Description

The SP1212 unidirectional TVS is fabricated in a proprietary silicon avalanche technology. These diodes provide a high ESD (electrostatic discharge) protection level for electronic equipment. The SP1212 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 12A 8/20 surge event as defined in IEC 61000-4-5 2nd Edition.

Features

- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 12A (8/20 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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Specifications are subject to change without notice.
Revision: 07/03/18
### Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P_{pk}$</td>
<td>Peak Pulse Power ($t_p=8/20\mu s$)</td>
<td>250</td>
<td>W</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>

**Notes:**
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 ($T_{OP}=25°C$)

<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>$I_R=1\mu A$</td>
<td>5.0</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Breakdown Voltage</td>
<td>$V_{BR}$</td>
<td>$I_R=1mA$</td>
<td>7.0</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Reverse Leakage Current</td>
<td>$I_{LEAK}$</td>
<td>$V_I=5V$</td>
<td>0.1</td>
<td>0.5</td>
<td></td>
<td>μA</td>
</tr>
<tr>
<td>Clamp Voltage$^1$</td>
<td>$V_C$</td>
<td>$I_{pp}=1A, t_p=8/20\mu s$</td>
<td>7.5</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{pp}=12A, t_p=8/20\mu s$</td>
<td>9.7</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Dynamic Resistance$^2$</td>
<td>$R_{DYN}$</td>
<td>TLP, $t_p=100ns$, I/O to GND</td>
<td>0.33</td>
<td></td>
<td></td>
<td>Ω</td>
</tr>
<tr>
<td>Peak Pulse Current</td>
<td>$I_{pp}$</td>
<td>$t_p=8/20\mu s$</td>
<td>12</td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>ESD Withstand Voltage$^1$</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 Capacitance$^1$</td>
<td>$C_{I/O-GND}$</td>
<td>Reverse Bias=0V, $f=1MHz$</td>
<td>290</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 $t_1=70ns$ to $t_2=90ns$

### 8/20μs Pulse Waveform

#### Clamp Voltage vs $I_{pp}$ for 8/20μs Waveshape
### Capacitance vs. Bias

![Capacitance vs. Bias Graph]

- **Bias Voltage (V)**
- **Capacitance (pF)**

### Positive Transmission Line Pulsing (TLP) Plot

![Positive TLP Plot]

- **TLP Voltage (V)**
- **TLP Current (A)**

### Negative Transmission Line Pulsing (TLP) Plot

![Negative TLP Plot]

- **TLP Voltage (V)**
- **TLP Current (A)**

### IEC61000-4-2 +8 kV Contact ESD Clamping Voltage

![IEC61000-4-2 +8 kV Clamping Voltage]

- **Voltage (V)**
- **Current (A)**

### IEC61000-4-2 -8 kV Contact ESD Clamping Voltage

![IEC61000-4-2 -8 kV Clamping Voltage]

- **Voltage (V)**
- **Current (A)**
Soldering Parameters

Reflow Condition: Pb – Free assembly

<table>
<thead>
<tr>
<th>Pre Heat</th>
<th>Min. Order Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Temperature Min (T_{\text{S(min)}})</td>
<td>150°C</td>
</tr>
<tr>
<td>- Temperature Max (T_{\text{S(max)}})</td>
<td>200°C</td>
</tr>
<tr>
<td>- Time (min to max) (t_s)</td>
<td>60 – 180 secs</td>
</tr>
</tbody>
</table>

Average ramp up rate (Liquidus) Temp \(T_{\text{L}}\) to peak: 3°C/second max

\(T_{\text{S(max)}}\) to \(T_{\text{L}}\) – Ramp-up Rate: 3°C/second max

Reflow - Temperature \(T_{\text{L}}\) (Liquidus): 217°C

- Temperature \(t_{\text{L}}\): 60 – 150 seconds

Peak Temperature \(T_{\text{P}}\): 260°C

Time within 5°C of actual peak Temperature \(t_{\text{p}}\): 20 – 40 seconds

Ramp-down Rate: 6°C/second max

Time 25°C to peak Temperature \(T_{\text{P}}\): 8 minutes Max.

Do not exceed: 260°C

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
<th>Min. Order Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP1212-01ETG</td>
<td>SOD882</td>
<td>10000</td>
</tr>
</tbody>
</table>

Product Characteristics

- Lead Plating: Matte Tin
- Lead Material: Copper Alloy
- Substrate Material: Silicon
- Body Material: Molded Compound
- Flammability: UL Recognized compound meeting flammability rating V-0

Part Marking System

F* = Part Code
* = Date Code

Part Numbering System

SP 1212 - 01 E T G

\(G = \text{Green} \)
\(T = \text{Tape & Reel} \)
\(E: \text{SOD882} \)
Package Dimensions — SOD882

Embossed Carrier Tape & Reel Specification — SOD882

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