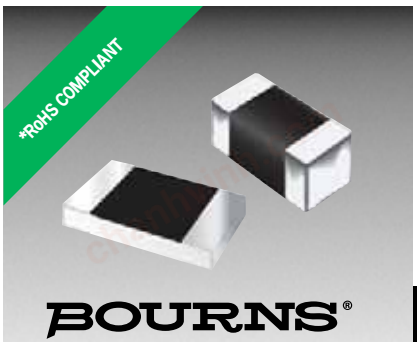
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Features

- 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

ChipGuard® MLC Series - ESD Protectors

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.

Device Symbol



Electrical Characteristics @ 25 °C (unless otherwise noted)

Parameter	Symbol	CG0402MLC-								Unit
		3.3LG	05LG	12LG	24LG	3.3LGA	05LGA	12LGA	24LGA	
Typical Continuous Operating Voltage	V_{DC}	3.3	5	12	24	3.3	5	12	24	V
Typical Clamping Voltage (Note 1)	V_C	25								V
Maximum Capacitance @ 1 VRMS 1 MHz	C_O	0.5								pF
Maximum Leakage Current @ Max. VDC	I_L	5								nA
Typical Trigger Voltage (Note 2)	V_T	250								V
Maximum Response Time	R_T	1								ns
ESD Protection: Per IEC 61000-4-2 Level 4 Min. Contact Discharge Min. Air Discharge Min. Air Discharge		 ±8 ±15 (Note 3) ±25								 kV kV kV
Operating Temperature	T_{OPR}	-40 to +85				-40 to +125				°C
Storage Temperature	T_{STG}	-55 to +150								°C

Parameter	Symbol	CG0603MLC-								Unit
		3.3LE	05LE	12LE	24LE	3.3LEA	05LEA	12LEA	24LEA	
Typical Continuous Operating Voltage	V_{DC}	3.3	5	12	24	3.3	5	12	24	V
Typical Clamping Voltage (Note 1)	V_C	25	25	25						V
Maximum Capacitance @ 1 VRMS 1 MHz	C_O	0.5								pF
Maximum Leakage Current @ Max. VDC	I_L	5	5	5						nA
Typical Trigger Voltage (Note 2)	V_T	250	250	250						V
Maximum Response Time	R_T	1								ns
ESD Protection: Per IEC 61000-4-2 Level 4 Min. Contact Discharge Min. Air Discharge Min. Air Discharge		 ±8 ±15 (Note 3) ±25								 kV kV kV
Operating Temperature	T_{OPR}	-40 to +85				-40 to +125				°C
Storage Temperature	T_{STG}	-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. IEC 61000-4-2 ESD Performance will meet minimum 1000 reps without degradation in performance.

WARNING Cancer and Reproductive Harm - www.P65Warnings.ca.gov

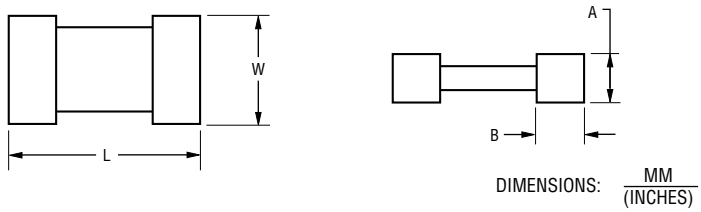
*RoHS Directive 2015/863, Mar 31, 2015 and Annex.
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ChipGuard® MLC Series - ESD Protectors

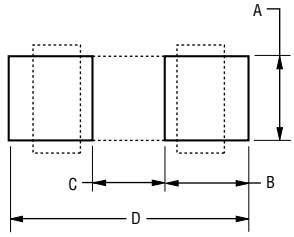
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Product Dimensions



