LEAK&lt;/sub&gt;</td>
<td>V&lt;sub&gt;BR&lt;/sub&gt;=5V</td>
<td>1</td>
<td>µA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clamp Voltage&lt;sup&gt;1&lt;/sup&gt;</td>
<td>V&lt;sub&gt;C&lt;/sub&gt;</td>
<td>I&lt;sub&gt;p&lt;/sub&gt;=1A, t&lt;sub&gt;p&lt;/sub&gt;=8/20μs, I/O to GND</td>
<td>6.9</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I&lt;sub&gt;p&lt;/sub&gt;=2A, t&lt;sub&gt;p&lt;/sub&gt;=8/20μs, I/O to GND</td>
<td>75</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Dynamic Resistance&lt;sup&gt;2&lt;/sup&gt;</td>
<td>R&lt;sub&gt;DYN&lt;/sub&gt;</td>
<td>TLP, t&lt;sub&gt;p&lt;/sub&gt;=100ns, I/O to GND</td>
<td>0.6</td>
<td></td>
<td></td>
<td>Ω</td>
</tr>
<tr>
<td>ESD Withstand Voltage&lt;sup&gt;1&lt;/sup&gt;</td>
<td>V&lt;sub&gt;ESD&lt;/sub&gt;</td>
<td>IEC 61000-4-2 (Contact)</td>
<td>±10</td>
<td></td>
<td></td>
<td>kV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IEC 61000-4-2 (Air)</td>
<td>±15</td>
<td></td>
<td></td>
<td>kV</td>
</tr>
<tr>
<td>Diode Capacitance&lt;sup&gt;1&lt;/sup&gt;</td>
<td>C&lt;sub&gt;DI/O-I/O&lt;/sub&gt;</td>
<td>Reverse Bias=0V, f=1 MHz</td>
<td>0.8</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, 2ns rise time, and average window t<sub>1</sub>=70ns to t<sub>2</sub>=90ns

Insertion Loss (S21) I/O to GND

Capacitance vs. Reverse Voltage

8/20μs Waveform

8kV Clamping Voltage

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Specifications are subject to change without notice.
Revised: 03/23/20
**Product Characteristics**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead Plating</td>
<td>Pre-Plated Frame</td>
</tr>
<tr>
<td>Lead Material</td>
<td>Copper Alloy</td>
</tr>
<tr>
<td>Substitute 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</td>
</tr>
<tr>
<td></td>
<td>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>
</tr>
</thead>
<tbody>
<tr>
<td>SP3031-01ETG</td>
<td>SOD882</td>
<td>10000</td>
</tr>
</tbody>
</table>

**Soldering Parameters**

- **Reflow Condition**: Pb – Free assembly
- **Pre Heat**
  - Temperature Min \(T_{min}\): 150°C
  - Temperature Max \(T_{max}\): 200°C
  - Time (min to max) \(t_{p}\): 60 – 180 secs
- **Average ramp up rate (Liquidus) Temp \(T_p\) to peak**
  - 3°C/second max
- **Critical Zone**
  - TL to TP
- **T_{S(min)} to T_{S(max)}**: 3°C/second max
- **Ramp-up Rate**
  - Temperature \(T_{L}\) (Liquidus): 217°C
  - Temperature \(t_{L}\): 60 – 150 seconds
- **Peak Temperature \(T_P\)**: 260 ± 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 Numbering System**

- **SP 3031 – 01 ETG**
  - **Series**: TVS Diode Arrays (SPA® Diodes)
  - **Number of Channels**: E: SOD882

**Part Marking System**

- **SOD882**
  - **Pin 1 Indicator**
  - **Product ID**

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Specifications are subject to change without notice.
Revised: 03/23/20
Package Dimensions — SOD882

Recommended Soldering Pad Layout

Embosed Carrier Tape & Reel Specification — SOD882

Device Orientation in Tape

Pin 1 Location

8mm Tape and Reel