SP03-6 Series
6V 150A Diode Array

Description
This new broadband protection component from Littelfuse provides overvoltage protection for applications such as 10/100/1000 BaseT Ethernet, T3/E3 DS3 interfaces, ADSL2+, and VDSL2+. This new protector combines the TVS diode element with a diode rectifier bridge to provide both longitudinal and differential protection in one package. This innovative design results in a capacitive loading characteristic that is log-linear with respect to the signal voltage across the device. This reduces intermodulation (IM) distortion caused by a typical solid-state protection solution.

Features & Benefits
- RoHS-compliant and lead-free
- SOIC-8 surface mount package (JEDEC MS-012)
- Low insertion loss, log-linear capacitance
- Combined longitudinal and differential protection
- Clamping speed of nanoseconds
- UL Recognized compound meeting flammability rating V-0
- Lightning, 150A (8/20 as defined in IEC 61000-4-5 2nd Edition)
- Low clamping voltage

Applications
- T1/E1 Line cards
- T3/E3 and DS3 Interfaces
- STS-1 Interfaces
- 10/100/1000 BaseT Ethernet

Agency Approvals

<table>
<thead>
<tr>
<th>Agency</th>
<th>Agency File Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL</td>
<td>E128662</td>
</tr>
</tbody>
</table>

Additional Information

Resources
Accessories
Samples

Agency File Number: E128662

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Rating</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Pulse Current (8/20µs)</td>
<td>150</td>
<td>A</td>
</tr>
<tr>
<td>Peak Pulse Power (8/20µs)</td>
<td>2800</td>
<td>W</td>
</tr>
<tr>
<td>IEC 61000-4-2, Contact Discharge, (Level 4)</td>
<td>30</td>
<td>kV</td>
</tr>
<tr>
<td>IEC 61000-4-2, Air Discharge, (Level 4)</td>
<td>30</td>
<td>kV</td>
</tr>
<tr>
<td>IEC 61000-4-5, 2nd Edition (8/20)</td>
<td>100</td>
<td>A</td>
</tr>
<tr>
<td>Telcordia GR 1089 (Intra-Building) (2/10µs)</td>
<td>150</td>
<td>A</td>
</tr>
<tr>
<td>ITU K.20 (5/310µs)</td>
<td>40</td>
<td>A</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 device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

### Electrical Characteristics (T<sub>op</sub> = 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 Stand-Off Voltage</td>
<td>V&lt;sub&gt;RWM&lt;/sub&gt;</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>6</td>
<td>V</td>
</tr>
<tr>
<td>Reverse Breakdown Voltage</td>
<td>V&lt;sub&gt;BR&lt;/sub&gt;</td>
<td>I&lt;sub&gt;R&lt;/sub&gt; = 1mA</td>
<td>6.8</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>Reverse Leakage Current</td>
<td>I&lt;sub&gt;R&lt;/sub&gt;</td>
<td>V&lt;sub&gt;RWM&lt;/sub&gt; = 6V, T = 25°C</td>
<td>-</td>
<td>-</td>
<td>25</td>
<td>µA</td>
</tr>
<tr>
<td>Clamping Voltage, Line-Ground</td>
<td>V&lt;sub&gt;C&lt;/sub&gt;</td>
<td>I&lt;sub&gt;IP&lt;/sub&gt; = 50A, t&lt;sub&gt;p&lt;/sub&gt; = 8/20 µs</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>V</td>
</tr>
<tr>
<td>Clamping Voltage, Line-Ground</td>
<td>V&lt;sub&gt;C&lt;/sub&gt;</td>
<td>I&lt;sub&gt;IP&lt;/sub&gt; = 100A, t&lt;sub&gt;p&lt;/sub&gt; = 8/20 µs</td>
<td>-</td>
<td>-</td>
<td>20</td>
<td>V</td>
</tr>
<tr>
<td>Junction Capacitance</td>
<td>C&lt;sub&gt;j&lt;/sub&gt; (Line-Ground)</td>
<td>Between I/O Pins and Ground V&lt;sub&gt;R&lt;/sub&gt;=0V, f= 1MHz</td>
<td>-</td>
<td>16</td>
<td>25</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td>C&lt;sub&gt;j&lt;/sub&gt; (Line-Line)</td>
<td>Between I/O Pins V&lt;sub&gt;R&lt;/sub&gt;=0V, f= 1MHz</td>
<td>-</td>
<td>8</td>
<td>12</td>
<td>pF</td>
</tr>
</tbody>
</table>

**Figure 1:**
Non-repetitive Peak Pulse Current vs. Pulse Time

**Figure 2:**
Current Derating Curve
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**Figure 3:**
Pulse Waveform

**Figure 4:**
Clamping Voltage vs. Peak Pulse Current

**Figure 5:**
Capacitance vs. Reverse Voltage

**Figure 6:**
Forward Voltage vs. Forward Current

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### Soldering Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reflow Condition</td>
<td>Pb – Free assembly</td>
</tr>
<tr>
<td>Pre Heat</td>
<td>- Temperature Min ($T_{ambient}$) 150°C</td>
</tr>
<tr>
<td></td>
<td>- Temperature Max ($T_{ambient}$) 200°C</td>
</tr>
<tr>
<td></td>
<td>- Time (min to max) ($t_L$) 60 – 180 secs</td>
</tr>
<tr>
<td>Average ramp up rate (Liquidus) Temp ($T_L$) to peak</td>
<td>3°C/second max</td>
</tr>
<tr>
<td>$T_{ambient}$ to $T_L$ - Ramp-up Rate</td>
<td>3°C/second max</td>
</tr>
<tr>
<td>Reflow</td>
<td>- Temperature ($T_L$) (Liquidus) 217°C</td>
</tr>
<tr>
<td></td>
<td>- Temperature ($T_L$) 60 – 150 seconds</td>
</tr>
<tr>
<td>Peak Temperature ($T_P$)</td>
<td>260°3°C/second max</td>
</tr>
<tr>
<td>Time within 5°C of actual peak Temperature ($t_L$)</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 ($T_P$)</td>
<td>8 minutes Max.</td>
</tr>
<tr>
<td>Do not exceed</td>
<td>260°C</td>
</tr>
</tbody>
</table>

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Revised: GD: 09/29/22
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Package Dimensions — Mechanical Drawings and Recommended Solder Pad Outline

Users Feeding Direction

Part Numbering System

Part Marking System

Ordering Information

Description
- **Part Number**: SP03-6BTG
- **Package**: SOIC Tape & Reel
- **Marking**: SP03-6
- **Min. Order Qty.**: 2500

**Part Numbering System**

**SP**
- TVS Diode Arrays (SPA® Diodes)
  - Series
  - Working Voltage

**03**
- 6
- B
- T
- G

- G= Green
- T= Tape & Reel

**Embossed Carrier Tape & Reel Specification — SOIC Package**

**Part Marking System**

**Ordering Information**

**Product Characteristics**

- **Lead Plating**: Matte Tin
- **Lead Material**: Copper Alloy
- **Lead Coplanarity**: 0.003 inches (0.08 mm)
- **Substrate Material**: Silicon
- **Body Material**: Molded
- **Flammability**: UL Recognized compound meeting flammability rating V-0

**Notes**
1. All dimensions are in millimeters
2. Dimensions include solder plating.
3. Dimensions are exclusive of mold flash & metal burr.
4. In is facing up for mold and facing down for trim/form, i.e. reverse trim/form.

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