**Description**

The SP3423 integrates 2 channels of low capacitance steering diodes and an avalanche breakdown diode to provide protection for electronic equipment that may experience destructive electrostatic discharges (ESD). The SP3423 can safely absorb repetitive ESD strikes above the maximum contact level specified in IEC 61000-4-2 international standard (±8kV contact discharge) without performance degradation.

The low off-state capacitance makes it ideal for protecting high-speed signal lines such as USB2.0/3.0 and 10GbE interfaces with an extremely low dynamic resistance to protect the most sensitive, state of the art chipsets against ESD transients.

Its flow-through capability makes this SP3423 TVS a PCB layout friendly component and helps reduce stray PCB capacitances.

**Features**

- ESD, IEC 61000-4-2, ±10kV contact, ±15kV air
- EFT, IEC 61000-4-4, 80A (t\(_{\text{p}}\)=5/50ns)
- Lightning, 2A (8/20\(\mu\)s as defined in IEC 61000-4-5 2nd edition)
- Low capacitance of 0.2pF (TYP) per I/O
- Low leakage current of 0.01\(\mu\)A (TYP) at 5V
- Small \(\mu\)DFN-6 footprint (1.2 mm x 1.0 mm x 0.5 mm)
- AEC-Q101 qualified
- Moisture Sensitivity Level(MSL -1)
- Halogen free, lead free and RoHS compliant

**Applications**

- LCD/PDP TVs
- External Storages
- DVD/Blu-ray Players
- Set Top Boxes
- Smartphones
- Ultrabooks/Notebooks
- Digital Cameras
- Portable Medical
- Automotive Electronics
- Wearable Technology
- USB 2.0/3.0
- Ethernet up to 10GbE

**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>Symbol</th>
<th>Parameter</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPP</td>
<td>Peak Current (tₚ=8/20μs)</td>
<td>2</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>Vₑₑₑₑ</td>
<td>Iₑₑ = 1μA</td>
<td></td>
<td>5.0</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Breakdown Voltage</td>
<td>Vₑₑ</td>
<td>Iₑₑ = 1mA</td>
<td>7</td>
<td>8.4</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Reverse Leakage Current</td>
<td>Iₑₑₑₑ</td>
<td>Vₑₑₑₑ = 5V, Any I/O to GND</td>
<td>0.01</td>
<td>0.5</td>
<td></td>
<td>μA</td>
</tr>
<tr>
<td>Clamp Voltage¹</td>
<td>Vₑₑ</td>
<td>Iₑₑₑₑ = 1A, tₑₑ =8/20μs, Fwd</td>
<td>10.4</td>
<td>13</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Iₑₑₑₑ = 2A, tₑₑ =8/20μs, Fwd</td>
<td>12.3</td>
<td>15</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Dynamic Resistance²</td>
<td>Rₑₑₑₑ</td>
<td>TLP, tₑₑ =100ns, I/O to GND</td>
<td>0.65</td>
<td></td>
<td></td>
<td>Ω</td>
</tr>
<tr>
<td>ESD Withstand Voltage¹</td>
<td>Vₑₑₑₑ</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</td>
<td>Cₑₑₑₑₑₑ</td>
<td>Reverse Bias=0V, f=3 GHz</td>
<td>0.2</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td>Cₑₑₑₑₑₑ</td>
<td>Cₑₑₑₑₑₑ =0V, f=3 GHz</td>
<td>0.1</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 t₁=70ns to t₂=90ns

8/20μs Pulse Waveform

Clamping voltage vs. IPP for 8/20μs waveshape
Low Capacitance ESD Protection - SP3423
TVS Diode Arrays (SPA® Diodes)

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
Soldering Parameters

Reflow Condition | Pb – Free assembly
---|---
Pre Heat | - Temperature Min \((T_{\text{min}})\)
| 150°C
- Temperature Max \((T_{\text{max}})\)
| 200°C
- Time (min to max) \((t_{\text{p}})\)
| 60 – 180 secs
Average ramp up rate (Liquidus) Temp \((T_{\text{L}})\) to peak
| 3°C/second max
\(T_{\text{min}}\) to \(T_{\text{L}}\) - Ramp-up Rate
| 3°C/second max
Reflow | - Temperature \((T_{\text{f}})\) (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>SP3423-02UTG</td>
<td>µDFN-6L</td>
<td>3000</td>
</tr>
</tbody>
</table>

Part Numbering System

\[ \text{SP} \, 3423 \, xx \, T \, G \]

- **Series**: TVS Diode Arrays (SPA® Diodes)
- **Number of Channels**: 02 = 2 channel
- **Package**
- **U** = µDFN-6L
- **T** = Tape & Reel
- **G** = Green

Part Marking System

\[ \bullet \, \text{TKD} \]

- **T**: Part code
- **K**: Assembly code
- **D**: Date code

Product Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead Plating</td>
<td>Pre-Plated Frame µDFN</td>
</tr>
<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>
Low Capacitance ESD Protection - SP3423

TVS Diode Arrays (SPA® Diodes)

Package Dimensions —µDFN-6L

Recommended Soldering Pad Layout

Drawing# : U02-A

Embossed Carrier Tape & Reel Specification — µDFN-6L

Disclaimer Notice - Littelfuse products are not designed for, and shall not be used for, any purpose (including, without limitation, automotive, military, aerospace, medical, life-saving, life-sustaining or nuclear facility applications, devices intended for surgical implant into the body, or any other application in which the failure or lack of desired operation of the product may result in personal injury, death, or property damage) other than those expressly set forth in applicable Littelfuse product documentation. Warranties granted by Littelfuse shall be deemed void for products used for any purpose not expressly set forth in applicable Littelfuse documentation. Littelfuse shall not be liable for any claims or damages arising out of products used in applications not expressly intended by Littelfuse as set forth in applicable Littelfuse documentation. The sale and use of Littelfuse products is subject to Littelfuse Terms and Conditions of Sale, unless otherwise agreed by Littelfuse. “Littelfuse” includes Littelfuse, Inc., and all of its affiliate entities. http://www.littelfuse.com/disclaimer-electronics

© 2020 Littelfuse, Inc.
Specifications are subject to change without notice.
Revised: JC.12/08/20