**Description**

This discrete TVS diode is fabricated in a proprietary silicon avalanche technology that protects electronic equipment I/O pins from destructive electrostatic discharges (ESDs). These robust TVSs can withstand repetitive contact or air ESD discharge events at ± 30 kV levels without suffering any performance degradation. This exceeds the ESD contact and air discharge test requirements of IEC 61000-4-2. Additionally, the TVS can withstand an 8/20 surge current event as defined in IEC 61000-4-5 2nd Edition up to 7A and still provide low voltage clamping levels.

**Features**

- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, 7A (8/20μs as defined in IEC 61000-4-5 2nd Edition)
- Low leakage current of 100nA (MAX) at 5V
- PPAP capable
- AEC-Q101 qualified
- Moisture Sensitivity Level (MSL -1)
- Halogen free, Lead free and RoHS compliant
- ESD, ISO 10605, 330pF 330Ω, ±25kV contact, ±30kV air

**Applications**

- Mobile phones
- Smart phones
- PDAs
- Portable navigation components
- Digital cameras
- Portable medical components
- Automotive applications

**Application Example**

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 Description</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_{PP}$</td>
<td>Peak Pulse Current ($t_j=8/20\mu s$)</td>
<td>7.0</td>
<td>A</td>
</tr>
<tr>
<td>$T_{OP}$</td>
<td>Operating Temperature</td>
<td>-40 to 150</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 conditions above the ratings indicated in this absolute maximum ratings section or 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>$V_{RWM}$</td>
<td>$I_p=1\mu A$</td>
<td>5.0</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Breakdown Voltage</td>
<td>$V_{BR}$</td>
<td>$I_p=1mA$</td>
<td>6.0</td>
<td>7.0</td>
<td>8.5</td>
<td>V</td>
</tr>
<tr>
<td>Reverse Leakage Current</td>
<td>$I_{LEAK}$</td>
<td>$V_d=5V$</td>
<td>100</td>
<td></td>
<td></td>
<td>nA</td>
</tr>
<tr>
<td>Clamp Voltage</td>
<td>$V_C$</td>
<td>$I_{PP}=1A$ $t_j=8/20\mu s$, I/O to GND</td>
<td>8.5</td>
<td>11</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{PP}=7A$ $t_j=8/20\mu s$, I/O to GND</td>
<td>11.5</td>
<td>14</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Dynamic Resistance</td>
<td>$R_{DYN}$</td>
<td>TLP, $t_j=100\text{ns}$, I/O to GND</td>
<td>0.23</td>
<td></td>
<td></td>
<td>Ω</td>
</tr>
<tr>
<td>ESD Withstand Voltage</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</td>
<td>$C_{I/O-GND}$</td>
<td>Reverse Bias=0V, f=1MHz</td>
<td>30</td>
<td>35</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 $t_1=70\text{ns}$ to $t_2=90\text{ns}$

# Capacitance vs. Reverse Bias

![Capacitance vs. Reverse Bias](image1)

# Clamping Voltage vs. $I_{PP}$ for 8/20μs waveshape

![Clamping Voltage vs. $I_{PP}$](image2)
**TVS Diode Array (SPA® Diodes)**
**General Purpose ESD Protection - AQ1003-01LTG Series**

### Positive Transmission Line Pulsing (TLP) Plot
![Positive TLP Plot](image)

### Negative Transmission Line Pulsing (TLP) Plot
![Negative TLP Plot](image)

### 8/20μs Pulse Waveform
![Pulse Waveform](image)

### Soldering Parameters

<table>
<thead>
<tr>
<th>Reflow Condition</th>
<th>Pb – Free assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Heat</td>
<td></td>
</tr>
<tr>
<td>- Temperature Min ($T_{\text{snop}}$)</td>
<td>150°C</td>
</tr>
<tr>
<td>- Temperature Max ($T_{\text{amax}}$)</td>
<td>200°C</td>
</tr>
<tr>
<td>- Time (min to max) ($t_s$)</td>
<td>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>$T_{\text{Lmax}}$ to $T_L$ - Ramp-up Rate</td>
<td>3°C/second max</td>
</tr>
<tr>
<td>Reflow</td>
<td></td>
</tr>
<tr>
<td>- Temperature ($T_L$) (Liquidus)</td>
<td>217°C</td>
</tr>
<tr>
<td>- Temperature ($T_T$)</td>
<td>60 – 150 seconds</td>
</tr>
<tr>
<td>Peak Temperature ($T_p$)</td>
<td>260°C–650°C</td>
</tr>
<tr>
<td>Time within 5°C of actual peak Temperature ($t_p$)</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: 09/16/19
TVS Diode Array (SPA® Diodes)
General Purpose ESD Protection - AQ1003-01LTG Series

ISO10605 (C:330pF, R:330Ω) contact discharge plot at +8KV

ISO10605 (C:330pF, R:330Ω) contact discharge plot at -8KV

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

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

Part Numbering System

<table>
<thead>
<tr>
<th>AQ</th>
<th>1003</th>
<th>01</th>
<th>L</th>
<th>T</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **L**: SOD-523
- **G**: Green
- **T**: Tape & Reel

Part Marking System

1  AD  2

A = Part Code
D = Date Code

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

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Package</th>
<th>Min. Order Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AQ1003-01LTG</td>
<td>SOD-523</td>
<td>5000</td>
</tr>
</tbody>
</table>

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Revised: 06/16/19
**TVS Diode Array (SPA® Diodes)**
General Purpose ESD Protection - AQ1003-01LTG Series

### Package Dimensions — SOD-523

*Symbol* | **Millimeters** | **Inches** |
---|---|---|
A | 0.51 | 0.020 | 0.030 |
A1 | 0.50 | 0.020 | 0.028 |
b | 0.25 | 0.010 | 0.014 |
c | 0.08 | 0.003 | 0.006 |
D | 0.70 | 0.028 | 0.035 |
E | 1.10 | 0.043 | 0.051 |
E1 | 1.50 | 0.059 | 0.067 |
E2 | 0.20 REF | 0.001 REF |
L | 0.01 | 0.000 | 0.003 |
θ | 7° REF | 7° REF |

### Embossed Carrier Tape & Reel Specification — SOD-523

*Symbol* | **Millimeters** | **Inches** |
---|---|---|
A0 | 0.91 | 0.036 | 0.040 |
B0 | 1.89 | 0.074 | 0.078 |
D0 | 1.50 | 0.059 | 0.063 |
D1 | 0.40 | 0.016 | 0.024 |
E1 | 1.65 | 0.065 | 0.073 |
F | 3.40 | 0.134 | 0.142 |
P0 | 3.90 | 0.154 | 0.161 |
P1 | 1.90 | 0.075 | 0.083 |
P1 | 1.95 | 0.077 | 0.081 |
K0 | 0.68 | 0.027 | 0.031 |
T | 0.17 | 0.007 | 0.009 |
W | 7.90 | 0.311 | 0.327 |

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