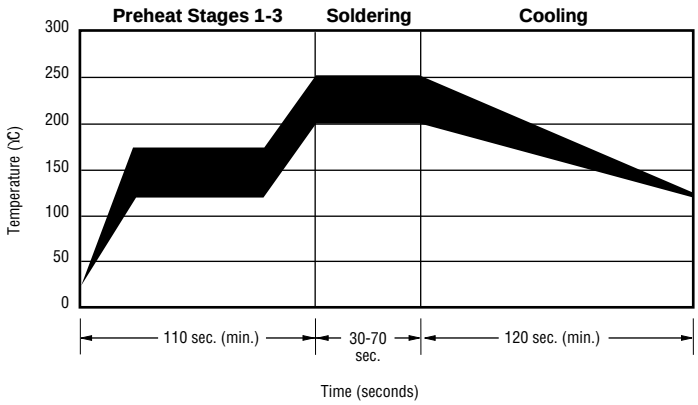
Dimension	CG0402 Series	CG0603 Series
L	1.00 ± 0.15 (0.04 ± 0.006)	1.60 ± 0.20 (0.064 ± 0.008)
W	0.50 ± 0.10 (0.02 ± 0.004)	0.80 ± 0.20 (0.032 ± 0.008)
A	0.36 ± 0.05 (0.014 ± 0.002)	0.45 ± 0.10 (0.018 ± 0.004)
B	0.25 ± 0.15 (0.10 ± 0.006)	0.30 ± 0.20 (0.012 ± 0.008)

Recommended Pad Layout



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

Solder Reflow Recommendations



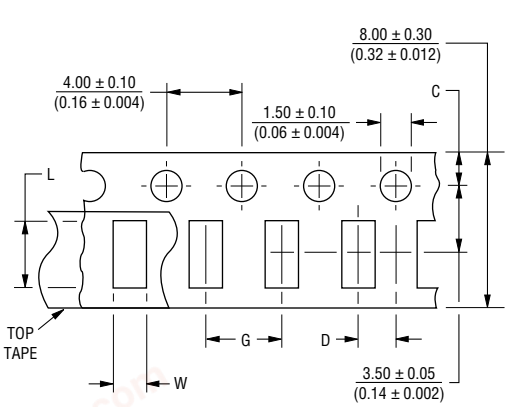
A	Stage 1 Preheat	Ambient to Preheating Temperature	30 s to 60 s
B	Stage 2 Preheat	140 °C to 160 °C	60 s to 120 s
C	Stage 3 Preheat	Preheat to 200 °C	20 s to 40 s
D	Main Heating	200 °C 210 °C 220 °C 230 °C 240 °C 250 °C to 255 °C	60 s to 70 s 55 s to 65 s 50 s to 60 s 40 s to 50 s 30 s to 40 s 5 s
E	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.

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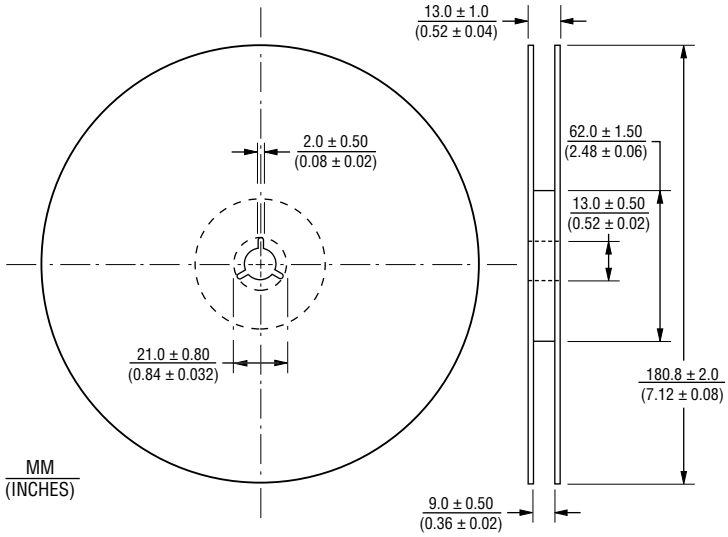
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Packaging Dimensions



NOTES: TAPE MATERIAL IS PAPER.
TAPE THICKNESS IS 0.48 ± 0.03 (0.019 ± 0.0012)
COVER TAPE ADHESION IS 40 ± 15 GRAMS.

DIMENSIONS: MM (INCHES)



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

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

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

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