

## Features

- RoHS compliant\*
- ESD protection >25 kV
- Low capacitance <0.05 pF
- Low leakage current <5 nA

## Applications

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

# ChipGuard® MLU Series - ESD Protectors

### General Information

The ChipGuard® MLU Series has been specifically designed to protect sensitive electronic components from electrostatic discharge damage. The MLU 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® MLU Series has been manufactured to provide low 0.05 pF capacitance and leakage currents less than 5 nA with excellent clamp qualities, making the family almost transparent under normal working conditions.

### Device Symbol

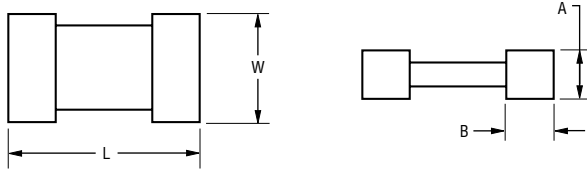


### Electrical Characteristics @ 25 °C (unless otherwise noted)

Parameter	Symbol	CG0402MLU / CG0603MLU (Note 3)				Unit
		3.3x	05x	12x	24x	
Typical Continuous Operating Voltage	V <sub>DC</sub>	3.3	5	12	24	V
Typical Clamping Voltage (Note 1)	V <sub>C</sub>	25				V
Maximum Capacitance @ 1 VRMS 1 MHz	C <sub>O</sub>	0.05				pF
Maximum Leakage Current @ Max. VDC	I <sub>L</sub>	5				nA
Typical Trigger Voltage (Note 2)	V <sub>T</sub>	250				V
Maximum ResponseTime	R <sub>T</sub>	1				ns
ESD Protection: Per IEC 61000-4-2 Min. Contact Discharge (>1000 Repts) Min. Air Discharge (>1000 Repts)		±8				kV
		±15				kV
Operating Temperature	T <sub>OPR</sub>	-40 to +125				°C
Storage Temperature	T <sub>STG</sub>	-55 to +150				°C

- Notes: 1. Per IEC 61000-4-2, Level 4 8 kV Contact Discharge. Measurement 30 ns after initiation of pulse.  
 2. Per IEC 61000-4-2, Level 4 8 kV Contact Discharge. Measurement at maximum pulse voltage.  
 3. Part number suffix "x" can be E for 0603 size or G for 0402 size to indicate tape & reel quantity.

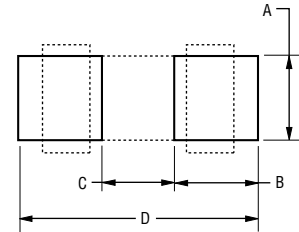
## Product Dimensions



DIMENSIONS:  $\frac{\text{MM}}{\text{(INCHES)}}$

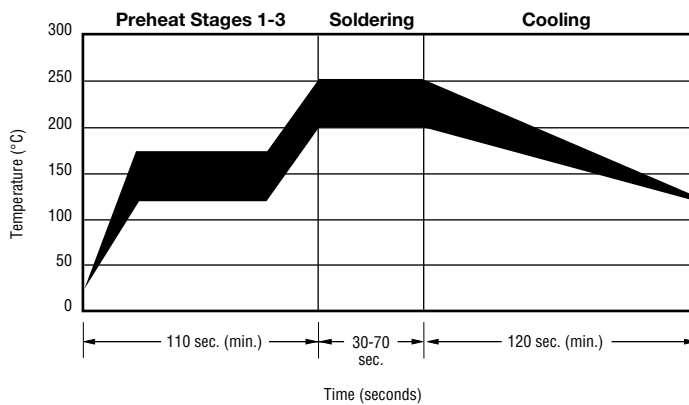
Dimension	CG0402 Series	CG0603 Series
L	$\frac{1.00 \pm 0.15}{(0.04 \pm 0.006)}$	$\frac{1.60 \pm 0.20}{(0.064 \pm 0.008)}$
W	$\frac{0.50 \pm 0.10}{(0.02 \pm 0.004)}$	$\frac{0.80 \pm 0.20}{(0.032 \pm 0.008)}$
A	$\frac{0.36 \pm 0.05}{(0.014 \pm 0.002)}$	$\frac{0.45 \pm 0.10}{(0.018 \pm 0.004)}$
B	$\frac{0.25 \pm 0.15}{(0.10 \pm 0.006)}$	$\frac{0.30 \pm 0.20}{(0.012 \pm 0.008)}$

## Recommended Pad Layout



Dim.	CG0402 Series	CG0603 Series
A	$\frac{0.51}{(0.020)}$	$\frac{0.76}{(0.030)}$
B	$\frac{0.61}{(0.024)}$	$\frac{1.02}{(0.040)}$
C	$\frac{0.51}{(0.020)}$	$\frac{0.50}{(0.020)}$
D	$\frac{1.70}{(0.067)}$	$\frac{2.54}{(0.100)}$

