**EPI-FLO – PVS Surface Mount Devices 0402, 0201 Available in Limited Quantities**

**Description:**

The EPI-FLO Polymer Voltage Suppressor (PVS) device provides a shunt for electro static-discharge (ESD) which protects sensitive electronic circuits from the damaging effects of over voltage and over current events.

EPI-FLO devices are capable of shunting voltages of up to 25 KV or more after trigger point is exceeded. While in the inactive state, EPI-FLO remains invisible to the electronic circuitry. Upon an ESD event trigger, conduction begins in less then <1nS, reaching full conduction in <2 nS.

Electronic Polymer’s unique construction yields a total device thickness of <10 mils. This patented design contributes to capacitance values <500 fF (10⁻¹⁵ Farads).*

Devices are certified with Transmission Line Pulse (TLP) test procedures exceeding standard based testing commonly available.*

**Features:**

- Protection against ESD events
- High tolerance to repeated pulses
- Extremely fast response time
- Ultra-low capacitance (femto-Farads)
- Very low leakage current
- Bi-directional conduction
- Pick-and-place compatible (Tape & Reel)
- Available in EIA footprints
- Low profile (< 10 mils)
- Low cost

**Electrical Specifications:**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Test Conditions</th>
<th>Component Type</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Voltage</td>
<td>VDC</td>
<td>continuous</td>
<td>1206/0805/0603/0402/0201</td>
<td>20</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trigger Voltage</td>
<td>V_T</td>
<td>TLP: Step increase in voltage to trigger point</td>
<td>1206/0805/0603/0402/0201</td>
<td>200</td>
<td>150</td>
<td>100</td>
<td>V</td>
</tr>
<tr>
<td>Clamping Voltage</td>
<td>V_C</td>
<td>TLP: 24 A, @ 30nS</td>
<td>1206/0805/0603/0402/0201</td>
<td></td>
<td></td>
<td>&lt;50</td>
<td>V</td>
</tr>
<tr>
<td>Response Time</td>
<td>T_R</td>
<td>TLP = 24 A, @ 30nS</td>
<td>1206/0805/0603/0402/0201</td>
<td>200</td>
<td></td>
<td></td>
<td>pS</td>
</tr>
<tr>
<td>Input Capacitance</td>
<td>C_IN</td>
<td>VDC = 0 V, f = 1 MHz</td>
<td>1206/0805/0603/0402/0201</td>
<td>50</td>
<td>200</td>
<td>500</td>
<td>fF</td>
</tr>
<tr>
<td>Leakage Current</td>
<td>I_L</td>
<td>VDC = 12 V</td>
<td>1206/0805/0603/0402/0201</td>
<td></td>
<td></td>
<td>100</td>
<td>nA</td>
</tr>
<tr>
<td>ESD Withstand</td>
<td># pulses</td>
<td>TLP: Pulse Width = 48nS, 24 A</td>
<td>1206/0805/0603/0402/0201</td>
<td>20</td>
<td>1,000-10,000</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>T_A</td>
<td>Humidity 55 ±10%</td>
<td>1206/0805/0603/0402/0201</td>
<td>-55</td>
<td>+25</td>
<td>+85</td>
<td>°C</td>
</tr>
</tbody>
</table>

* Patents Pending
### Device Selection:

The table details an approximate correlation between two ESD test methods: Transmission Line Pulser (TLP) ESD versus industry standard ESD test methods.

<table>
<thead>
<tr>
<th>Pulse Width</th>
<th>Source Impedance</th>
<th>$V_{in}$</th>
<th>$I_{in}$</th>
<th>Industry Specification</th>
<th>Source Impedance</th>
<th>$V_{in}$</th>
<th>$I_{in}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>48ns</td>
<td>50Ω</td>
<td>150V</td>
<td>6A</td>
<td>HBM 4kV</td>
<td>1500Ω</td>
<td>4kV</td>
<td>2.7A</td>
</tr>
<tr>
<td>48ns</td>
<td>50Ω</td>
<td>250V</td>
<td>10A</td>
<td>HBM 8kV</td>
<td>1500Ω</td>
<td>8kV</td>
<td>5.3A</td>
</tr>
<tr>
<td>48ns</td>
<td>50Ω</td>
<td>300V</td>
<td>12A</td>
<td>IEC 61000-4-2-X</td>
<td>330Ω</td>
<td>4kV</td>
<td>12A</td>
</tr>
<tr>
<td>48ns</td>
<td>50Ω</td>
<td>500V</td>
<td>20A</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48ns</td>
<td>50Ω</td>
<td>600V</td>
<td>24A</td>
<td>IEC 61000-4-2-X</td>
<td>330Ω</td>
<td>8kV</td>
<td>24A</td>
</tr>
<tr>
<td>48ns</td>
<td>50Ω</td>
<td>1900V</td>
<td>76A</td>
<td>IEC 61000-4-2-X</td>
<td>330Ω</td>
<td>25kV</td>
<td>76A</td>
</tr>
</tbody>
</table>

