**Description**

The SP1026 back-to-back diodes are fabricated in a proprietary silicon avalanche technology. These diodes provide a high ESD (electrostatic discharge) protection level for electronic equipment. The SP1026 TVS can safely absorb repetitive ESD strikes at±30kV (contact discharge, IEC 61000-4-2) without performance degradation. Additionally, each diode can safely dissipate 5A of 8/20μs surge current (IEC 61000-4-5) with very low clamping voltages.

**Features**

- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 5A (8/20μs as defined in IEC 61000-4-5 2nd edition)
- Low leakage current of 0.5μA (MAX) at 5V
- Space efficient 0201 footprint
- Halogen free, Lead free and RoHS compliant
- µDFN-2 footprint component
- AEC-Q101 qualified

**Applications**

- Mobile phones
- Smart phones
- Smart watches
- Tablets
- Portable navigation devices
- Portable medical devices

**Application Example**

![Application Example Diagram]

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)
General Purpose ESD Protection - SP1026 Series

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 Pulse Current ($t_p=8/20\mu s$)</td>
<td>5</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>

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 ($T_{OP}=25^\circ C$)

<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>$V_{RSM}$</td>
<td>$I_C = 1\mu A$</td>
<td>-</td>
<td>-</td>
<td>6.0</td>
<td>V</td>
</tr>
<tr>
<td>Breakdown Voltage</td>
<td>$V_{BR}$</td>
<td>$I_C=1mA$</td>
<td>-</td>
<td>7.8</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>Reverse Leakage Current</td>
<td>$I_{LEAK}$</td>
<td></td>
<td></td>
<td>0.1</td>
<td>0.5</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>-</td>
<td>12.0</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>Clamp Voltage$^1$</td>
<td>$V_C$</td>
<td>$I_{pp}=2A, t_p=8/20\mu s$</td>
<td>-</td>
<td>13.4</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>Diode Capacitance$^2$</td>
<td>$C_{DYN}$</td>
<td>TLP, $t_p=100\mu s$, I/O to GND</td>
<td>1.4</td>
<td>-</td>
<td>-</td>
<td>Ω</td>
</tr>
<tr>
<td>ESD Withstand Voltage$^3$</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>ESD Withstand Voltage$^3$</td>
<td>$V_{ESD}$</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>$C_{I/O}$</td>
<td>Reverse Bias=0V, $f=1$ MHz</td>
<td>15</td>
<td>-</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>Diode Capacitance$^1$</td>
<td>$C_{I/O}$</td>
<td>Reverse Bias=2.5V, $f=1$ MHz</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>pF</td>
</tr>
</tbody>
</table>

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.

Capacitance vs. Reverse Bias

Insertion Loss (S21) I/O to GND

© 2019 Littelfuse, Inc.
Specifications are subject to change without notice.
Revised: 09/10/19
TVS Diode Array (SPA® Diodes)
General Purpose ESD Protection - SP1026 Series

Clamping Voltage vs. \(I_{pp}\)

Transmission Line Pulsing (TLP) Plot

8/20\(\mu\)S Pulse Waveform

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

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

Specifications are subject to change without notice.
Revised: 09/10/19
Soldering Parameters

Reflow Condition
- Temperature Min ($T_{\text{min}}$) 150°C
- Temperature Max ($T_{\text{max}}$) 200°C
- Time (min to max) ($t_{\text{L}}$) 60 – 180 secs

Average ramp up rate (Liquidus) Temp ($T_{\text{L}}$) to peak
$T_{\text{L}}$ to $T_{\text{P}}$ - 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.

Product Characteristics

Lead Plating
- Pre-Plated Frame

Lead Material
- Copper Alloy

Substrate material
- Silicon

Body Material
- Molded Epoxy

Flammability
- UL Recognized epoxy meeting flammability rating V-0

Package Dimensions — μDFN-2 (0201)

Package μDFN-2 (0201)
JEDEC MO-236

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Millimeters</th>
<th>Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.23 - 0.33</td>
<td>0.009 - 0.013</td>
</tr>
<tr>
<td>A1</td>
<td>0.00 - 0.05</td>
<td>0.000 - 0.002</td>
</tr>
<tr>
<td>A2</td>
<td>0.10 REF</td>
<td>0.004 REF</td>
</tr>
<tr>
<td>b</td>
<td>0.18 - 0.30</td>
<td>0.007 - 0.012</td>
</tr>
<tr>
<td>D</td>
<td>0.55 - 0.65</td>
<td>0.022 - 0.026</td>
</tr>
<tr>
<td>E</td>
<td>0.25 - 0.35</td>
<td>0.010 - 0.014</td>
</tr>
<tr>
<td>L1</td>
<td>0.12 - 0.24</td>
<td>0.005 - 0.009</td>
</tr>
<tr>
<td>L2</td>
<td>0.12 - 0.23</td>
<td>0.005 - 0.009</td>
</tr>
<tr>
<td>K1</td>
<td>0.165 REF</td>
<td>0.006 REF</td>
</tr>
</tbody>
</table>

Specifications are subject to change without notice.
Revised: 09/10/19
**TVS Diode Array (SPA® Diodes)**

**General Purpose ESD Protection - SP1026 Series**

---

### Part Numbering System

```
SP 1026 - 01 U T G
```

- **U**: μDFN-2
- **T**: Tape & Reel
- **G**: Green

**Series**

TVS Diode Arrays (SPA® Diodes)

**Number of Channels**

---

### Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
<th>Min. Order Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP1026-01UTG</td>
<td>μDFN-2</td>
<td>15000</td>
</tr>
</tbody>
</table>

---

### Embossed Carrier Tape & Reel Specification — μDFN-2

#### Symbol | Millimetres | Inches
--- | --- | --- | --- | ---
A0 | 0.33 | 0.13 | 0.013 | 0.005
B0 | 0.63 | 0.25 | 0.025 | 0.010
D0 | 1.40 | 0.55 | 0.055 | 0.022
E | 1.65 | 0.65 | 0.065 | 0.026
F | 3.45 | 1.36 | 0.136 | 0.054
K0 | 0.30 | 0.12 | 0.012 | 0.005
P0 | 1.90 | 0.75 | 0.075 | 0.030
P1 | 1.95 | 0.77 | 0.077 | 0.031
P2 | 3.90 | 1.54 | 0.154 | 0.061
T | 0.13 | 0.05 | 0.005 | 0.002
W | 7.90 | 3.11 | 0.311 | 0.123

---

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [http://www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).

© 2019 Littelfuse, Inc.
Specifications are subject to change without notice.
Revised: 09/10/19