## Solder Reflow Recommendations



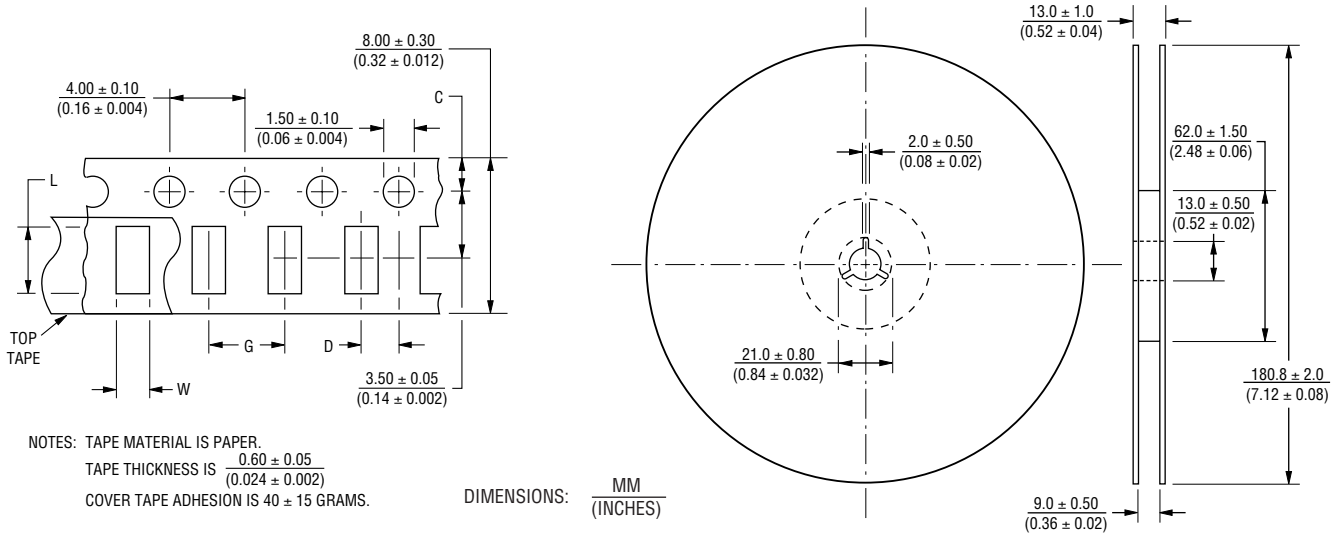
A	Stage 1 Preheat	Ambient to Preheating Temperature	30 s to 60 s
B	Stage 2 Preheat	140 °C to 160 °C	60 s to 120 s
C	Stage 3 Preheat	Preheat to 200 °C	20 s to 40 s
D	Main Heating	200 °C	60 s to 70 s
		210 °C	55 s to 65 s
		220 °C	50 s to 60 s
		230 °C	40 s to 50 s
		240 °C	30 s to 40 s
E	Cooling	200 °C to 100 °C	1 °C/s to 4 °C/s

- 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.

# ChipGuard® MLU Series - ESD Protectors

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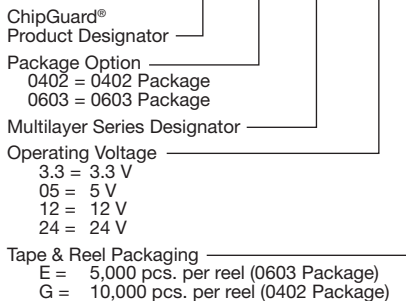
## Packaging Dimensions



Dimension	CG0402 Series	CG0603 Series
C	$\frac{1.75 \pm 0.05}{(0.04 \pm 0.002)}$	$\frac{1.75 \pm 0.10}{(0.04 \pm 0.004)}$
D	$\frac{2.00 \pm 0.02}{(0.08 \pm 0.0008)}$	$\frac{2.00 \pm 0.05}{(0.08 \pm 0.002)}$
L	$\frac{1.12 \pm 0.03}{(0.045 \pm 0.0012)}$	$\frac{1.80 \pm 0.20}{(0.072 \pm 0.008)}$
W	$\frac{0.62 \pm 0.03}{(0.025 \pm 0.0012)}$	$\frac{0.90 \pm 0.20}{(0.036 \pm 0.008)}$
G	$\frac{2.0 \pm 0.05}{(0.08 \pm 0.002)}$	$\frac{4.0 \pm 0.05}{(0.16 \pm 0.002)}$

## How to Order

### CG 0402 MLU - 12 G



**Asia-Pacific:** TEL +886-2 25624117 • FAX +886-2 25624116  
**Europe:** TEL +41-41 7685555 • FAX +41-41 7685510  
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REV. G 11/09

Specifications are subject to change without notice.  
 Customers should verify actual device performance in their specific applications.