### Environmental Test:

- Vibration: MIL-STD-202F, Method 201A, 10 to 55 Hz, 1 minute cycle, 2 hours each in x-y-z.
- Chemical Resistance: ASTM D-543, 4 hrs @ 40ºC, 3 solutions (H₂O, detergent solution, defluxer)
- Operating Temperature Characteristics: measurement at 25ºC, 85ºC and -56ºC.
- Full Load Voltage: 20 VDC for 1000 hours at 25ºC
- Solder Leach Resistance and Terminal Adhesion: Per EIA-576
- Solderability: MIL-STD-202, Method 208 (95% coverage)
- Solder Shock: IPC-TM-650-2.4.13

### Mechanical Specifications:

![Figure 1. Recommended Pad Geometries](image1.png)

![Figure 2. Part Dimensions Geometries](image2.png)

<table>
<thead>
<tr>
<th>Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>L</th>
<th>W</th>
<th>t</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>3216</td>
<td>1.7</td>
<td>0.9</td>
<td>3.8</td>
<td>3.2 ±0.2</td>
<td>1.6 ±0.15</td>
<td>&lt;0.26</td>
<td>0.45 ±0.2</td>
</tr>
<tr>
<td>(1206)</td>
<td>(.067)</td>
<td>(.035)</td>
<td>(.15)</td>
<td>(.126 ±0.008)</td>
<td>(.063 ±0.006)</td>
<td>(&lt;.01)</td>
<td>(.018 ±.008)</td>
</tr>
<tr>
<td>2012</td>
<td>1.3</td>
<td>0.7</td>
<td>2.6</td>
<td>2.0 ±0.2</td>
<td>1.25 ±0.15</td>
<td>&lt;0.26</td>
<td>0.35 ±0.15</td>
</tr>
<tr>
<td>(0805)</td>
<td>(.051)</td>
<td>(.028)</td>
<td>(.102)</td>
<td>(.079 ±0.008)</td>
<td>(.049 ±.006)</td>
<td>(&lt;.01)</td>
<td>(.014 ±.006)</td>
</tr>
<tr>
<td>1608</td>
<td>0.9</td>
<td>0.5</td>
<td>2.0</td>
<td>1.6 ±0.1</td>
<td>0.85 ±0.1</td>
<td>&lt;0.26</td>
<td>0.30 ±0.2</td>
</tr>
<tr>
<td>(0603)</td>
<td>(.035)</td>
<td>(.020)</td>
<td>(.079)</td>
<td>(.063 ±.004)</td>
<td>(.033 ±.004)</td>
<td>(&lt;.01)</td>
<td>(.012 ±.008)</td>
</tr>
<tr>
<td>1005</td>
<td>0.6</td>
<td>0.4</td>
<td>1.3</td>
<td>1.0 ±0.05</td>
<td>0.5 ±0.05</td>
<td>&lt;0.26</td>
<td>0.25 ±0.05</td>
</tr>
<tr>
<td>(0402)</td>
<td>(.01)</td>
<td>(.016)</td>
<td>(.051)</td>
<td>(.039 ±.002)</td>
<td>(.02 ±.002)</td>
<td>(&lt;.01)</td>
<td>(.01 ±.002)</td>
</tr>
<tr>
<td>0525</td>
<td>0.43</td>
<td>0.28</td>
<td>0.79</td>
<td>0.5 ±0.05</td>
<td>0.3 ±0.05</td>
<td>&lt;0.26</td>
<td>0.15 ±0.05</td>
</tr>
<tr>
<td>(0201)</td>
<td>(.017)</td>
<td>(.011)</td>
<td>(.031)</td>
<td>(.024 ±.002)</td>
<td>(.012 ±.002)</td>
<td>(&lt;.01)</td>
<td>(.006 ±.002)</td>
</tr>
</tbody>
</table>
**EPI-FLO – PVS Surface Mount Devices**

**Ordering Information:**

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**Series Type**
- SM = Surface Mount

**Protection Units**
- xx

**Chip Size (EIA for Surface Mount)**
- 1206
- 0805
- 0603
- 0402
- 0201

**Max Operating Voltage**
- 006 = 6 volts
- 012 = 12 volts
- 020 = 20 volts

**Trigger Voltage**
- 050 = 50 volts
- 100 = 100 volts
- 150 = 150 volts
- 200 = 200 volts
- 400 = 400 volts
- 600 = 600 volts

**Performance Standard**
- A – IEC61000-4-2, 330 Ω source impedance
- B – HBM (Human Body Model), 1500 Ω source impedance
- C – MM (Machine Model)
- D – CDM (Charged Device Model)
- E – CDE (Cable Discharge Event)

**ESD Voltage**
- 2KV = 2 kilovolts, contact discharge
- 4KV = 4 kilovolts, contact discharge
- 8KV = 8 kilovolts, contact discharge
- 15KV = 15 kilovolts, air discharge
- 25KV = 25 kilovolts, air discharge

**Special Requirements**
- S = Standard EIA footprint
- CU = Custom

**Packaging Options**
- T = Tape & Reel
- B = Bulk
- P = Panel
- G = Gel pack

**Notes:**
Manufacturer specifications subject to change.
Measurements subject to change based upon test set up.
Measurements subject to change based upon application circuit filtering or parasitics.