ChipGuard® MLC Series - ESD Protectors

**Features**
- RoHS compliant*
- ESD protection >25 kV
- Low capacitance <0.5 pF
- Low leakage current <50 nA

**Applications**
- HDMI 1.4
- Digital Visual Interface (DVI)
- USB 3.0 / USB OTG
- Memory protection
- SIM card ports

**General Information**

The ChipGuard® MLC Series has been specifically designed to protect sensitive electronic components from electrostatic discharge damage. The MLC family has been designed to protect equipment to IEC61000-4-2, Level 4 (±8 kV Contact / ±15 kV Air Discharge) ESD specifications targeted for high speed USB 3.0/USB OTG, HDMI 1.4, DVI or IEEE1394 applications.

The ChipGuard® MLC Series has been manufactured to provide low 0.5 pF capacitance and leakage currents less than 5 nA with excellent clamp qualities, making the family almost transparent under normal working conditions.

**Electrical Characteristics @ 25 °C (unless otherwise noted)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>CG0402MLC-</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical Continuous Operating Voltage</td>
<td>$V_{DC}$</td>
<td>3.3</td>
<td>5</td>
</tr>
<tr>
<td>Typical Clamping Voltage (Note 1)</td>
<td>$V_C$</td>
<td>25</td>
<td>V</td>
</tr>
<tr>
<td>Maximum Capacitance @ 1 VRMS 1 MHz</td>
<td>$C_O$</td>
<td>0.5</td>
<td>pF</td>
</tr>
<tr>
<td>Maximum Leakage Current @ Max. VDC</td>
<td>$I_L$</td>
<td>5</td>
<td>nA</td>
</tr>
<tr>
<td>Typical Trigger Voltage (Note 2)</td>
<td>$V_T$</td>
<td>250</td>
<td>V</td>
</tr>
<tr>
<td>Maximum Response Time</td>
<td>$R_T$</td>
<td>1</td>
<td>ns</td>
</tr>
</tbody>
</table>

**ESD Protection:**
- Per IEC 61000-4-2 Level 4
- Min. Contact Discharge
- Min. Air Discharge
- Min. Air Discharge

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>CG0603MLC-</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical Continuous Operating Voltage</td>
<td>$V_{DC}$</td>
<td>3.3</td>
<td>5</td>
</tr>
<tr>
<td>Typical Clamping Voltage (Note 1)</td>
<td>$V_C$</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Maximum Capacitance @ 1 VRMS 1 MHz</td>
<td>$C_O$</td>
<td>0.5</td>
<td>pF</td>
</tr>
<tr>
<td>Maximum Leakage Current @ Max. VDC</td>
<td>$I_L$</td>
<td>5</td>
<td>5</td>
</tr>
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<td>Typical Trigger Voltage (Note 2)</td>
<td>$V_T$</td>
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<td>Maximum Response Time</td>
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<td>1</td>
<td>ns</td>
</tr>
</tbody>
</table>

**Specifications:**
- Specifications are subject to change without notice.
- Users should verify actual device performance in their specific applications.

**Additional Information**

Click these links for more information:
- PRODUCT SELECTOR
- TECHNICAL LIBRARY
- INVENTORY
- SAMPLES
- CONTACT

**Device Symbol**

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**WARNING**

Cancer and Reproductive Harm - [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

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ChipGuard® MLC Series - ESD Protectors

Product Dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>CG0402 Series</th>
<th>CG0603 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>1.00 ± 0.15 (0.04 ± 0.006)</td>
<td>1.60 ± 0.20 (0.064 ± 0.008)</td>
</tr>
<tr>
<td>W</td>
<td>0.50 ± 0.10 (0.02 ± 0.004)</td>
<td>0.80 ± 0.20 (0.032 ± 0.008)</td>
</tr>
<tr>
<td>A</td>
<td>0.36 ± 0.05 (0.014 ± 0.002)</td>
<td>0.45 ± 0.10 (0.018 ± 0.004)</td>
</tr>
<tr>
<td>B</td>
<td>0.25 ± 0.15 (0.10 ± 0.006)</td>
<td>0.30 ± 0.20 (0.012 ± 0.008)</td>
</tr>
</tbody>
</table>

Recommended Pad Layout

Solder Reflow Recommendations

110 sec. (min.)
30-70 sec.
120 sec. (min.)

<table>
<thead>
<tr>
<th>Stage 1 Preheat</th>
<th>Main Heating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient to Preheating Temperature</td>
<td>200 °C</td>
</tr>
<tr>
<td>30 s to 60 s</td>
<td>200 °C to 100 °C</td>
</tr>
<tr>
<td>110 sec. (min.)</td>
<td>1 °C/s to 4 °C/s</td>
</tr>
<tr>
<td>30-70 sec.</td>
<td>5 s</td>
</tr>
<tr>
<td>120 sec. (min.)</td>
<td></td>
</tr>
</tbody>
</table>

- This product can be damaged by rapid heating, cooling or localized heating.
- Heat shocks should be avoided. Preheating and gradual cooling recommended.
- Excessive solder can damage the device. Print solder thickness of 150 to 200 um recommended.
- Solder gun tip temperature should be kept below 280 °C and should not touch the device directly. Contact should be less than 3 seconds. A solder gun under 30 watts is recommended.
### Packaging Dimensions

**NOTES:** TAPE MATERIAL IS PAPER, TAPE THICKNESS IS 0.009 ± 0.0012, COVER TAPE ADHESION IS 40 ± 15 GRAMS.

**DIMENSIONS:** MM

<table>
<thead>
<tr>
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<th>CG0402 Series</th>
<th>CG0603 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>1.75 ± 0.05 (0.04 ± 0.002)</td>
<td>1.75 ± 0.10 (0.04 ± 0.004)</td>
</tr>
<tr>
<td>D</td>
<td>2.00 ± 0.02 (0.08 ± 0.0008)</td>
<td>2.00 ± 0.05 (0.08 ± 0.002)</td>
</tr>
<tr>
<td>L</td>
<td>1.12 ± 0.03 (0.045 ± 0.012)</td>
<td>1.80 ± 0.20 (0.072 ± 0.008)</td>
</tr>
<tr>
<td>W</td>
<td>0.62 ± 0.03 (0.025 ± 0.012)</td>
<td>0.90 ± 0.20 (0.036 ± 0.008)</td>
</tr>
<tr>
<td>G</td>
<td>2.0 ± 0.05 (0.08 ± 0.002)</td>
<td>4.0 ± 0.05 (0.16 ± 0.002)</td>
</tr>
</tbody>
</table>

### How to Order

**CG 0n0n MLC - n.n x x x**

- **ChipGuard®** Product Designator
- **Package Option**
  - 0402 = 0402 Package
  - 0603 = 0603 Package
- **Multilayer Series Designator**
- **Operating Voltage**
  - 3.3 = 3.3 V
  - 05 = 5 V
  - 12 = 12 V
  - 24 = 24 V
- **Low Leakage Current Option**
  - L = Low Leakage Current
  - Blank = Standard Product
- **Tape & Reel Packaging**
  - E = 5,000 pcs. per reel (0603 Package)
  - G = 10,000 pcs. per reel (0402 Package)
- **Operating Temperature Option**
  - A = Higher +125 °C Operating Temperature
  - Blank = Standard Product

**Note:** Only models lower than 10 volts require decimal point.
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